ISSN 0973-1113

INDIAN JOURNAL OF EXTENSION EDUCATION AND RURAL DEVELOPMENT

Volume 32 Year 2024

Published by
RAJASTHAN SOCIETY OF EXTENSION EDUCATION
UDAIPUR - 313 001 (RAJASTHAN)

Volume 32 INDIAN JOURNAL OF EXTENSION EDUCATION AND RURAL DEVELOPMENT Year 2024

RAJASTHAN SOCIETY OF EXTENSION EDUCATION

Regd. No. 206/Udaipur/2002-03

PATRONS

Dr. R.C. Mehta, *Ex-Dean, Rajastha College of Agriculture, Udaipur*
Dr. S.L. Mathur, *Ex-Director Extension Education, RAU, Bikaner*
Dr. B.M. Sharma, *Ex-Director Extension Education, MPUAT, Udaipur*
Dr. V.S. Kulhari, *Ex-Incharge, Extension Wing, ARS, Dugrapura, Jaipur*
Dr. Mrs. Puspha Gupta, *Ex-Dean, College of Home Science, MPUAT, Udaipur*
Dr. K.S. Babel, *Ex-Head, Dept. of Extension Education, RCA, Udaipur*
Dr. K.D. Sharma, *Ex-Head, Dept. of Extension Education, SKNCA, Jobner (Jaipur)*
Dr. V.P. Sharma, *Ex-Head, Dept. of Extension Education, RCA, Udaipur*

EXECUTIVE COUNCIL

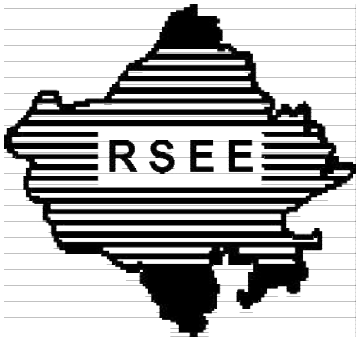
President	**Dr. P.N. Kalla,** *Former Director Extension Education, SKRAU, Bikaner and Dean, Faculty of Agriculture, Jagannath University, Chakshu, Jaipur*
Vice President	**Dr. Archna Raj Singh,** *Former Dean, College of Home Science, SKRAU, Bikaner*
	Dr. B.S. Bhimawat, *Former Dean, College of Agri., Agriculture University., Jodhpur*
Secretary	**Dr. N.K. Punjabi,** *Professor & Former Head, Department of Extension Education, School of Agricultural Sciences, Dabok, Udaipur (Raj.)*
	Mobile : 9950606736
Joint Secretary	**Dr. D.S. Bhati,** *Associate Professor, Krishi Vigyan Kendra, Ajmer (Raj.)*
Treasurer	**Dr. Rajeev Bairathi,** *Professor, Directorate of Extension Education, Udaipur.* Tel. : 0294-2410491 (O), 9414239548 (M)
Member	**Dr. G.S. Bangarva,** *Former Dean, SKN College of Agriculture, SKNAU, Jobner (Jaipur)*
	Dr. S.D. Dhakar, *Former Dean, College of Agriculture, Bhilwara*
	Dr. Subhash Chand, *Professor, Krishi Vigyan Kendra, Bikaner*

EDITORIAL BOARD

Chief Editor	**Dr. S.K. Sharma,** *Former Director, Directorate of Extension Education, SKRAU, Bikaner.* 9460619006 (M)
Executive Editor	**Dr. Ms. Dhriti Solanki,** *Dean, College of Community and Applied Sciences, Udaipur.* 9414822246 (M)
Member	**Dr. Ashok Kumar Sharma,** *Principal Scientist, DPMR, Sewar, Bharatpur.* 9983140780 (M)
	Dr. F.L. Sharma, *Professor (Extension Education), B.N. University, Udaipur.* 9829199742 (M)
	Dr. S.S. Sisodia, *Professor & Head, Dept. of Ext. Edu., RCA, Udaipur.* 8824915992 (M)
	Dr. (Mrs.) Deepali Dhawan, *Dean, PG, SKRAU, Bikaner.* 9461159300 (M)
	Dr. B.S. Meena, *Professor, Agricultural Research Station, Sriganganagar.* 8764375302 (M)
	Dr. (Mrs.) Seema Tyagi, *Assistant Professor, Directorate of Prioritization, Monitoring and Evaluation, Bikaner.* 982819348 (M)
	Dr. (Mrs.) Achla Gakkher, *Professor, Institute of Home Science, Agra.* 9675885762 (M)
	Dr. P.S. Naruka, *Senior Scientist, KVK, Neemach (MP).* 7000573845 (M)

ISSN : 0973-1113

INDIAN JOURNAL OF EXTENSION EDUCATION AND RURAL DEVELOPMENT



2024

PUBLISHED BY

RAJASTHAN SOCIETY OF EXTENSION EDUCATION

Department of Extension Education
Maharana Pratap University of Agriculture & Technology
Outside Surajpole, Udaipur-313001, Rajasthan, INDIA
Phone : 0294-2410491, Fax : 0294-2418976
e-mail : rseeudaipur@rediffmail.com

Indian Journal of Extension Education and Rural Development

FROM EDITOR'S DESK

It is a matter of great pleasure for me to share with you the current issue of IJEE & RD for the year 2024. Total 32 research papers on areas pertaining to significant contemporary issues of rural development and agricultural extension are included in the present issue. The research papers related to Agriculture, Community Science, Management, Dairy & Animal Husbandry, and Rural Development in general forms the major content of this volume. I am highly grateful to the Editorial board and Executive Editor Prof. Dhriti Solanki for their untiring and painstaking efforts in bringing out this issue in time. Prof. F.L. Sharma on Editorial Board deserves special thanks for his commendable work and shouldering the responsibility of bringing this task to reality. He has always been instrumental in pooling efforts of editiorial board memebers to complete the work in time keeping in view the non-impact points of NAAS. We appreciate the continuous cooperation extended by the President of the society Prof. P.N. Kalla and Vice-presidents Prof. Archna Raj Singh & Prof. B.S. Bhimawat for their guidance and help in this matter. We are also grateful to Prof. N.K. Panjabi, Secretary of the society for his continuous cooperation and free hand in completing the task well in time, financial resources are never been limiting factor for the good cause of society's development. The contributors of research papers are precious and highly valued members of the society. We are heartly thankful to them for their trust in the society and sharing their research work through this platform. We expect the similar type of cooperation from the members in future too. We assure the contributors and members to come up to their expectations in the years to come. We are grateful to Dr. S.S. Sisodia, Professor & Head, Department of Extension Education, RCA for his cooperation, providing space and resources for anywork related to RSEE. Thanks are also due to Prof. Rajshree Upadhyay, Dept. of EECM, College of Community and Applied Sciences for her cooperation and concern in all matters related to this journal. Last but not the least Image Print Media deserves special appreciation and thanks for printing the journal in time.

Best regards

S.K. Sharma
Chief Editor

ISSN 0973-1113

INDIAN JOURNAL OF EXTENSION EDUCATION AND RURAL DEVELPMENT

Volume 32 Year 2024

CONTENTS

Ind. J. Ext. Educ. & R.D. 32 : 2024

DETERMINANTS INFLUENCING COMPETENCIES OF TEACHING FACULTIES IN SAUs : ANALYSIS OF ACADEMIC AND INSTITUTIONAL FACTORS

Jasbir Singh Manhas*

ABSTRACT

The objective of the study was to find out the determinants influencing competencies of teaching faculties in six SAUs viz., SKUAST-Jammu, SKUAST-Kashmir, PAU, Ludhiana, CCSHAU, Hissar, CSKHPKV, Palampur and MPUAT, Udaipur. The study shows that determinants viz., teaching experience, educational qualification and infrastructure facilities and resources influence competencies of faculties in SAU's to a very large extent whereas determinants viz., gender, marital status, job position and responsibility, coordinate duties other than academic responsibilities such as co-curricular activities, attending official meetings etc. and interpersonal relationships does not influence competencies of faculties in SAU's. The findings can help the educational institutions to create a satisfied working environment through targeting a satisfied work force which delivers efficient and effective performance. Thus, this study contributes to the education institutions in enhancing the competencies of a teacher, selecting a right teacher for a right job and ensuring that the human resource based activities like training, development and performance appraisal is based on the right set of competencies.

INTRODUCTION

In the education system a university teacher is the most important study source, which is available to most of the students (ENQA, 2009). The teacher is interpreted as a professional who is qualified for theoretically profound and critical analysis of educational phenomena, processes in the teaching his study subject. This allows him to design the context and educational policies and procedures in the way so that they lead to the objectives set by the educational objectives without the teacher manipulating his students and therefore creating optimal condition for their moral development and self development (Valica and Rohn, 2013). In this connection, teach means to impart knowledge to or instruct someone as to how to do something; or to cause someone to learn, or understand something by example or experience; or to encourage someone to accept something as a fact or principle (Soanes and Stevenson, 2003). The work of the university teacher has a great impact on development of knowledge and cognition in each society. It is very demanding work that requires professional competences and continual enhancing professional knowledge, social competencies, and also ability to develop them, ability in scientific research what is connected also with ability to transfer the science results to students in such a way to understand them and were inspiring for their future development.

Competences represent a summary of key professional and personal skills/talents and behavioural patterns of an individual. They form the basis of any proficient working behaviour, and the level of their maturity is crucial for the successful performance of the profession concerned. From this point of view, the competences of university teachers are of exceptional importance, mainly because teachers constitute the basis for the creation of new knowledge and new values beneficial to the university as well as to students. Competency is defined by Parry (1998) as a cluster of related knowledge, attitudes, and skills that affect a major part of one's job. Similarly, Davis *et al.,* (2004) state: "competencies encompass clusters of skills, knowledge, abilities, and behaviours required for people to succeed". According to Burke (1990), "competencies embody the ability to transfer skills and knowledge to new situations within the

*Associate Professor, Directorate of Extension, SKUAST- Jammu, Chatha-180009

occupational area". There is a growing popularity for the notion of competence as integrated capabilities (Biemans *et al.,* 2004). To maximize student learning, teachers must have expertise in a wide-ranging array of competencies in an especially complex environment where hundreds of critical decisions are required each day (Jackson, 1990). The human resource developed by agricultural education system played a pivotal role in transforming agricultural scenario in the country by achieving self-sufficiency in food production. While, there are various factors which influence the quality of higher education like funding support, physical infrastructure, quality of human resources, etc., the competence of faculty members plays the most significant role in defining the quality of the graduates from the institutions (Ramesh *et al.,* 2020). Keeping aforementioned facts into consideration; the study entitled, "Determinants influencing competencies of teaching faculties in SAU's: Analysis of academic and institutional factors" was undertaken with an objective to study the determinants influencing competencies of teaching faculties in SAU's.

RESERACH METHODOLOY

Descriptive research design was be used in the study. The research was be conducted in six SAUs viz., SKUAST-Jammu, SKUAST-Kashmir, PAU, Ludhiana, CCSHAU, Hissar, CSKHPKV, Palampur and MPUAT, Udaipur. The target population for this study consisted of three sub-groups of teaching faculty in SAUs viz., Assistant Professors, Associate Professors and Professors. A list of faculty members was procured from selected SAUs. A random sample each of 15 Assistant Professors, Associate Professors and Professors from each selected SAU was drawn by using simple random sampling technique, thus, making a total sample size of 270 respondents.

Keeping in view the objective of the study, a well structured interview schedule was developed. For data collection, respondents were interviewed personally. Besides, Google form was also developed and used as research instrument for the collection of primary data. Determinants influencing competencies of teaching faculties in SAU's was measured by using 5 point continuum scale viz., no extent at all, small extent, moderate extent, large extent and very large extent with score 1, 2, 3, 4, and 5 respectively. Thereafter, data were analyzed, tabulated and interpreted in the light of objective of the study.

RESULTS AND DISCUSSION

Age of respondents:

Table 1 shows that majority of respondents i.e., 121 (45.00 per cent) belonged to age group of 41 to 44 years followed by 39.00 per cent of them having age above 44 years. However, only 16.00 per cent of the respondents were reported from below age group of 41 years.

A perusal of data presented in Table 1 show that 64 (71 per cent) Professors were above 44 years of age followed by 25 (28.00 per cent) of them belonged to age group of 41 to 44 years. Only 1

Table 1: Distribution of respondents according to their age

n= 270

S. No.	Age group (Years)	Professors		Associate Professors		Assistant Professors		Total	
		F	%	F	%	F	%	F	%
1.	Below 41 years	1	1.00	8	9.00	35	39.00	44	16.00
2.	41 to 44 years	25	28.00	42	47.00	54	60.00	121	45.00
3.	Above 44 years	64	71.00	40	44.00	1	1.00	105	39.00
	Total	**90**	**100.00**	**90**	**100.00**	**90**	**100.00**	**270**	**100.00**

F= Frequency, %= Per cent, n= Sample size

per cent of them belonged to below 41 years age group.

A deep glance at the data further reveal that 42 (47.00 per cent) of Associate Professors belonged to 41 to 44 years age group followed by 44.00 per cent of them who were reported from above 44 years age group. Only 9.00 per cent of them were found below 41 years age group.

Table 1 further shows that 54 (60.00 per cent) of Assistant Professors were found in age group of 41 to 44 years followed by 39.00 per cent of them who belonged to age group of below 41 years. However, only 1.00 per cent of Assistant Professors were reported from age group of above 44 years.

Gender of the respondents

Table 2 shows that majority of the respondents i.e. 223 (83.00 per cent) were male and 17.00 per cent were female. Table further shows that 84.00 per cent professors were male and 16 per cent of them were female. 83 per cent associate professors were male and 17 per cent of them were female. Besides, 80.00 per cent assistant professors were male and 20.00 per cent of them were female.

Marital status of the respondents:

Data in Table 3 show that 99 per cent of respondents were married, whereas only 1 per cent of them were unmarried. Further, 99 per cent of professors and assistant professors were married, whereas 1 per cent of them were unmarried. Also, 98 per cent associate professors were married whereas 2 per cent of them were unmarried.

Educational qualification of the respondents

Data in Table 4 shows that all the respondents were doctorate and none of them were M. Sc. (Ag.).

Determinants influencing competencies of teaching faculties in SAU's

Educational Qualification

Data in Table 5 show that majority of the respondents i.e. 200 (74 per cent) reported that educational qualification influence teaching competencies to a very large extent followed by 70 respondents (26 per cent) who expressed that educational qualification influences teaching competencies to a large extent.

Table 2: Distribution of respondents according to their gender

n= 270

S. No.	Gender	Professors		Associate Professors		Assistant Professors		Total	
		F	%	F	%	F	%	F	%
1.	Male	76	84.00	75	83.00	72	80.00	223	83.00
2.	Female	14	16.00	15	17.00	18	20.00	47	17.00
	Total	**90**	**100.00**	**90**	**100.00**	**90**	**100.00**	**270**	**100.00**

F= Frequency, %= Per cent, n= Sample size

Table 3: Distribution of respondents according to their marital status

n= 270

S. No.	Marital Stratus	Professors		Associate Professors		Assistant Professors		Total	
		F	%	F	%	F	%	F	%
1.	Married	89	99.00	88	98.00	89	99.00	266	99.00
2.	Unmarried	1	1.00	2	2.00	1	1.00	4	1.00
	Total	**90**	**100.00**	**90**	**100.00**	**90**	**100.00**	**270**	**100.00**

F= Frequency, %= Per cent, n= Sample size

Age (in years)

Table 5 shows that majority of the respondents 160 (59 per cent) reported that age influence teaching competencies to a large extent followed by 22 per cent of the respondents who expressed that age influences the teaching competencies to a large extent. Further, 11 per cent and 8 per cent of the respondents reported that age influences the teaching competencies to moderate and small extent, respectively.

Gender

Table 5 shows that majority of the respondents 265 (98 per cent) reported that gender does not influence teaching competencies, whereas 20 per cent of the respondents expressed that gender influences teaching competencies to a small extent.

Teaching Experience

Data in Table 5 shows that majority of the respondents i.e. 225 (83 per cent) reported that teaching experience influence teaching competencies to a very large extent followed by 45 respondents (17 per cent) who expressed that teaching experience influences teaching competencies to a large extent.

Teaching workload (Credit hours/ week/ semester)

Data in Table 5 show that majority of the respondents i.e. 120 (44 per cent) expressed that teaching workload influence teaching competencies to a moderate extent followed by 34 per cent respondents reported that teaching workload influences teaching competencies to a small extent. Further, 11 per cent and 7 per cent respondents expressed that teaching workload influences teaching competencies to large extent and very large extent respectively. Also, 4 per cent of the respondents reported that teaching workload does not influence teaching competencies.

Infrastructure facilities and resources

Data in Table 5 show that majority of the respondents 181 (67 per cent) reported that infrastructural facilities influence teaching competencies to a very large extent followed by 32 per cent of the respondents who expressed that infrastructural facilities influences the teaching competencies to a large extent. Interestingly, only one per cent respondents expressed that infrastructural facilities influence teaching competencies to a moderate extent.

Trainings/ Refresher courses (Summer/Winter Schools) attended

Data in Table 5 show that majority of the respondents 122 (45 per cent) reported that trainings/ refresher courses (summer/winter schools) attended influence teaching competencies to a moderate extent followed by 26 per cent of the respondents who expressed that trainings/ refresher courses (summer/winter schools) attended influences the teaching competencies to a large extent. Besides, 16 per cent and 13 per cent of the respondents reported that trainings/ refresher courses (summer/winter schools) attended influences the teaching competencies to a very large extent and small extent respectively.

Short courses attended

Table 5 shows that majority of the respondents

Table 4: Distribution of respondents according to their educational qualification

n= 270

S. No.	Educational qualification	Professors		Associate Professors		Assistant Professors		Total	
		F	%	F	%	F	%	F	%
1.	M.Sc. (Ag.)	-	-	-	-	-	-	-	-
2.	Ph.D.	90	100.00	90	100.00	90	100.00	270	100.00
	Total	**90**	**100.00**	**90**	**100.00**	**90**	**100.00**	**270**	**100.00**

F= Frequency, %= Per cent, n= Sample size

Table 5: Determinants influencing competencies of teaching faculties in SAU's

n=270

S. No.	Determinants influencing competencies	No Extent At All		Small Extent		Moderate Extent		Large Extent		Very Large Extent	
		F	%	F	%	F	%	F	%	F	%
1.	Educational Qualification	-	-	-	-	-	-	70	26.00	200	74.00
2.	Age (in years)	-	-	21	8.00	29	11.00	160	59.00	60.00	22.00
3.	Gender	265	98.00	5	2.00	-	-	-	-	-	-
4.	Teaching Experience	-		-	-	-	-	45	17.00	225	83.00
5.	Teaching workload Credit hours/ week/semester	10	4.00	91	34.00	120	44.00	30	11.00	19	7.00
6.	Infrastructure facilities and resources	-	-	-	-	3	1.00	86	32.00	181	67.00
7.	Trainings/ Refresher courses (Summer/Winter Schools) attended	-	-	36	13.00	122	45.00	70	26.00	42	16.00
8.	Short courses attended	-	-	87	32.00	164	61.00	14	5.00	5	2.00
9.	Job Position and Responsibility	252	93.00	18	7.00	-	-	-	-	-	-
10.	Daily Working Hours	-	-	14	5.00	49	18.00	151	56.00	56	21.00
11.	Work Environment	-	-	5	2.00	25	9.00	165	61.00	75	28.00
12.	Performance Appraisal Process	192	71.00	57	21.00	15	6.00	6	2.00	-	-
13.	Interpersonal Relationships	238	88.00	27	10.00	5	2.00	-	-	-	-
14.	Distance of the institution and living place	27	10.00	80	30.00	146	54.00	14	5.00	3	1.00
15.	The career choice of teaching as a profession	-	-	-	-	3	1.00	225	83.00	42	16.00
16.	Marital Status	257	95.00	13	5.00	-	-	-	-	-	-
17.	Job satisfaction	-	-	-	-	5	2.00	203	75.00	62	23.00
18.	Coordinate duties other than academic responsibilities such as co-curricular activities, attending official meetings etc.	246	91.00	24	9.00	-	-	-	-	-	-

F= Frequency, %= Per cent, n= Sample size

164 (61 per cent) reported that short courses attended influence teaching competencies to a moderate extent followed by 32 per cent of the respondents who expressed that short courses attended influences the teaching competencies to a small extent. Interestingly, only 5 per cent and 2 per cent of the respondents expressed that short courses attended influences the teaching competencies to a large extent and very large extent respectively.

Job Position and Responsibility

Table 5 shows that majority of the respondents 252 (93 per cent) reported that job position and responsibility does not influence teaching competencies, whereas only 7 per cent of the respondents expressed that job position and responsibility influence teaching competencies to a small extent.

Daily Working Hours

A perusal of data in Table 5 show that majority of the respondents 151 (56 per cent) reported that daily working hours influence teaching competencies to a large extent, whereas 21 per cent of them reported that daily working hours influence teaching competencies to a very large extent. Besides, 18 per cent of the respondents expressed that daily working hours influence teaching competencies to moderate extent. However, only 5 per cent of the respondents reported that daily working hours influence teaching competencies to a small extent.

Work Environment

Table 5 shows that majority of the respondents 165 (61 per cent) reported that work environment influence teaching competencies to a very large extent followed by 28 per cent of the respondents who expressed that work environment influence the teaching competencies to a large extent. Further, only 9 per cent and 2 per cent of the respondents reported that work environment influences the teaching competencies to moderate and small extent respectively.

Performance Appraisal Process

Table 5 shows that majority of the respondents 192 (71 per cent) reported that performance appraisal process does not influence teaching competencies, whereas 21 per cent expressed that performance appraisal process influence teaching competencies to a small extent. Besides, 6 per cent and 2 per cent of the respondents reported that performance appraisal process influence teaching competencies to moderate and large extent.

Interpersonal Relationships

A perusal of data in Table 5 show that majority of the respondents 238 (88 per cent) expressed that interpersonal relationships does not influence teaching competencies. This was followed by 10 per cent and 2 per cent of respondents who expressed that interpersonal relationships influence teaching competencies to a small and moderate extent.

Distance of the institution and living place

Table 5 shows that majority of the respondents 146 (54 per cent) expressed that distance of the institution and living place influence teaching competencies to moderate extent, whereas 30 per cent of the respondents reported that distance of the institution and living place influence teaching competencies to a small extent. This was followed by 10 per cent of the respondents who reported that distance of the institution and living place does not influence teaching competencies. Interestingly, only 5 per cent and 1 per cent of the respondents reported that distance of the institution and living place influence teaching competencies to a large extent and very large extent respectively.

The career choice of teaching as a profession

Data in Table 5 show that majority of the respondents i.e. 225 (83 per cent) reported that the career choice of teaching as a profession influence teaching competencies to a large extent followed by 42 (16 per cent) respondents who expressed that the career choice of teaching as a profession influence teaching competencies to a very large extent. However, only 1 per cent respondents reported that the career choice of teaching as a profession influence teaching competencies to a moderate extent.

Marital Status

Data in Table 5 show that majority of the respondents 257 (95 per cent) reported that marital status does not influence teaching competencies, whereas only 13 (5 per cent) of the respondents expressed that marital status influence teaching competencies to a small extent.

Job satisfaction

Data in Table 5 show that majority of the respondents i.e. 203 (75 per cent) reported that job satisfaction influence teaching competencies to a large extent followed by 62 (23 per cent) respondents who expressed that job satisfaction influence teaching competencies to a very large extent. However, only 2 per cent respondents reported that job satisfaction influence teaching competencies to a moderate extent.

Coordinate duties other than academic responsibilities such as co-curricular activities, attending official meetings etc.

Table 5 shows that majority of the respondents 246 (91 per cent) reported that coordinate duties other than academic responsibilities such as co-curricular activities, attending official meetings etc. does not influence teaching competencies, whereas only 24 (9 per cent) of the respondents expressed that coordinate duties other than academic responsibilities such as co-curricular activities, attending official meetings etc. influence teaching competencies to a small extent.

CONCLUSION

The study contributes to the higher educational institutions and to the faculties also, for betterment of the education system. The study focuses on the factors which affect the teaching competencies thus helping the institutions to have an efficient recruitment, training and performance management process in place. Competent teachers will thus help to have better quality and employable graduates. This can help the institutions to monitor and ensure an effective system and satisfied work force.

REFERENCES

Biemans, H., Nieuwenhuis, L., Poell, R., Mulder, M. and Wesselink, R. 2004. Competence Based VET in the Netherlands: Background and Pitfalls. *Journal of Vocational Education and Training*, **56**(4): 523- 538.

Burke, J. W. 1990. Competency Based Education and Training. The Farmer Press, UK. Pp: 204.

Davis, P., Naughton, J. and Rothwell, W. 2004. New Roles and Competencies for The Profession: Are You Ready for the Next Generation? *Training and Development*, **55**: 26-36.

ENQUA. 2009. Standards and Guidelines for Quality Assurance in the European Higher Education Area. Third edition. Helsinki: European Association for Quality Assurance in Higher Education.

Jackson, P. W. 1990. Life in classrooms. New York, NY: Teachers College Press.

Parry, S. B. 1998. Just What Is a Competency? (And Why Should You Care?). *Training*, **35**(4): 58-64.

Ramesh, P., Krishnan, P., Thammi Raju, D., Venkateswarlu, G., Srinivasa Rao, Ch., Venkateswarlu, B. 2020. Enhancing Competence of Agricultural Faculty: Piloting Agriculture-led Development. ICAR Policy Paper, Indian Council of Agricultural Research (ICAR), New Delhi. 10-25.

Soanes, C. and Stevenson, A. 2003. Oxford Dictionary of English. Second Edition. Oxford. Oxford University Press.

Valica, M. and Rohn, T. 2013. Development of the Professional Competence in the Ethics Teachers. 4th International Conference on New Horizons in Education. *Procedia - Social and Behavioral Sciences,* **106**: 865-872.

❑❑❑

Recevied : 05.03.2024
Accepted : 11.06.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

CONSTRAINTS FACED BY CFLDs BENEFICIARY FARMERS IN ADOPTION OF IMPROVED CHICKPEA PRODUCTION TECHNOLOGY

Hans Raj Jatav*, Shobhana Gupta, Anjali Tomar***, Siddharth Namdeo**** and Dileep Kumar Jatav*****

ABSTRACT

The present study was under taken in the Malwa Plateau Agro-climatic zones of Madhya Pradesh. The KVKs conducted a many numbers of Cluster Frontline demonstration on chickpea crop. Chickpea crop was selected as under all pulse's crops. Chickpea covers highest area and it is one of the most important pulse crops grown of Malwa Plateau Agro-Climatic Zone of Madhya Pradesh. The hill region constitutes about 14% in the Malwa plateau. The design of research is the most important and crucial aspect of the research methodology. It is the entire process of planning and carrying out the research. To seek the answers for the research question, an ex-post facto research design was used to explore or search through a problem or situation to provide insights and understanding in the investigation.

INTRODUCTION

Pulse crops play an important role in Indian agriculture. Besides being rich in protein, pulses are the main sources of essential amino acids for predominantly vegetarian population of India. They contain 22-24 per cent of protein, which is almost twice the protein in wheat and thrice as that of rice. In India, owing to its diverse agro-climatic conditions, pulses are grown throughout the year and plays an important role in crop rotation, mixed and inter-cropping, maintaining soil fertility through nitrogen fixation, release of soil-bound phosphorus and thus contribute significantly to sustainability of the farming systems. In the production process, pulses require less water than cereals. Cluster Front Line demonstrations (CFLDs) is a unique approach by the Indian Council of Agricultural Research on Oilseed and Pulse crops to provide an direct interface between researcher and farmers as the scientists are directly involved in planning, execution and monitoring of the demonstrations. With this background the study was conducted to know the constraints faced by chickpea producer during the production technology in malwa plateau agro-climatic zone of Madhya Pradesh in the year 2023-24 and this study also involves suggestions to overcome these constraints.

RESEARCH METHODOLOGY

The present study was under taken in the Malwa Plateau Agro-climatic zones of Madhya Pradesh. The design of research is the most important and crucial aspect of the research methodology. It is the entire process of planning and carrying out the research. To seek the answers for the research question, an ex-post facto research design was used to explore or search through a problem or situation to provide insights and understanding in the investigation. Among all 8 KVKs in Malwa Plateau Agro-Climatic Zone i.e., Indore, Dewas, Ujjain, Shajapur, Rajgarh, Ratlam, Mandsaur and Neemuch; four (50 %) KVKs were selected randomly. List of villages where CFLD pulses programme is being implemented from last five year was taken from the respective KVKs. One village

*Ph.D. In-Service and Scientist, KVK (RVSKVV), Ujjain, MP.
**Associate Professor and HOD, Department of Agriculture Extension RVSKVV, COA, Gwalior, MP.
***Assistant Professor, K. R. Mangalam University, Gurgaon.
****Guest Teacher, JNKVV, College of Agriculture, Panna, MP.
*****Ph.D. Research Scholar, College of Agriculture (RVSKVV), Gwalior, MP.

at nearest vicinity and one village at remote vicinity from each KVK was selected for the present study. Two villages from each KVK were selected. Thus, total eight villages were selected for the study. List of CFLD beneficiary farmers was taken from respective KVKs. 15 beneficiary farmers and 15 non beneficiary farmers were selected randomly from each village. Thus, total 120 beneficiary and 120 non-beneficiary farmers were selected from 4 KVKs for the study. Thus, the total sample drawn for study was 240 farmers.

RESULT AND DISCUSSION

The constraints analysis is reported based on the opinion survey of the sample Chickpea growers. Thus, the generalizations of results are the feedback

Table. 1. Constraints faced by chickpea growers

S.No.	Constraints	No. of chickpea growers	Percentage	Rank
A	**Production constraints**			
1.	Lack of good quality of seeds	54	45.00	**IX**
2.	Not availability of seed at time	63	52.50	**VI**
3.	Not availability of loan at proper time	67	55.83	**V**
4.	Lack of proper resource and money	61	50.83	**VII**
5.	High cost of agricultural inputs	56	46.67	**VIII**
6.	High infestation of insect,disease.	110	91.66	**I**
7.	Non availability of fertilizers at proper time	102	85.00	**II**
8	Incidence of weeds menace	95	79.16	**IV**
9	Unfavourable weather condition	98	81.66	**III**
B	**Technical constraints**			
10.	Lack of knowledge about improved technology	58	48.33	**II**
11.	Lack of trainings / demonstration for improved agriculture	55	45.83	**III**
12	Lack of knowledge on location specific improved varieties of chickpea	80	66.66	**I**
13.	Lack of irrigation facilities	48	40.00	**V**
14.	Lack of cooperation and demotivation of agriculture extension officer and workers for field survey	51	42.50	**IV**
15.	Lack of information	38	31.67	**VI**
C	**Marketing constraints**			
16.	Lack of market facilities	90	75.00	**IV**
17.	Low market price of product	85	70.83	**V**
18.	Less transportation facilities	80	66.67	**VII**
19	In sufficient storage facilities.	95	79.16	**II**
20.	Lack of knowledge about proper place of marketing.	110	91.67	**I**
21.	Lack of cooperative marketing organization	92	76.67	**III**
22.	Loading charges has to be bear by the growers	83	69.17	**VI**

through Chickpea growers engaged in chickpea farming in the region.

Several constraints barring the sustainable production of the traditional or local practices of chickpea crop in the area. These are related to resources management faults and stresses of a biotic and biotic nature. The farmers opinion obtained regarding the factors affecting adversely production as well as non adoption of various improved chickpea production technology and practices are presented in Table 1.

The above table reveals the production, technical and marketing constraints as reported by the chickpea growers and it was found that in case of production constraints, majority of the chickpea growers reported that High infestation of insect,diseases (91.66%) with rank-I, followed by Non availability of fertilizers at proper time (85%) with II rank ,unfavourable weather condition (81.66%) with III rank, incidence of weeds menace (79.16%) with IV rank, non availability of loan at proper time (55.83%) with V rank, not available of seed at time (52.50%) with VI rank, lack of proper resource and money (50.83%) with rank-VII, high cost of agricultural inputs (46.67%) with the rank-VIII, lack of good quality of seeds with the rank-IX.

In case of technical constraints most of them had lack of knowledge on location specific improved varieties of chickpea (66.66%) with the rank -I followed by (48.33%) farmers had lack of knowledge about improved technology with the rank-II, lack of training/ demonstration for improving the agriculture (45.83%) with the rank -III, lack of cooperation and de-motivation of agriculture extension officer and workers for field survey (42.50%) with the rank-IV lack of irrigation facilities (40%) with the rank-V, lack of information (31.67%) with the rank-VI, respectively.

Similarly in case of marketing constraints majority of farmers belonged to lack of knowledge about proper place of marketing (91.67%) with the rank-I, followed by insufficient storage facilities (79.16%) with the rank -II, lack of cooperative marketing organization (76.67%) rank -III, lack of market facilities (75%) rank-IV, low market price of product (70.83%) with the rank-V, loading charges has to be bear by the growers (69.17%) with the rank-VI and less transportation facilities (66.67%) rank-VII, respectively.

Suggestions to overcome the constraints:

For removing of these constraints expressed by the Chickpea growers following suggestions were made. Table 2 shows the suggestions expressed by the Chickpea growers to remove the constraints their off.

In the present study chickpea growers were asked for minimizing the technological gap regarding chickpea production. The following suggestions were confronted by the chickpea growers to overcome the constraints, majority belonged to Information of plant protection at time with 77.50% followed by transportation facilities at low cost should be available to the farmers (70.83%) easily providing the loan at low interest level (55.83%), providing the improved variety seed time (52.50%), availability of fertilizer and other agriculture input at time (50.83%), corporation and motivation of agriculture and workers for field survey (45.83%), availability of input at low cost for poor and small farmers (42.50%), irrigation facilities providing at proper time (40.00%), technical information should be provided at right time (31.67%), share marketing facilities in area (30%), respectively were the main suggestions as given by the chickpea growers for solving the constraints.

CONCLUSION

Based on the results of the study it can be concluded that during the chickpea production technology farmers faced several constraints, such as production, technical, and marketing constraints. It was found that, majority of the problems faced by chickpea growing farmers were related to production constraints. Further, it was also revealed that, majority of the innovative farmers faced issues like more demotivation from others, lack of awareness about financial support, lack of technical guidance, lack of timely guidance and unavailability

Table.2. Suggestions confronted by the chickpea grower's for solving the constraints

S.No.	Items	No. of chickpea growers	Percentage	Rank
1.	Providing the improved variety seed at time	63	52.50	**IV**
2.	Easley providing the loan at low interest level	67	55.83	**III**
3.	Availability of fertilizer and other agricultural input at time	61	50.83	**V**
4.	Technical information should be provided at right time	38	31.67	**IX**
5.	Information of plant protection at time	93	77.50	**I**
6.	Co-operation and motivation of agriculture extension officer and workers for field survey	55	45.83	**VI**
7.	Irrigation facilities providing at proper time	48	40.00	**VIII**
8.	Availability of input at low cost for poor and small farmers	51	42.50	**VII**
9.	Fair marketing facilities in area	36	30.00	**X**
10.	Transportation facilities at low cost should be available to the farmers	85	70.83	**II**

of proper storage facility for produce. Hence, the findings indicated that farmers are keen to innovate more but due to various constraints of improved chickpea production technologies. Therefore, concerned organizations should lend their support to those farmers.

REFERENCES

Gurjar, L.S., Daipuria, O.P., Prashant Sharma, Prabhakar Sharma, and M. M. Patel 2018. Constraints faced by beneficiaries of front line demonstration in adoption of improved pulse production technology. 313-316.

Karthickraja, M., R. Premavathi, P. P. Murugan, and Vanetha, K.P. 2023. Constraints faced by the groundnut growers in adoption of Cluster Frontline Demonstration of Villupuram district. 91-97.

Ram, L., Asiwal, B.L., Singh, H. and Kumar, J. 2023. Impact of cluster frontline demonstration on green gram (*Vigna radiata L.*) Production and contraints in Sikar District semi arid region of Rajasthan. *Annals of Agricultural Research*, **44**(1): 127-135.

Upamanya, G. K., Sarma, H., Barman, P. D., & Deka, A. K. 2020. Evaluation of Training Programmes on Oyster Mushroom Cultivation Conducted by KVK, Barpeta and Constraints Perceived by Mushroom Growers in Barpeta District of Assam, *India. Int. J. Curr. Microbiol. App. Sci.*, **9**(5): 560-568.

❑❑❑

Recevied : 16.03.2024
Accepted : 11.06.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

OPPORTUNITIES FOR AGRI-TECH STARTUPS IN RAJASTHAN

Shekhar Sumit*, Seema Tyagi and Amita Sharma*****

ABSTRACT

Agri-tech startups in India offer innovative solutions such as digital marketing platforms, advisory services, and transparent pricing to transform the agricultural sector. These startups leverage modern technologies to enhance productivity, profitability, and efficiency in agriculture. Government of India has taken initiatives to support startups through programs like "Startup India" and Rashtriya Krishi Vikas Yojana - Remunerative Approaches for Agriculture and Allied Sectors Rejuvenation (RKVY-RAFTAAR) scheme. The Government of Rajasthan had also introduced policies and initiatives, including the "Rajasthan Startup Policy 2022," to foster a vibrant startup ecosystem. The policy supports the entire startup ecosystem, including agri-tech, providing incentives, training, and enabling conditions. The objective of this study was to analyze the opportunities for agri-tech startups in Rajasthan. To serve the purpose the co-founders of agri-tech startups operating in Rajasthan were involved in the study. Development and monetization of phygital (physical + digital) marketplace model, integration of quality certification to the digital marketplace models, real-time data driven farm advisory platform, Farm-to-Market model, post-harvest management technology platform, produce aggregation technology platform and decentralized farm storage model are the biggest opportunities for the agri-tech startups in Rajasthan.

INTRODUCTION

The word 'startup' has multiple definitions. The Oxford Dictionary defines the word 'startup' as "a newly established business" whereas Merriam-Webster defines it as the "the act or instance of setting an operation or motion or fledging business enterprise". Startups can be defined as "a young company that is just beginning to develop or a company that is in its initial stage of business operations" (Investopedia). Startups are ventures that focus on a unique product or service and are often managed by few founders. According to Forbes, startups are the young companies rooted in innovation with an intent to solve a problem or to create an entire category of new goods and services. The Department for Promotion of Industry and Internal Trade (DPIIT), Government of India defines a startup as an entity whose period of existence is less than 10 years and has not exceeded an annual turnover of US $ 13 million (Rs. 100 crores) during any financial year since its operations. The entity to be called as startup should be incorporated as a Private Limited Company or a Registered Partnership Firm or a Limited Partnership. The entity to be called as startup should not have been formed by reconstruction of an already existing business.

The word 'agri-tech' can be defined as utilization of technology for improving agricultural output productivity, profitability and efficiency. Apart from agriculture, agri-tech also finds its application in horticulture, forestry, aquaculture and viticulture. Agri-tech includes application of internet, automation technologies, Internet of Things (IoT) data science, Artificial Intelligence (AI) and Machine Learning (ML). Automated irrigation, precision farming, weather forecasting, IoT-based sensors, satellite imaging, remote sensing, drone technology etc. are a part of agri-tech. Agri-tech is solving the problem of shrinking cultivable land by enabling farmers to get more yield from less land. Words like agritech, agro-tech, agtech etc. are synonymously used in place of agri-tech.

An 'Agri-tech Startup' is a venture aimed at creating products or services that improve

*MBA Student, Institute of Agri Business Management, Swami Keshwanand Rajasthan Agricultural University, Bikaner
**Assistant Professor, Swami Keshwanand Rajasthan Agricultural University, Bikaner
***Assistant Professor, Swami Keshwanand Rajasthan Agricultural University, Bikaner

agricultural output using the latest technological advancements. Agri-tech startups are the entrepreneurial initiatives taken by the tech-driven startups to change the status-quo of the agricultural sector. Agri-tech startups also aim to increase farmers' income by elimination middle men from their business operations (procurement or sourcing). Some agri-tech startups are making the agricultural supply chain more efficient using modern technologies. Agri-tech startups are the pioneers of agricultural transformation through digitalization. Agri-tech has the potential of increasing agricultural performance improving farmers' lives. Numerous agri-tech startups have emerged at the national level that are reaping the benefits of innovative disruption in the field of agriculture and providing solutions for supply chain inefficiencies either in the upstream side or the downstream side of agricultural production.

1.1. Different Categories of Agri-tech Startups: The agri-tech sector itself is an ecosystem of companies working towards making the occupation of farming more profitable by leveraging technologies like data analytics, SaaS (Software as a Service), Artificial Intelligence (AI) and Machine Learning (ML). Following are the agri-tech startupsoperating in Rajasthan classified under broad categories that are globally used to classify the agri-tech startups:

The objective of the study was to identify the opportunities for the agri-tech startups in the state through the questionnaire response received from the founders of the agri-tech startups. Policy papers were also reviewed to get a clear idea of the opportunities available in the state. The factors that encouraged the agri-tech startups to operate in the study area were assessed using weighted Likert scale. Since the existing gaps are opportunities for any startup, the existing gaps in the agricultural value chain have been identified and ranked using Garrett ranking technique. The opportunities for agri-tech startups in the major gaps were then identified on the basis of literature review and discussion with the founders of agri-tech startups. The biggest opportunities for upstream as well as downstream supply chain agri-tech startups in Rajasthan were also compared in the study.

RESEARCH METHODOLOGY

For the purpose of this project, descriptive research approach was selected to gather relevant information required to fulfil the objectives of the study. Primary as well as secondary data was collected to meet the objectives of the study. Primary data was collected from the respondents (startup co-founders) with the help of semi-structured questionnaires. Secondary data was

Table 1: Agri-tech startups operating in Rajasthan under different categories

Category	Name of the Startups	Number of startups
Upstream Supply Chain	DeHaat, Gramophone, Agrostar, BigHaat, Bharat Agri, FarMart, Innoterra, AgriBolo, Freshokartz, Farmers Stop, Visron, Fasal Amrit	10
Downstream Supply Chain	Samunnati, Agrowave, Otipy, Vegrow, ApnaGodam, Bijak, DeHaat, Gramophone, Freshokartz, FarMart, Segritech, Innofarms, Kisantreat, Go Naturo, The Modern Farmers	15
Agri-Fintech	Samunnati Financial Intermediation, FarMart, Freshokartz, Innoterra	4
Precision Agriculture and Farm Mechanization	Fasal, AgNext, Aarav Unmanned Systems	3

Source: Researcher's computation from multiple web sources

collected from published literature such as market research reports, annual publications, journals, government databases, online newsletters, online articles etc.The study was conducted on the co-founders of agri-tech startups operating in Rajasthan. The state of Rajasthan was selected as the study area because it is among the few states that have a startup ecosystem which is being funded and promoted by the state government. Moreover, Rajasthan is among the best performing states in terms of startup policy implementation and seed funding support (Adhya& Sahoo, 2022). Rajasthan was also awarded with the title of 'Aspiring Leader' for supporting startup ecosystems in 2021 (Ministry of Commerce and Industry, 2022). To meet the objectives of the study, co-founders of agri-tech startups were selected as sample unit and relevant data was collected from them. The questionnaire was mailed to numerous co-founders of agri-tech startups in upstream and downstream supply chain categories and the response received was made the sample size of the study. A total of 10 agri-tech startups were selected from the upstream (3) and downstream (7) supply chain categories because they had the highest number of startups operating in the study area. Judgemental sampling has been used for selecting the area under the study i.e., Rajasthan. The category of sampling units (agri-tech startups) have also been selected by judgmental sampling. The judgement regarding the category of agri-tech startups was made on the basis of number of agri-tech startups of different categories that are operating in Rajasthan. Upstream and downstream supply chain categories were selected because most of the startups operating in Rajasthan fell in these two categories. The agri-tech startups under these two categories were selected by convenience sampling.

RESULTS AND DISCUSSION

Out of 10 selected agri-tech startups, 3 belonged to the upstream supply chain and 7 belonged to the downstream supply chain category. Most of the selected agri-tech startups were established in 2016 followed by 2018 and 2020. A total of 8 among 10 respondent startups were established during the implementation period of Rajasthan Startup Policy 2015 which was implemented for 5 years i.e. from 2016 to 2020. The agri-tech startups established during the implementation period of Rajasthan Startup Policy 2022 i.e. from 2022 were not included because they are in the ideation stage of their startup.

A total of 7 out of 10 respondent agri-tech startups were in their 'Seed Stage' of funding. One respondent startup was completely bootstrapped which means the startups has been funded only by the founders and nobody else. The funding stages can be categorised into Pres-Seed, Seed and Series A stage. Pre-seed funding is the earliest stage of funding for a new company, occurring when the founders are just starting their operations. It is not typically considered as one of the official rounds of funding. Seed funding is the initial round of equity funding that a business venture or enterprise receives. It represents the first official investment raised by the company. After the seed stage, the next funding round is called Series A funding. During this stage, it is crucial to have a well-defined business model aimed at generating sustainable profits in the long term (Investopedia).

To meet the requirements of the objective, factors that encourage the agri-tech startups to operate in Rajasthan were assessed. As the existing gaps are opportunities for any startup, the existing gaps in the agricultural supply chain have been identified and ranked using Garrett ranking technique. The opportunities for agri-tech startups in the major gaps were then identified on the basis of literature review and discussion with the founders of agri-tech startups.

Factors Favouring Operations of Agri-tech Startups in Rajasthan: A startup founder always thinks about the favourable factors prevailing in the particular geographical market before making the decision to actually penetrate it. These favourable factors attract startups to operate in a particular market / area. Hence the factors that encourage the startups to operate in Rajasthan have been identified on the basis of response received from the

Table 2: Factors that encourage the upstream agri-tech startups to operate in Rajasthan

(n=3)

		Frequency of respondents					Total
	Weights	**1**	**2**	**3**	**4**	**5**	
S. No	**Statements**	**SD**	**D**	**N**	**A**	**SA**	
1	Big market size of Agri-inputs in Rajasthan	0	0	0	2	1	13
2	Rajasthan has a favorable startup ecosystem	0	0	1	0	2	13
3	Diverse agricultural practices requiring different agri inputs (including machinery)	0	0	1	1	1	12
4	The demand for high quality agri inputs is increasing in Rajasthan	0	0	0	1	2	14
5	Internet penetration in the rural areas of Rajasthan is increasing	0	0	0	1	2	14
6	Penetration of smartphones is increasing in the rural areas of Rajasthan	0	0	0	1	2	14
7	Awareness among farmers about the technological advancements in the field of agriculture is increasing	0	0	1	1	1	12
8	The rate of adoption of modern technologies by the farmers is high in Rajasthan	0	0	1	1	1	12
9	Farmers of Rajasthan have higher risk-taking ability	0	0	2	0	1	11
10	Farmers of Rajasthan are keen on using new solutions for improving yield and profitability	0	0	1	1	1	12
11	Government agencies are supportive towards the operations of agritech startups	0	0	1	1	1	12
12	Farmers of Rajasthan are willing to pay more for better quality inputs	0	0	2	0	1	11

**SD - Strongly Disagree, D - Disagree, N - Neutral, A - Agree, SA - Strongly Agree

respondents.

From Table 2, it can be derived that increasing penetration of smartphones and internet in rural areas favourable startup ecosystem of Rajasthan and big market size of agri inputs are the biggest factors that encourage the upstream agri-tech startups to operate in Rajasthan.

From Table 3, it can be derived that favourable startup ecosystem and supportive government agencies, increasing penetration of smartphones in rural areas and production of diverse agri-commodities are the biggest factors that encourage the downstream agri-tech startups to operate in Rajasthan.

Based on the total scores obtained in Table 2 and 3, the most important factors that encourage the upstream and downstream agri-tech startups respectively to operate in Rajasthan are presented in Table 4.

Based on the comparison made between upstream and downstream agri-tech startups in Table 4 for the encouraging factors, it is observed that increasing penetration of smartphones and internet in rural areas, big size of agri input market, production of diverse agri-commodities and favourable startup ecosystem of Rajasthan are the biggest factors that encourage the agri-tech startups to operate in Rajasthan.

Table 3: Factors that encourage the downstream agri-tech startups to operate in Rajasthan

(n=7)

S. No		Frequency of respondents					Total
	Weights	**1**	**2**	**3**	**4**	**5**	
	Statement	**SD**	**D**	**N**	**A**	**SA**	
1	Rajasthan is among the largest producers of various agri commodities like oilseeds, soybean, groundnut	0	1	5	0	1	22
2	Rajasthan has a favourable startup ecosystem	0	0	1	3	3	30
3	Rajasthan falls under 3 agro-climatic zones supporting production diverse agri commodities	0	0	1	5	1	28
4	Rajasthan has the highest number of APMCs integrated with e-NAM	0	0	7	0	0	21
5	Internet penetration in the rural areas of Rajasthan is increasing	0	0	1	6	0	27
6	Penetration of smartphones is increasing in the rural areas of Rajasthan	0	0	1	4	2	29
7	Awareness among farmers about the technological advancements in the field of agriculture is increasing	0	0	6	0	1	23
8	The rate of adoption of modern technologies by the farmers is high in Rajasthan	0	0	1	6	0	27
9	Farmers of Rajasthan have higher risk-taking ability	0	0	0	6	1	29
10	Government agencies are supportive towards the operations of agritech startups	0	0	1	3	3	30

**SD - Strongly Disagree, D - Disagree, N - Neutral, A - Agree, SA - Strongly Agree

Table 4: Comparison of factors encouraging upstream and downstream agri-tech startups to operate in Rajasthan

Encouraging factors for agri-tech startup operations in Rajasthan		
S. No	**Upstream agri-tech startups**	**Downstream agri-tech startups**
1	Increasing penetration of smartphones and internet in rural areas	Favourable startup ecosystem and supportive government agencies
2	Favourable startup ecosystem of Rajasthan	Penetration of smartphones in rural areas
3	Big market size of agri inputs	Production of diverse agri-commodities

Opportunities for agri-tech startups in Rajasthan

A startup is a newly formed company that identifies gaps/problems in the existing markets or society and comes up with innovative ideas to solve that problem and make a profitable business out of it by making the life of its potential customers easier. The study has identified the major gaps/problems in the agricultural supply chain of Rajasthan. Since the gaps are opportunities for a startup, they have been ranked accordingly by the respondents from their startup's point of view. The opportunities for agri-tech startups in the major gaps were then identified on the basis of literature review and discussion with the founders of agri-tech startups.

Following are the rankings of gaps in agricultural value chain given by the upstream agri-tech startups. They have been calculated by Garrett Ranking technique based on the response received.

Based on the rankings on Table 5, inefficient market linkage of farm inputs, low availability of high-quality inputs, limited last-mile delivery of farm inputs and services, lack of data driven crop advisory services are the biggest gaps in the agricultural value chain from the perspective of upstream agri-tech startups. The opportunities for the agri-tech startups have been identified after discussion with the founders of agri-tech startups. The corresponding opportunities for the gaps have been mentioned in Table 6.

Based on Table 6, the biggest opportunities for upstream agri-tech startups are development and monetization of phygital marketplace model for farm inputs and real-time data driven farm advisory platform.

Following are the rankings of gaps in agricultural value chain given by the downstream agri-tech startups. They have been calculated by Garrett Ranking technique based on the response received.

Based on the rankings on Table 7, inefficient market linkage of farm produce huge post-harvest losses at various levels of supply chain due to inappropriate handling, distress sale of farm produce due to its perishable nature and lack of storage

Table 5: Gaps in the agricultural value chain identified by the upstream agri-tech startups in Rajasthan

(n=3)

Calculation of Garret Values and Rankings														
		Garrett Values											Total	
S. No	Gaps / Ranks	1	2	3	4	5	6	7	8	9	10	11		Ranking
1	Inefficient market linkage of farm inputs	83	72	65	0	0	0	0	0	0	0	0	220	1
2	Low availability of high-quality inputs	83	72	0	0	55	0	0	0	0	0	0	210	2
3	Low availability of high-quality inputs	0	0	0	59	0	0	0	41	35	0	0	135	7
4	Retailers promoting high margin farm inputs instead of quality products	83	0	0	0	0	0	0	41	0	0	17	141	6
5	Conventional farming practices followed by majority of farmers	0	0	0	0	0	0	45	41	35	0	0	121	9
6	Farmers lack access to formal sources of credit for meeting farm	0	0	0	0	0	50	45	0	0	0	17	112	10
7	Farmers lack access to crop insurance facilities	0	0	0	0	0	0	0	0	35	56	0	91	11
8	Lack of data driven crop advisory services	0	72	0	0	55	50	0	0	0	0	0	177	4
9	Low farm mechanization due to high initial cost	0	0	0	0	55	50	0	0	0	0	17	122	8
10	Low technological adoption among farmers due to lack of technical	0	0	65	59	0	0	0	0	0	28	0	152	5
11	Limited last mile delivery of farm inputs and	0	0	130	59	0	0	0	0	0	0	0	189	3

Table 6: Opportunities for upstream agri-tech startups based on the gaps identified by them

S. No	Gaps Identified	Suggested Opportunities
1	Inefficient market linkage of farm inputs	It can be monetized by developing a digital platform that serves as a comprehensive marketplace for farm inputs.
2	Low availability of high-quality inputs	A quality certification platform for farm inputs can be developed and integrated with the pygital marketplace platform to assure that farmers get supplier verified inputs.
3	Limited last-mile delivery of farm inputs and services	This gap can be monetized by developing a phygital (physical + digital) platform in which the farmers can order and receive their inputs from the affiliated physical setups nearby.
4	Lack of data driven crop advisory services	This gap can be addressed by developing a farmer advisory platform that uses real time data from multiple sources to draw accurate analysis of the conditions and advise the farmers for relevant interventions

Table 7: Gaps in the agricultural value chain identified by the downstream agri-tech startups in Rajasthan

(n=7)

		Calculation of Garrett Values and Ranking												
		Garrett Values											Total	
S. No.	Gaps / Ranks	1	2	3	4	5	6	7	8	9	10	11		Ranking
1	Inefficient market linkage of farm produce	249	0	65	59	0	100	0	0	0	0	0	473	1
2	Huge post-harvest losses at various levels of supply chain due to inappropriate handling	166	216	0	0	55	0	0	0	35	0	0	472	2
3	Highly volatile prices of farm produce	0	0	65	0	0	0	45	41	35	28	34	248	10
4	Lack of price transparency among supply chain partners	83	0	65	59	0	0	45	41	0	56	0	349	7
5	Too many intermediaries in the supply chain	0	72	0	0	55	0	0	41	105	28	0	301	8
6	Distress sale of farm produce due to its perishable nature	0	144	65	118	55	50	0	0	0	0	0	432	3
7	Improper post-harvest management practices due to low awareness	0	72	65	59	110	50	0	0	0	0	17	373	5
8	Low bargaining power of farmers due to small quantity of produce	0	0	0	0	0	50	45	41	35	84	0	255	9
9	Lack of storage facilities nearby	83	0	0	118	55	0	90	0	35	0	0	381	4
10	High transportation costs due to distant marketplaces (APMCs)	0	0	0	0	0	0	45	123	0	0	51	219	11
11	Lack of cold chain infrastructure for perishables	0	0	130	0	55	100	45	0	35	0	0	365	6

facilities nearby are the biggest gaps in the agricultural value chain from the perspective of downstream agri-tech startups. The opportunities for the agri-tech startups have been identified after discussion with the founders of agri-tech startups. The corresponding opportunities for the gaps have been mentioned in Table 8.

From Table 6 and 8, the biggest opportunities for upstream and downstream agri-tech startups in Rajasthan are given in Table 9.

On the basis of Table 9, it can be highlighted that development and monetization of phygital marketplace model, integration of quality certification to the digital marketplace models, real-time data driven farm advisory platform, Farm-to-Market model, post-harvest management technology platform, produce aggregation technology platform and decentralized farm storage model are the biggest opportunities for the agri-tech startups in Rajasthan.

CONCLUSION

- Factors like increasing penetration of smartphones and internet in rural areas, big size of agri input market, production of diverse agri-commodities and favourable startup ecosystem

Table 8: Opportunities for downstream agri-tech startups based on the gaps identified by them

S. No	Gaps Identified	Suggested Opportunities
1	Inefficient market linkage of farm produce	Farm-to-market model can be developed by virtually connecting farmers to corporate buyers on digital platform.
2	Huge post-harvest losses at various levels of supply chain due to inappropriate handling	Post-harvest management technology platform can be developed and all the supply chain partners can be connected to it for close coordination and better commodity handling.
3	Distress sale of farm produce due to its perishable nature	Produce Aggregation Technology Platform for perishables can be developed and integrated with the cold chain partners for reducing loss in quality and quantity of produce.
4	Lack of storage facilities nearby	Decentralized Farm Produce Storage platform can be developed to monetize this gap.

Table 9: Comparison of opportunities for upstream and downstream agri-tech startups in Rajasthan

Opportunities for agri-tech startups in Rajasthan		
S. No	**Upstream agri-tech startups**	**Downstream agri-tech startups**
1	Development of a comprehensive digital marketplace for farm inputs	Development of Farm-to-Market model for the harvest
2	Development of a phygital marketplace for farm inputs	Development of Post-harvest management technology platform for perishable commodities
3	Development and integration of quality certification platform with the digital marketplace.	Development of Produce Aggregation Technology platform
4	Development of real-time data driven farm advisory platform	Development of Decentralized Farm Storage model

of Rajasthan are the biggest factors that encourage the agri-tech startups to operate in Rajasthan. This is similar to the findings of Sharma (2019). This is because a bigger input market size will ensure steady demand of various agri inputs and the production of diverse agri commodities will ensure availability of different agri commodities within the state itself.

- Development and monetization of phygital marketplace model, integration of quality certification to the digital marketplace models, real-time data driven farm advisory platform, Farm-to-Market model, post-harvest management technology platform, produce aggregation technology platform and decentralized farm storage model are the biggest opportunities for the agri-tech startups in Rajasthan.

The role played by agri-tech startups in solving some of the inherent problems of the agricultural supply chain and creating jobs in the agriculture sector are now being widely recognized by both government as well as the investors. The following recommendations aim to foster a conducive environment for agri-tech startups in Rajasthan, enabling their growth, addressing critical gaps and overcoming challenges to unlock the full potential of the agri-tech sector in the state :

- The Government of Rajasthan should continue to implement and promote the Rajasthan Startup Policy 2022. The government should also ensure that agri-tech startups receive the necessary support, incentives, and training to foster their growth and success.
- The agri-tech startups should develop remunerative business plans on phygital marketplace models, real-time data driven farm advisory platforms, Farm-to-Market models, post-harvest management technology platforms, produce aggregation technology platforms and decentralized farm storage models. They can seek help from the business incubators associated with Rajasthan Startup Policy 2022.
- Tech-savvy rural youth can be incentivized for providing training on handling digital technologies to the farmers under Corporate Social Responsibility (CSR) and University Social Responsibility (USR) initiatives.

REFERENCES

Accel and Omnivore 2021. Post Covid Agritech Landscape. Omnivore. Retrieved on March 7, 2023, from https://www.omnivore.vc/wpcontent/uploads/2020/12/ Post-Covid-Agritech-Landscape-in-India.pdf

Adhya, P. S. and Sahoo, S. K. 2022. Agritech Startups in India: A Revolutionary Idea Giving Birth to Agripreneurs. *International Journal of Innovative Research in Technology*, **9**(5) : 2349-6002.

Anand, A., and Raj, S. 2019. Agritech startups: The ray of hope in Indian agriculture. Discussion Paper 10, MANAGE-Centre for Agricultural Extension Innovations, Reforms and Agripreneurship (CAEIRA), Hyderabad.

Bhardwaj, N. 2022. Agritech in India: Industry Overview and Scope for Investments. India Briefing News. https://www.india-briefing.com/news/agritech-in-india-overview-and-scope-investments-23628.html/

Dayalani, V. 2021. India's Agritech Market Landscape Report 2021. Inc 42. Retrieved June 15, 2023, from https://inc42.com/reports/indias-agritech-market-landscape-report-2021/

Dhanavandan, S. 2016. Application of Garrett Ranking Technique: Practical Approach. *International Journal of Library and Information Studies*, **6**(3): 2231-4911.

Government of Rajasthan. 2022. Rajasthan Startup Policy 2022. Department of Information Technology and Communication, Government of Rajasthan.

Ilankumaran, G. 2019. Scenario of Indian Startups with Special Reference to Agritech Startups. *Think India Journal*, **22**(19): 325-341.

Ministry of Commerce and Industry (Press Information Bureau, Mumbai) 2022. Results of

Start-Up Ranking of States 2021 announced [Press release].

Singh, A K., and Prasad Panigrahy, B. 2023. Innovation by Start-ups in Upgrading Agriculture Supply Chain in Indian Economy. In Entrepreneurship and Economic Sustainability (1): 56-65.

Ministry of Agriculture and Farmers Welfare, 2022. Central government's policy initiative for Agricultural Startups, Union Agriculture Minister makes many announcements in the conference [Pressrelease].

Mittal, R., Agarwal, M. and Kadam, M. 2021. Agribusiness Startup: Issues, Challenges & Opportunities. *Journal of Agricultural Marketing,* **1**(1): 64-72.

Narayanan, L. B., Dayal, G. and Dublish, S. 2021. Agritech: A much-needed digital revolution for the agri sector. LKS-In Focus (Lakshmikumaran and Sridharan Attorneys).

Narayanan, L. B. and Dublish, S. 2021. Investments in agritech sector: An analysis of the last decade. LKS-In Focus (Lakshmikumaran and Sridharan Attorneys).

National Academy of Agricultural Sciences (NAAS). 2022. Agri-startups in India: Opportunities, Challenges and Way Forward. In NAAS Policy Paper. Retrieved March 7, 2023, from http://naas.org.in/Policy%20Papers/policy%20108.pdf

Pahwa, A. 2020. Agritech-towards transforming Indian agriculture. *Ernst & Young LLP EY*, **8**: 1-53.

Pal, D., Sharma, L., Mukherjee, K. and Poddar, R. 2021. A Way Forward for Agri Start-ups in India. *International Journal of Management and Human Science*, **5**(4): 37-44.

Research and Markets. 2021. Agritech Market Forecast to 2027 - COVID-19 Impact and Global Analysis by Type and Application and Gegraphy. Research and Markets Limited.

Seth, A. and Ganguly, K. 2017. Digital Technologies Transforming Indian Agriculture. WIPO Knowledge Repository.

Sharma, K., and Mathur, H. P. 2019. A Step Towards Digital Agronomy by Startups. *International Journal of Business Insights and Transformation*, **12**(1): 26-32.

Sharma, L. 2019. Entrepreneurial drive for Sustainability: Agro Tech Startups. *International Journal of Research in Advent Technology*, **7**(6S): 2321-9637.

Sirsikar, I. and Dutta, R. 2023. The Rise of Agri-tech in India. Editorial-Invest India. Retrieved on March 4, 2023, from https://www.investindia.gov.in/team-india-blogs/rise-agri-tech-india.

Surliya, V., Beniwal, A., and Maan, K. 2021. Agri Start-up in India- Opportunities and Performance in Indian Context. *Just Agriculture*, **1**(11): 2582-8223.

AgriTech Startups in India. 2023. Tracxn. Retrieved on March 4, 2023, from https://tracxn.com/explore/AgriTech-Startups-in-India

Agri-tech. 2017. Tech Target. Retrieved on March 3, 2023, from https://www.techtarget.com/whatis/definition/agri-tech

❑❑❑

Recevied : 24.07.2024
Accepted : 11.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

ENTREPRENEURIAL OPPORTUNITIES FOR FARM WOMEN THROUGH PEARL MILLET PROCESSING

Poonam Kalash*, Pratibha Tewari, Sundar Anchra***, B.S. Rathore****, J.K. Parihar***** and S.P.S. Tanwar******

ABSTRACT

Rajasthan has the largest area under pearl millet with the highest production in the country. Pearl Millet is the staple food crop of Rajasthan. Secondary agriculture initiative in post-harvest processing has potential to enhance farm women's income. The present study was carried out in Jodhpur district of Rajasthan where skill development programs and awareness camps were organized to encourage for starting value added pearl millet based enterprise for enhancing income instead of selling raw produce which fetch low profits. In the year of 2021, initially ten SHGs were formed as per NRLM Rajeevika model and hands-on training on post-harvest processing of Pearl Millet based recipes were provided. Ten satellite food processing centres were identified with SHG and provisioned with Tool Kit nirgam. These SHGs were linked with banks and FSSAI. SHGs started producing various kinds of snacks and sweets with suitable packaging, logo and labels and started selling through various events like IITF-2022, Kisan mela/Saras mela/Rajeevika mela/ Millet conclave/Millet Summit etc. at an initial stance. Since second year, these SHGs participated in twenty six events and earned an income of around eight lakhs rupees. The result of present study has shown that pearl millet based products has enhanced the entrepreneurial opportunities and cost:benefit ratio of enterprise has increased gradually with the each year i.e., 1:1.75 in the year 2021, and 1:2.6 in the year 2022. The consumption frequency of millet based value added products has also increased from 58% of sample daily consumption to 83% of daily consumption. Higher acceptability of pearl millet value added products and increased consumption frequency has significantly enhanced the income of farm women.

INTRODUCTION

Pearl millet/ bajra (*Pennisetum glaucum*) is the most widely grown crop among all millets in India. It is highly suitable for cultivation in semi-arid zones. It is a highly nutritious coarse cereal grain. Bajra ranks third after rice and wheat, and is a major source of dietary energy and nutritional security for the rural population in many parts of India.

In recent years, millets have received additional attention due to their unparalleled nutritional profile and easy consumption in various forms of value-added products. Besides rich quality nutrients, utilization of millets as a staple food is restricted to traditional consumers only however on-availability of consumer-friendly, ready-to-eat food products is the major reason for increased consumption of millets (Hulse *et al.* 1980). Poor quality attribute of the millets and their traditional preliminary form of consumption like flours such as dark and dull colour, coarse and gritty texture, astringent taste, high fibre content, larger cooking time, antinutritional constituents, low shelf life have limited their utilization. Most of these limitations can be overcome through the better utilization of appropriate processing technologies. Appropriate techniques of millet processing lead to the promising and successful utilization of millets in various traditional and convenience health foods. Different processed products from millets have been developed in various

*Subject Matter Specialist (Home Science), Krishi Vigyan Kendra, ICAR-Central Arid Zone Research Institute, Jodhpur
**Principal Scientist (Food & Nutrition), Krishi Vigyan Kendra, ICAR-Central Arid Zone Research Institute, Jodhpur
***JRF, , Krishi Vigyan Kendra, ICAR-Central Arid Zone Research Institute, Jodhpur
****Principal Scientist & Head, Krishi Vigyan Kendra, ICAR-Central Arid Zone Research Institute, Jodhpur
*****STO, Krishi Vigyan Kendra, ICAR-Central Arid Zone Research Institute, Jodhpur
******Principal Scientist and Head, Transfer of Technology and Training Division,ICAR-CAZRI

categories like popped, flaked, puffed, extruded, roller dried, fermented, malted and composite flours, weaning foods, etc. Some of the processing technologies have promising effects on the food qualities and its nutrition like extrusion of pearl millet in weaning foods enhances the protein digestibility (Cisse *et al.* 1998).

Millets have nut like flavour and are mildly sweet since they are tasty grains. When compared to rice, millets are rich source of energy, protein, minerals and dietary fibre. Millets have high food value, but their consumption has declined in past. Hence an effort was made to increase the utilization of small millets in popular foods which would find ready acceptability with the tag of "HEALTH FOODS". Farmers usually prepare products with cereals, in-order to increase the utilization of millets, cereals were replaced by millets.

Rajasthan has the largest area under pearl millet with the highest production in the country. Pearl Millet is the staple food crop of Rajasthan. Pearl millet can be used as food, feed and fodder. It can be grown under harsh eco-climatic conditions. It is superior to major cereals, in terms of energy value, protein, fat and minerals content.

Training is considered as part of strategy for development and growth of an organization and important aspect of the entrepreneurship development (Jayalaxmi *et al.*, 2020). Training enhance skill educates a person as to be fitted, qualified and proficient in doing some job. It is a process which includes a sequence of experiences, a series of opportunities to learn, in which trainee is exposed in some more or less systematic way to certain materials or events. Basically training is intended to help individuals to learn and to bring a desired standard of efficiency, condition and behaviour (Meena *et al.*, 2012).

RESEARCH METHODOLOGY

Assessment of the entrepreneurial opportunities by processing of pearl millet for generating income to improve their livelihoods was primary objective of the study. The present study was carried out in Jodhpur district of Rajasthan. On the basis of research carried out, there are several problems in the area of millets which need to be addressed. These include lack of knowledge of uses, constraints and opportunities for the target neglected and underutilized grain, limited income generation, market commercialization and demand limitations, lack of research and development activities and weak national capacities, lack of links across conservation, and production to consumption "filières". Few answers to overcome these problems could be focusing on the local value, indigenous knowledge and uses of the crops in order to link and promote cooperation among stakeholders, develop value adding strategies (through processing, marketing, commercialization, etc.); Organize planning workshops for all stakeholders; establish; and strengthen operational links between stakeholders.

Secondary agriculture or livelihood enhancement action plans are seen as turning point for enhancing incomes. Women are strong human resource in quality processing and value addition to farm produce. Entrepreneurship development through post harvest processing can hedge farm risk by linking it to post harvest processing of indigenous millet (pearl millet).

Formation of SHG and Training of SHGs members on value addition

Ten self-help groups (SHGs) were organized and linked with NRLM at ten sites in Jodhpur district. Capacity building of SHGs in integrated post-harvest processing based on science led interventions of twelve identified products was done through institutional support of ICAR-CAZRI, Jodhpur. The farm women were given method demonstration on preparation of millet based value added products. Awareness programme were conducted to popularize the value added products from Perl millets. They were skilled to make value added products and knowledge materials of low cost nutritious pearl millet recipes. The training provided them a hands-on-experience in preparing the Bajara Laddu, Kurkre, Mathari, Namkeen and bakery

Table 1. Cost benefit ratio for the year 2021-2022

Year	Treatment 1 (T1) Rs./kg	Treatment 2 (T2) Rs./kg	Cost of processing Rs./kg	Increase in income/kg	Cost benefit ratio
2021	25	280	160	120	1:1.75
2022	30	400	150	250	1:2.6

products with the incorporation of millet flour. Training program on marketing and entrepreneurship development were also imparted. After training, farm women were asked to select a product for marketing. They selected pearl millet laddu as product for the enterprise. The product (Laddu) was made with pearl millet flour and jaggery including Indian butter (Ghee) which is a nutritious snack item suitable for all age groups.

Establishing marketing linkages for the processed produce

All SHGs were supported to obtain FSSAI license to manufacture and sale processed products. Labeling and packaging support was given through project staff. Marketing of products was supported through various local and international events exposure. Farm women were promoted to participate in local fairs and India International Trade Fair 2022.

RESULTS AND DISCUSSION

The raw produce were sold to dealers for Rupees 25/- per kg (Kilo Gram) of peal millet in the year 2020 the produced was processed into Pearl Millet laddos and sold for a price of Rs 280/- per kg of laddu which was included Rs.160-/ processing cost and Rs. 120/- profit per kilogram. The cost benefit ratio for the year 2021 was 1:1.75 as shown in Table 1.

The reason for increasing the price was market demands and confidence in farm women. They started selling products near schools, government offices, etc. Taste was appreciated and the mouth by mouth advertising of local people helped them to increase sale. For the year 2022 the raw produce were sold to dealers for Rupees 30/- per kg. Of Pearl Millet, but the processed pearl Millet laddus were sold for a price of Rs. 400/- per kg of laddu which included Rs. 150/- processing cost and Rs. 250/- profit per kilogram. The cost benefit ratio for the year 2022 was 1:2.6. The reason for decrease in processing price was development of relationships and contracts with local dealer for providing same quality raw material for low rates than market price. Market demands and confidence in farm women has increased compared to previous year.

Consumption of millet based products frequency before value addition

Nutritional status and consumption of millets in their diets was documented through 24 hour diet recall method. The results shown that 58% of sample consumes millet in from of roties (Bajra roties) every day and 24% of sample consumes once in a week and 8% consumes once in a month (Table 2). Hundred per cent of the studied samples were not aware about millet value addition. They sold the produces as raw crop and stores few produce for their family consumption, basically for traditional recipes only.

Table 2: Consumption of Millet based products frequency before value addition

S.No.	Frequency	Pre cent
1.	Daily	58
2.	Weekly	24
3.	Once a month	08

The post evaluation after the study was done which indicated that the financial conditions and nutritional status of farm women has improved. The results of post evaluation of 24 hour diet recall has shown that that 83% of sample consumed millet in from of millet based value added products like every day and 11% of sample consumed once in a week and 6% consumed once in a month as shown in Table 3.

Table 3: Consumption of Millet based products frequency after value addition

S.No.	Frequency	Pre cent
1.	Daily	83
2.	Weekly	11
3.	Once a month	06

CONCLUSION

Millet value based products has enhanced the enterprise opportunities as the increase in health consciousness of the people. In the present study the cost benefit ratio has increase gradually with the each year 1:1.75 in the year 2021and 1:2.6 in the year 2022. The consumption frequency of millet based value added products has also increased from 58% of sample daily consumption to 83% of daily consumption. Traditional roties were not accepted by young agesubjects, and unable to chew and swallow by old age, millet based value added products were highly accepted and resulted in increased consumption frequency and as well as increased the income of farm women.

Thus, it may be inferred that, millets are important for the food security, good health and income of poor farmers in certain agro-climatic regions. Awareness programmes, trainings and demonstrations of millets and millet value addition techniques improved their knowledge on millets and areas of enterprises. However, these crops have not received adequate attention of the policy makers for the purpose of investment on their research and development, mainstreaming these grains in developmental programmes, in public procurement and in distribution system is need of hour.

The adoption of appropriate type of processing technology with suitable type of equipment surely decreases the anti-nutritional constituents, off taste, and off flavors from the millet. Because of this, day by day the consumers for millets are continuously increasing. Also, the commercial scale production of various value-added products of millets are boosted due to the availability of suitable type of processing machineries and equipment. The advancement in the processing technologies of millets opens a new horizon and it will help to raise millets at competitive level of staple food.

REFERENCES

Hulse JH, Laing EM and Pearson OE, 1980. Sorghum and the Millets: Their Composition and Nutritive value. Academic press.

Cisse B, Wilson JP, Hess DE, Hanna WW and Youm O. 1998. Striga hermonthica infection of wild Pennisetum germplasm is related to time of flowering and downy mildew incidence. Int. Sorghum Millets News Letter **3**(9): 149-150.

Jayalaxmi P, Rajesh AM, Pushpa P, Chikanna GS, Tulasiram K and Ambika DS. 2020. Impact of value addition training programmes of KVK in Kolar District, Karnataka. *International Journal of Current Microbiology and Applied Sciences* **9**(12):1475-1481.

Meena MS, Rajbir S, Meena HR and Meena BK. 2012. Impact assessment of training on food processing and preservation. *Indian Journal of Social Research,* **53**(2):117-122.

Jahan Afifa,Arunjyothi R, Shankar A.,Reddy jagan mohan M.Reddy prabhakar T., Rajasheker, Krishna Rama K, and Shravika L. 2020. Enhancing entrepreneurship opportunities through millet based value added products to farm women of Nagarkurnool District. *Current Journal of Applied Science and Technology* **39**(48): 293-299.

❑❑❑

Recevied : 04.06.2024
Accepted : 08.07.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

GOAT MANAGEMENT PRACTICES ADOPTING BY GOAT KEEPERS

C.M. Yadav*, Prakash Kumawat, Anita Yadav***, Rajesh Jalwania**** and Rashmi Chouhan*****

ABSTRACT

The present investigation was carried out to evaluate the goat management practices adopting by goat keepers in Bhilwara district of Rajasthan. A total of 100 goat farmers from 8 villages spread over two blocks Mandel and Suwana in Bhilwara district were included in the study. The adoption rate of feeding practices for goats indicated higher mean score (0.56) for practice of concentrate feeding to lactating goats, breeding practices higher mean score (0.74) was possessed by breeding age, with respect to the adoption of improved health practices, maximum mean score was recorded for treatment of sick goat by a veterinarian (0.74) and kid management higher mean score (0.97) was observed for feeding of colostrum to new-born kid, respectively. The overall adoption index was low (26.72%) and ranged from 10.58% for feeding practices to 38.33% for breeding practices.

INTRODUCTION

Goat has been very popular among marginal farmers and most of the weaker sections of the society because of low investment, easy management, short gestation and high return. Presently, India has a goat population of 148.9 million (2019) with an average flock size of 4 goats per family. As of 2019, there were 20.84 million goats in Rajasthan, which represents a 3.81% decrease from the previous census in 2012. Rajasthan produced a total of 3.10 million tons of goat milk and 95.23 thousand tons of goat meat in 2022-2023. Goat farming has tremendous potential for income and employment generation, especially in rural areas (Singh *et al.*, 2013) Goat is known as 'Poor man's cow' in India and is a very important component in dry land farming system. Marginal or undulating lands unsuitable for other types of animals like cow or buffalo, goat is the best alternative. With very low investments goat rearing can be made in to a profitable venture for small and marginal farmers.

Goats are reared for milk and meat. Goat is a multi-functional animal and plays a significant role in the economy and nutrition of landless, small and marginal farmers in the country. Goat rearing is an enterprise, which has been practiced by a large section of population in rural areas. Goats can efficiently survive on available shrubs and trees in adverse harsh environment in low fertility lands where no other crop can be grown. Goat have been utilized for their milk, meat, hair, and skins all over the world. Thus, a study was undertaken to evaluate the goat management practices adopting by goat keepers in Bhilwara district of Rajasthan.

RESEARCH METHODOLOGY

A study was undertaken in selected districts of Bhilwara in Rajasthan, to understand the goat management practices adopting by goat keepers. A total of 100 goat farmers from 8 villages spread over two blocks Mandel and Suwana which is four villages in each block in Bhilwara district were included in the study. Data on rearing practices of goats were collected through personal interviews with the help of a well-structured schedule. The extent of adoption of improved scientific goat rearing

*Professor, Animal Production, KVK, Bhilwara, Rajasthan
**SRF, NICRA, Project, KVK, Bhilwara, Rajasthan
***Technical Assistant, KVK, Bhilwara, Rajasthan
****Assistant Professor, KVK, Shahpura, Rajasthan
*****M.V.Sc. Scholar, KVK, Shahpura, Rajasthan

practices was assessed as full, partial and non-adoption with scores of 2, 1 and 0, respectively. Total score for each practice was calculated and the mean score was calculated. Accordingly, area-wise adoption indices were calculated and finally overall adoption index was determined (Yadav and Sharma, 2012) by using the following formula:

$$\text{Adoption index (\%)} = \frac{\text{Actual score obtained}}{\text{Maximum score assigned}} \times 100$$

RESULTS AND DISCUSSION

The data presented in Table 1 about adoption rate of feeding practices for goats indicated higher mean score (0.56) for practice of concentrate feeding to lactating goats followed by a special feeding after kidding (0.18), feeding of concentrate during advanced pregnancy (0.13), stall feeding (0.12), feeding of concentrate before 2-3 weeks of breeding to females (0.06), and feeding of mineral mixture (0.04). It was observed that concentrate fed to female goats at the rate of 100-150 g/day and majority of the respondents fed homemade concentrate which comprised maize, jowar, wheat, gram chunni and wheat bran. For breeding practices, higher mean score (0.74) was possessed by breeding age, followed by breeding after 2-3 months of kidding (0.69), heat detection (0.67), selection criteria for breeding buck (0.57) and changing of breeding buck (0.38). Narmatha *et al.* (2013) also reported that 90% of farmers in Namakkal district (Tamil Nadu) adopted practices of identifying the goats in heat. It was observed that mounting on each other and bleating were the most reliable symptom for detection of goats in heat.

With respect to the adoption of improved health practices, maximum mean score was recorded for treatment of sick goat by a veterinarian (0.74), protection from extreme weather (0.72), vaccination against foot and mouth Disease, peste des petits ruminants and enterotoxaemia (0.42) followed by, deworming for endo-parasites (0.40), ecto-parasite control (0.13) and isolation of sick animals (0.04) which is similar result reported by Yadav (2019).

Higher mean score (0.97) was observed for feeding of colostrum to new-born kid followed by feeding of colostrum to new-born kid within one hour of birth (0.62) feeding of green fodder (0.44), practice of weaning at 2-3 months of age (0.18) and castration of male kids at 2-3 months of age (0.02) and Lahoti and Chole (2010) found that 100% respondents in Beed district (Maharashtra) adopted the colostrum feeding within one hour to new-born kid and 10% adopted castration of male kid. Yadav and Naagar (2021) also reported on dairy farming technologies in Bhilwara district. The overall adoption index was low (26.72%) and ranged from 10.58% for feeding practices to 38.33% for breeding practices (Table 2).

The low adoption of scientific rearing practices in the study area could be attributed to poor economic status and lack of scientific knowledge among farmers. Thus, to improve the adoption of goat rearing practices in the study area, departments and non- governmental organizations should arrange capacity building and farm visits for the demonstration will benefits of improved scientific goat rearing practices to goat farmers.

CONCLUSION

A study was undertaken to investigate the adoption practices of scientific goat rearing in Bhilwara district of Rajasthan. Data collected from 100 farmers revealed that breeding management 38.33%) had a highest adoption index followed by kid management (29.83%), health care (28.16%) and feeding practices (10.58%) for goats. The overall adoption index for improved practices by goat farmers was 26.72%, which indicated poor adoption of goat rearing practices in the study area. Assured feeding, breeding and health care services and financial support are needed to enhance the income of goat keepers. Hence, priority should be given to build their capacity for developing value chain and mobilise critical services for improving the production.

Table1. Adoption of scientific goat rearing practices

Practice	Adoption (No. of farmers)			Total adoption Score	Mean score
	Full	Partial	No		
Feeding management					
Stall feeding	2	10	88	14	0.12
Concentrate feeding to lactating does	6	50	44	62	0.56
Concentrate feeding during advanced pregnancy	4	9	87	17	0.13
Special feeding after kidding	2	16	82	22	0.18
Concentrate feeding before 2-3 weeks of breeding	1	5	94	7	0.06
Supplementary feeding of mineral mixture	1	3	96	5	0.04
Breeding management					
Appropriate age of breeding (12-14 months)	58	16	26	132	0.74
Libido as selection criteria for breeding bucks	39	18	43	96	0.57
Breeding after 2-3 months of kidding	17	52	31	86	0.69
Pregnancy diagnosis by veterinarian	00	00	100	00	0.00
Changing of breeding bucks	10	28	62	48	0.38
Adoption of heat detection	31	36	33	98	0.67
Health management					
Deworming	14	26	60	54	0.40
Vaccination	10	32	52	52	0.42
Isolation of sick animals	0	04	94	4	0.04
Treatment of sick goats	22	52	26	96	0.74
Ecto-parasite control	5	8	87	18	0.13
Protection from extreme weather	42	30	28	114	0.72
Kid management					
Colostrum feeding to kids (2-3 h after birth)	87	10	3	184	0.97
Timely feeding of colostrum (thrice a day)	24	38	42	86	0.62
Weaning of kids (at 3 months of age)	10	8	72	28	0.18
Green fodder to kids	12	32	46	56	0.44
Ligation and disinfection of naval cord	00	00	100	00	0.00
Castration of male kids	2	00	98	4	0.02

Table 2. Adoption of scientific goat management practices

Practices	Maximum possible score	Obtained adoption score	Adoption index (%)
Feeding management	1200	127	10.58
Breeding management	1200	460	38.33
Health management	1200	338	28.16
Kid management	1200	358	29.83
Overall	4800	1283	26.72

REFERENCES

19" Livestock Census, 2019. Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, New Delhi.

Lahoti, S.R. and Chole, R.R. 2010. Adoption of feeding practices by goat keepers. *Indian Journal of Animal Research,* **44**: 52-54.

Narmatha, N., Sakthivel, K.M., Uma, V. and Akila, N. 2013. Adoption and constraints in improved goat rearing practices. *Indian Journal of Animal Research,* **47**: 547-550.

Sabapara, G.P. and Kharadi, V.B. 2015. Adoption of improved goat rearing practices in southern Gujarat. *Indian Journal of Small Ruminants* **21**:367-369.

Singh, M.K., Dixit, A.K., Roy, A.K. and Singh, S.K. 2013. Goat rearing: A pathway for sustainable livelihood security in Bundelkhand region. *Agricultural Economics Research Review* **26**: 79-88.

Yadav, C.M.2019. Adoption of Scientific Goat Rearing Practices in Bhilwara District of Rajasthan. *Indian Res. J. Ext.Edu.***19**(1):49-51.

Yadav, C.M. and Naagar, K.C. 2021. Dairy Farming Technologies Adopted by the Farmers in Bhilwara District of Rajasthan. *Indian Res. J. Ext.Edu.* **21**(1):7-11.

Yadav, K.N. and Sharma, M.L. 2012. Adoption and adoption gap of goat keepers towards recommended goat rearing practices. *Indian Research of Extension Education* **12**:77-80.

❑❑❑

Recevied : 07.06.2024
Accepted : 16.07.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

PRODUCTIVITY ANALYSIS OF CLUSTER FRONT LINE DEMONSTRATIONS ON GROUNDNUT IN DAUSA DISTRICT OF RAJASTHAN

B. L. Jat*, Akshay Chittora and Sunita Kumari*****

ABSTRACT

The present study was conducted at the farmers' fields of Dausa district of Rajasthan (India) to investigate the impact of cluster front line demonstrations on groundnut during kharif 2017 to kharif 2021. A total of 293 demonstrations of groundnut in 123.4 ha area having similar number of traditional practices or local check were carried out in sandy loam soil under irrigated conditions of Dausa district. Yield of front line demonstrations trials and potential yield of respective variety and year were compared to estimate the yield gap which were further categorized into technology gap and extension gap. The technology gap was recorded highest (8.94 q/ha) in case of GJG-19 during kharif 2021 while lowest technology gap (4.90 q/ha) was recorded in case of HNG-69 during 2018. The extension gap was the highest during kharif 2018 (4.77 q/ha) and lowest during kharif 2021 (1.66 q/ha). The average technology gap was 6.91 q/ha and the average extension gap was 3.21 q/ha. The technology index was maximum during kharif 2021 (31.93%) while minimum during kharif 2018 (16.33%). Average technology index was recorded 23.86%. The highest yield (25.10 q/ha) of groundnut demonstrations was recorded during kharif 2018 with variety HNG-69 while lowest yield (19.06 q/ha) was recorded during kharif 2021 with variety GJG-19. Average yield of demonstrations was 22.29 q/ha, whereas average yield of local check was 19.08 q/ha, representing 16.58% yield increase in demonstrations over local check. The average gross return of demonstrations was Rs 122359 which was 14.02 per cent higher over control. The average net return of demonstrations was Rs 84275 which was 21.06 per cent higher over local check. The average B:C ratio of the demonstrations was 3.22 where as it was 2.86 in local check.

INTRODUCTION

After successful story of green revolution the country has made an impressive progress in enhancing productivity of wheat. However, today itself a major portion of foreign money has to invest to import of edible oil by India government. This calls for renewed efforts for analyzing the production constraints and evaluating location specific monetary and non-monetary technology for improving the existing productivity level. Groundnut or peanut or earthnut or monkeynut is an important edible oil crop in Rajasthan both from the point of view of gross hectarage cultivated and pod outturn. The groundnut was cultivated in 5.53 mha area with 9.67 m.t. production having 1750 kg/ha productivity. Similarly in the state of Rajasthan the area, production and productivity of groundnut was 0.47 mha, 0.91 m.t. and 1943 kg/ha, respectively (Anon, 2014). The triennial average data (2011-13) of area, production and productivity indicate that annually 42.1 m.t. of groundnut are produced in the world from a cropped area of 24.9 m ha with an average productivity of 16.88 q/ha. Though, considering the cultivated area (5.11 m ha) India ranks first, followed by China and Nigeria, the production and productivity are comparatively less. In comparison, China helds the most promising in production (16.63 m.t.) and USA in 43 q/ha of groundnut. Consequently, China had maximum share (Aproximate 40%) followed by India(Approximate 17%) in global groundnut production. (Anon, 2015).

District Dausa falls in Agroclimatic zone IIIa.namely "Semi-Arid Eastern Plains" covering Dausa, Ajmer, Tonk and Jaipur districts. The

*Senior Scientist & Head, Krishi Vigyan Kendra, Dausa
** Subject Matter Specialist, Krishi Vigyan Kendra, Dausa
*** Subject Matter Specialist, Krishi Vigyan Kendra, Dausa

headquarter of the zone is situated at Rajasthan Agricultural Research Institute, Durgapura, Jaipur. The technologies generated by scientist of Rajasthan Agricultural Research Institute Durgapura were tested and disseminated through cluster front line demonstrations to farmers of Dausa district. Groundnut is the most important cereal crop grown in Kharif season in Dausa district of Rajasthan. Groundnut crop occupy the first rank in kharif oilseed crops grown in Dausa district. It account for 9635 hectares area and 135760 metric ton production with 1409 kg/ha productivity (Anon, 2021). The hike in production in recent years has been possible due to improvement in productivity and strategies adopted by the government by launching various schemes. In view of this, a project on cluster front line demonstration was started in 2015 in order to demonstrate the production potential and latest advancement in package of practices among the farmers with the view to reduce the time lag between technology generated and its adoption. This also enable field functionaries to elucidate the production constraints and limitation in the adoption of technology for onward transmission to scientists to reorient their research accordingly, in order to improve the productivity all the latest and unfolded technologies were carried out in cluster front line demonstrations plots under the direct supervision of the scientist by supplying the critical inputs.

Keeping in view the importance of cluster front line demonstration in Dausa district of Rajasthan in productivity enhancement and increase the monetary returns, the present study was carried out.

RESEARCH METHODOLOGY

The present study was conducted at the farmers' fields of Dausa district of Rajasthan during the Kharif season of consecutive five from 2017 to 2021. A total of 293 demonstrations and 123.4 ha area having similar number of traditional practices or local check was carried out in sandy loam soil under rainfed conditions. The Groundnut crop was sown in around June to mid-July and harvested in mid-October across the years. The variety HNG 69 and GJG 19 was used in demonstration in different villages and years. The cluster front line demonstration were conducted in Sindoli, Badoli villages of Dausa block, Didwana, Ralawas, Burja, seengpura Bhanwata in Lalsot block and Badoli and Mohammadpura and Gopalpura in Ramgarh Pachwara block of Dausa district. In cluster front line demonstrations especial emphasis was given to proper seed rate (80 kg/ha), balance use of fertilizers (15 kg/ha N and 20 kg/ha P2O5 and 250 kg gypsum), high yielding variety (HNG 69 and GJG19), seed treatment with pesticides, and proper & need based plant protection measures. In traditional or local check plots farmers were using higher seed rate (120 kg/ha), Imbalance use of fertilizers, local or Gujrat company seed for sowing, improper seed treatment and plant protection measures. The cross section data on output of Groundnut crop and input used per hectare have been collected from the cluster front line demonstration trials. In addition to this in traditional or control plot followed by farmers have also been collected and used for further calculation like cost of cultivation, gross returns, net returns, additional cost, additional returns, B: C ratio. The benefit cost ratio (B: C) was calculated dividing the net monetary return by the total cost of cultivation.

Yield gap, extension gap and technology index were calculated as follows:-

Technology gap = Potential yield- Demonstration yield

Extension gap = Demonstration yield- Farmers/ Traditional yield

Technology index = Pi-Di/Di X 100

Where Pi= Potential yield of the crop

Di= Demonstration yield of the crop

RESULTS AND DISCUSSION

Yield gaps: Yield of front line demonstration trials and potential yield of the respective variety and year were compared to estimate the yield gap which was further categorized in to technology and extension gaps. Technology gaps (8.94 q/ha) was highest in

Table 1. Comparative statement of yield and other parameters of cluster front line demonstrations on groundnut in different villages of Dausa district of Rajasthan

Year	Village	Block	Variety	No of Demo	Area (ha)	Highest yield of Demo (q/ha)	Lowest yield of Demo (q/ha)	Average yield of Demo (q/ha)	Average yield of Local Check (q/ha)	% increase	Technology Gap (q/ha)	Extension Gap	Technology Index (%)
2017	Sindoli, Badoli, Deedwana, Ralawas	Dausa and Lalsot	HNG 69	125	50	30	20	24.10	19.44	23.97	5.9	4.66	19.67
2018	Burja and Seengpura	Lalsot	HNG 69	60	30	31	21	25.10	20.33	23.46	4.9	4.77	16.33
2019	Badoli	Ramgarh Pachwara	HNG 69	42	16.8	28.5	19	23.79	21.01	13.23	6.21	2.78	20.70
2020	Mohamadpura & Gopalpura	Ramgarh Pachwara	GJG 19	41	16.6	22.0	16.0	19.41	17.22	12.72	8.59	2.19	30.68
2021	Bhanwata	Lalsot	GJG-19	25	10	21.5	17.0	19.06	17.4	9.54	8.94	1.66	31.93
Total	-	-	-	293	123.4	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	26.6	18.6	22.29	19.08	16.58	6.91	3.21	23.86

Table 2. Economics of the cluster front line demonstrations on groundnut in different villages of Dausa district of Rajasthan

Year	Village	Variety	No. of Demo	Area (ha)	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		% increse in Gross return	Net return (Rs/ha)		% increase in net return	Additional cost (Rs/ha)	Additional return (Rs/ha)	B:C ratio	
					Demo	Local	Demo	Local		Demo	Local				Demo	Local
2017	Sindoli, Badoli, Deedwana, Ralawas	HNG 69	125	50	33150	31250	107595	89872	19.72	74445	58622	26.99	1900	17723	3.25	2…88
2018	Burja and Seengpura	HNG 69	60	30	35324	33324	126440	105452	19.90	91116	72128	26.33	2000	20988	3.58	3.16
2019	Badoli	HNG 69	42	16.8	41399	40424	137091	122941	11.51	95692	82517	15.97	975	14150	3.31	3.04
2020	Mohamadpura & Gopalpura	GJG 19	41	16.62	40474	42874	118388	106835	10.81	77914	63691	22.33	-2400	11553	2.93	2.49
2021	Bhanwata	GJG-19	25	10	40074	40774	122283	113070	8.15	82209	72296	13.71	-700	9213	3.05	2.77
Total	-	-	293	123.4	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	38084	37729	122359	107634	14.02	84275	69850	21.06	355	14725	3.22	2.86

case of GJG 19 at village Bhanwata in 2021 and lowest (4.90 q/ha) of HNG 69 at village Burja and Seengpura in the year 2018. Average technology gap were 6.91 q/ha. Though, the cluster front line demonstration trials were laid down under the supervision of KVK scientists at the farmers' fields'. There exists gap between the potential yield and demonstration yield. This may be due to the soil fertility and weather condition especially rainfall intensity, interval etc. Hence, location specific recommendations are necessary to bridge the gap. Higher technology gap (647 kg/ha) were also recorded by Meena *et al.* (2012) and Subhash Katare *et al.* (2011).

The extension gap for all the year in front line demonstrations on groundnut were lower as compared to technology gap. This emphasized the effort made by the scientist to educate the farmers in adoption of improved technology to narrow the extension gaps. Among the cluster front line demonstration on groundnut in different years, extension gap was highest in variety HG 69(4.77 q/ha) at village Burja and Seengpura in year 2018, and lowest (1.66 q/ha) at village Bhanwata in variety GJG 19 in year 2021. The average extension gap was 3.21 q/ha. These findings are in line with the findings obtained by Kaushik in 1993 and Meena et al 2012) i.e. 406 kg/ha. All cluster front line demonstrations were found lower extension gap as compared to technology gap. Similar findings were also reported by Sharma and Sharma (2004).

Technology Index: Technology index shows the feasibility of the evaluated technology on the farmers fields'. The lower the value of the technology index more feasibility of technology. Technology index was highest by the tune of 31.93 per cent at village Bhanwata in the year 2021, and lowest 16.33 per cent at villages Burja and Seengpura in 2018. The average technology index was found 23.86 per cent. Similarly, technology index were also reported by Meena et al (2012) i.e. 26.98 per cent and Subhash Katare et al (2011) i.e. 24.21 per cent. This indicates that in CFLDs a wide gap exists between the technology evaluated at research station and farmers fields'. Hence, according to the criterion HNG 69 variety at village Burja and Seengpura in year 2018 is best followed by at village Sindoli, adoli, Deedwana and Ralawas in year 2017.

Comparison of yield and economics: The highest groundnut yield of cluster front line demonstration were found 31.0 q/ha in 2018 at Burja and Seengpura village followed by 30.0 q/ha, and 28.5 q/ha, at villages Sindoli, Badoli, Didwana & Ralawas in 202017 and Badoli in 2019, respectively. The lowest yield were found 16.0 q/ha followed by 17.0 q/ha and 19.0 q/ha at village Mohammadpura, Gopalpura in year 2020, Bhanwata in year 2021 and Badoli in year 2019, respectively. Average yield of cluster front line demonstration were found maximum by the tune of 25.10 q/ha at village Burja and Seengpura in year 2018 with the variety HNG 69, followed by 24.10 q/ha and 23.79 q/ha at Sindoli, Badoli, Didwana & Ralawas in year 2017 with the variety HNG 69 and Badoli in year 2019 with the same variety, respectively. The Maximum percentage increase over control or traditional practice recorded 23.97 per cent at village Sindoli, Badoli, Didwana & Ralawas in 2017 with the variety of HNG 69, followed by 23.46 per cent at village Burja and Seengpura in year 2018 with the same variety. Studies shows that average percentage increase was found 16.58 per cent which show that cluster front line demonstrations found better than farmers practices or control (Suryawansi and Prakash, 1993, Sagar and Chandra, 2004 and Meena *et al.* 2012) for increasing the productivity of farmers community. (Table -1).

On the basis of Table -2 for economics of various cluster front line demonstrations on groundnut in different years, the highest percent increase in gross return were found 19.90 per cent at village Burja and Seenpura in year 2018 with the variety of HNG 69 followed by 19.72 per cent and 11.51 per cent at village Sindoli, Badoli, Didwana & Ralawas in year 2017 and at village Badoli in year 2019 with the same variety. Average per cent increase of gross return was found 14.02 per cent which is substantial for the farming community of Dausa district. The highest increase in net return were found 26.99 per

cent at village Sindoli, Badoli, Didwana & Ralawas in year 2017 with the variety of HNG 69 followed by 26.33 per cent and 22.33 per cent in village Burja and Seengpura in year 2017 with the variety HNG 69 and village Mohammadpura & Gopalpura in year 2020 with the variety GJG 19. Average net return was found 21.06 per cent increase which shows cluster front line demonstrations can be increasing the living standard of farming community of Dausa District.

Among all front line demonstrations the highest B:C ratio were found 3.58 in village Burja and Seengpura in year 2018 with the variety HNG 69 followed by 3.25 and 3.31 at village Sindoli, Badoli, Didwana & Ralawas in year 2017 with the variety HNG 69 and village Badoli in year 2019 with the same variety, respectively. Similar findings were also reported by Meena *et al.* 2012.

CONCLUSION

Overall results shows that variety HNG 69 is found better in per cent increase, gross returns and net return and B:C ratio. Across the years cluster front line demonstrations were found higher productivity ranging from 9.54 to 23.97 per cent and higher B:C ratio from 2.93 to 3.58. Cluster front line demonstrations shows in respect of per cent increase of yield and B: C ratio is sufficient for increasing production of groundnut and increasing living standard of farmers' community of Dausa district. Presently 16.58 per cent increase reveals that if farmers adopt the demonstrated technologies, they will fetched 21.06 per cent more net return in addition to they are getting now in traditional practices will improving their livelihood. Presently the area of groundnut in Dausa district is 9635 ha, by adopting the demonstrated technology farmers of Dausa district can get 21.06 per cent additional returns in terms of net returns per year.

REFERENCES

Anonymous 2014. Agricultural Statistics at a glance.

Anonymous 2015. ICAR-DGR News Letter, 14: 1-2.

Anonymous, 2021. ZREAC report of Deputy Director (Agriculture), Dausa.

Katare Subhash, Pande, S. K. and Mustafa Mohd. 2011. Yield gap analysis of rapeseed mustard through FLD. *Agriculture Update*. **6**(2): 5-7.

Kaushik, K. K. 1993. Growth and instability of oilseed production. *Indian Jounal of Agricultural Economics*, **48**: 334-338.

Meena, B. L., Meena, R. P., Meena, R. H and Balai, C.M. 2012. Yield gap analysis of rapeseed mustard through FLD in agroclimatic zone IVa of Rajasthan. *Journal of Oilseeds Brassica*, **3**(1): 51-55.

Sagar, R. L. and Ganesh Chanra 2004. Evaluation of FLD on mustard in Sunderbans, West Bengal. *Indian Journal of Extension Education*, **40**(3&4): 96-97.

❑❑❑

Recevied : 04.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

ENHANCED FARMER'S LIVELIHOOD THROUGH NICRA INTERVENTIONS

Prakash Kumawat*, C.M. Yadav, Anita Yadav*** and Rajesh Jalwania******

ABSTRACT

The present study was carried out by Krishi Vigyan Kendra, Bhilwara in Dolikhera village in Suwana block under sub humid southern and plain Aravalli hills IVA agro climatic zone with their climate vulnerability i.e., drought, heat wave and water stress during 2021-22 to 2022-23.The result indicated that In-situ moisture conservation in maize Farmers earned a net return of Rs. 46840/ ha with B:C ratio of 2.52 over the local cultivar (Rs. 33340/ha with 1.48 B:C ratio) which increases the productivity. 10 Foliar sprays of 1% KNO3 in maize during drought period mitigated the drought effect in maize and gave 25.30% higher grain yield as compared to farmer practices. Improved variety of Black gram PU-01 was demonstrated at 10 farmers field in 8 ha area, which resulted in 29.23% higher yield as compared to local variety. Suitable intercropping systems under real rainfall situations (maize+blackgram 2:2/3:2) were also demonstrated at 10 farmers' fields in 8 ha area which resulted in 34.49% higher yield as compared to local variety.

INTRODUCTION

National Innovations on Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR) launched in 2nd February, 2011. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The research for adaptation and mitigation covers crops, livestock, fisheries and natural resource management. The project consists of four components, and they are Strategic Research, Technology Demonstration, Capacity Building, and Sponsored/Competitive Grants.

Climate change is an important area of concern for the whole world and to India as well. Ensuring food and nutritional security for the growing population like India is challenging as the primary source of food is through agriculture. India is predicted to yield less between 4.5 & 9% due to change in the climate. Since agriculture makes up around 16% of India's GDP, a 4.5 to 9% negative impact on agri production implies a cost of climate change to be roughly up to 1.5% of GDP per year. Hence, the Government of India has favoured high priority on research and development to withstand climate change in the agriculture sector. The KVK's goal is to produce committed and motivated people resources for the nation's development in agriculture (Chauhan, 2016). National Initiative on Climate Resilient Agriculture (NICRA) with the below objectives:

- To enhance the resilience of Indian agriculture which covers crops, livestock and fisheries to climatic variability and climate change through the development of technologies.
- To demonstrate site-specific technology packages on farmers' fields.
- To enhance the capacity building of scientists and other stakeholders in climate-resilient agricultural research and its application.

RESEARCH METHODOLOGY

Both short term and long term outputs are expected from the new and improved varieties of crops, livestock breeds, management practices which helps in adaptation & mitigation and inputs for creating a policy on climate-resilient agriculture

*SRF, NICRA, Project, KVK, Bhilwaraf, Rajasthan
**Professor, Animal Production, KVK, Bhilwara, Rajasthan
***Technical Assistant, KVK, Bhilwara, Rajasthan
****Assistant Professor, KVK, Shahpura, Rajasthan

in the developmental planning. The overall outcome has improved the resilience of agricultural production to climate variability in vulnerable regions. The project is comprising of four components: viz. strategic research on adaptation and mitigation, technology demonstration on farmers' fields with present climate variability, sponsored and competitive research grants to fill research and capacity building of stake-holders. The technology demonstration component deals with demonstrating technologies for adapting crop and livestock production systems to climate variability. This component is implemented in selected districts of the country through location-specific interventions by Krishi Vigyan Kendra in a participatory model. The selection of districts is done on the following criteria: drought proneness, cyclone proneness based on the frequency, flood proneness, vulnerability to the heat wave and cold wave and actual incidence of floods and droughts. The interventions in the village panchayats are finalised following a participatory approach through the Village Climate Risk Management Committee (VCRMC) based on the climate-related problems in the village survey. The program was launched in all the villages by involving the state departments and leaders of the panchayats. This is to ensure local ownership from the beginning and convergence of related schemes currently in operation in the panchayat. The interventions are made in the following four areas *viz*. Natural resources, Crop Production, Livestock and Fisheries and Institutional Interventions. Hence, KVK, Bhilwara has selected the one village of Dolikhera in Suwana block under sub humid southern and plain Aravalli hills IVA agro climatic zone with their climate vulnerability i.e., drought, heat wave and water stress during the financial year 2021-22 to 2022-23.

RESULTS AND DISCUSSION

Performance of component demonstration laid out by KVK Bhilwara under different modules is as follows:

Natural Resource Management:

During the year 2022, KVK organized 10 In-situ moisture conservation demonstration in maize like deep ploughing +Sowing against the slope and ridging after sowing (30 DAS) which resulted for improving the available moisture to maize and gave 23.46% higher grain yield as compared to farmer practices. Farmers earned a net return of Rs. 46840/ ha with B:C ratio of 2.52 over the local cultivar (Rs 33340/ha with 1.48 B:C ratio) increased the productivity of 10 farmers. They used this practice to raise the crop and improved the water holding capacity of soil and 10 Foliar sprays of 1% KNO3 in maize during drought period mitigated the drought effect in maize and gave 25.30% higher grain yield as compared to farmer practices. Farmers earned a net return of Rs. 47510/ ha with B:C ratio of 2.53 over the local cultivar (Rs 34640/ha with 1.60 B:C ratio) increased the productivity of demonstration 10 farmers. Soil and water samples of 40 farmer's field were analysed and advised them to apply nutrients according to the soil health card issued.

Crop production: Total 30 demonstrations were conducted in Maize, Black gram, Sorghum covering 24 ha. During Kharif season 2022, Maize variety DHM-121 was demonstrated at 10 farmers' fields in 8 ha area, which resulted in 18.46 % higher yield as compared to local variety. Farmers earned a net return of Rs. 40810/ ha with B:C ratio of 2.19 over the local cultivar (Rs. 28010/ha with 1.38 B:C ratio). Improved variety of Black gram PU-01 was demonstrated at 10 farmers field in 8 ha area, which resulted in 29.23% higher yield as compared to local variety. Farmers those who have sown the modern variety earned a net return of Rs. 21650/ha with 2.13 B:C ratio in comparison to farmers variety (Rs 16540/ ha with B:C ration 1.66). Double purpose variety of Sorghum CSV15 was demonstrated at 10 farmers' fields in 8 ha area, which resulted in 24.30% higher yield as compared to local variety. Farmers earned a net return of Rs. 34560/ha with 2.35 B:C ratio in comparison to farmers variety (Rs 22635/ ha with B:C ration 1.64).

Suitable intercropping systems under real rainfall situations (maize+blackgram 2:2/3:2) are also demonstrated at 10 farmers' fields in 8 ha area which resulted in 34.49% higher yield as compared

to local variety. Farmers earned a net return of Rs. 46220/ha with 2.25 B:C ratio in comparison to farmers variety (Rs 19450/ ha with B:C ration 1.66) minimizes the loss of single crop failure.

Livestock and Green fodder production: Total 46 demonstrations were conducted, introduction of new fodder crops Napier grass at 10 farmers field (10 kg each demonstration), improved Shelter for animals at 4 farmers, improved poultry breed (60 Chicks Partapdhan) and Goat (Sirohi) breed were demonstrated to livestock farmers under NICRA project as these breeds performed well and gave additional income. Two breeding bucks (Sirohi) provided to farmers play important role to breed improvement. Ten demonstrations of area specific mineral mixture (10kg each) for animal feeding and digestibility of fodder and milk production increased. For improvement of cow breed sex-oriented semen were injected as AI through Animal health department to 10 cattles in the NICRA village.

Institutional Interventions: Various agriculture implements including sprayer, bund former, disc plough and harrow have been purchased for timely completion of agriculture operation in 95.0ha area during the year 2022. This intervention resulted in saving of time (1.5 to 2.5hr/day), 30 to 35% manpower, 8 to 10% diesel and with an increase of 10 to 15% in crop yield.

Custom Hiring Centre: Place finalized for the CHC establishment at newly selected NICRA village, selection of site and planning has been done for the establishment of CHC at newly adopted NICRA village in March 2022 Dholikhera, Bhilwara according to ICAR-CRIDA Hyderabad guidelines. Different agricultural implements (Seed cum fertilizer drill, tractor operated spray machine, Rain Gauge, Wheel hoe and knapsack sprayer) performed very well which earned a revenue of Rs 2550/- by helping 30 farmers for timely completion of agricultural operations over 60 ha area during the year under report.

Rainfall scenario for the year 2022: During the reporting year annual rainfall recorded 840.0 mm; while rainfall received in the month of June, July, August, September and October during the year 2022 was 41, 484.2, 221.2, 52.4, and 41.2 mm, respectively

CONCLUSION

Several successful interventions under NICRA project have been adopted in Dolikhera village in Bhilwara district. Drought tolerant and short duration varieties of Maize (DHM-121), Black gram (PU-01), Sorghum (CSV-15) have been sown in normal rainfall area it gives higher returns. Similarily, under

Impact of contingency measures taken up in the village (Relate the dry spells with crop and their growth stages)

S. No	Dry spell/ heat wave/cold wave/frost (no. of days)	Duration	Crop	Crop stage affected	Intervention taken up*	Number of farmers involved	Impact on crop yields (q/ha)		
							Farmers' practice	Demo	Increase over farmers' practice
1	Dry spell (12 days)	3rd September to 14th September	Maize	Grain filling	Spray KNO_3 @1%	10	20.25	24.55	21.23%
2	Heat wave (4 days)	12th March to 15th March	Mustard	Grain filling	Life saving irrigation given wherever water is available	10	Without life saving irrigation	Light life saving irrigation	11-13%

climate resilient varities of Mustard (PM-30) and Chickpea (GNG-2144) were included. Various agriculture implements intervention resulted in saving of time (1.5 to 2.5hr/day), 30 to 35% manpower, 8 to 10% diesel and with an increase of 10 to 15% in crop yield. Suitable intercropping systems under real rainfall situations (maize+blackgram 2:2/3:2). Farmers earned a net return of Rs. 46220/ha with 2.25 B:C ratio in comparison to farmers variety (Rs. 19450/ ha with B:C ration 1.66) minimizes the loss of single crop failure due to Suitable intercropping systems under real rainfall situations (maize+blackgram 2:2/3:2). Various livestock related interventions viz. animal breed up-gradation, housing, fodder mineral mixture supplementation, vaccination and deworming etc. for increasing productivity. It may be concluded that maximum awareness and capacity building of farmers about the NICRA interventions for reduce agriculture risk and enhanced livelihood.

REFERENCES

Chauhan, N.M.J. 2016. Aptitude of the programme coordinators of Krishi Vigyan Kendras of India. *Indian Research Journal of Extension Education.* **11**(3): 19-24.

NICRA Annual Report, 2022. ICAR-Agricultural Technology Application Research Institute, Zone-II, CAZRI Campus, Jodhpur, Rajasthan.

National Informatics Centre, Meghalaya State Centre.

ICAR-Agricultural Technology Application Research Institute Umiam, Meghalaya-793103. India.

NICRA-ICAR (2018) www.nicra-icar.in/nicra revised/index.php/home1 Date access: 30th January, 2018.

❑❑❑

Recevied : 15.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

PROBLEMS FACED BY FARM WOMEN IN ENTREPRENEURSHIP ACTIVITIES

Pallabi Bora* and Maitrayee Dutta**

ABSTRACT

Women have shattered the confines of traditional homemaking roles, venturing into diverse professions and services. Female entrepreneurs have demonstrated equal business insight to their male counterparts, emerging as judicious and dynamic leaders. Women-owned businesses are rapidly proliferating across economies worldwide. As societal perceptions evolve, the latent entrepreneurial talents of women are being unleashed, bolstering their economic standing. Women enter the business arena propelled by skill, knowledge, and adaptability, seeking financial independence and personal fulfillment. A "Women Entrepreneur" embraces the challenge of entrepreneurship to fulfill personal aspirations and achieve economic autonomy. In this study, an effort was made to explore the challenges encountered by respondents in managing and establishing their enterprises. Data regarding various issues faced by female farm entrepreneurs, were gathered using an open-ended schedule.

INTRODUCTION

Women entrepreneurs are individuals or groups of women who initiate and manage business endeavours. Their roles encompass exploring new business opportunities, taking on risks, introducing innovations, coordinating operations, managing administration, and providing effective leadership across all business facets. The presence of women entrepreneurs is notably on the rise within global economies, reflecting the increasing recognition of women's economic contributions. Factors such as knowledge, skills, and adherence to business principles drive women's participation in entrepreneurial ventures. Push and pull factors empower women to pursue self-sustaining occupations and assert their independence. The concept of women's entrepreneurship is increasingly recognized as a potent solution to address both rural and urban poverty challenges. Women entrepreneurs often embark on entrepreneurial endeavours out of necessity, as they lack alternative avenues to contribute to their family's income (Timmapur *et al.*,2018). Throughout history and persisting today, women have been pivotal in safeguarding essential life support systems like land, water, flora, and fauna. Their contributions include preserving soil health *via* organic recycling and ensuring crop security through the maintenance of diverse varieties and genetic resilience. Women are essential contributors to farming and the enhancement of rural life quality. Unfortunately, societal barriers and gender bias often obscure their significant roles. Research focused on women and agriculture illustrates that workers are categorized according to gender, race, ethnicity, marital status, and citizenship, allowing employers flexibility in production. Agrifood corporations tend to pay women less than men; however, they benefit from the skills and knowledge women bring from their prior experience in small-scale production (Haimid *et al.*, 2016). Moreover, government initiatives frequently overlook women in agriculture, diminishing the potential advantages of programs, particularly in areas such as food production, household income enhancement, nutrition, literacy, poverty alleviation, and population control. Ensuring rural women have equal access to educational opportunities would undoubtedly enhance their performance and emancipate them from marginalized societal statuses (Milan *et al.* 2014). Women-owned businesses remain a minority, and the challenges confronting female entrepreneurs are substantial, often differing significantly from those

*Asstt. Prof., Department of Extension Education, CA, AAU, Jorhat
**Ph.D. Scholar, Department of Extension Education, CA, AAU, Jorhat

encountered by their male counterparts.

Hence, the objective of this study is to comprehend the issues and challenges encountered by farm women in entrepreneurial activities.

RESEARCH METHODOLOGY

Out of 36 administrative districts the present study was conducted in Jorhat district of Assam during 2022-23. The Jorhat district of Assam has an altitude of 80-200 msl with a latitude of 20°10' N - 27°20' N and a longitude of 93°37' E - 93°57' E. The respondents of Jorhat district were selected randomly for the present study. A purposive and random sampling design was followed for selection of the respondent for the present study. A total of 120 farm women engaged in selected entrepreneurial activities as respondents for the study. A total of 15 problems were identified and judged and they were divided in a three point continuum of 'very serious', 'serious', 'not so serious' with a 3 point continuum i.e with scores of 3, 2, 1 respectively. The respondents were interviewed in their local language with the help of an open ended structured schedule. The collected data were properly tabulated and analyzed with the help of suitable statistical techniques such as frequency, percentage, weighted mean and rank. The WMS was calculated by using the following formula:

$$\text{WMS} = \frac{\text{Sum of product of frequnecy and score assigned}}{\text{Total number of respondents}}$$

Where, WMS = Weighted Mean Score

RESULTS AND DISCUSSIONS

It was found that the farm women faced various problems during the entrepreneurial activities. Altogether 15 problems were identified which were documented under the following subheads: Personal problems, Social problems, Technical problems, Marketing problems and Transportation problems.

1. Personal problems: Table 1 reveal that the first and foremost problem expressed by the majority of the respondents were the difficulty in time management (WMS=2.44) and given the rank 1. The probable reason may be due to the demanding nature of farm work, which often requires long hours and unpredictable schedules. Excessive workload was the second problem identified with WMS= 1.82 as perceived by majority of the farm women which may be due to the constant focus on fulfilling their responsibilities on the farm and at home, leaving very little time for self-reflection and attributing it to the challenge of balancing business responsibilities with insufficient social assistance which is similar to the findings as suggested by Kumar *et al.*, 2016 and Singh *et al.*, 2014. Limited risk tolerance was given the rank 3 with WMS=1.75 as perceived by majority of the farm women. The probable reason behind these may be due to factors such as financial constraints, family responsibilities and societal expectations. Additionally women may perceive risks differently and prioritize stability and security over the potential rewards of entrepreneurship. Reluctant to engage with others was the fourth important constraint among the personal problems as perceived by majority of the farm women with WMS= 1.70.

2. Social Problems: Insufficient access to veterinary care was the first most important problem with WMS= 1.66, which resembles the findings given by Rajashree *et al.*, 2019, which is similar to the findings revealed by Jain *et al.*, 2016. Insufficient social assistance was ranked as the first most important problem with WMS= 1.65. The probable reason behind this may be due to a combination of factors such as rural isolation, limited access to resources, and traditional gender roles that prioritize men's work over women's. Lack of family assistance is the third most important problem among the social problems as perceived by the farm women with WMS=1.58.

3. Technical problems: Insufficient training and information accessibility was ranked as the most important problem among the technical problems which was given the rank 1 with WMS=1.55, which is similar to the findings as suggested by Baruah *et al.*, 2024. This may be due to traditional gender roles, limited educational opportunities, cultural norms, and unequal access to resources. These factors can contribute to their exclusion from

Table 1: Problems faced by the farm women through entrepreneurship activities

S.No.	Problems	F	WMS	Rank
1	**Personal problems**			
a.	Difficulty in time management	105	2.44	I
b.	Excessive workload	98	1.82	II
c.	Limited risk tolerance	95	1.75	III
d.	Reluctant to engage with others	92	1.70	IV
2.	**Social problems**			
a.	Insufficient access to veterinary care	85	1.66	I
b.	Insufficient social assistance	87	1.65	II
c.	Lack of family assistance	80	1.58	III
3.	**Technical problems**			
a.	Insufficient training and information accessibility	78	1.55	I
b.	Inadequate grasp of recommended business ventures	75	1.50	II
4.	**Marketing problems**			
a.	Market rivalry	71	1.43	I
b.	Elevated production costs	69	1.38	II
5.	**Transportation problems**			
a.	Inadequate production volume	64	1.34	I
b.	High vehicle hiring expenses	60	1.14	II
c.	Lack of proper road connectivity	53	1.09	III
d.	Restricted mobility	48	1.00	IV

agricultural extension programs and other sources of information. Inadequate grasp of recommended business ventures was ranked as the second most important problem among the technical problem with WMS=1.50

4. Marketing problems: Market rivalry was the most important problem as perceived by the farm women and given the rank 1 with WMS= 1.43, which is similar to the findings as given by Jain *et al.*, 2016. and elevated production costs was the second most important problem with WMS=1.38.

5. Transportation problems: Inadequate production volume was given the first rank with WMS= 1.34. This may be due to various factors such as limited access to resources like land, capital and technology, as well as societal norms that restrict to their participation in decision making. High vehicle hiring expenses was the second most important problem with WMS= 1.14, which is similar to the findings as suggested by Kumar *et al.*, 2016. This may be due to reasons like Farming activities often follow seasonal patterns, with certain times of the year being busier than others. During peak seasons, farm women may need to hire vehicles more frequently to manage increased workloads, leading to higher overall expenses. Lack of proper road connectivity was the third important problem with WMS=1.09. Restricted mobility was the fourth important problem with WMS= 1.00, which is similar to the findings given by Rajashree *et al.*, 2019.

CONCLUSION

The most common problems faced by the respondents were difficulty in time management, reluctance to engage with others, excessive workload etc. Therefore, the government must develop initiatives and resources to alleviate the challenges faced by female entrepreneurs in the agricultural sector of Jorhat district. Also women require backing and support from family members, the government, society, male colleagues, and various other groups. With the appropriate

assistance from these entities, they can integrate into the mainstream of the national rural economy and consequently contribute to rural economic development. It is imperative for the government to devise a plan enabling Indian women entrepreneurs to focus more on empowerment through training, development, and capacity-building programs.

REFERENCES

Baruah, J.J., Bora, P. Chauhan, J.K., Suryawanshi, D., Das, P., & Dutta, M. 2024. Problems Faced by Muga Silkworm Rearers of Assam. *Indian Res. J. Ext. Edu.* **24**(1): 72-74.

Haimid, M. T., Masdek, N. R. M., Rahim, H., & Rahim, A. 2016. Women entrepreneurs in the agriculture sector: Issues and challenges. *Economic and Technology Management Review,* **11**: 53-61.

Jain, A.K., Sharma N.K., & Goyal, T.C., Meena, O.P., and Mishra P. 2016. Constraints Perceived By Stakeholders About Animal Health Delivery Services In Tonk District of Rajasthan. *Ind. J. Extn. Educ. & RD.* **24**: 91-96.

Kumar, S. & Sharma, N. K. 2016. Constraints perceived by the farmers in adoption of recommended coriander Production Technology. *Indian. J. Ext. Educ &R. D,* **24**:166-169.

Meena, K. C., Meena, B. L., Meena, C. B., & Sharma, N. 2020. Problems Faced By The Guava Producers In Sawai Madhopur District Of Rajasthan. *Indian Journal of Extension Education and Rural Development*, **28**: 1.

Milan, R., & Khan, F. 2013. Overview of Agro Business in Uttar Pradesh: With reference to Women Entrepreneurs. *Dynamics of Public Administration*, **30**(2): 174-187.

Rajasree, R., Sharma, F.L., Sisodia, S.S. & B. Upadhyay 2019. Constraints Perceived By the Vegetable Growers In Adoption Of Eco-Friendly Technologies. *Indian Journal of Extension Education and Rural Development.* **27**: 70-74.

Singh, K., Verma, S. R., Sharma, F. L., & Punjabi, N. K. 2014. Constraints and obstacles perceived by mango growers in adoption of scientific mango production technology. *Ind. J. Extn. Educ. & RD.*, **22**: 124-133.

Timmapur, A. N., & Hasalkar, S. 2018. Problems faced by women entrepreneurs in rural areas of northern Karnataka. *International Journal of Home Science,* **4**(1): 270-273.

❑❑❑

Recevied : 07.06.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

SOCIO ECONOMIC IMPORTANCE OF SCREENING SWEET CORN (*Zea may L. ssp. Saccharata*) HYBRID IN UDAIPUR AND BANSWARA REGION FOR BETTER PARENT AND ECONOMIC HETEROSIS

Divya Chouhan*, R.B. Dubey and Preksha Nagar*****

ABSTRACT

The present study was conducted to estimate better parent heterosis and economic heterosis in sweet corn (Zea mays L. Ssp. saccharata) hybrids and to screen out hybrids having high green cob and fodder yield and high TSS content. A total 66 genotypes comprising of 45 sweet corn hybrids, 18 parental lines and 3 standard checks (Priya, Madhuri and Sugar-75) were evaluated in RBD in three different environments (E1 at Instructional Farm, RCA, Udaipur during Kharif-2019, E2 at ARS, Banswara during Kharif-2019 and E3 at Instructional Farm, RCA, Udaipur during Rabi-2019-20) in RBD with three replications for twenty diverse traits. A number of crosses exhibited heterosis for green cob and fodder yield, while only few hybrids reported to exhibit heterosis for TSS and protein content. Maximum and positively significant heterosis over the best check was shown by the sweet corn hybrid L7 x T1 (73.68%) for green cob weight/plant. Highest and positively perceptible economic heterosis for green fodder yield (kg/ha) and TSS content of green grain was observed for the sweet corn hybrids L4 x T2 (86.24%) and L11 x T1 (17.89%) respectively.

INTRODUCTION

Sweet corn is a field corn in an arrested state of development (Erwin, 1951). With high nutritional values, delicate texture and sweet taste within pericarp and endosperm, it is treated as vegetable. The flavor, texture and sweetness of sweet corn kernels is due to presence of some endosperm mutant genes viz., brittle1 (bt1), brittle2 (bt2), shrunken2 (sh2), amylase extender (ae1), dull1 (du1), sugary1 (su1), sugary enhancer (se) and waxy1 (wx1) (Hassan et al., 2019) which alter the starch biosynthesis pathway in endosperm. The most useful mutations among them, sh2, bt1, su1 and se, function either by accumulating sugar at the expense of starch or by changing types and proportions of different polysaccharides stored in endosperm (Boyer and Shannon 1984). Total sugar content in sweet corn at milky stage ranges from 25-30 per cent as compared to 2-5 per cent of normal corn (Sadaiah *et al.,* 2013). Sweet corn breeding aims to improve quality and appearance as well as cob yield however, the genetic base of sweet corn breeding programme is relatively narrow and related inbreds often are crossed to make hybrids that meet the strict market requirements on quality and appearance (Tracy, 1994). The development of superior hybrids is more difficult in sweet corn because the heterotic patterns are poorly defined (Revilla and Tracy, 1997). Generally, all commercial sweet corn hybrids are based on one or more defective endosperm mutants, and production of high quality seed is more difficult for sweet corn than for most types of corn (Tracy, 1994). Sweet corn breeders have often focused on improving quality and ear appearance, rather than on enhancing yield (Tracy, 1993). But emphasis on kernel sweetness along with yield needs to be considered as the major objective of sweet corn improvement. Keeping in view the above facts and the growing demand of sweet corn in the domestic and international market, development of hybrids exhibiting hybrid vigor has been taken as objective of first importance of the research.

*Asstt. Prof., College of Agriculture, Agriculture University, Jodhpur
**Prof. & Dean, RCA, MPUAT, Udaipur
***Assistant professor, B.N. College of Agriculture, Udaipur

RESEARCH METHODOLOGY

Eighteen diverse sweet corn inbred lines, collected from different parts of the country were used as parents (fifteen females and three testers) (Table 1). The crosses were made in line x tester matting design at Instructional Farm, RCA, Udaipur during kharif 2018. Total 66 genotypes comprising of 45 sweet corn hybrids, 18 parental lines and 3 standard checks (Priya, Madhuri and Sugar-75) were evaluated in RBD in three different environments (E1 at Instructional Farm, RCA, Udaipur during Kharif-2019, E2 at ARS, Banswara during Kharif-2019 and E3 at Instructional Farm, RCA, Udaipur during Rabi-2019-20) in RBD with three replications.

Recommended agronomic practices were used to raise a healthy crop. Observations were recorded for 20 yield attributing quantitative and qualitative characters like days to 50 per cent tasseling, days to 50 per cent silking, plant height, ear height, number of leaves/plant, length of leaf, breadth of leaf, days to green cob harvest, number of ear/plant, ear length, ear girth, number of grain rows/ear, number of grains/row, 100 fresh seed weight, green cob weight/ plant, moisture per cent of green grain, green cob yield, green fodder yield, TSS content of green grain and protein content.Ten plants were taken from each row for recording observations from each replication. TSS content was recorded using hand refrectrometer. Estimation was done over the three environments on pooled basis. Heterosis over mid-parent and better parent was calculated with the standard formula. Estimates of standard heterosis was calculated according to Virmani *et al.* (1982) and the significance of heterosis was tested using't' test.

RESULTS AND DISCUSSION

The degree and direction of heterotic response varied not only from character to character but also hybrid to hybrid over the three environments. For characters related to crop duration like days to tasseling, silking and maturity and ear placement, negative heterosis is desirable. For yield characters like green cob yield, green fodder yield and green cob weight/plant and for quality characters like sugar content and protein content, heterosis in positive and significant direction is desirable.

The estimation of standard heterosis was done over the best check Sugar-75 over the three environments for all the characters under study (Table 2). The analysis of data for economic heterosis for green cob yield over the three environments revealed that the sweet corn hybrid L7 x T1 exhibited highest estimates of positively significant standard heterosis against the best check Sugar-75 (71.40%). Maximum and positively significant heterosis over the best check was shown by the sweet corn hybrid L7 x T1 (73.68%) for green cob weight/plant. Highest and positively perceptible economic heterosis for green fodder yield (kg/ha) and TSS content of green grain was observed for the sweet corn hybrids L4 x T2 (86.24%) and L11 x T1 (17.89%) respectively. The present findings were in close agreement with earlier findings of Dagla et al. (2014) and Kumari *et al.*

Table 1. List of genotypes used

S. No	Symbol	Pedigree	S. No	Symbol	Pedigree
1.	L_1	SC-7-2-1-2-6-1	10.	L_{10}	BAJ-SC-17-2
2.	L_2	SC-18728	11.	L_{11}	BAJ-SC-17-1
3.	L_3	BAJ-SC-17-6	12.	L_{12}	DMSC-28
4.	L_4	BAJ-SC-17-10	13.	L_{13}	Mas Madu (sh2 sh2)
5.	L_5	BAJ-SC-17-12	14.	L_{14}	MRCSC-12
6.	L_6	BAJ-SC-17-9	15.	L_{15}	SC-33
7.	L_7	BAJ-SC-17-11	16.	T_1	SC-35
8.	L_8	BAJ-SC-17-8	17.	T_2	SC-32
9.	L_9	BAJ-SC-17-4	18.	T_3	DMRSC-1

Table 2. Heterosis, better parent heterosis and economic heterosis for sweet corn hybrids for green fodder yield, TSS content of green grain and green cob yield

S. No.	Crosses	Heterosis, better parent heterosis and economic heterosis for sweet corn hybrids								
		Green fodder yield (kg ha^{-1})			TSS content of green grain (%)			Green cob yield (kg ha^{-1})		
		Heterosis	Better parent heterosis	E. Heterosis	Heterosis	Better parent heterosis	E. Heterosis	Heterosis	Better parent heterosis	E. Heterosis
1	L_1 X T_1	154.26**	103.38**	29.37**	13.27**	0.99	10.47*	146**	92.19**	1.51
2	L_2 X T_1	119.09**	87.44**	19.23**	7.96**	-4.51*	4.51	146.03**	142.88**	28.28**
3	L_3 X T_1	200.97**	182.29**	79.57**	6.51**	-1.89	7.35	219.18**	163.91**	39.39**
4	L_4 X T_1	66.17**	61.68**	2.85	-5.68**	-11.06**	-2.7	59.31**	26.31**	13.91*
5	L_5 X T_1	66.78**	26.76**	-19.37**	5.26*	-0.63	8.74*	93.08**	72.99**	-8.63
6	L_6 X T_1	60.9**	34.95**	-14.15*	-2.27	-2.82	6.31	94.21**	84.33**	-2.64
7	L_7 X T_1	223.38**	150.73**	59.49**	13.97**	3.73	13.52**	241.52**	224.52**	71.4**
8	L_8 X T_1	17.95**	3.73	-34.02**	-3.99*	-5*	3.95	192.02**	124.47**	18.56**
9	L_9 X T_1	88.37**	60.63**	44.84**	17.99**	-0.21	9.15*	54.16**	9.04**	38.92**
10	L_{10} XT_1	45.23**	33.84**	0.99	-0.86	-2.75	6.38	105.95**	76.58**	30.47**
11	L_{11} XT_1	132.3**	122.23**	41.36**	9.4**	7.75**	17.89**	98.32**	68.95**	26.78**
12	L_{12} XT_1	217.87**	151.19**	59.79**	23.59**	5.35*	15.26**	162.82**	153.18**	33.72**
13	L_{13} XT_1	172.3**	168.48**	75.71**	7.4**	-7.46**	1.25	123.21**	99.66**	33.66**
14	L_{14} XT_1	65.3**	57.17**	10.89	11.38**	-2.11	7.07	128.69**	123.16**	23.85**
15	L_{15} XT_1	-31.26**	-44.13**	-64.46**	-11.23**	-11.54**	-2.5	-26.47**	-38.06**	-67.29**
16	L_1 X T_2	139.26**	101.08**	12.68*	6.58**	4.12	-6.45	148.52**	91.9**	4.75
17	L_2 X T_2	155.14**	130.53**	29.19**	6.38*	3	-7.49	153.41**	146.18**	34.37**
18	L_3 X T_2	132.06**	131.39**	29.67**	-2.12	-3.34	-10.96*	197.22**	142.62**	32.43**
19	L_4 X T_2	220.53**	209.52**	86.24**	-12.05**	-15.26**	-17.89**	46.3**	17.43**	5.9
20	L_5 X T_2	223.51**	157.24**	44.16**	17.59**	13.16**	9.92*	180.36**	147.61**	35.15**
21	L_6 X T_2	-20.95**	-30.08**	-60.82**	-6.61**	-14.53**	-7.56	-19.34**	-24.62**	-58.85**
22	L_7 X T_2	146.77**	100.52**	12.37*	21.32**	21.27**	8.95*	166.74**	149.58**	36.22**
23	L_8 X T_2	91.1**	77.85**	-0.33	-5.95**	-13.53**	-7.42	225.45**	147.33**	35**
24	L_9 X T_2	10.55**	-10.37**	-19.19**	20.11**	10.63**	-0.62	18.21**	-15.57**	7.57
25	L_{10} XT_2	71.37**	49.32**	12.67*	0.87	-6.52**	-1.6	30.69**	13.62*	-16.05*

continue...

S. No.	Crosses	Heterosis, better parent heterosis and economic heterosis for sweet corn hybrids								
		Green fodder yield (kg ha^{-1})			TSS content of green grain (%)			Green cob yield (kg ha^{-1})		
		Heterosis	Better parent heterosis	E. Heterosis	Heterosis	Better parent heterosis	E. Heterosis	Heterosis	Better parent heterosis	E. Heterosis
26	L_{11} X T_2	76.47**	73.35**	0.71	7.59**	-0.65	5.41	91.05**	65.01**	23.82**
27	L_{12} X T_2	161.2**	116.65**	21.41**	19.34**	10.89**	-0.35	130.51**	118.6**	19.32**
28	L_{13} X T_2	60.57**	49.03**	-2.47	23.03**	15.69**	3.95	77.51**	61.13**	7.86
29	L_{14} X T_2	72.2**	54.49**	9	28.46**	23.5**	10.96*	82.9**	81.39**	0.67
30	L_{15} X T_2	-3.22	-17.24**	-53.62**	-14.41**	-22.31**	-14.42**	35.8**	12.89	-38.38**
31	L_1 X T_3	274.98**	244.47**	31.43**	24.14**	16.93**	13.31**	321.68**	246.78**	3.04
32	L_2 X T_3	235.77**	186.46**	29.57**	22.81**	14.71**	11.17**	260.22**	147.15**	27.2**
33	L_3 X T_3	173.26**	114.97**	19.77**	8.72**	6.04*	2.77	233.66**	159.4**	-10.44
34	L_4 X T_3	40.71**	7.71	-35.19**	0.79	0.79	-2.29	109.08**	26.74**	14.3*
35	L_5 X T_3	146.46**	142.23**	-19.87**	8.14**	8.01**	4.92	133.19**	70**	-28.89**
36	L_6 X T_3	163.56**	129.47**	-1.11	-8.64**	-13.39**	-6.31	204.16**	113.5**	1.28
37	L_7 X T_3	233.46**	218.77**	11.67*	4.58*	0.72	-2.36	307.6**	185.9**	35.97**
38	L_8 X T_3	184.81**	136.65**	14.23*	-8.23**	-12.59**	-6.38	354.12**	280.33**	7.94
39	L_9 X T_3	31.9**	-10.68**	-19.47**	16.52**	3.74	0.55	19.67**	-31.17**	-12.3
40	L_{10} X T_3	-23.38**	-45.47**	-58.86**	12.5**	8.05**	13.73**	14.14	-28.13**	-46.9**
41	L_{11} X T_3	147.26**	91.61**	11.31	6.34**	1.74	7.98	123.48**	40.27**	5.26
42	L_{12} X T_3	95.96**	82.75**	-32.52**	-1.55	-11.61**	-14.36**	183.82**	97.46**	-3.36
43	L_{13} X T_3	72.08**	28.04**	-16.21**	21.4**	10.25**	6.87	188.63**	85.62**	24.26**
44	L_{14} X T_3	107.2**	50.51**	6.19	4.46	-3.1	-6.1	157.77**	73.37**	-3.78
45	L_{15} X T_3	52.44**	37.4**	-45.31**	-10.79**	-16.15**	-7.63	192.12**	123.43**	-19.2**
46	S.E.Diff.	573.62	662.36	-	0.31	0.36	-	380.61	439.49	-
47	CD 5%	1127.94	1302.44	3196.32	0.61	0.71	1.73	748.42	864.2	2098.92
48	CD 1%	1485.17	1714.92	4208.12	0.8	0.93	2.28	985.44	1137.89	2763.34
					*. ** significant at 5 and 1%, respectively					

(2018). None of the sweet corn hybrids were reported to exhibit significant economic heterosis in required direction for the characters days to 50 per cent tasseling, plant height, days to green cob harvest, ear girth and protein content over the three environments against the best check Sugar-75. Estimates for better parent heterosis revealed that the hybrid L8 x T3 exhibited maximum positively perceptible heterosis over the better parent for green cob weight/plant (268.63%) and green cob yield (280.33%). For TSS content of green grain, the hybrid L14 x T2 (23.50%) exhibited maximum heterosis over the better parent in significantly positive direction. None of the sweet corn hybrids were reported to exhibit significant better parent heterosis over the environments for protein content. Hybrid L1 x T3 showed highest and significant value for better parent heterosis in positive direction for green fodder yield (244.47%) and ear length (96.43%). The results were in conformity with the earlier findings of Ruswandi et al. (2015), Wahba et al. (2016), Bharti (2017) and Mahato (2018).

CONCLUSION

Sweet corn cobs are tender, sweet in taste and thus its cultivation is most remunerative. Therefore, cultivation and demand of sweet corn is increasing in India and in the international market. Thus, increasing attention is now being paid to explore potential of sweet corn in India. During this research the batter parents and hybrid selected were handed over to PI, IACRP on maize for further testing and using material for development of sweet corn hybrids which in turn improve the socio economic condition of farmers

REFERENCES

Bharti, B. 2017. Heterosis, combining ability and stability in quality protein maize (Zea mays L.) hybrids. Ph.D. (GPB) Thesis, Maharana Pratap University of Agriculture and Technology, Udaipur.

Boyer C. D. and Shannon J. C. 1984. The use of endosperm genes for sweet corn improvement. *Plant Breeding Reviews*, **1**:193-161.

Dagla, M. C., Gadag, R. N., Sharma, O. P. and Kumar, N. 2014. Estimation of heterosis for grain yield and quality traits in sweet corn (Zea mays L. Ssp sacharata). *Electronic Journal of Plant Breeding,* **5**(4): 775-780.

Erwin, A. T. 1951. Sweet corn- mutant or historic species? *Economic Botany,* **5**(3): 302- 306.

Kumari, R., Singh, A. K. and Suman, S. 2018. Quantitative studies on heterosis and inbreeding depression in maize (Zea mays L.). *Journal of Applied and Natural Science,* **10**(1): 64-69.

Mahato, A. 2018. Genetic analysis of yield and quality traits in sweetcorn (Zea mays Ssp saccharata). Ph.D., Thesis, GPB, BHU, Varanasi.

Revilla, P. and Tracy, W. F. 1997. Heterotic patterns among open pollinated sweet corn cultivars. *Journal of American Society of Horticulture Science*, **122**: 319-324.

Tracy, W. F. 1993. Sweet corn. In: G. Kalloo and B. O. Bergh (Eds.) Genetic improvement of vegetable crops. Pergamon. Oxford. U. K, 777-807.

Tracy, W. F. 1994. Sweet corn. In: A. R. Haullauer (ed.) Specialty types of maize. CRC Press, Boca Raton, Fla, 147-187.

Virmani, S. S., Aquino, R. O. and Khush, G. S. 1982. Heterosis breeding in rice (Oryza sativa L.). Theory of Applied. *Genetics*, **63**: 373-380.

❑❑❑

Recevied : 12.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

PARTICIPATION OF TRIBAL FARM WOMEN IN DECISION MAKING PROCESS RELATED TO FARM AND HOME ACTIVITIES IN SOUTHERN RAJASTHAN

Pratibha Meena*, S.S. Sisodia, Rajeev Bairathi*** and G.L. Meena******

ABSTRACT

Tribal are the marginalized community in our society and in tribal women are more marginalized. For development as a whole their upliftment in the society is must. The study regarding participation of tribal farm women in the decision-making process related to farm and home activities was conducted in fully tribal districts. Dungarpur tehsil from Dungarpur district and kushalgarh tehsil from Banswara district were selected for the study. It was observed that out of 120 respondents, 70.00% have medium level participation in decision-making process related to farm activities, 16.67 per cent of respondents were having high level of participation in decision-making process related to farm activities and 13.33 per cent of respondents were having low level of participation in decision-making process related to farm activities. Further observed that majority of the respondents (65.00 %) have medium level participation in decision-making process related to home activities 18.33 per cent of respondents were having low level of participation in decision-making process related to home activities and 16.67 per cent of respondents were having high level of participation in decision-making process related to home activities.

INTRODUCTION

Tribal population in India is 104.30 million, which constitute 8.60 per cent of tribal population. There are about 449 tribes and sub tribes in different parts of India. The states of Madhya Pradesh, Maharashtra, Orissa, Gujarat, Rajasthan, Jharkhand, Chhattisgarh, Andhra Pradesh, West Bengal and Karnataka are the states having maximum population of Schedule Tribe. Assam, Meghalaya, Nagaland, Jammu & Kashmir, Tripura, Mizoram, Bihar, Manipur, Arunachal Pradesh and Tamil Nadu account for another 15.30 per cent of the total scheduled tribe population. This population lives in various parts of the country, some of them are being from Uttar Pradesh, Assam, Rajasthan and Maharashtra.

In tribal communities, the role of women is substantial and crucial. They constitute about half the total population but in tribal society women are more important than in other social groups, because they work harder, and the family economy and management depend on them. Still their involvement in the main stream of the society is so less and neglected.

For Tribal Women upliftment a lot of government sponsored schemes for their upliftment is introduced either by state or by central govt. like Adivasi mahila shashaktikaran yojana, schedule tribes' development fund and many more but not any single schemes for tribal development could reach their desired target. A lot of efforts had been in the field of tribal development but desired results are yet to be obtained. Lack of education, participation, social awareness illiteracy are the main hinderances for their development.

RESEARCH METHODOLOGY

This study was conducted in Dungarpur tehsil of Dungarpur district and Kushalgarh tehsil of Banswara district. These districts were selected due to the fact that these are the fully tribal districts and come under the jurisdiction of MPUAT. Using Simple random sampling 15 respondents from 8

*M.Sc. Scholar, Department of Extension Education, RCA, MPUAT, Udaipur (Raj.)
**Head, Department of Extension Education, RCA, MPUAT, Udaipur (Raj.)
***Professor, Directorate of Extension Education, RCA, MPUAT, Udaipur (Raj.)
****Associate Professor, Department of Agricultural Economics, RCA, MPUAT, Udaipur (Raj.)

selected villages from each selecetd tehsil, thus total of 120 respondents were studied.

RESULTS AND DISCUSSION

Distribution of respondents on the basis of participation in decision-making process related to farm activity are given in Table 1.

To get an insight of participation in decision-making process related to farm activities the respondents were grouped into (i) high (ii) medium and (iii) low

The information in Table 1 indicated that majority of the respondents (70.00 %) had medium level of participation in decision-making process related to farm activities, 16.67 per cent of respondents were having high level of participation, while only 13.33 per cent of respondents were having low level of participation in decision-making process related to farm activities.

Activity wise participation in decision-making process related to farm activities are given in Table 2.

Aspect-wise participation in decision-making process related to farm activities was calculated to obtain a clear picture of participation of farm women in decision-making process related to farm activities of the respondents.

Table 1: Distribution of respondents on the basis of participation in decision-making process related to farm activities

(n=120)

Sr. No.	Participation in decision-making process related to farm activities	f	%
1.	Low (<15.08)	16	13.33
2.	Medium (15.08-30.21)	84	70.00
3.	High (>30.21)	20	16.67
	Total	120	100

f = frequency, % = per cent, Mean = 22.65, S.D. = 7.56

The information in Table 2 reveals that "Selling of milk and milk products" ranked 1st with MPS 87.08. Further it was found that "management of cattle" stands at rank 2nd with MPS 85.41. "Manure management" ranked 3rd with MPS of 79.58, "use of own seeds" stands at rank 4th with

Table 2: Activity wise participation in decision-making process related to farm activities

(n=120)

Sr. No.	Activity	MPS	RANK
1.	Selection of Seed	65.83	XI
2.	Introducing a new crop variety	50.41	XVI
3.	Borrowing money for farm operations	51.25	XV
4.	Buying farm equipment/machinery	47.91	XVII
5.	Quantity and type of fertilizers to be used on the farm	53.33	XIV
6.	Selection of crops (vegetables/fruits/flowers/cereals) as per season	70.41	VII
7.	Manure preparation	79.58	III
8.	Use of own seeds	77.08	IV
9.	Hiring farm labourers	53.75	XIII
10.	Adoption of new farm practices	68.75	IX
11.	Deciding about area under each crop	69.58	VIII
12	Using plant protection measures	67.08	X
13.	Selling surplus farm produceand by product	74.58	V
14.	Buying/selling land	59.58	XII
15.	Management of cattle	85.41	II
16.	Selling of milk and milk products	87.08	I
17.	Buying and selling Animals	70.83	VI

MPS=Mean Per cent Score

MPS 77.08. "Selling surplus farm produce and by product", "Buying and selling Animals" and "Selection of crops (vegetables/fruits/flowers/ cereals) as per season" ranked 5th, 6th and 7th with MPS 74.58, 70.83 and 70.41 respectively.

Further examination of table indicates that "Deciding about area under each crop" ranked 8th with MPS 69.58, "Adoption of new farm practices" ranked 9th with MPS 68.75, "Using plant protection measures" ranked 10th with MPS 67.08, "Selection of Seed" ranks 11th with MPS 65.83, "Buying/ selling land" ranked 12th with MPS 59.58, "Hiring farm labourers" ranked 13th with MPS 53.75, "Quantity and type of fertilizers to be used on the farm" ranked 14th with MPS 53.33, "Borrowing money for farm operations" ranked 15th with MPS 51.25, "Introducing a new crop variety" ranked 16th with MPS 50.41 and lastly "Buying farm equipment/ machinery" ranked 17th with MPS 47.91.

Distribution of respondents on the basis of participation in decision-making process related to home activity is given in Table 3.

To get an insight of participation in decision-making process related to home activities the respondents were grouped into (i) high (ii) medium (iii) low. The information in table 3 indicated that majority of the respondents (65.00 %) have medium level participation in decision-making process related to home activities, 18.33 per cent of respondents were having low level of participation in decision-making process related to home activities and 16.67 per cent of respondents were having high level of participation in decision-making process related to home activities.

Table 3: Distribution of respondents on the basis of participation in decision-making process related to home activities

(n=120)

Sr. No.	Category	f	%
1.	Low (<11.13)	22	18.33
2.	Medium (11.13-24.54)	78	65.00
3.	High (>24.54)	20	16.67
		120	100.00

f = frequency, % = per cent, Mean = 17.84, S.D. = 6.70

Activity wise participation in decision-making process related to home activities is given in Table 4.

Aspect-wise participation in decision-making process related to home activities was calculated to obtain a clear picture of participation of farm women in decision-making process related to home activities of the respondents. Here in Table 4 different activities of decision-making process related to home are given with their Mean Percent Score and rank. The information in Table 4 reveals that "Decoration of house" ranked 1st in participation in decision-making process related to home activities with a MPS of 79.58.

Further examination of Table 4 explains that "Selection and preparation of food" stands at rank 2nd with a MPS of 76.66. Further the aspect "Construction of new house" ranked 3rd with a mean percent score of 71.25. Table 4 also shows that "Deciding manner of saving" stands at rank 4th with a MPS of 66.66., Data of Table 4 reveal that "Household repairs", "Purchasing household articles"and "Attending social gatherings in the village" ranked 5th, 6th and 7th with a MPS of 66.25, 65.83 and 65.41, respectively.

Further examining of data in Table 4 found that "Construction of additional rooms" ranked 8th with a MPS of 65.00 and aspect "Attending religious ceremonies/functions" ranked 9th with a mean per cent score of 62.08. The "Settling marriage of children" stands at rank 10th with a MPS of 60.00.

The data of Table 4 further indicate that the aspect "Borrowing and giving loans" and "New borewell" stands at rank 11th and 12th respectively with a respective mean per cent score of 58.33 and 55.00. Lastly the "Deciding occupation of children" and "Deciding education of children" ranked 13th and 14th with mean percent score of 50.41 and 49.58, respectively.

Category wise overall participation in decision-making process is given in Table 5.

Category wise participation in decision-making process was calculated to obtain a clear picture in

Table 4: Activity wise participation in decision-making process related to home activity

(n=120)

Sr. No.	Participation in decision-making process related to home activities	MPS	RANK
1.	Construction of new house	71.25	III
2.	Construction of additional rooms	65.00	VIII
3.	Household repairs	65.83	V
4.	Decoration of house	79.58	I
5.	Deciding education of children	49.58	XIV
6.	Deciding occupation of children	50.41	XIII
7.	Settling marriage of children	60.00	X
8.	Purchasing household articles	65.83	V
9.	Selection and preparation of food.	76.66	II
10.	Borrowing and giving loans	58.33	XI
11.	Deciding manner of saving	66.66	IV
12	Attending religious ceremonies/functions	62.08	IX
13.	Attending social gatherings in the village	65.41	VII
14.	New borewell	55.00	XII

MPS = Mean Percent Score

Table 5: Category wise overall participation in decision-making process

Sr. No.	Category wise participation in overall decision-making process	MPS	RANK
1.	Decision-making process related to farm management	66.61	I
2.	Decision-making processrelated to home management	63.69	II

decision-making process by the respondents. In order to rank activities, the mean percent score of each category was also determined. The outcome of the experiment is shown in the table 5.

CONCLUSION

The study indicated that 70.00 per cent of the respondents belongs to medium level participation in decision-making process related to farm activities and selling of Milk and Milk products is the most favored aspect with Mean Per cent Score of 87.08. Further it was observed that 65.00 per cent of the respondents found to had medium level participation in decision-making process related to home activities and 18.33 per cent had low level of participation in decision-making process related to home activities. Decoration of house is the most favoured aspect with a Mean Per cent Score of 79.58. On the basis of results it is recommended that education gap among tribal should be covered and that will ultimately lead to upliftment of the tribal.

Agencies working for tribal development should focuses on increasing the participation of them in mainstream of the society rather than just providing them financial assistance.

REFERENCES

Boncales, P., Misamis, L., and Rosello, J. 2021. Women in agriculture: Tracking the farm women's participation in Agricultural Operations and allied activities in Lazi, Siquijor. *International Journal of Social Science Research*, **3**(4): 155-167.

Bora, P., Mishra, P. and Das, P. 2023. Production Decision Making Pattern of Gender in Tribal

Farming Community of Assam. *Indian Research Journal of Extension Education* **23**(2): 125-130.

Das, G. 2023. A Study on Decision Making Ability of The Rural Women on Farm Management. *Indian Education*, **23**(1): 30-33.

Patil, A. L., Thorat, K. S. and Shinde, V. B. 2023. Role of Women in Farm Decision-Making. *The Pharma Innovation Journal*, **12**(12): 1974-1978.

Sahu, A., Rawat, M., and Kumar, A. 2023 Study on Participation of Farm Women in Agricultural Activities. *Technoframe-A Journal of Multidisciplinary Advance research*, **12**(2): 35-38.

❑❑❑

Recevied : 20.08.2024
Accepted : 30.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

CONSTRUCTION OF KNOWLEDGE TEST TO MEASURE ECO-FRIENDLY MANAGEMENT PRACTICES OF MANGO

R.P. Mahadik*, N.K. Punjabi, F.L. Sharma*** and B. Upadhyay******

ABSTRACT

Need based Knowledge scale was developed with objective to determine a scale to measure knowledge of eco-friendly management practices of mango. The steps followed in construction and standardization of scale by using relevancy test, reliability and validity test. The knowledge scale constructed in the present study can be used by future researchers in conducting impact and evaluation studies on eco-friendly management practices/ technologies of mango and related crops.

INTRODUCTION

Eco-friendly management practices are the organic in nature. It does not cause any damage to air, water and soil, safe to human beings and are free from causing environmental pollution. This technological practices are dynamic because they differ considerably from region to region depending on soil type, rainfall, topography etc. and are often modified by the local farmers.

The technique used by rural people if well documented can make an important contribution to development. Documentary help in search for solution to many problems and also help to reduce the erosion of traditional technology. It can be moulded with scientific knowledge to boost productivity and living standards. These technologies are easily diffused and adopted by the mango growers as those were development by them through continuous experience.

Need based and location specific eco-friendly management practices and their full use at client system is vital for maximization of agricultural production. Still there is exists a wide gap between the technology available at the research station, its knowledge and adoption at the farmers level. Keeping this in view the need based knowledge scale was developed with following objective.

1. To construct a scale to measure knowledge of eco-friendly management practices of mango.

RESEARCH METHODOLOGY

A scale was developed to measure the knowledge of eco-friendly management practices of mango.

The schedule was developed with a view to know the existing knowledge of respondents about eco-friendly mango cultivation practices. For this purpose, all the statements related to knowledge of eco-friendly mango cultivation practices were listed with the help of experts. These items were again discussed with the concerned subject matter specialists, extension workers and experienced mango orchardists to ensure that no important aspect or practices had been left out of the list. The following criteria were followed in the selection of the items:

a) Knowledge item should promote thinking rather than simple memorization.

b) Item should be evaluative and be able to differentiate the well informed from the poorly informed respondents.

On the basis of the advice received from the experts, the schedule was divided into eleven major aspects viz., soil and climate, variety, planting and after care, irrigation management, intercropping, manure and fertilizers, plant protection, nutritional deficiency and physiological disorder management, harvesting, grading, packaging & transport and post- harvest management for pest and diseases.

*Assistant Professor Dr. B.S. Konkan Krishi Vidyapeeeth, Dapoli
**Ex. Head, Department of Extension Education, RCA, Udaipur
***Ex. Head, Department of Extension Education, RCA, Udaipur
****Ex. Head and Professor Department of Statistics, RCA, Udaipur

The final schedule contained of 39 questions covering all aspects of eco-friendly management practices of mango. The total maximum possible knowledge score was 60. Prior to administrating it to the sampled respondents, the knowledge schedule was pre-tested with 30 respondents not included in the study sample for clarity of language, coverage of subject matter and to minimize the redundancy and doubts. The suggestions so received were incorporated accordingly.

Reliability of the test

According to Karlinger (1967) "Reliability is the accuracy or precision of measuring instrument." Here test-retest method was used for measuring the reliability of knowledge test. The test was administered to the same group of respondents numbering 30 at an interval of 15 days. The agreement between the scores was obtained from the two applications of same scale by means of correlation coefficient (rtt), which is called as coefficient of dependability. The correlation coefficient (rtt) calculated was 0.84, which was significant at 1 per cent level of significance indicating that the scale is reliable.

Validity of the test

The validity of the test depends upon the accuracy with which it measures what it is expected to measure. To find out the validity of the test, content and construct validity of the test was examined. Statements were properly selected to cover the whole universe of the content of the knowledge. The selected statements were presented to a panel of subject matter specialists associated with mango cultivation to find out the jury validity. The experts rated the test as valid for measuring the knowledge of respondents about mango cultivation practices. Only those items which secured 80-85 per cent concurrence of expert's opinion were included in the final test.

RESULT AND DISCUSSION

The disclosed knowledge test of eco-friendly management practices of mango are presented below:

CONCLUSIONS

The know knowledge level of eco-friendly management practices mango, a test to measure the knowledge of eco- friendly management

Answer the following questions about your knowledge regarding eco-friendly management practices of mango. Each questions have its weightage responding to question. Please tick mark (✓) for each answer or response.

Sl. No	Item wise question and answer	Mark allotted
A.	**Soil and Climate**	
1.	In which type of soil the mango cultivation is done in Konkan region ? - Lateratic soil	(1)
2.	State the soil pH suitable for best mango cultivation ? - 5.5 to 7.5	(1)
B.	**Variety**	
3.	Name any three variety recommended for Konkan region. - Alphanso / Ratna/ Sindhu /Suvarna / Konkan Ruchi / Konkan Raja	(3)
4.	List out two characteristics of the Alphonso. - Pleasent taste (delicious) - Attractive colour - Fresh and smelling deliciouly even after processing - Good keeping quality	(2)
5.	List out two drawbacks of Alphonso - Alternate bearing - Spongy tissue	(2)

C.	**Planting and after care**	
6.	What is the recommended planting distance for mango graft? - 10 X 10 mt.	(1)
7.	What is the recommended size of pit for planting mango graft ? - 1 X 1 mt.	(1)
8.	Which type of bamboo shape is given to young plant for support? 'H' shape	(1)
9.	How many years the inflorence is to be removed from graft ? - First four year	(1)
D.	**Irrigation Management**	
10.	Which is the appropriate interval is to be followed for one year mango graft in different season ? - Winter season – 7 days (once in week) - Summer season – 3 days (Twice in week)	(2)
11.	Name the recommended methods of irrigation for young plants. - Ring method - Drip method	(2)
E.	**Intercropping**	
12.	Which crops are recommended as intercrop in mango orchard during initial stage ? - Vegetable crops – Radish, Ridge gourd, Tomato, Wali, Brinjal, Bitter gourd - Tuber crops – Sweet potato and as per season - Turmeric and tapioca in Kharif season.	(3)
F.	**Manures and Fertilizers**	
13.	How much quantity of manures should be applied in pit while planting mango graft in the orchard ? - 20 kg cow dung/ compost / organic fertilizer	(1)
14.	What is the recommended method of manures and fertilizer application in mango? - Ring method (As per size of canopy)	(1)
15.	Do you know the exact time of manures and fertilizer application to mango in Konkan? - On onset of monsoon	(1)
16.	Give any three names of organic fertilizers which are used for mango. - Compost / cow dung / fish meal/ bone meal/ cow urine / vermicompost etc.	(3)
17.	State the names of two plants used as green manures for mango crop ? - Glyricidia (*Glyricidia sepium*) and Dhaincha (*Sesbania aculata*)	(2)
18.	How many per cent of nutrients are available from recycling of litter in the mango orchard itself ? - 10 %	(1)
19.	Is cow urine is good for maximizing the yield of the mango? - - - Yes	(1)
20.	To maximize the yield of mango how cow urine is used ? - 3 to 6 sprays of weekly interval of cow urine 55 % concentration when fruit is in marble size	(2)
G.	**Plant protection**	
21.	State any two major pest and diseases of mango. -Pest – Mango hopper, Fruit fly , Mango stem borer etc. -Diseases – Powdery mildew, Bacterial blight, Sooty mould etc.	(4)

22.	List out any two natural predators in mango orchard. ----- Spiders / birds / red ants	(1)
23.	State the name of fungus used along with its dose for control of mango hopper and powdery mildew. - *Verticillium lecanii* (2.5 gm/lit water)	(2)
24.	What is the name of trap recommended by Dr. BSKKV, Dapoli for control of fruit fly ? Also give its proportion. - Rakshak trap (10 traps /ha)	(2)
25.	State the attractant used in the trap. - Methyl Eugenol	(1)
26.	List out any two susceptible varieties for mango stone weevil. - Neelam - Totapuri	(2)
27.	State the name of Loranthus cutter developed by Dr. BSKKV, Dapoli. - Amar Loranthus cutter	(1)
28.	Which is the fungicides generally used for control of many diseases/ as preventive measure ? - Bordeaux mixture	(1)
H.	**Nutritional deficiency and physiological disorder**	
29.	Give any two types of physiological disorder. - Spongy tissue / fruit clustering / black tip / internal necrosis	(2)
30.	Which green manure is used for controlling salt injury ? - Dhaincha (*Sesbania aculata*)	(1)
I.	**Harvesting**	
31.	What is the proper stage of mango fruit harvesting ? - 85 % maturity to fruit	(1)
32	State the name of the mango harvester recommended for Dr. BSKKV, Dapoli. - 'Nutan' mango harvester	(1)
33.	What is the T.S.S. of raw mango fruit? 8 – 10 %	(1)
34.	Which techniques are used to avoid brush injury? - Remove the left over ratches - Put dry leaf between the fruits. - Cover the fruit with tissue paper.	(2)J
J.	**Grading, packaging and transport**	
35.	Which criteria is used for grading mango fruit ? - Size and wt.	(1)
36.	What kind of material is used for packaging of mango fruit ? - CFB boxes	(1)
37.	What is ideal time for mango fruit transportation ? - Night hrs.	(1)
K.	**Post-harvest management for pest and diseases**	
38.	How many degree temperature is used for Hot water treatment for mango fruit ? - 52 ^{0} C for 5-10 minutes.	(2)
39.	At what degree temperature mango fruit is pre cool before storage? - 13-15 ^{0} C	(1)

practices of mango has been presented in this paper. The knowledge scale constructed in the present study can be used by future researchers in conducting impact and evaluation studies on eco-friendly management practices/ technologies of mango and related crops.

REFERENCES

Kadam, J.R. 2006. A study on the adoption behaviour of the commercial mango growers with reference to commercial mango production technology, Ph.D. (Ag.) thesis submitted to Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli. (M.S.).

Kesarkar, S., 2010. Cashewnut cultivation in Goa state with special reference to organic cultivation practices. Ph.D. (Ag.) thesis submitted to Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.).

G.L. Ray and Sagar Mondal, Research methods in social sciences and extension education. Kalyani Publisher.

❑❑❑

Recevied : 04.06.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

ADOPTION OF IMPROVED DAIRY CATTLE PRACTICES BY FARM WOMEN

Meenal Tripathi*

ABSTRACT

women in rural areas performing household and agriculture work have been traditionally and predominantly engaged in animal husbandry and dairy activities. Animal husbandry in rural areas is generally the job of women. Therefore, it is important to equip them with scientific knowledge regarding dairy cattle management practices to enable rural women to adopt required technologies for increasing milk production. Therefore, the present study entitled "Adoption of dairy cattle management practices by rural women " was taken with the objective to find out the knowledge of improved dairy cattle management practices by rural women. The study was conducted in Girwa tehsil of Udaipur district of Rajasthan. The sample consisted of 100 rural women from four villages of Girwa tehsil. Personal interview technique was used for collecting data from the respondents. Frequency, percentage and mean percent score were used for analysis of data. Findings of the study revealed that the respondents had average level of adoption of improved dairy cattle management practices as overall MPS was 41.30 per cent. Majority of the respondents were found in high adoption category in management (54.36MPS) and feeding (48.09MPS), and least in breeding (35.84MPS) and health care (15.75MPS) component.

INTRODUCTION

Animal husbandry has always been a major concern in the Indian economy along with agriculture. The credit of growth in the livestock sector goes to women. Rural women besides performing household and agriculture work have been traditionally and predominantly engaged in animal husbandry and dairy activities. Therefore, it is important to equip them with scientific knowledge regarding dairy cattle management practices to enable rural women to adopt required technologies for increasing milk production. The present study attempt to highlight adoption of rural women regarding improved dairy cattle management practice.

Dairy cattle management practices cover a broad area of activities like breeding, feeding, healthcare and management. Contribution of women in these dairy cattle management practices is very significant, however due to illiteracy and lack of knowledge about improved practices. They are still using traditional practices in dairy cattle management. So it is important to educate women regarding improved dairy cattle management practices to enable them to adopt required technologies for increasing milk production. Therefore, the present study has been taken up with the objective to find out the adoption of improved dairy cattle management practices.

RESEARCH AND METHODOLOGY

The present study was conducted in Udaipur district of Rajasthan state. The district has total 10 tehsils, out of which one tehsil i.e. Girwa was selected purposively. From the identified tehsil, 4 villages falling within a radius of 20 kms from each direction of the tehsil headquarter were selected. Four practices were considered for study i.e. breeding, feeding, healthcare and management of cattle. Sample consisted of 100 rural women (25 from each village) having at least 2 cows. Personal interview technique was used to collect the data from the respondents. Frequency distribution, percentage and mean per cent scores were used to arrive at conclusion

*Assistant Professor and Head, U.S. Ostwal P.G. College, Chittorgarh, Rajasthan

RESULTS AND DISCUSSION

Background information of the respondents: Nearly half of the respondents (49%) belonged to the age group of 25 to 40 years and 39 per cent were below 25 years of age. More than 60 per cent respondents were under general caste category (Brahmin and Rajput). Regarding education, 29 per cent respondents were illiterate, 24 per cent could just read and write and 22 per cent respondents were educated upto primary standard. Agriculture was the main occupation of 98 per cent respondents however, majority of them were involved in some, subsidiary occupations like animal husbandry, caste occupation, agriculture labourer business, etc.

Adoption of Improved Dairy Cattle Management Practices by Rural Women: Efficient transfer of innovations and their practical application in field situations is key to the economic development of India, where the bulk of the population depends on agriculture and livestock. To help women to adopt new technologies several programmes are in operation throughout the country. Still, there exists a wide gap between the technology available at the research station and its adoption by rural women. Therefore, in the present study, an effort was made to know the adoption of improved dairy cattle management practices by the respondents.

Overall adoption of improved dairy cattle management practices by the respondents: Data presented in Table 1 elucidate that the respondents had an average level of adoption of improved dairy cattle management practices as the overall mean per cent adoption score was 41.30. The results are supported by that of Meena *et al.* (2004) concluded that majority of the respondents were in the category of medium level of adoption of improved animal husbandry practices.

Component wise distribution of respondents in different adoption categories reveal that in case of breeding and healthcare, majority of the respondents (55-62%) belonged to poor adoption category while 30 and 36 per cent respondents were in the category of average adoption. Few (2-15%) fell in the good adoption category. In feeding, 52 per cent respondents were in the category of average adoption, 31 per cent belong to poor adoption category. With regard to management component, majority of the respondents (69%) had average adoption level, while 21 per cent belonged to good adoption category.

Component wise adoption indicates that adoption was highest in management component with 54.36 MPS, followed by feeding (48.09MPS), breeding (38.83MPS) and least in healthcare with MPS 17.75. Similar findings have been reported by Mahipal and Kherde (1992) found that adoption index of respondents was highest in cattle management, while it was lowest in case of healthcare practices.

COMPONENT WISE ADOPTION:

Breeding: Perusal of Table 2 reveals that more than half of the respondents (57%) possessed exotic

Table 1. Distribution of respondents by their overall adoption of improved dairy cattle management practices

N= 100

S. No.	Practices	Adoption level			Mean percent score
		Poor	Average	Good	
1	***Breeding***	55	30	15	38.83
2	***Feeding***	31	52	17	48.09
3	***Healthcare***	62	36	2	17.75
4	***Management***	10	69	21	54.36

Overall mean per cent score 41.30

breeds of cow *viz*. Holestein, Jersey and Redden and 41 per cent respondents had improved local breed of cow *viz*. Kankraj, Tharparkar and Rathi. Tabulated data depicts that respondents identified heat in cow by seeing symptoms like bellowing (56%), mucous discharge from vagina (32%), frequent urination (48%) and allow other animal to mount (28%). Few respondents detected heat by licking other animals and swelling of udder and teats. The results are in line with Kokete and Tyagi (1991) who reported that majority of the respondents (76%) could identify a cow in heat by observing the symptoms like bellowing, mounting on other animals and frequent urination.

Nearly one third of the respondents (30%) followed the treatment by a veterinary doctor for a regular heat period of their cattle for better reproductive health. More than 40 per cent respondents reported that after observing the symptoms of heat in cattle, they generally allow the cattle to meet with in 12 to 18 hours, as they were aware about the fact that maximum chance of conception is in between these hours. Only 32 per cent respondents used to inseminate cow within 60-90 days after calving. This was due to the reason that nearly 40 per cent of respondents possessed a local breed of cow, which comes in heat within 120-150 days after calving.

It was found that though the majority of the respondents knew about the importance of artificial insemination, yet in practice only 28 per cent adopted it and the majority of them were following a natural method of breeding by locally available sire. This was due to improper artificial insemination facility in or near the village.

With respect to pregnancy diagnosis in cow, one third of the respondents used to identify the pregnancy symptoms by observing the heat cycle i.e. when cow does not comes in heat again, which is considered as an authentic method of pregnancy diagnosis by the scientists. Some of the respondents (12%) confirm by pregnancy test by veterinarian. Other respondents identified conception by seeing symptoms like stopped bellowing after getting served, red colour of vagina and keeping the tail away from vagina which do not have any scientific base as per the veterinary doctor. Only 28 per cent respondents were doing castration at correct age (6-12 months).

Feeding: The efficiency of cattle can be increased up to fifty per cent by feeding an adequate quantity of balanced ration. Data related to feeding aspect

Table 2. Adoption of improved breeding practices by the respondents

N=100

S. No.	Practices	f / %
1	Improved breeds of cow	
	Local breed	41
	Exotic breed	57
2	Heat detection	
	Bellowing	56
	Mucous discharge from vagina	32
	Restless and frequent urination	48
	Allow other animals to mount	28
3	Treatment for regular heat period	30
4	Insemination of cow in heat period (12-18 Hours)	42
5	Insemination of cow within 60 – 90 days after calving	32
6	Artificial insemination	28
7	Pregnancy diagnose	
	Observing signs of next heat cycle	32
	Pregnancy test	12
8	Correct age of castration (6 to 12 month)	28

depict that only 17 per cent respondents fed the cattle with a balanced ration (3 kg. concentrate, 4-6 kg. dry and 20-30 kg. green fodder) and majority of the respondents (83%) were not giving the green fodder and concentrate in required quantity. This was basically due to lack of knowledge regarding preparation of balanced ration and non availability of green fodder. Similar results were concluded by Chaudhary (1998) who revealed that majority of the respondents were not feeding proper balanced ration to pregnant and milking cattle.

A good number of respondents used to supply extra ration during pregnancy of cow (78%) and after calving (92%) for proper development of foetus and cattle. Majority of the respondents (66%) provides green fodder to cattle for increasing milk production. More than 40 per cent respondents (42%) fed mineral mixture to the cattle for good reproductive health, protection from diseases and for high milk production. A good number of respondents fed fodder to milking cattle twice a day (82%). An average number of respondents (48%) used chaffed fodder for feeding cattle for its maximum utilization. Nearly half of the respondents did not follow this practice, due to lack of knowledge. More than 40 per cent respondents fed colostrum to newly born calf as they knew that it protect the calf from several diseases and provide nutrition for proper growth. Remaining (58%) respondents were not feeding it, due to the false view that it may cause gastric trouble or develop worms in the calf's stomach.

Table 3 further depicts that only 24 per cent respondents gave supplementary feed to the calf after two months of birth and remaining 76 per cent respondents did not provide supplementary feed till 3-4 months as they were of the opinion that cow's milk is sufficient to fulfill the nutritional requirement and there is no need to provide supplementary feed to the calf. Only two per cent of the respondents enrich fodder by urea and remaining 98 per cent do not follow the practice, due to lack of knowledge. Nearly one third of the respondents (36%) gave 30-40 litre drinking water per day to adult cow while 64 per cent respondents did not provide the above quantity of water. This was due to the reason that nearly half of the respondents had local breed cows, which do not require much water.

Health care: Overall review of Table 4 depicts that majority of the respondents did not follow the improved healthcare practices. Critical analysis of the data reveal that only few respondents go for vaccination of their cattle against Foot and Mouth diseases (4%), Rinderpest (1%), Hemorrhagic Septicemia (3%) and majority of them (96%) did not follow the practice. This was mainly due to lack of knowledge about importance of vaccination. Besides some of the respondents also reported the

Table 3. Distribution of respondents by their adoption regarding improved feeding practices

N=100

S. No.	Practices	f / %
1	Feeding of balanced ration (3kg concentrate, 4-6 kg. dry fodder, 20-30 kg green fodder)	17 78
2	Feed extra ration to pregnant cow	92
3	Feed extra ration to cow after calving	66
4	Provide green fodder for improving milk production	42
5	Importance of mineral mixture	82
6	Two time feeding of ration to milking cow chaffing of fodder	48
7	Enrichment of fodder by urea	2
8	Feed colostrum to new born calf with in one hour after birth	42
9	Necessity of supplementary feeding of calf	24
10	Drinking water per day (30-40 Liter.)	36

problem of lack of veterinary clinics in the village. Majority of the respondents (70%) gave either medicine or apply DDT powder on the body of cattle to prevent the cattle from external parasites. Some of the respondents used traditional method of ash application on the cattle's body for control of external parasites, which is not a scientifically correct practice.

Regarding deworming it was found that only 14 and 2 per cent respondents followed the practice of deworming of cow and calf, respectively. Remaining (86-98%) were not taking any measure for prevention from internal parasites. Nearly half of the respondents (48%) stop milking the pregnant cow before two months of calving, while 52 per cent continue to milk a cow till 1 month before calving. This was due to lack of knowledge about right practice.

Management: The data presented in Table 5 clearly show that almost all the respondents (96%) used ventilators in the cattle shed for good ventilation. Nearly half of the respondents (48%) followed 3:1 ratio of open and covered space in cattle shed, 38 per cent respondents had pacca flooring in the shed, only 8 per cent respondents followed pacca canal in the cattle shed .It was found that majority of the respondents (58%) had knowledge about manger in the cattle shed but only 12 per cent respondents followed this practice, it was due to lack of money for construction of shed.

Table 4. Distribution of respondents by their adoption regarding improved Healthcare practices

N=100

S. No.	Practices	f / %
1.	Vaccination	
	a. Foot and mouth diseases (FMD)	4
	b. Hemorrhagic septicemia (HS)	3
	c. Black quarter	-
	d. Rinderpest	1
2	Prevention from external parasites (Medicine, DDT powder)	70
3	Deworming of cow in every six month	14
4	Deworming of calf in every three month	2
5	Stop milking of pregnant cow before two month of calving	48

Table 5. Distribution of respondents by their adoption regarding improved management practices

N=100

S. No.	Practices	f / %
1.	Facilities in cattle shed	
	a. Manger	12
	b. Pacca canal	8
	c. Ventilators	96
	d. Ratio of open and covered space is 3:1	48
	e. Pacca flooring of the shade	38
2	Regular cleaning of cattle shade	100
3	Washing hand before milking	96
4	Washing udder before milking	78
5	Full hand method for milking	15
6	Boiling of milk for protection from bacteria	100
7	Burning of carcasses	7

All the respondents adopted the practice of regular cleaning of cattle shed for maintaining hygienic condition and prevention from diseases. Majority of the respondents followed clean milk production practices like washing hands (96%) and washing udder (78%) before milking. Similar results were concluded by Singh *et al.* (1998) found that maintenance of cleanliness in animal shed and proper washing of hand and udder before milking was adopted by majority of the respondents.

It was further found that only 15 per cent respondents followed full hand method of milking, this was due to lack of knowledge about right method of milking. The practice of burning of carcasses was adopted by only 7 per cent respondents and rest 93 per cent respondents reported that they use to sell the dead body to cobbler. All the respondents adopted the practice of boiling milk for protection from bacteria.

The findings lead to the conclusion that the adoption level of the respondents with respect to improved dairy cattle management practices was average. Adoption was highest in management practices, followed by feeding, breeding and least in healthcare.

CONCLUSION

The adoption profile of the respondents clearly revealed that respondents had average level of adoption regarding improved dairy cattle management practices. The average level of adoption might be due to lack of exposure to different information soureses viz. radio, T.V., film, exhibition, related literature, etc. Similarly, the women also reported that they have limited access to the extension services. Hence, there is a need to educate women regarding improved dairy cattle management practices. For these specialized training programmes should be organized for them at village level.

REFERENCES

Anonymous, 1998. Report of AICRP. Home Science Extension Education, Rajasthan Agriculture University. Bikaner.

Ashok, S. 1997. Report of Effectiveness of Gopal Yojana in Girwa Panchayat Samiti of Udaipur District in Rajasthan. An Unpublished M.Sc Thesis. Rajasthan Agriculture University, Bikaner.

Bhagate ,G.R., Khar, S.R., Slathia, P.S. and Singh, S. 2004. Role of Women in Agriculture and Allied Activities in Hill. *Intensive Agriculture*. **42**(07-08): 7-10.

Bhople, R.S. and Varade, P.K. 1998. Feed and Animal Feeding Practices Adopted by Cattle Owners. *Rural India*. **61**(1): 21-25.

Chaudhary, M.1998. Knowledge and Adoption of Modern Cattle Management Practices and Their Contribution towards Rural Economy in Barmer District of Rajasthan. An Unpublished Ph.D. Thesis. Rajasthan Agriculture University. Bikaner.

Chaudhary, M.C., Bhimawat, B.S. and Kalla, R.N. 2000. Milk Production Technology for Southern Rajasthan. *Agriculture Extension Reviews*. **12**(3): 26.

Gupta, L., Tank, U.N. and Dobaria K.D. 2003. Knowledge and Adoption of Improved Dairy Practices. *Agriculture Extension Review*. **15**(1): 30-31.

Jamal, S. 1994. Women in Dairy Development. Concept Publishing House. New Delhi.

Jassi, A.S., Dillion, D.S. and Sharma, D.P. 1997. Training Needs of Young Farmers for Dairy Farming, Department of Extension Education Pau, Ludhiana, Punjab. *Dairy Guide*. **18**(1): 201-71.

Kashyap, S., Sharma, R.K. and Verma T. 1990. Time Use Analysis of Rural Women in Agriculture Related Activities. *Indian Journal of Social Research*. **31**(3): 280-283.

Kharole, M. 1990. The Utilization Pattern of Rural Women in Dairy Farming. An Unpublished M. Sc. Thesis, Haryana Agricultural University, Hissar.

Kashyap, S., Sharma, R.K. and Verma T. 1990. Time Use Analysis of Rural Women in Agriculture

Related Activities. *Indian Journal of Social Research*. **31**(3): 280-283.

Kharole, M. 1990. The Utilization Pattern of Rural Women in Dairy Farming. An Unpublished M. Sc Thesis, Haryana Agricultural University, Hissar.

Mahipal, S.and Kherde, R.L. 1992. Adoption of Scientific Dairy Farming Practices by Land Less Cattle Keepers. *Indian Dairymen*. **11**(19): 473-478.

Maity, M., Sindhu, D.S. and Basu, K. 2002. Constraints Faced by The Dairy Farm Women in Adoption Clean Milk Production Practices. *Rural India*. **65**(5): 102.

Meena, B.L. 1994. A Study on Adoption of Training Needs of Trible Women in Improved Dariy Farming Practices in Jaipur District (Raj.). An Unpublished M. Sc. Thesis. NDRI, Karnal

Paul, S. 2000. Attitude of Tribal towards Cross Breeding in Cattle in Sarada Panchayat Samiti of Udaipur, Rajasthan. An Unpublished M. Sc. Thesis, Rajasthan Agriculture University, Udaipur.

Podikunju, B., Panwar, J.S. and Sharma, F.L. 1999. Knowledge of Farmwomen about Modern Livestock Management Practices in Udaipur District of Rajasthan. *Rajasthan Journal of Extension Education*, **7**:31-34.

Prasad, K. 1992. Training Needs of Farmers in Scientific Dairy and Crop Farming Practices in Rained Area of Hamirpur District, Uttar Pradesh. An Unpublished M. Sc. Thesis, NDRI, Karnal.

Sharma, A. 1990. Knowledge and practices of rural women regarding cattle care. An Unpublished M.Sc. Thesis, Rajasthan Agriculture University, Bikaner.

Sharma, F.L. and Intodia, S.L. 1990. Extent of technical knowledge of livestock keepers in tribal areas in Rajasthan. *Rajasthan Journal of Extension Education*. **1**:20-24.

Sharma, N. 1995. Knowledge and adoption of improved animal husbandry practices with respect to buffalo rearing by the farmers in tribal areas of Udaipur district (Rajasthan). An Unpublished M.Sc. Thesis, Rajasthan Agriculture University, Bikaner.

Singh, L. and Thomas, C.K. 1992. Knowledge and adoption in the technology of dairy farming and its constraints. *Indian Dairyman*. **14**(9): 445-450.

❑❑❑

Recevied : 15.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

KNOWLEDGE, ADOPTION AND ATTITUDE OF CLUSTER FRONTLINE DEMONSTRATION ON CHICKPEA PRODUCTION TECHNOLOGY

Hans Raj Jatav*, Shobhana Gupta and Dileep Kumar Jatav*****

ABSTRACT

The present study was under taken in the Malwa Plateau Agro-climatic zones of Madhya Pradesh. The KVKs conducted a many numbers of Cluster Frontline demonstration on chickpea crop. Chickpea crop was selected as under all pulse's crops, chickpea covers highest area and it is one of the most important pulse crops grown of Malwa Plateau Agro-Climatic Zone of Madhya Pradesh. The hill region constitutes about 14% in the Malwa plateau. List of villages where CFLD pulses programme is being implemented from last five year was taken from the respective KVKs. One village at nearest vicinity and one village at remote vicinity from each KVK was selected for the present study. Two villages from each KVK were selected. Thus, total eight villages were selected for the study. To seek the answers for the research question, an ex-post facto research design was used.

INTRODUCTION

Pulse contain 22-24 per cent of protein, which is almost twice the protein in wheat and thrice as that of rice. In India, owing to its diverse agro-climatic conditions, pulses are grown throughout the year and plays an important role in crop rotation, mixed and inter-cropping, maintaining soil fertility through nitrogen fixation, release of soil-bound phosphorus and thus contribute significantly to sustainability of the farming systems. In the production process, pulses require less water than cereals. Cluster Front Line demonstrations (CFLDs) is a unique approach by the Indian Council of Agricultural Research on Oilseed and Pulse crops to provide an direct interface between researcher and farmers as the scientists are directly involved in planning, execution and monitoring of the demonstrations. With this background the study was conducted to know the knowledge, adoption and attitude of chickpea producer about Cluster Front Line demonstrations (CFLDs).

Indian Council of Agriculture Research, New Delhi introduced Cluster Frontline Demonstration (CFLDs) with the inception of technology Mission of Pulses and Oilseed crops from 2015-16. The Cluster Frontline Demonstration took place under the technical supervision of KVK Scientists all over India.

RESEARCH METHODOLOGY

The present study was under taken in the Malwa Plateau Agro-climatic zones of Madhya Pradesh. The design of research is the most important and crucial aspect of the research methodology. To seek the answers for the research question, an ex-post facto research design was used. Among all 8 KVK in Malwa Plateau Agro-Climatic Zone i.e., Indore, Dewas, Ujjain, Shajapur, Rajgarh, Ratlam, Mandsaur and Neemuch; four (50 %) KVKs were selected randomly. List of villages where CFLD pulses programme is being implemented from last five year was taken from the respective KVKs. One village at nearest vicinity and one village at remote area from each KVK was selected for the present study. Two villages from each KVK were selected. Thus, total eight villages were selected for the study. List of CFLD beneficiary farmers was taken from respective KVKs. 15 beneficiary farmers and 15 non beneficiary farmers were selected randomly from each village. Thus total 120 beneficiary and 120 non-beneficiary farmers were selected from 4

*Ph.D. In-Service and Scientist, KVK (RVSKVV), Ujjain, MP.
**Associate Professor and HOD, Department of Extension, RVSKVV, COA, Gwalior, MP.
***Ph.D. Research Scholar, Collage of Agriculture (RVSKVV), Gwalior, MP.

KVKs, for the study. Thus, the total sample drawn for study was 240 farmers.

RESULTS AND DISCUSSION

Table 1 represent the knowledge level of farmers regarding chickpea production technology. It was found that in case of 'land preparations' the majority of CFLDs beneficiary (41.67 per cent) belonged to high knowledge level followed by moderate (40.83 per cent) and low (17.50 per cent). while majority of non beneficiaries belonged to low (39.17 percent) followed by moderate (35.84 per cent) and high (22.50 percent).

In case of 'improved varieties seed' most of the CFLDs beneficiary farmers had moderate (40.00 per cent) followed by high (33.33 per cent) and low (26.67 per cent) level, while in non beneficiary majority of farmers had low (35.84 per cent) followed by moderate (33.33 per cent) and high (30.83 per cent).

It was found that in case of 'seed treatment' most of the CFLDs beneficiary belonged to high (38.33%), followed by moderate (37.50%) and low (24.17%) knowledge level, while majority of non beneficiaries belonged to low (43.33%) followed by moderate (35.84%) and high (22.83%) knowledge level.

knowledge level regarding 'Seed rate' majority of CFLDs farmers belonged to moderate (40.00%) category followed by high (35.83)% and low (24.17%),on the other hand in non-beneficiary farmers, majority of them belonged to low level(41.67%) followed by moderate (40.83%) and high (17.50%) knowledge level.

Table 1: Knowledge level of CFLDs beneficiary farmers and Non beneficiary farmers regarding chickpea production technology

S.No.	Name of practices	Knowledge level of CFLDs beneficiary farmers			Knowledge level of non beneficiary farmers		
		Low	Moderate	High	Low	Moderate	High
1.	Land preparation	21 (17.50)	49 (40.83)	50 (41.67)	47 (39.17)	46 (38.33)	27 (22.50)
2.	Improved variety seeds	32 (26.67)	48 (40.00)	40 (33.33)	43 (35.84)	40 (33.33)	37 (30.83)
3.	Seed treatment	29 (24.17)	45 (37.50)	46 (38.33)	52 (43.33)	43 (35.84)	25 (20.83)
4.	Seed rate	29 (24.17)	48 (40.00)	43 (35.83)	50 (41.67)	49 (40.83)	21 (17.50)
5.	Methods of sowing	25 (20.83)	52 (43.33)	43 (35.84)	46 (38.33)	45 (37.50)	29 (24.17)
6.	Recommended dose of fertilizers	37 (30.83)	43 (35.84)	40 (33.33)	52 (43.33)	43 (35.84)	25 (20.83)
7.	Irrigation management	31 (25.83)	47 (39.17)	42 (35.00)	44 (36.66)	40 (33.34)	36 (30.00)
8.	Weed management	27 (22.50)	46 (38.33)	47 (39.17)	40 (33.33)	43 (35.84)	37 (30.83)
9.	Insect control	21 (17.50)	49 (40.83)	50 (41.67)	56 (46.67)	36 (30.00)	28 (23.33)
10.	Disease control	37 (30.83)	43 (35.84)	40 (33.33)	50 (41.67)	44 (36.67)	26 (21.66)
	Overall average	**29 (24.17)**	**47 (39.17)**	**44 (36.66)**	**48 (40.00)**	**43 (35.84)**	**29 (24.16)**

In case of Knowledge level regarding 'methods of sowing, major CFLDs beneficiary had moderate level (43.33%) followed by high (35.84%) and low level (20.83%) of knowledge and in non-beneficiary farmers, majority of farmers had low (38.33%) knowledge followed by moderate (37.50%) and high (24.17%) knowledge level, respectively.

It was found that majority of CFLDs beneficiaries farmers had moderate (35.84%) knowledge regarding 'recommended dose of fertilizer' followed by high (33.33%) and low (30.83%). I n other hand the non beneficiaries had low knowledge(43.33%) followed by moderate (35.84%) and high (20.83%) knowledge.

Knowledge level regarding 'irrigation management, most of the CFLDs beneficiary farmers belonged to moderate level (39.17%) followed by high (38.33%) and low (25.83%) and in case of non beneficiary farmers most of them belonged to low (36.66%) knowledge level followed by moderate (33.34%) and low (30.00%), respectively.

It was found that 39.17 per cent of CFLDs beneficiary farmers had high knowledge level regarding 'weed management' followed by moderate (38.33 per cent) and low (22.50 per cent), while majority of non beneficiaries had moderate level of knowledge (35.84 per cent) followed by low (33.33 per cent) and high (30.83 per cent) knowledge level.

In case of 'insect control' a sizable number of CFLDs beneficiary farmers belonged to high knowledge level group (41.67 per cent) followed by moderate (40.83 per cent) and (17.50 per cent) low knowledge level, whereas the non beneficiaries had low knowledge (46.67 per cent) followed by moderate 30.00 per cent and high (23.33 per cent), respectively.

The Table 1 also reveals the knowledge level regarding 'disease control' and it was found that the most of the CFLDs beneficiary farmers had moderate knowledge (35.84%) followed by high (33.33%) and low (30.83%) knowledge, while in case of non beneficiaries most of them had low knowledge (41.67%) followed by moderate (36.67%) and high (21.66%) knowledge.

Table 2 shows the overall distribution of knowledge level of CFLDs beneficiary and non-beneficiaries farmers regarding chickpea production technology. It was found that majority of CFLDs farmers belonged to moderate (39.17%) followed by high (36.66%) and low (24.17%), while majority of non-beneficiaries farmers belonged to low (40.00%) followed by moderate (35.84%) and high (24.16%) knowledge, level respectively.

The data presented in Table 3 depict the extent of adoption towards improved chickpea production technology by the farmers under CFLDs programm.

The data revealed that in case of land preparation 41.67 per cent farmer had full extent of adoption followed by partial adoption 40.83 per cent had no adoption, 17. 50 per cent with the mean score 1.24 (Rank -I).

The extent of adoption towards improved variety seed majority of farmers belonged to partial adoption (40.00)% followed by full (33.33%) and no

Table 2: Overall Knowledge level of CFLDs beneficiary farmers and Non beneficiary farmers regarding chickpea production technology

S.No.	Categories	CFLDs Beneficiary		Non beneficiary farmers	
		Frequency	Percentage	Frequency	Percentage
1.	Low	29	24.17	48	40.00
2.	Moderate	47	39.17	43	35.84
3.	High	44	36.66	29	24.16

Table 3: Extent of adoption of improved chickpea production technology by the farmers under CFLD programme

S.No.	Name of practices	Extent of adoption			Total score obtained	Mean score	Rank order
		No	Partial	Full			
1.	Land preparation	21 (17.50)	49 (40.83)	50 (41.67)	149	1.24	I
2.	Improved variety seeds	32 (26.67)	48 (40.00)	40 (33.33)	128	1.06	VII
3.	Seed treatment	29 (24.17)	45 (37.50)	46 (38.33)	137	1.14	IV
4.	Seed rate	29 (24.17)	48 (40.00)	43 (35.83)	134	1.11	V
5.	Methods of sowing	25 (20.83)	52 (43.33)	43 (35.83)	138	1.15	III
6.	Recommended dose of fertilizers	37 (30.83)	43 (35.83)	40 (33.33)	123	1.02	VIII
7.	Irrigation management	31 (25.83)	47 (39.17)	42 (35.00)	131	1.09	VI
8.	Weed management	27 (22.50)	46 (38.88)	47 (39.17)	140	1.17	II
9.	Insect control	21 (17.50)	49 (40.83)	50 (41.67)	149	1.24	I
10	Disease control	37 (30.83)	43 (35.83)	40 (33.33)	123	1.02	VIII
	Overall average	**29 (24.17)**	**47 (39.17)**	**44 (36.66)**	**134**	**1.12**	

adoption (26.67%) with mean score 1.06 (Rank-VII).

It was found that adoption regarding Seed treatment most of the farmers had full extent of adoption (38.33%) followed by partial adoption (37.50%) and no adoption (24.17%) with mean score 1.14 (Rank -IV).

The data also reveals the extent of adoption towards seed rate and it was found that majority of farmers belonged to partial adoption (40.00%) followed by full adoption (35.83%) and no adoption (24.17%) with mean score 1.11(Rank-V).

In case of methods of sowing notable size of farmers belonged to partial extent of adoption (43.33 %) followed by full adoption (35.83 %) and no adoption (20.83%) with mean score 1.15 (Rank -III).

Extent of adoption toward recommended dose of fertilizers ,it was found that majority of farmers belonged to partial adoption (35.83 per cent) followed by full adoption (33.33 per cent) and no adoption (30.83 per cent) with mean score 1.02 (Rank-VIII) respectively.

It was found that in case of adoption regarding irrigation management the majority of farmers had partial adoption 39.17 per cent followed by full adoption 35.00 per cent and no adoption 25.83 per cent with mean score 1.09 (Rank -VI).

In case of weed management most of the farmers belonged to high extent of adoption (39.17%) followed by partial adoption (38.88%) and no adoption (22.50%) with mean score 1.17(Rank -

II).

Adoption regarding insect control, majority of respondents had full extent 41.67 per cent followed by partial adoption 40.83 per cent and 17.50 per cent with mean score 1.24 (Rank -I).

Adoption regarding 'disease control' most of the farmers (35.83%) belonged to partial adoption followed by full adoption (33.33%) and no adoption (30.83%) with the mean score 1.02 (Rank-VIII), respectively.

Table 4 reveals the overall extent of adoption of improved chickpea production technology by the farmers under CFLD program and it was found that majority of CFLD beneficiaries belonged to partial adoption (39.17 percent) followed by full adoption (36.66 per cent) and full adoption (24.17 per cent) respectively.

Attitude of CFLDs beneficiary farmers and Non beneficiary farmers about improved package of practices.

Data presented in Table 5 show the attitude of CFLDs beneficiaries farmers and it was found that the attitude towards Scientists/extension personnel have latest information about Chickpea Production Technology (CPT), most of the CFLDs beneficiaries had favorable attitude (40.00 per cent) followed by moderate favorable (39.16 per cent) and unfavorable (20.84 per cent).

In case of attitude towards Scientists/extension personnel are not helpful to farmers. Majority of CFLDs beneficiaries belonged to moderately favorable 39.16 per cent followed by unfavorable 34.17 per cent and favorable 26.67 per cent.

Attitude towards scientists/extension personnel to be awared of the problems faced by farmers in adopting new gram production technology (CPT) and help them overcome these problems in your areas. Most of the CFLDs beneficiaries had favorable (35.84%) followed by moderate favorable (35.00 per cent) and unfavorable (29.16 per cent).

Most of the CFLDs beneficiaries had moderate favorable attitude 37.50% followed by favorable 32.50% and unfavorable 30.00% towards Gram Production Technology (CPT) demonstrated through CFLD is need based and location specific.

In case of attitude towards, gram Production Technology (CPT) demonstrated through CFLD did not prove beneficial for the farmers, majority of CFLDs beneficiaries had unfavourable 40.00% followed by moderate favorable 33.34% and favorable 26.66%.

Most of the CFLDs beneficiaries had unfavorable attitude (41.66%) followed by moderate favorable (30.84%) and favorable (27.50%) attitude towards Chickpea Production Technology (CPT) has not brought about significant changes in the farming practices of farmers.

Majority of CFLDs beneficiaries belonged to moderate favorable (34.17%) followed by favorable (33.34%) and unfavorable (32.50%) towards chickpea Production Technology (CPT) through CFLD is made affordable, reliable and affordable by farmers.

In case of attitude towards, the Chickpea Production Technology (CPT) advocated was technically and ecologically sound and according to the farmer's resources, most of the CFLDs beneficiaries had moderate favorable attitude 37.50% followed by favorable 32.50% and

Table 4: Overall extent of adoption of improved chickpea production technology by the farmers under CFLD programme

S.No.	Categories	CFLDs Beneficiary	
		Frequency	Percentage
1.	No	29	24.17
2.	Partial	47	39.17
3.	Full	44	36.66

Table 5: Attitude of CFLDs beneficiary farmers and Non beneficiary farmers about improved package of practices

S.No	Statement	CFLDs Beneficiary		
		Unfavorable	Moderate favorable	Favorable
1	Scientists/extension personnel have latest information about Chickpea Production Technology (CPT)	25 (20.84)	47 (39.16)	48 (40.00)
2	Scientists/extension personnel are not helpful to farmers	32 (34.17)	47 (39.16)	41 (26.67)
3	Scientists/extension personnel to be awared of the problems faced by farmers in adopting new gram production technolog (CPT) and help them overcome these problems in your areas	35 (29.16)	42 (35.00)	43 (35.84)
4	Gram Production Technology (CPT) demonstrated through CFLD is need based and location specific	36 (30.00)	45 (37.50)	39 (32.50)
5	Gram Production Technology (CPT) demonstrated through CFLD did not prove beneficial for the farmers	32 (40.00)	48 (33.34)	40 (26.66)
6	Chickpea Production Technology (CPT) has not brought about significant changes in the farming practices of farmers	33 (41.66)	50 (30.84)	37 (27.50)
7	Chickpea Production Technology (CPT) through CFLD is made affordable, reliable and affordable by farmers	39 (32.50)	41 (34.17)	40 (33.34)
8	The Chickpea Production Technology (CPT) advocated was technically and ecologically sound and according to the farmer's resources	36 (30.00)	45 (37.50)	39 (32.50)
9	The small farmers training program conducted during the program is not sufficient for successful farming operations	38 (35.00)	42 (33.34)	40 (31.66)
10	Technology has an important contribution in increasing gram production	32 (26.66)	45 (37.50)	43 (35.84)
11	Mitigation of risk with strong adoption of technology in CFLD	30 (25.00)	42 (35.00)	48 (40.00)
12	The literature provided regarding Chickpea Production Technology (CPT) is not sufficient and understandable	28 (40.00)	44 (36.66)	48 (23.34)
13	CFLD actually served as a reference laboratory for gram growers and helped in building confidence among gram growers about improved technology	33 (27.50)	50 (41.66)	37 (30.84)
14	Training/field days/farmer fairs and exhibitions organized by the KVK are not useful means of acquiring practical knowledge	35 (37.50)	40 (33.34)	45 (29.16)
15	Scientists/extension personnel have regularly visited the farms of the beneficiaries and resolved their problems immediately	37 (30.83)	41 (34.17)	42 (35.00)
16	Selection of farmers by KVK is appropriate	34 (28.33)	47 (39.17)	39 (32.50)
17	Even if the scheme is withdrawn by KVK, farmers will continue to use gram production technology	37 (30.83)	43 (35.83)	40 (33.34)
18	KVK have proved suitable as implementing agencies	36 (30.00)	46 (38.34)	38 (31.66)
19	CFLD selected varieties give better yield and good quality than local varieties	36 (30.00)	45 (37.50)	39 (32.50)
20	The use of chemical fertilizers and pesticides threatens the health of farmers	32 (37.50)	45 (35.84)	43 (26.66)
21	Not all farmers can perform CFLD as it requires skill	29 (40.84)	42 (35.00)	49 (24.16)
22	There is no change in the wage rates of workers due to the introduction of CFLD	30 (38.34)	44 (36.66)	46 (25.00)
23	CFLD requires regular contact with kvk scientists	34 (28.33)	46 (38.33)	40 (33.34)

unfavorable 30.00%.

It was found that attitude towards, the small farmers training program conducted during the program is not sufficient for successful farming operations,majority of CFLDs beneficiaries had unfavorable (35.00%) followed by moderate favorablete (33.34%) and favorable (31.66%).

Attitude towards technology has an important contribution in increasing gram production, most of the CFLDs beneficiaries had moderate favorable (37.50%) followed by favorable (35.84%) and unfavorable (26.66%).

Most of the CFLDs beneficiaries belonged to favorable attitude (40%) towards mitigation of risk with strong adoption of technology in CFLD, followed by moderate favorable (35.00%) and unfavorable (25.00%).

In case of attitude towards the literature provided regarding chickpea Production Technology (CPT) is not sufficient and understandable, most of the CFLDs beneficiaries farmers had unfavourable attitude (40.00%) followed by moderate favourable (36.66%) and favourable (23.34%).

Majority of CFLDs beneficiary farmers belonged to moderate favourable attitude (41.66%) toward CFLD actually served as a reference laboratory for gram growers and helped in building confidence among gram growers about improved technology,followed by favourable (30.84%) and unfavorable (27.50%).

Attitude toward Training/field days/farmer fairs and exhibitions organized by the KVK are not useful means of acquiring practical knowledge,most of CFLDs beneficiaries farmers had unfavourable attitude (37.50%) followed by moderate favourable (33.34%) and favorable (29.16%).

Attitude toward Scientists/extension personnel have regularly visited the farms of the beneficiaries and resolved their problems immediately, majority of CFLDs beneficiaries had favourable attitude (35.00%) followed by moderate favourable (34.17%) and unfavorable (30.83%).

In case of attitude towards Selection of farmers by KVK is appropriate,it was found that majority of CFLDs beneficiaries belonged to moderate favorable attitude (39.17%) followed by favorable (32.50%) and unfavorable (28.33%).

It was found that majority of CFLDs beneficiaries had moderate favorable attitude (35.83%) followed by favourable (33.34%) and unfavorable (30.83%) towards even if the scheme is withdrawn by KVK, farmers will continue to use gram production technology.

Attitude towards CFLD selected varieties give better yield and good quality than local varieties, it was found that majority of CFLDs beneficiaries belonged moderate favourable attitude (38.84%) followed by favorable (31.66%) and unfavorable attitude (30.00%).

In case of. KVK have proved suitable as implementing agencies, attitude of CFLDs beneficiaries belonged to moderate favorable (37.50%) followed by favorable (32.50%) and unfavorable (30.00%).

Most of the CFLDs beneficiaries had unfavorable attitude (37.50%) towards the use of chemical fertilizers and pesticides threatens the health of farmers, followed by moderate favorable attitude (35.84%) and favorable (26.66%).

Majority of CFLDs beneficiaries had unfavorable attitude (40.84 per cent) followed by moderate favorable (35.00 per cent) and favorable (24.16 per cent) towards not all farmers can perform CFLD as it requires skill.

It was found that majority of CFLDs beneficiaries belonged to unfavorable attitude (38.34%) towards there is no change in the wage rates of workers due to the introduction of CFLD.followed by moderate favorable attitude (36.66%) and favorable attitude (25.00%).

Most of the CFLDs beneficiary had moderate favourable attitude (38.33%) followed by favourable (33.34%) and unfavorable (28.33%) towards the CFLD requires regular contact with kvk scientists.

Attitude of CFLDs beneficiaries toward Adoption of CFLD practices has helped in improving the socio-economic condition of farmers most of the farmers belonged to moderate favourable attitude (37.50%) followed by favourable attitude (33.34%) and unfavorable attitude (29.16%).

Table 6: Over all Attitude of CFLDs beneficiary farmers and Non beneficiary farmers about improved package of practices

S.No.	Categories	CFLDs Beneficiary
	Frequency	Percentage
1. Unfavourable	35	29.16
2. Moderate	45	37.50
3. Favourable	40	33.34

Table 6 shows the overall distribution of attitude of CFLDs beneficiaries regarding chickpea production technology. It was found that majority of CFLDs farmers had moderate favorable attitude (37.50%) followed by favorable attitude (33.34%) and (29.16%) had unfavorable attitude.

CONCLUSION

The frontline demonstration beneficiary farmers holds a significant impact on the knowledge and adoption levels of gram practices, than non-beneficiaries. Majority beneficiary farmers had favourable attitude towards cluster frontline demostration.

REFERENCES

Singh, R. P., Singh, A. K., Singh, R. P., Singh, R. K., & Singh, M. 2020. Impact of cluster frontline demonstrations on pulses productivity and profitability in farmer's field. *Indian Journal of Extension Education*, **56**(1): 134-141.

Lakra, P. K., C. P. Rahangdale, Sandeep Sharma, and P. S. Rathiya 2021. Comparative performance of cluster frontline demonstration for increasing productivity of pulses in Surguja district of Chhattisgarh. *IJCS*, **9**(1): 2586-2589.

Kantwa, C.R., Tripathy, S., Bhadauria, R.S., Sharma, B., Jakhar, S.R., Kumar, S. and Singh, S.R.K., 2024. Front Line Demonstration on Performance of Chickpea in Malwa Region of Madhya Pradesh. *Legume Research*, **47**(1): 74-77.

❑❑❑

Recevied : 16.06.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

CONSTRAINTS FACED BY FARMERS DURING CROP PRODUCTION IN UDAIPUR DISTRICT OF RAJASTHAN

Anju Yadav* and S.S. Burark**

ABSTRACT

A study was conducted to analyse the constrai**nts faced by farmers during c**rop production under tube-well irrigation in Udaipur district of Rajasthan. A total of 120 farmers were selected from 6 randomly selected villages of 3 tehsils namely Vallabhnagar, Mavli and Girwa. The primary data were collected with the help of pre structured schedule during the year 2020-2021. Garrett's Ranking technique and Rank Based Quotient (RBQ) method were used to analyse the problems faced by farmers in the study area. Results of the study revealed that among technical constraints, the most important constraint was lack of adequate water for irrigation at the critical growth period during crop production. Lack of market access for input and output was found major constraint related to market. Fragmented land holding was observed prime constraint at farm level. At harvesting period non- availability of labour was found major constraint related to labour. Other constraints were related to finance and environment. It is suggested that minimize the extent of constraints by providing better market access for farm inputs and outputs to the farmers and subsidy to dig the bore-wells by the government.

INTRODUCTION

Rajasthan, located in the northwestern part of India, is the largest state in terms of area. It covers approximately 342,239 square kilometers. Rajasthan State is located within latitude 23°30 N-30°120 N and longitude 69°300 E-78°170 E in the western part of the Indian subcontinent. Southern Rajasthan is an important physiographic unit of the state, lying in the lap of Aravalli Mountain. Southern Rajasthan comprising the districts of Bhilwara, Udaipur, Banswara, Dungarpur and Chittorgarh is popularly known as "Mewar".

Udaipur district is located between 23°46' & 25°05' North latitudes and 73°09' & 74°35' East longitudes covering an area of 13419 sq. km. which is 3.65 per cent of the state area. The terrain is predominantly hilly and undulating. The Udaipur district is a part of Udaipur division and is divided into eleven sub-divisions, viz. Girwa, Gongunda, Kotra, Mavli, Vallabhnagar, Sarada, Salumber, Jhadol, Kherwada, Rishabhdeo and Lasadia. Administratively the district is divided into 11 tehsils and 11 development blocks. Total number of villages in the district are 2511. The region, which comes under Agro-climatic Zone IV-A (Sub-Humid South Plain and Aravali Hill Zone) is characterized by moderate rainfall and temperature variation between 0ºC - 25ºC in winters to 26ºC - 50ºC in summers. The main sources of irrigation are wells, tube-wells, ponds and tanks. There are 3 irrigation divisions and 98 irrigation projects, which have created 68,443 hectares of irrigation potential. This network includes 6 tanks with the irrigation potential of 2,500 acres (Ground water scenario, Udaipur district, central Ground Water Board, 2013 report). The important crops in the district are Maize, Wheat, Barley and Gram. Nearly 50 per cent of all the farm families in the district cultivate land of under 1 hectare size.

Understanding the constraints that farmers confront during crop production is essential for developing targeted interventions and policy measures to bolster agricultural sustainability and enhance the farmers' socio-economic well-being. This research paper aims to explore and analyze the various constraints faced by farmers in Udaipur district, Rajasthan, during their crop production.

*Ph.D. Scholar, Department of Agricultural Economics & Management, RCA, MPUAT, Udaipur, Rajasthan, India
**Retd. Professor, Department of Agricultural Economics & Management, RCA, MPUAT, Udaipur, Rajasthan, India

RESEARCH METHODOLOGY

The present study was based on primary data. Udaipur district has been purposively selected for the study on the basis of highest irrigated area under main source of irrigation as tube- well irrigation. A total of 120 farmers were selected from 6 randomly selected villages of 3 tehsils namely Vallabhnagar, Mavli and Girwa. The respondents were interviewed personally with the help of a well-structured and pre tested interview schedule in order to get relevant information. The detailed information required for the study was collected for the year 2020-21. The constraints faced by the farmers during crop production were divided into different categories viz. technical, market related, farm level, labour related, financial and environment related constraints. Constraints analysis was done by two methods viz Garrett's Ranking technique and Rank Based Quotient for analyzing the extent of problems faced by farmers in study area.

(i) Garrett's Ranking technique: Garrett's Ranking technique was used to analyze the constraints faced by the farmers under tube-well irrigation source of water. In this method the respondents were asked to assign the rank for relevant indicators listed and the outcomes of such ranking was converted into score value with the help of the following formula:

Per cent position = 100 (Rij - 0.5) / Nj

Where,

Rij = Rank given for ith variable by the ith respondents

Nj = Number of variables ranked by the jth respondents

With the help of Garrett's table, the per cent position was estimated and converted into scores, then for each constraints the per cent position values were evaluated and mean values of score was calculated. The factor having highest mean value was considered to be the most important factor and ranked accordingly.

(ii) Rank Based Quotient (RBQ): For the calculation of RBQ, each respondent was asked to give ranking from the prepared list of constraints according to the perceived severity. Each respondent assigned different ranking for different constraints based on their own perception. The problem having highest RBQ value was considered as major constraints.

Rank Based Quotient (RBQ) was calculated by using following formula:

$$RBQ = \Sigma fi\ (n+1-i) \times 100 / N \times n \ \{i=1\}$$

Where,

fi = frequency of respondents reporting a particular constraint under ith rank;

N= total number of respondents;

n = number of constraints identified;

i= rank of the attributes

RESULTS AND DISCUSSION

Every crop activity performed by the farmers associated with some constraints of different aspects were analysed and presented for the farmers of Udaipur district using tube-well and other sources of irrigation.

1. Technical constraints

The results of score and ranking of Garrett and RBQ in crop production for technical constraints faced by farmers are depicted in Table 1. It revealed from the table that farmers faced major constraints as lack of adequate water for irrigation at the critical growth period during crop production (with Garrett score 73.04 and RBQ score 90.10) followed by shortage of electricity power supply (with Garrett score 66.34 and RBQ score 83.95), and odd timings of electricity supply (with Garrett score 59.05 and RBQ score 73.33) as second and third ranked constraints in Udaipur district. The least technical constraints faced by the farmers were no repair or untimely repair of water distribution system (with Garrett score 29.70 and RBQ score 22.60) and siltation problem in water channel (with Garrett score 20.50 and RBQ score 13.02) in the study area. The ranking of technical constraints were

similar in both the methods with little bit different score in Udaipur district.

2. Market constraints

The results of score and ranking of Garrett and RBQ in crop production for market constraints faced by farmers of Udaipur district are presented in Table 2. It could be observed from the findings that farmers in the study area were faced major market constraints as lack of market access for farm inputs and outputs (with Garrett score 73.31 and RBQ score 94.86) followed by non-availability of fertilizers in required period and quantity in the market (with Garrett score 60.82 and RBQ score 76.53) and lack of marketing facilities at local market place (with Garrett score 54.10 and RBQ score 67.64). The least marketing constraint faced by the farmers was delay in receiving payment against sale of farm produce (with Garrett score 21.41 and RBQ score 26.81) in the study area.

3. Land constraints

Out of the three land constraints fragmented land holding (Garrett score 68.05 and RBQ score

Table 1: Technical constraints faced by farmers in Udaipur district

S. No.	Constraints	Garrett Score	Garrett Rank	RBQ Score	RBQ Rank
1.	Lack of adequate water for irrigation at the critical growth period during crop production	73.04	I	90.10	I
2.	Low level of knowledge of irrigation water lifting devices	53.57	IV	62.81	IV
3.	Shortage of electricity power supply	66.34	II	83.95	II
4.	Odd timings of electricity supply	59.05	III	73.33	III
5.	Poor availability or non-availability of Conveyance pipe, Nozzles, etc. locally	50.61	V	56.56	V
6.	Poor maintenance of canal/ distribution system	38.35	VI	34.16	VI
7.	No repair or untimely repair of water distribution system	29.70	VII	22.60	VII
8.	Siltation problem in water channels	20.50	VIII	13.02	VIII

Table 2: Market constraints faced by farmers in Udaipur district

S. No.	Constraints	Garrett Score	Garrett Rank	RBQ Score	RBQ Rank
1.	Non - availability of quality seed in market	27.01	V	34.86	V
2.	Non-availability of fertilizers in required period and quantity in market	60.82	II	76.53	II
3.	Lack of market access for farm inputs and outputs	73.31	I	94.86	I
4.	Lack of transportation facilities (farm to mandi)	42.97	IV	51.39	IV
5.	Delay in receiving payment against sale of farm produce.	21.41	VI	26.81	VI
6.	Lack of marketing facilities at local market place	54.10	III	67.64	III

98.33) was considered the most important land constraints in Udaipur district in Table 3. Similar results were observed by Rohit, *et al.,* (2017).

4. Labour constraints

Table 4 reveal that non-availability of labour during harvesting period (with Garrett score 66.30 and RBQ score 95.27) was considered the most important constraints related to labour by analysing both method viz Garrett and RBQ in Udaipur district. Other important labour constraints were high cost of labour (with Garrett score 50.47 and RBQ score 67.50) and lack of skilled labour availability (with Garrett score 35.90 and RBQ score 41.94) which were ranked at second and third position, respectively. The least rank assigned to lack of skilled labour availability due to the fact that agricultural operations does not require much skilled labour. Rohit, *et al.,* (2017) reported in their study non-availability of labour during peak period as most important constraints in peri-urban vegetable cultivation.

5. Financial constraints

The results of score and ranking of Garrett and RBQ in crop production for financial constraints faced by farmers are depicted in Table 5. It was revealed from the findings that farmers of Udaipur district encountered with lack of funds for digging wells/ tube- wells as major constraint (with Garrett score 73.14 and RBQ score 92.73) followed by high cost of fertilizer and manures (with Garrett score

Table 3: Land constraints faced by farmers in Udaipur district

S. No.	Constraints	Garrett Score	Garrett Rank	RBQ Score	RBQ Rank
1.	Fragmented land holding	68.05	I	98.33	I
2.	Non- suitability of land	51.47	II	66.94	II
3.	Low land (water logged)	34.32	III	39.16	III

Table 4: Labour related constraints faced by farmers in Udaipur district

S. No.	Constraints	Garrett Score	Garrett Rank	RBQ Score	RBQ Rank
1.	Non availability of labour during harvesting period	66.30	I	95.27	I
2.	High cost of labour	50.47	II	67.50	II
3.	Lack of skilled labour availability	35.90	III	41.94	III

Table 5: Financial constraints faced by farmers in Udaipur district

S. No.	Constraints	Garrett Score	Garrett Rank	RBQ Score	RBQ Rank
1.	Unawareness of credit facilities provided by government	42.80	V	45.23	V
2.	Poor financial condition of farmers	38.28	VI	36.42	VI
3.	Lack of funds for digging wells/ tube- wells	73.14	I	92.73	I
4.	Inadequate subsidy on electricity and fertilizer	44.05	IV	56.90	IV
5.	Lack of insurance coverage	23.33	VII	27.87	VII
6	High cost of fertilizer and manures	56.06	II	83.45	II
7	High cost of plant protection chemicals	49.78	III	70.83	III

Table 6: Environmental constraints faced by farmers in Udaipur district

S. No.	Constraints	Garrett Score	Garrett Rank	RBQ Score	RBQ Rank
1.	High incidence of disease and pest	65.04	I	93.05	I
2.	High rainfall during standing crop	48.41	II	63.88	II
3.	Fluctuation in temperature and humidity during crop growth period	37.17	III	44.16	III

56.06 and RBQ score 83.45). The least financial constraints reported by the farmers was lack of insurance coverage (with Garrett score 23.33 and RBQ score 27.87) in the study area. Yadav and Burark (2022) also found similar results during crop production in Banswara district of Rajasthan.

6. Environmental constraints

The results of score and ranking of Garrett and RBQ in crop production for environmental constraints faced by farmers in Udaipur district showed that high incidence of disease and pest (with Garrett score 65.04 and RBQ score 93.05) was considered as major constraints (Table 6). The least environmental constraints faced by the farmers was fluctuation in temperature and humidity during crop growth period (with Garrett score 37.17 and RBQ score 44.16) in the study area. All the three environmental constraints showed same ranking in both the methods of analysis.

CONCLUSION

It can be concluded from the results of study that among major the technical constraints faced by the farmers, the most important constraints were lack of adequate water for irrigation at the critical growth period during crop production and shortage of electricity power supply. The lack of market access for farm inputs and outputs, non-availability of fertilizers in required period and quantity in market and lack of marketing facilities at local place were the major constraints faced by the farmers. Among the labour related constraints unavailability of labour during harvesting period and high cost of labour were the main constraints. Fragment land holding and non- suitability of land for cropping were most important constraints related to farm level problems. Lack of funds for digging wells/ tube- wells was the major financial constraint. High incidence of disease and pest was major constraint related to environment. It is suggested that to minimize the extent of constraints by providing better market access for farm inputs and outputs to the farmers and subsidy to dig the bore-wells by the government.

REFERENCES

Bhutia, T.L., Kamal, R.K. and Kumar, S.M.U. 2017. Constraints analysis in the crop-livestock farming systems of small and marginal farmers of Bihar. *Journal of Research*, **19**(1): 92-96.

Khatik, R, Sharma, FL, Jain, HK. 2017. Various constraints perceived by urd growers in Southern Rajasthan. *Current Agriculture Research Journal,* **5**(1): 141-145.

Narayan, L, Meena, GL, Upadhyay, B. 2014. Constraints analysis of dairy farming in Banswara district. *Indian Journal of Extension Education and Rural Development*, **22**: 81-84.

Praveena, S. and Bojiraj, M. 2017. A cross sectional study on constraints in broiler farming at Perambalur district of Tamil Nadu. *Asian Journal of Animal Science*, **12**(2): 120-123.

Tailor, R., Meena, G. L., Sharma, L. and Sharma, F. L. 2012. Constraints faced by the tribal farmers in dairy farming in Udaipur district. *Rajasthan Journal of Extension Education*, **20**(1): 187-189.

❑❑❑

Recevied : 15.06.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

KNOWLEDGE LEVEL OF GRAM GROWERS ABOUT IRRIGATION MANAGEMENT PRACTICES IN ZONE Ic OF RAJASTHAN

Diksha Sharma* and Seema Tyagi**

ABSTRACT

In the Thar desert of Rajasthan, people not only face an acute drinking water problem all through the year but also suffer from regular crop failures due to scarcity of water.Therefore, the present study was conducted to study the knowledge level of the gram growers about irrigation management in two clusters namely- Phoolasar and Kheruwala from Bikaner and Jaisalmer districts, respectively. For comparison between beneficiary and non-beneficiary farmers, a total of 320 respondents were drawn (160 beneficiary and 160 non-beneficiary). For measuring the knowledge level of the gram growers about irrigation management, a knowledge test was prepared by consulting various experts and through research reviews. Thus, this test included seven major aspects with 40 knowledge-based questions and sub questions.

The investigation revealed that majority (61.25%) of beneficiary gram growers had a medium level of knowledge about irrigation management practices followed 22.50 and 16.25 per cent of respondents with high and low level of knowledge, respectively. The beneficiary respondents had maximum knowledge on the aspect of "General information about water storage system", while they had least knowledge about the "Irrigation Interval". The non-beneficiary respondents had highest knowledge regarding "General crop practices" and least knowledge about the "Method of Irrigation". A significant difference was found in the knowledge level of beneficiary and non-beneficiary respondents about irrigation management practices.

INTRODUCTION

Rajasthan is the most water deficient state in the country following short spell of monsoon coupled with erratic behavior and scanty rainfall. Drought is the most frequent disaster recurring in the state.Among these challenging problems, the scarcity of water for irrigation is the major one. Though, efforts by government to overcome such problems have been the thrust of past efforts like canal irrigation, construction of diggies and use of micro irrigation system. Nonetheless, the issue of irrigation water supply has posed a constant threat to the farmers of this region. Gram has emerged as one of the most important pulse crops, capable of growing in harsh climates, low rainfall and poor soil conditions and considered as significant crop for arid Rajasthan. Looking at the agricultural and industrial importance of this marginalized crop and for obtaining good yield, irrigation management is very important factor. Knowledge is one of the important components of behavior and it plays a major role in covert and overt behaviour of human beings. Once knowledge is acquired, it produces changes in the thinking process of an individual, which would lead to further changes in the mental aptitude. Therefore, it was thought opportune to probe into the level of knowledge of the gram growers about the irrigation management practices in water scarcity area of Zone Ic of Rajasthan.

RESEARCH METHODOLOGY

The study was undertaken in two clusters namely- Phoolasar and Kheruwala from Bikaner and Jaisalmer districts, respectively. These clusters were selected in agro climatic Zone-Ic under Rajasthan Agricultural Competitiveness Project (RACP) on some specific criteria, as most of the area is dependent on canal water apart from monsoon rains and ground water for cultivation

*Assistant Professor, Ext. Edu., SKNAU, Jobner
**Assistant professor, Home Science (Ext.Edu.), SKRAU, Bikaner

purposes.

The three gram panchayats, namely- Phoolasar, Goduand Ranjeetpura of Phoolasar cluster and four gram panchayats namely- Jaluwala, Tawariwala, Gajjewala and Ravwala of Kheruwala cluster were covered under RACP. Two gram panchayats namely- Godu and Ranjeetpura from Phoolasar cluster and Gajjewala and Tawariwala from Kheruwala cluster were selected purposely as higher numbers of farmer were covered under RACP in these gram panchayats. In order to compare between beneficiary and non-beneficiary, a total sample of 320 respondents were drawn, comprising of 160 beneficiary and 160 non-beneficiary farmers.For measuring the knowledge level of the gram growers about irrigation management, a knowledge test was prepared by consulting various reviews and researches. Seven major aspects were included in the knowledge test such as general information about water source, water distribution and delivery facilities, general crop practices, crop water requirement for irrigation, method of irrigation, critical stages of irrigation and irrigation interval. Each aspect was included having several questions and sub-questions for knowledge assessment of the respondents. The questions were both close ended and open ended types.

The respondents were awarded one score for each right answer and zero for each wrong answer. The responses obtained from the respondents were counted and converted into mean percent score. Therefore, the possible maximum obtainable knowledge score was 79 and minimum score was zero. The mean and standard deviation of the entire respondents (i.e. beneficiary and non-beneficiary respondents) were also computed for classifying the knowledge into different categories based on the mean and standard deviation. The respondents were classified under three knowledge categories namely low, medium and high level.

RESULTS AND DISCUSSION

From the above table, it can be observed that the majority (61.25%) of beneficiary gram growers had a medium level of knowledge about irrigation management practices followed by 22.50 and 16.25 per cent of respondents with high and low level of knowledge, respectively. It is also depicted from table 1 that the majority (63.75%) non-beneficiary respondents belonged to medium level of knowledge followed by low (25.00%) and high (11.25%) level of knowledge. In the case of overall respondents (80 beneficiaries and 80 non-beneficiaries), the majority (61.25%) possessed medium level of knowledge followed by a low (20.63%) and high (18.13%) level of knowledge.

It may be concluded from the above narration that the majority of the respondents were having a medium level of knowledge regarding irrigation management practices.

With respect to the different aspects wise knowledge level, gram growers were analyzed separately. The relative importance of all the seven aspects of knowledge levels about irrigation

Table 1 Distribution of gram growers on the basis of knowledge regarding recommended irrigation management practices

N=160

S. No.	Knowledgelevel	GramGrowers					
		Beneficiary (n=80)		Non-beneficiary (n=80)		TOTAL (160)	
		F	%	F	%	F	%
1	Low (below 48.69)	13	16.25	20	25.00	33	20.63
2	Medium (from 48.69 to 62.97)	49	61.25	51	63.75	98	61.24
3	High (above 62.97)	18	22.50	09	11.25	29	18.13

Mean=55.83,S.D.=7.14; F=Frequency, %=Percentage

management practices was highlighted by ranking them in descending order on the basis of the mean per cent score of knowledge level. The data have been illuminated in Table 2.

A critical look at Table 2 reveal that the beneficiary respondents possessed highest knowledge about "General information about water storage system" (84.43 MPS) and this aspect was assigned rank first. The second highest rank was accorded to "Method of irrigation" (82.76 MPS) followed by "General crop practices" (77.22 MPS), "Critical stages of irrigation" (76.75 MPS), "General information about water source" (74.73 MPS) and "Crop water requirement for irrigation" (74.68 MPS) were assigned ranks third, fourth, fifth and sixth, respectively. Whereas, "Irrigation interval" (72.34 MPS) was found in the last position of the knowledge level of respondents about irrigation management practices in gram cultivation.

Data illustrated in Table 2 regarding non-beneficiary respondents shows, "General crop practices" (71.94 MPS) as highest knowledge and assigned rank first. The second rank assigned to "Crop water requirement for irrigation" (70.78 MPS) subsequently "Critical stages of irrigation" (70.12 MPS), "General information about water source" (69.27 MPS), "Irrigation interval" (66.56 MPS) and "General information about water storage system" (57.27 MPS) were assigned third, fourth, fifth and sixth ranks, respectively. While "Method of irrigation" (50.17 MPS) perceived as least level of knowledge of respondents and assigned seventh rank among irrigation management practices.

In the case of overall aspect-wise knowledge of gram growers about irrigation management practices in gram, it is evident from Table 2 that respondents had the highest knowledge about "Critical stages of irrigation" (72.50 MPS) and ranked first followed by "General information about water source" (71.77 MPS). Whereas "Crop water requirement for irrigation" (71.71 MPS), "General information about water storage system" (69.88 MPS), "General crop practices" (69.65 MPS) and "Irrigation interval" (68.82 MPS) were assigned third, fourth, fifth, and sixth ranks, respectively. However, the last position stands for "Method of irrigation" (65.62 MPS) and assigned seventh rank.

This might be due to the fact that beneficiary farmers participated in the training programme conducted by Rajasthan Agriculturals Competitiveness Project (RACP) in collaboration with Department of Agriculture, Department of Horticulture and Agricultural Research Station (ARS), Bikaner. Hence, the participants were

Table 2: Aspect wise knowledge level of gram growers regarding recommended irrigation management practices

S. No.	Knowledge aspects	Beneficiary (n=80)		Non-beneficiary (n=80)		Overall (160)	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	General information about water source	74.73	V	69.27	IV	71.77	II
2.	General information about water storage system	84.43	I	57.27	VI	69.88	IV
3.	General crop practices	77.22	III	71.94	I	69.65	V
4.	Crop water requirement for irrigation	74.68	VI	70.78	II	71.71	III
5.	Method of irrigation	82.76	II	50.17	VII	65.62	VII
6.	Critical stages of irrigation	76.75	IV	70.12	III	72.50	I
7.	Irrigation interval	72.34	VII	66.56	V	68.82	VI
	Pooled	**77.55**		**65.15**		**69.99**	

rs = Rank Correlation; MPS = Mean Percent Score; Significant at 0.01 level of probability

provided with the necessary guidance and technical knowledge concerning recommended irrigation management practices. Whereas, the non-beneficiary respondents were deprived of necessary guidance, technical knowledge and training regarding recommended irrigation management practices. This might have resulted in a high level of knowledge of beneficiary farmers when compared to non-beneficiary farmers.

An effort was also made to determine the relationship between the ranks assigned by the beneficiary and non-beneficiary respondents by applying the rank correlation test. The value of rank correlation (rs) was 0.78 which shows a positive correlation. The significance of rs was tested by the "t? test and it was observed that the calculated "t? value (11.35) was higher than its tabulated value. This leads to the conclusion that there was a difference in the rank assignment pattern of knowledge possessed by the beneficiary and non-beneficiary gram growers about irrigation management practices, though there was a difference in magnitude of Mean percent Score (MPS) of the beneficiary and non-beneficiary respondents.

To know about the significant difference between the beneficiaryand non-beneficiary respondents, a comparison of data by mean andstandard deviation also revealed and presented in table 3.

The data related to aspect-wise comparison of the knowledge level of both beneficiary and non-beneficiary gram growers incorporated in Table 3, pointed out that calculated "Z" value was higher than the tabulated value in the four aspects of irrigation management practices i.e. "General information about water source", "General information about water storage system", "Method of irrigation" and "Critical stages of irrigation" significant at 0.01 level of probability. The table also depicts that three aspects of irrigation management practices i.e. "General crop practices", "Crop water requirement for irrigation" and "Irrigation interval" significant at 0.05 level of probability.This shows that in all the seven aspects of irrigation management practices the beneficiary and non-beneficiary respondents had wide differences in their knowledge level. It means that beneficiary farmers possessed more knowledge as compared to the non-beneficiary respondents in the above-mentioned seven aspects as well as the overall knowledge of the beneficiary and non- beneficiary farmers regarding irrigation management practices.

Table 3: Aspect-wise comparison of knowledge level of gram growers regarding recommended irrigation management practices

S. No.	Aspects	Beneficiary (n=80)		Non-beneficiary (n=80)		Z'Value
		Mean±	S.D.	Mean±	S.D.	
1	General information about water source	14.20	2.01	13.28	1.93	2.96**
2	General information about water storage system	9.28	1.21	6.30	2.24	10.49**
3	General crop practices	6.95	1.20	6.47	1.84	2.02*
4	Crop water requirement for irrigation	5.97	1.13	5.65	0.76	2.11*
5	Method of irrigation	11.58	2.51	7.02	2.53	11.69**
6	Critical stages of irrigation	7.67	0.88	7.01	1.24	3.89**
7	Irrigation interval	5.78	1.42	5.32	1.34	2.19*
	Overall	**8.78**	**1.48**	**7.29**	**1.69**	**5.05****

**Significant at 0.01 level of probability; *Significant at 0.05level of probability; SD = Standard Deviation; NS = Non significant

The probable reason might be the level of education, medium level of extension participation and mass media exposure. These all lead to the awareness of farmers about new innovation ideas. This trend was expected.

Similar findings were observed with the findings of Ghintala and Singh (2013), Kumar *et al.* (2016), Rai *et al.* (2018), Oremo *et al.* (2019) and Tank odara *et al*. (2020) who reported that the respondents in general were having medium knowledge about water management technologies and other relevant improved technologies. A small percentage of respondents were having either low or higher knowledge about improved production technologies.

CONCLUSION

The investigation reveals that majority (61.25%) of beneficiary gram growers had a medium level of knowledge about irrigation management practices followed by 22.50 and 16.25 per cent of respondents with high and low level of knowledge, respectively. The beneficiary respondents had maximum knowledge on the aspect of "General information about water storage system", while they had least knowledge about the "Irrigation Interval". The non-beneficiary respondents had highest knowledge regarding "General crop practices" and least knowledge about the "Method of Irrigation". A significant difference was found in the knowledge level of beneficiary and non- beneficiary respondents about irrigation management practices.Hence upon, it is suggested that by providing adequate awareness and training programme for gaining information in area of irrigation management which is essential for acceptance and adoption of new innovative ideas about irrigation management practices.

REFERENCES

Ghintala, A. and Singh, K. 2013. Knowledge and Adoption of Sprinkler Irrigation System by Farmers of Banaskatha District of North Gujarat. *Indian J. Ext. Edu.* **21**: 26-29.

Kumar, D., Roy, A. and Mohnaty, A.K. 2016. Association of Knowledge Level of the Farmers about Sprinkler System of Irrigation with Independent Variables in the Jhunjhunu District of Rajasthan. *Indian. J. Hill. Farming.* **29**(1): 6-9.

Oremo, F., Mulwa, R. and Oguge, N. 2019. Knowledge, Attitude and Practice in Water Resources Management among Small holder Irrigators in the Tsavo Sub-Catchment, Kenya. Resources. **8**: 2-17.

Rai, A.K., Khajuria, S. and Kumar, R. 2018. Knowledge and Adoption of Improved Production Technology of Maize by the Farmers of Panchmahal District in Gujarat. *Guj. J. Ext. Edu.* **29**(1): 44-47.

Tankodara, K.D., Lakhalani, M.M. and Gohil, G.R. 2020. Chickpea Growers Knowledge about Chickpea Production Technology in Junagadh District of Gujarat State, India. *Int. J. Curr. Microbiol. App. Sci.* **9**(5): 1796-1799.

❑❑❑

Recevied : 24.07.2024
Accepted : 14.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

EFFECT OF ORGANIC NUTRIENT MANAGEMENT PRACTICES ON GROWTH, YIELD AND QUALITY OF SPROUTING BROCCOLI (*Brassica oleracea* L. VAR. ITALICA) CV. "GREEN MAGIC"

Preksha Nagar*, Yagyesh Purohit and Divya Chouhan*****

ABSTRACT

An experiment was carried out at Horticulture farm, Department of Horticulture, School of Agricultural Sciences, Dabok, Udaipur in Rabi season from October 2022 to February 2023, to study the effect of organic nutrient management practices on growth, yield and quality of Broccoli. There were 12 treatments comprising of different combinations of organic manures. The Randomized block design was adopted with three replications. Results showed that among the all treatments, application of 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting was observed with maximum plant height (52.37 cm at harvest), leaf length (43.17 cm), leaf width (34.73 cm), minimum days taken to head formation (59.27), while in yield and quality parameters minimum days taken to head harvest (92.10), polar diameter of head (16.63 cm) , equatorial diameter of head (18.63 cm), fresh weight of head (403.93 g), volume of head (300.33 m3) , and yield per hectare (96.94 q/ha), total soluble solid (8.50°Brix), ascorbic acid (93.18 mg/100g) also observed in same treatment (T6: 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting) as compared to rest of treatments. Minimum values of all observations were recorded under control (no manure), in which no manure had been applied.

INTRODUCTION

Broccoli (*Brassica oleracea* var italica; 2n=18), originated from the Mediterranean region commonly known as Hari ghobi in hindi, belongs to the family Brassicaceae. The broccoli derived its name from the Latin word Brachium meaning an arm or branch. Broccoli is known as the "Crown of jewel nutrition" because it is rich in vitamins and minerals. It is a rich source of vitamin A and C, carotenoids, fiber, calcium and folic acid. It has about 130 times more vitamin A contents than cabbage. It contains a few important phyto-chemicals, beta-carotene, indole-3-carbinol which help to fight breast and lung cancer. Phyto-chemicals prevent carcinogens (cancer causing substances) from forming. It also contains in sulfoslfuron, which block growth of tumors and reduce the risk of cancer (Aires *et al.*, 2006). The area of vegetable crop in India is 9396 thousand hectares with production of 162897 thousand million tons.

Farm yard manure is rich in nutrients that basically use cow dung and cow urine. The organic manure FYM not only provides nutrient to the plant but also improves the soil texture by linking soil aggregates effect. Organic manure increases cation exchange capacity, water holding capacity and soil phosphate availability besides enhancing fertilizer use efficiency and soil microbial population, reducing nitrogen losses due to slow nutrient release (Tadesse *et al.*, 2013). Vermicompost is also another widely used organic manure rich in both macro and micronutrients, besides promoting plant production, microbial humus and nitrogen fixers (Bano *et al.*, 1987). Vermicompost is a stable organic fine granular matter, when applied to the soil, it loosens the soil and enhances the passage to the air inlet. With vermicompost enriched soil provides additional substances which are not found in chemical fertilizers. Vermicompost is primarily made up of C, H and O and contains nutrients such as NO3,

*Assistant Professor, B.N. College of Agriculture, Udaipur
**M.Sc. Scholar, School of Agricultural Sciences, Dabok, Udaipur
***Assistant Professor, College of Agriculture, A.U., Jodhpur

PO4, Ca, K, Mg, S and micronutrients that have similar effects on plant growth and yield as inorganic soil fertilizers (Singh *et al.*, 2008).

Neem cake is a concentrated organic manure of plant origin obtained mainly from neem fresh fruits (*Azadirachta indica L.*) following oil extraction (as a residue). Neem cake, besides large amounts of potash, contains not only nitrogen but also some phosphoric acid.

Jeevamrut is a liquid organic manure which is an excellent source of natural carbon and biomass that contains macro and micro nutrients required by crops. In comparison to other forms of manures, Jeevamrut has proven to be more effective in quality and yield which can be used along with other manures. The product of organic liquid fertilizer is meant for the fermentation process, which constitutes efficient living soil microorganism that improves the plant growth, productivity and supply sufficient amount of nutrients (Kumar *et al.*, 2021).

Adding of poultry manure to soils not only aid to overcome the disposal issue but also increase the physical, chemical and biological prolificity of soils (Friend *et al.*, 2006; McGrath *et al.*, 2009). Such as, sustained cultivation of tillable soils mostly results in the deterioration of soil structure which cause diminished crop production. But, if poultry manure is added to cultivated soil then it improve the fertility of soil by enhancing the organic matter of soil, increase water holding capacity, aggregate stability of the soil and improve oxygen diffusion rate (Mahimairaja *et al.*, 1995a; Adeli *et al.*, 2009).

RESEARCH METHODOLOGY

The field experiment was conducted during October, 2022 to March, 2023 Horticulture farm, Department of Horticulture, School of Agricultural Sciences, Dabok, Udaipur. Geographically, Udaipur is located at 24° 57' N latitude and 73° 69' E longitude at an elevation of 598.00 meters above mean sea level. This particular part of India falls under agroclimatic zone IV a *i.e.* "Sub-Humid Southern Plain and Aravalli Hills" of Rajasthan state. The geography of the experimental site was fairly leveled with an ample surface drainage and the field soil was having clay loam texture. At the transplanting time, 100% of recommended dose of nitrogen (150 kg ha^{-1}) was applied through FYM, as described in the treatments. Nutrient composition of the organic inputs used in experimentation presented in table 1. The treatments were as follows: T1: Control (No Manure), T2: 100% RDN through Farm Yard Manure (20 t/ha), T3: 100% RDN through Vermicompost (8-10 t/ha), T4: 100% RDN through Poultry Manure (2 t/ha), T5: 100% RDN through Neem Cake (2 t/ha), T6: 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting, T7: 50% RDN through Vermicompost + Poultry manure and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting, T8: 75% RDN through Poultry manure + Neem cake and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting., T9: 75% RDN through Neem cake + FYM and Jeevamrut spray @ 500l/ha at 30,40 and 60 days after transplanting, T10 :75% RDN through FYM + Vermicompost + Poultry manure + Neem cake and Jeevamrut spray @ 500 l/ha at 30,40 and 60 days after transplanting, T11:50% RDN through FYM + vermicompost + poultry manure + Neem cake and Jeevamrut spray @ 500l/ha at 30,40 and 60 days after transplanting, T12:100% spray of Jeevamrut @ 500 l/ha at 30, 40 and 60 days after transplanting. Observations were recorded for growth, yield and quality parameters. On a tagged plant growth parameters *i.e.* plant height (30DAT, 60DAT and at harvest), leaf length (cm), leaf width (cm), days taken to head formation (DAT) and yield parameters *i.e.*, days taken to head harvest, polar diameter of head (cm), equatorial diameter of head (cm), fresh weight of head (g), yield (t/ha), volume of head (cm3) plant basis were computed and the average values were reported. Randomized Block Design will be used to analyse the individual data of the numerous characters evaluated in the experiment, as suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Effect of organic nutrients management practices on growth parameters of broccoli were significantly

affected by effect of organic nutrients management practices. Significantly the highest values of plant height (*i.e.* 20.13, 31.43 and 52.37 cm on 30 DAT, 60 DAT and at harvest, respectively), length of leaf (*i.e.* 43.17 cm), leaf width (*i.e.* 34.73 cm) and minimum days taken to head formation (*i.e.* 59.27 days) were recorded under T6 treatment (*i.e.* 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting) while, the lowest values of plant height (*i.e.* 16.07, 22.27 and 40.27 cm on 30 DAT, 60 DAT and at harvest, respectively), length of leaf (*i.e.* 33.37 cm), leaf width (*i.e.* 27.67 cm) and maximum days taken to head formation (*i.e.* 66.23 days) were noticed with treatment T1 (*i.e.* control). (Shown in Table 1). Phosphorus is essential for protein synthesis, chlorophyll and for establishment of good root mass. Similar results were noted through using organic manures by Kumar *et al.* (2018) in cauliflower and Gupta *et al.* (2018) in cabbage.

Effect of organic nutrients management practices on yield significantly minimum days taken to head harvest (*i.e.* 92.10 days), maximum polar diameter of head (*i.e.* 16.63 cm), equatorial diameter of head (*i.e.* 18.63), fresh weight of head (*i.e.* 403.63 g), volume of head (*i.e.* 300.33 cc), yield per plot (*i.e.* 9694.40 g), yield per hectare (*i.e.* 96.94t/ha) and harvest index (*i.e.* 57.18 %) was noticed in T6 treatment (*i.e.* 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting.) while, the maximum days taken to head harvest (*i.e.* 98.07 days), lowest polar diameter of head (*i.e.* 13.73 cm), equatorial diameter of head (*i.e.* 14.33 cm), fresh weight of head (*i.e.* 245.47 g), volume of head (*i.e.* 210.00 cc), yield per hectare (*i.e.* 58.91 t/ha) and was observed under treatment of T0 (*i.e.* control) (Table 2.). The maximum in curd yield can be attributed to the increase in canopy spread, maximum number of leaves, curd length and diameter which may have enhance the photosynthetic surface area and led to greater synthesis and translocation of photosynthetase towards curd formation. These findings are in line with the findings of Sharma (2002) in cauliflower, Sharma *et al.*, (2008) in broccoli and Mehedi. *et al.*, (2018) in broccoli. This may be due to an increase in the photosynthetic activity of the plant with overall growth and an increase in ascorbic acid content. These results also get support in the findings of Mohanta *et al.*, (2018) in Sprouting Broccoli cv. Shayali and Rana *et al.*, (2020) in cabbage.

Effect of organic nutrients management practices on quality parameters was found significant during experimentation. The significantly maximum total soluble solid (*i.e.* 8.50 0Brix), ascorbic acid (*i.e.* 93.18 mg/100g) was noted under treatment of T6 (*i.e.* 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting) while, the minimum total soluble solid (*i.e.* 7.00 0Brix), ascorbic acid (*i.e.* 75.60 mg/100g) was noticed from treatment of T1 (*i.e.* control). This is due to easy availability of nitrogen and organic carbon lead to balanced C:N ratio which improved the quality of produce. Similar response was recorded by Premsekhar and Rajshree (2009) and Alam *et al.* (2019) in okra.

CONCLUSION

Based on the results obtained from the present investigation, it is conducted that the highest growth and yield of broccoli *viz.*, highest values of plant height (*i.e.* 20.13, 31.43 and 52.37 cm on 30 DAT, 60 DAT and at harvest, respectively), length of leaf (*i.e.* 43.17 cm), leaf width (*i.e.* 34.73 cm) and minimum days taken to head formation (*i.e.* 59.27 days), minimum days taken to head harvest (*i.e.* 92.10 days), maximum polar diameter of head (*i.e.* 16.63 cm), equatorial diameter of head (*i.e.* 18.63), fresh weight of head (*i.e.* 403.63 g), volume of head (*i.e.* 300.33 cc), yield per plot (*i.e.* 9694.40 g), yield per hectare (*i.e.* 96.94t/ha) and harvest index (*i.e.* 57.18 %) were recorded under T6 treatment (*i.e.* 75% RDN through Poultry Manure + Vermicompost and Jeevamrut spray @ 500 l/ha at 30, 40 and 60 days after transplanting) and minimum in T10 treatment (*i.e.*, control).

Table 1: Effect of organic nutrient management practices on growth parameters of broccoli

Treatment	Plant height (cm)			Leaf length (cm)	Leaf width (cm)	Days taken to head formation (DAT)
	30 DAT	60 DAT	At harvest			
T_1	16.07	22.27	40.27	33.37	27.67	66.23
T_2	18.70	29.50	48.67	40.33	32.13	60.90
T_3	19.33	30.60	50.80	42.13	33.83	59.47
T_4	18.47	28.57	46.77	38.53	30.67	61.83
T_5	18.73	29.73	49.50	41.17	32.67	60.07
T_6	20.13	31.43	52.37	43.17	34.73	59.27
T_7	18.43	27.50	46.13	37.67	30.17	62.60
T_8	18.13	24.97	44.53	36.10	29.77	64.10
T_9	18.27	26.10	45.73	36.73	29.93	63.53
T_{10}	18.53	28.77	47.40	39.57	31.87	61.43
T_{11}	18.17	24.40	43.07	35.20	29.27	64.83
T_{12}	16.47	23.53	42.20	34.10	28.57	65.90
SEm±	1.55	0.67	1.28	0.74	0.37	0.71
C.D.@5%	4.56	1.97	3.77	2.18	1.10	2.08

Table 2: Effect of organic nutrient management practices on yield parameters of broccoli

Treatment	Days taken to head harvest	Polar diameter of head (cm)	Equatorial diameter of head (cm)	Fresh weight of head (g)	Volume of head (cm)	Yield per hectare (t/ha)
T_1	98.07	13.73	14.33	245.47	210.00	58.91
T_2	93.77	15.60	16.20	374.67	275.00	89.92
T_3	92.37	16.17	17.20	394.33	291.67	94.64
T_4	94.83	15.03	16.10	352.27	255.00	84.54
T_5	93.07	15.90	16.93	381.33	283.33	91.52
T_6	92.10	16.63	18.63	403.93	300.33	96.94
T_7	95.10	14.90	15.87	343.33	250.00	82.40
T_8	96.87	14.47	15.43	313.70	235.67	75.28
T_9	96.13	14.67	15.70	330.77	240.67	79.38
T_{10}	94.07	15.27	16.27	364.93	263.33	87.58
T_{11}	97.00	14.33	15.20	300.50	229.33	72.12
T_{12}	97.60	14.00	14.67	268.00	222.33	64.32
SEm±	0.52	0.17	0.65	7.41	7.05	1.78
C.D.@5%	1.51	0.49	1.90	21.74	20.69	5.22

Table 3: Effect of organic nutrients management practices on total soluble solid and ascorbic acid

Treatment	Total soluble solid (°Brix)	Ascorbic acid (mg/100g)
T_1	7.00	75.60
T_2	7.90	89.53
T_3	8.20	91.33
T_4	7.73	87.63
T_5	8.10	90.70
T_6	8.50	93.18
T_7	7.57	86.17
T_8	7.27	83.10
T_9	7.43	84.43
T_{10}	7.83	88.93
T_{11}	7.23	81.33
T_{12}	7.13	79.27
SEm±	**0.09**	**1.54**
C.D. @ 5%	**0.27**	**4.50**

REFERENCES

Adeli, A., Tewolde, H., SistaniI, K.R., Rowe, D.E. 2009. Broiler litter fertilization and cropping system impacts on soil properties. *Agronomy Journal.* **110**: 1304-1310.

Aires, A., Rose, E. and Carvalho, R. 2006. Growth, physiological disorder fruit yield and quality of strawberry [Fragaria x ananassa (Duch)]. Bioresource Technology, **99**: 8502-8511. *Journal of Science Food and Agricultural*, **86**: 1512-16.

Alam, S.M., Ullah, M.A., Haider, S.I., Nawab, N.N., Aamir, S.S. and Mahmood, I.A. 2019. Effect of farm yard manure and planting densities on growth, yield and quality of okra under natural farming. *International Journal of Research in Agriculture and Forestry*, **6**: 21-25.

Bano, B., Kale, R.D. and Gajanan, G.N. 1987. Culturing of earthworm (*Eudrilus eugeniae*) for cast production and assessment of wormcast as bio-fertilizer. *Journal of Soil Biological Ecology,* **7**: 98-104.

Chandrakala, M. 2008. Effect of FYM and fermented liquid manures on yield and quality of Chilli (*Capsicum annuum* L.). M. Sc.(Agriculture Chemistry). University of Agricultural Sciences, Dharwad.

Friend, A.L., Roberts, S.D., Schoenholtz, S.H., Mobley, J.A. and Gerard, P.D. 2006. Poultry litter application to Loblolly pine forests: Growth and nutrient containment. *Journal of Environmental Quality.* **35**: 837-848.

Kumar, S., Trivedi, H., Khanna, R., Sah, R., Verma, A.K. and Kumar M. 2019. Effect of bio enhancers on growth and yield of cabbage (*Brassica oleracea* L. var. capitata). *International Journal of Chemical Studies*, **7**(2): 754-75.

Mahimairaja, S., Bolan, N.S.,and Hedley, M.J. 1995a. Agronomic effectiveness of poultry manure composts. *Communications in Soil Science and Plant Analysis* **26**: 1843-1861.

McGrath, S., Maguire, R.O., Tacy, B.F. and Kike, J.H. 2009. Improving soil nutrition with poultry litter application in low input forage systems. *Agronomy Journal.* **102**: 48-54.

Mehedi MNH, Mohosina F, Khanom A, Ali MI, Peda M.N. 2018. Effects of organic manures on the growth and yield of broccoli. *Bangladesh Journal*. **35**: 47 -50.

Mohanta, R., Nandi, A.K., Mishra, S.P., Pattnaik, A., Hossain, M.M., Padhiary, A.K. 2018. Effects of integrated nutrient management on growth, yield, quality and economics of sprouting broccoli (*Brassica oleracea* var. italica) cv. Shayali. *Journal of Pharmacognosy and Phytochemistry.* **7**(1): 2229 -2232.

Nurhidayati, N., Machfudz, M. and Murwani, I. 2017. Direct and residual effect of various vermicompost on yield and quality of broccoli. *Journal Of Applied Sciences Research* **13**(8): 30-37.

Panse VC, Sukhatme PV. 1985. Statistical methods for agricultural workers. ICAR Publications, New Delhi.

Premsekhar, M. and Rajshree, V. 2009. Influence of organic manures on growth, yield and quality of okra. *American-Eurasian Journal of Sustainable Agriculture*, **3**: 6-8.

Rana, S., Thakur, K.S., Bhardwaj, R.K., Kansal, S., and Sharma, R. 2020. Effect of biofertilizers and micronutrients on growth and quality attributes of cabbage (*Brassica oleracea* var. capitata L.). *Int. J. Chem. Studies,* **8**(1): 1656 -1660.

Sharma, A. and Chandra, A. 2002. Economic evaluation and different treatment combinations of plant spacing and nitrogen in cabbage and cauliflower. *Current Agriculture*, **26**(1/2): 103 -105.

Sharma, A., Parmar, D.K., Kumar, P., Singh, Y., and Sharma, R.P. 2008. Azotobacter soil amendment integrated with cow manure reduces need for NPK fertilizers in sprouting broccoli.

Singh, S., Saxena, A.K. and Nyori, B. 2022. Consequence of various organic manures on growth, yield and economics of sprouting broccoli (*Brassica oleracea* L. var.italica) under low hills of Uttarakhand. *The Pharma Innovation Journal,* **11**(11): 735-741.

Swain, S.S., Sahu, G.S. and Mishra, N., 2015. Effect of panchagavya on growth and yield of chilli (L.) cv. Kuchinda Local. *Green Farming*, **2**: 338-340.

Tadesse, T., Dechassa, N., Bayu, W., and Gebeyehu, S., 2013. Effects of farmyard manure and inorganic fertilizer application on soil physico-chemical properties and nutrient balance in rain-fed lowland rice ecosystem. *American Journal of Plant Sciences*, **4**: 309-316.

❑❑❑

Recevied : 07.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

A STUDY ON TECHNOLOGICAL GAP IN THE ADOPTION OF RECOMMENDED PRACTICES OF POTATO IN ASSAM

Maitrayee Dutta* and Pallabi Bora**

ABSTRACT

The significant presence of substantial yield disparities and technological deficiencies across various crops poses a formidable challenge to Indian agriculture. Among these crops, potato holds paramount importance within the country, yet encounters analogous issues wherein actual yields fall significantly short of their potential. This study endeavours to examine the technological gap in potato cultivation specifically within the region of Assam. Keeping in view the factors affecting the technological gap a study was conducted purposely in Sonitpur district of Assam in order to study the technological gap that existed in the potato growing areas of the Sonitpur District. A total of 120 farmers were selected from 4 villages of Sonitpur district. A pilot survey was carried out using a pre structured schedule. It was revealed that 19.16 per cent of the respondents have low overall technological gap with 64.16 per cent of the respondents with medium overall technological gap.

INTRODUCTION

The agricultural sector holds immense significance in the Indian economy, serving as the largest private sector employer, offering livelihoods to over half of the country's population, predominantly situated in rural regions. Potatoes are a staple in the daily diets of over a billion individuals worldwide. For hundreds of millions in developing nations, their survival hinges on the potato as a crucial food source. As per the 2011 census, approximately 68.84% of the Indian population, accounting for around 83.31 crore individuals, reside in 6,40,867 distinct villages scattered across the nation. Consequently, the progress of India is intricately intertwined with the advancement of the agricultural sector and the enhancement of farmers' incomes (Singh *et al.*, 2020). Assam has a total of 103812 hectares of potato cultivation with an average yield of 6685 kg/ha. Potatoes are a staple in the daily diets of over a billion individuals worldwide. For hundreds of millions in developing nations, their very survival hinges on the potato as a crucial food source. Assam's economy is primarily driven by agriculture, with significant contributions from animal husbandry and forestry to the state GDP. These sectors serve as the primary catalysts for economic growth. Approximately 63% of the state's workforce is engaged in agricultural and allied activities, with more than 79% of the total cultivated area dedicated to food crop production. Rice stands out as the principal food crop, while jute, tea, pulses, cotton, oilseeds, sugarcane, vegetables, and fruits are cultivated abundantly.

In recent times, potatoes have emerged as a major cash crop in the state, playing a crucial role in its agricultural economy. The popularity of potatoes has surged significantly over the years. Despite possessing only around 6% of India's potato-growing area in 2003-04, Assam contributed just 2.35% to the country's total potato production (Pandit *et al.*,2006). Sonitpur district of Assam has a total production of 62988 tonnes in a total area of about 7603 hectares. In order to increase production and to ease adoption, various forms of support and guidance must be made available. Therefore, when endorsing any upgraded technology, relevant departments ought to attain a comprehensive understanding of farmer's characteristics to ensure the technology aligns effectively with their socio-economic conditions (Baruah *et al.*,2022).

RESEARCH METHODOLOGY

The research was conducted in the state of

*Ph.D Scholar., Department of Extension Education, CA, AAU, Jorhat
**Asst. Prof., Department of Extension Education, CA, AAU, Jorhat

Assam, situated in the North-Eastern region of India, spanning latitudes 24° to 28°18' north and longitudes 89°50' to 97°4' east. Assam covers an area of 78,523 sq.km (78,523,000 ha) and has a population exceeding 311 lakh (as per the 2011 census). The state is divided into 35 administrative districts out of which this study focusses on the Sonitpur district of Assam.

Sonitpur district was chosen as most of the farmers are involved in the commercial cultivation of potato. 4 villages of Sonitpur district namely Gingia, Thelamara, Borsola, Depota were randomly selected for the present study. From these 4 villages a total of 120 respondents were chosen using the proportionate random sampling technique.

RESULTS AND DISCUSSION

The study below reveals the distribution of respondents according to the category wise technological gap .

From Table 1 an analysis of the respondents according to the overall technological gap revealed that majority of the respondents (64.16%) had medium overall technological gap in adoption of scientific practices of potato cultivation followed by 19.16 per cent respondents with low overall technological gap in adoption of scientific practices of potato cultivation. 16.66 per cent was found with high technological gap in adoption of scientific practices of potato cultivation which is similar to the findings suggested by Bishnoi *et al.*,2020. The per centage wise distribution of the respondents according to the overall technological gap was presented in Table 3.

Measurement of technological gap

The technological gap represents the variance between suggested technologies and their actual adoption by farmers. In this research, the 'technological gap' was calculated by combining scores given to individual practices based on farmer's feedback. The technological gap for each aspect of potato cultivation was evaluated across three classifications: full gap, partial gap, and no gap. Compliance with recommended practices was classified as 'no gap' and assigned a score of 0. Any deviation from the recommended practice was labeled as a 'partial gap' with a corresponding score of 1. Farmers who completely neglected the recommended practice were categorized as having a 'full gap' and assigned a score of 2.

A study from the Table 2 reveal that there existed

Table 1: Distribution of respondents according to overall technological gap

Technological gap category	Score range	F	%
Low overall technological gap	Up to 27	23	19.16
Medium overall technological gap	28 to 45	77	64.16
High overall technological gap	Above 45	20	16.66
	Total	120	100

Table 2: Practice wise distribution of respondents

SI No	Practices	No. of respondents		
		Full gap	Partial gap	No gap
1	Tillage practices	31 (25.83)	64 (53.33)	25 (20.83)
2	Use of improved variety practices	52 (43.33)	66 (55.00)	2 (1.66)
3	Earthing up	10 (8.33)	58 (48.33)	52 (43.33)
4	Fertilizer use	27 (22.50)	58 (48.33)	35 (29.16)
5	Plant protection practices	48 (40.00)	55 (45.83)	17 (14.16)
6	Irrigation	44 (36.66)	58 (45.83)	18 (15.00)
7	Seed rate	36 (30.00)	64 (53.33)	20 (16.66)

**Figures within parentheses indicate percentage

a significant technological disparity in the implementation of recommended potato cultivation methods among the stakeholders. The maximum technological gap was found in the use of improved variety (43.33%) followed by plant protection practices with 40.00 per cent. 36.66 per cent of the respondents had full gap in the irrigation practices followed by 30.00 per cent of the respondents who had full gap in the used of recommended seed rate. Only a small per cent of the respondents (8.33%) had full gap in earthing up followed by 25.83 per cent of the respondents who had full gap in the use of tillage practices. 22.50 per cent of the respondents who had full gap in the use of appropriate fertilizers.

55.00 per cent of the respondents had partial gap in the use of improved variety practices which is similar to the findings given by Sharma *et al.*,2015, followed by 53.33 per cent of the respondents who had partial gap in the use of appropriate tillage practices and seed rate. 48.33 per cent of the respondents had partial gap in the earthing up and the fertilizer use followed by 45.83 per cent of the respondents who had partial gap in the plant protection practices which is significant with the findings provided by Goudappa *et al.*,2012 and Dave *et al.*,2011 and irrigation which is significant with the study conducted by Naruka *et al.*,2009.

43.33 per cent of the respondents had no gap in the mulching practices of potato 29.16 per cent of the respondents had no gap in the fertilizer use followed by 20.83 per cent of the respondents had no gap in the tillage practices.16.66 per cent of the respondents who had no gap in the seed rate practices. 15.00 per cent of the respondents had no gap in the irrigation practices followed by 14.16 per cent of the respondents had no gap in the plant protection practices. 1.66 per cent of the respondents had no gap in the use of improved variety practices.

CONCLUSION

From the above study it can be concluded that majority of the respondents had medium overall gap technological gap and maximum gap was found in the use of improved variety or the plant protection practices etc. Therefore, proper training should be provided and skill enhancement programmes should be conducted so that the respondents could reduce the technological gap regarding the potato cultivation practices and also to adopt the recommended practices of potato cultivation. There is a necessity to distribute enhanced technologies among farmers through efficient extension approaches such as training and demonstrations. Farmers should be motivated to embrace the recommended set of practices, acknowledging their potential for increased returns."

REFERENCES

Baruah, J., Das, P., & Bora, P. 2022. Factors Influencing Adoption Of Recommended Muga Rearing Practices In Assam. *Ind. J. Ext. Educ. & R.D.* **30**: 111-116.

Bishnoi, R., Avinashilingam NA, V., & Tewari, P. 2020. Adoption Of Improved Pearl Millet Cultivation Practices Inarid Region. *Ind. J. Ext. Educ. & R.D.* **28**: 36-39.

Dave, R., Godawat, A., & Soni, R. L. 2011. Adoption of Okra Crop Production Technologies In Tribal Women Promoted Under Naip. *Ind. J. Ext. Educ. & R.D.* **19**: 117-120.

Goudappa, S. B., Biradar, G. S., & Bairathi, R. 2012. Technological gap in chilli cultivation perceived by farmers. *Research Journal of Extension Education*, **20**: 171-174.

Sharma, L. K., Sharma, F.L. and Upadhyay, B. 2015. Adoption Behaviour of Bt. Cotton Growers in Rajsamand District of Rajasthan. *Ind. J. Ext. Educ. & R.D.* **23**: 24-28

Singh, D.K., Pandey, N.K., Kharumnuid, P. and Singh, R.K. 2020. Analysis of yield and technological gaps of potato production in Bihar. *Economic Affairs*, **65**(1): 51-56.

❑❑❑

Recevied : 12.06.2024
Accepted : 17.07.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

IMPACT OF CLUSTER FRONTLINE DEMONSTRATIONS ON GROUNDNUT YIELD AND ADOPTION LEVEL IN WESTERN RAJASTHAN

M.M. Puniya*, L.R. Choudhary, A.S. Jat*** and D.K. Bagri******

ABSTRACT

The study aimed to analyze the performance and promote cluster front-line demonstrations in groundnut production and assessing CFLDs contribution in yields and the adoption of improved technologies. During the rainy seasons of 2018-20, a series of Cluster Frontline Demonstrations (CFLDs) were conducted at the farmers' fields of Jodhpur, Rajasthan. These demonstrations covered a total area of 85 hectares, aimed to showcase the latest agronomic production technologies in comparison to traditional farmer practices. A total of 144 CFLDs were conducted across villages of Jodhpur district, with the objective to measure the effectiveness and advantages of employing advanced technologies for groundnut cultivation. These CFLDs highlighted the potential benefits of integrated crops management such as timely sowing, precise nutrient, water and weed management, and plant protection measures. This approach allowed farmers to observe first hand the outcomes of implementing these techniques, helping them make informed decisions about adopting modern agricultural practices for better yields and economic gains. The study's findings indicate that the technology demonstrated during the cluster frontline demonstrations led to significant improvements in groundnut yield compared to traditional farmer practices. Three years results indicated that demonstrated technologies yielded a 23 % greater yield than farmer's practices. The yield gap between the extension and demonstrated technology was 0.46 t ha^{-1}, however the technology gap was 0.34 t ha^{-1}. The technology index, which measures the difference in yield between demonstrated technology and the potential maximum yield, was 11.6 %. Further, adoption of demonstrated technology led to better economic outcomes. On average, it resulted in a higher net return of Rs. 75,898 t ha^{-1} and an additional return of Rs. 21,824 t ha^{-1} compared to the farmer practices. We calculated an incremental cost-benefit ratio of 18.3 for the demonstrated technology, indicating that the benefits outweighed the costs significantly. Also, the study found that the highest adoption gap was in soil treatment practices, with only 55.6 % of farmers adopting it. On the contrary, the adoption gap was the lowest in sowing time, with 85.4 % of farmers adopting it. These gaps could be attributed to various constraints or challenges in implementing certain practices. Overall, the study highlights the positive impact of implementing demonstrated agricultural technologies in groundnut cultivation. These results indicate that the adoption of improved practices can lead to higher yields, better economic returns, and improved cost-benefit ratio compared to traditional practices.

INTRODUCTION

Groundnut (*Arachis hypogaea L.*) is a self-pollinated, and a type of legume from the Fabaceae family. This crop is known for its high nutritive value, and is often referred to as the "golden" or "miracle" bean. Groundnut is a valuable source of minerals (P, Ca, Mg, and K) and vitamins (E, K, and B). Despite its nutritional value, groundnut production faces constraints such as use of low-yielding local varieties and lack of seed treatment leading to seed-borne diseases and reduced plant populations. India is the largest global producer of oilseeds, with

*SMS (Agronomy), Krishi Vigyan Kendra, Maulasar, (Nagaur-II), Agriculture University, Jodhpur, Rajasthan
**SMS (Ext.), Krishi Vigyan Kendra, Maulasar, (Nagaur-II), Agriculture University, Jodhpur, Rajasthan
****Senior Scientist & Head, Krishi Vigyan Kendra, Maulasar, (Nagaur-II), Agriculture University, Jodhpur, Rajasthan
****SMS (A.H.), Krishi Vigyan Kendra, Maulasar, (Nagaur-II), Agriculture University, Jodhpur, Rajasthan

groundnut being a significant oilseed crop. In India, groundnut covers ~5.02 million hectares and produces ~8.11 million tonnes (Anonymous, 2019). Priya et al (2021) reported that the most important problems as expressed by most of the respondents were less remuneratie prices for the produce, high cost of cultivation, uncertainty in weather condition specially rainfall and high labor scarcity at crucial operations like sowing, weeding and harvesting. Rajasthan is a major groundnut-producing state, second only to Gujarat. Bikaner and Jodhpur are the highest-producing districts in Rajasthan. Groundnut contributes significantly to the oilseed production in Rajasthan, with Jodhpur district producing over 372183 million tons annually with a productivity of 2269 kg/ha (GOR, Kharif 2023). The CFLDs are a method of transferring the latest agricultural technologies to farmers. These demonstrations involve showcasing modern production and protection technologies and management practices in real farming situations (Singh *et al.,* 2012; Patil *et al.,* 2019). The objective is to demonstrate the effectiveness of newly released technologies in various agro-climatic regions and farming scenarios. The demonstrations were conducted in ten-hectare blocks to ensure maximum impact and adoption of the demonstrated technology. The CFLDs were accompanied by supportive extension activities like field days and farmers' conventions for better knowledge dissemination.

RESEARCH METHODOLOGY

The study was conducted in the Western Plains Agro-climatic Zone of the Jodhpur district of Rajasthan. Before start of experiments, a Participatory Rural Appraisal (PRA) was conducted in each village and based on questionaries, farmers response, their needs, current practices and challenges, the experimental sites were selected. A total of 144 CFLDs were carried out on randomly selected farmer's fields in three villages i.e., Barjasar, Pali, and Amla. The demonstrations were conducted during the rainy seasons of 2018, 2019, and 2020 under irrigated conditions. Each demonstration was conducted on an area of 0.4 and 0.8 hectares with adjacent plots, where farmer's followed their traditional practices, were kept as a reference for comparison. The demonstrations showcased a package of improved technologies, including line sowing, nutrient management, seed treatment, and other recommended practices. Improved groundnut varieties, such as HNG-123 and GJG-19, were tested in the CFLDs. The comparison of the scientific cultivation and farmer's practices given in table 1. The soils of study area belong to loamy fine to coarse group, with low nitrogen, medium Phosphorus and available potash. The soil PH ranged between 8.0 to 9.9, EC ranged between 0.20 to 5.5 and 0.19 to 0.60 percent organic carbon in the soil. During the crop growing season, minimum temperature ranged between 23.5 to 25.60 C while, maximum temperature ranged between 43.5 to 48.50 C, respectively. The average wind velocity is 10 to 30 km/hr and sunshine was 10 to 12 hours. Sowing was done in the second week of June, and other agricultural practices were applied following the recommended package of practices for kharif crops (DOA, 2022). The bunch/Semi-spreading varieties (HNG-123and GJG-19) included for demonstrations, seed treatment with Carbendazim 50 WP at 2 g/kg seed; quinalphos 25 EC 25 ml/kg seed, recommended seed rate at 80 kg/ha with line sowing and recommended dose of nutrients 15:60:0 NPK kg/ha (Table 1). Under demonstrations plot, total fertilizers requirements of crop were applied basal through DAP based fertilizers. The weeds were controlled with one manual weeding at 30-35 DAS fb pre-emergence application of pendimethalin 30 EC at 1 kg/ha. For management of white grub, used chlorpyriphos 20 EC at 4 l/ha or Imidacloprid 17.8 SL at 300 ml/ha within 21 days after beetle mass emergence. Data related to pod yields from the CFLD plots and fields cultivated using local practices were collected. The collected data set were used to assess the impact of the demonstrated technologies on yields and other economic parameters. The traits as suggested by Yadav *et al.* (2004) were used for gap analysis, likely referring to a comparison between the demonstrated

technologies and traditional practices. A technology index has been calculated to gauge the effectiveness of the demonstrated package of technologies. The economic parameters related to groundnut cultivation were calculated, including cost-effectiveness profitability, and other relevant factors. The research aimed to bridge the gap between traditional practices and modern technologies to enhance agricultural productivity.

Estimation of productivity and yield enhancements: The primary data on pod yields and farmer's practices were collected from the beneficiary farmers through random plot cutting methodology followed by personal contacts. The yield increase in frontline demonstration over farmer's practice was calculated by using following formula adopted for analysis are suggested by Choudhary, Yadav and Singh (2009):

% yield increase over farmer's practice = Average demonstration plot yield- Farmer's average plot yield/ Farmer's average plot yield × 100

Estimation of technology and extension gaps and technology index: The estimation of technology and extension gaps, technology index and other economic analysis was done using formula by Kadian, Sharma, and Sharma (1997): Samui *et al.* (2000):

Extension gap = Average demonstration plot yield - Farmer's average plot yield

Technology gap = Potential yield -Average demonstration plot yield

Technology index = Potential yield --Average demonstration plot yield /Potential yield × 100

Additional cost (Rs.) = Demonstration cost (Rs.) - Farmer's practice cost (Rs.)

Effective gain = Additional returns (Rs.)-Additional cost (Rs.)

Additional returns = Demonstration returns (Rs.)-Farmer's practice returns (Rs.)

B: C ratio =Gross returns/total costs

Incremental B: C ratio=Additional returns / Additional cost

RESULTS AND DISCUSSION

Cluster frontline demonstration versus farmer's practices: Before the commencement of CFLDs at the farmer's field, the participatory rural appraisal was undertaken. Based on this, the gap between farmers' practices and improved technology of groundnut cultivation in the Jodhpur district of Rajasthan was worked out (Table 1). Among technological interventions, no gap was observed under the farming situation, time of sowing and method of sowing. In contrast, a full gap was recorded for soil and seed treatment and maintaining plant stand spacings. However, a 50 % gap was recorded for particulars such as seed rate, variety, fertilizer and weed management, and plant protection etc. These gaps noticed in the farmer's field are ascribed to the slow pace of extension, machinery and unreached public extension systems or improved technologies, especially among small holders and other vulnerable groups (Badhala and Bareth, 2013). Further, farmers used local cultivars of groundnut showing low yield potential instead of newly released varieties with the appropriate adoption of an improved package of recommended technologies.

Impact of CFLDs on pod yields: The maximum demonstrated pod yields recorded in the years 2019 and 2020 was 2.25 t/ha, respectively. In 2018, the yield was slightly lower at 2.23 t/ha. These yields were compared with local checks, which yielded 2.05, 2.03, and 1.96 t/ha for the 2018, 2019 and 2020, respectively (Table 2). The use of high-yielding varieties (HYVs), better quality inputs, and scientific guidance from KVK specialists contributed to improved yields. There was a significant yield increase observed when comparing the improved practices with traditional farmer's practices. In the rainy season of 2020, there was a 25.6 % increase in yield over traditional practices, however in 2018 and 2019, the yield increase was 18.9% and 24.4%, respectively. These results highlighted the positive impact of using modern agricultural techniques, including the adoption of HYVs and improved

Table 1: Technological interventions under CFLDs and farmer's practices for groundnut cultivation in Jodhpur district of Rajasthan

Particulars	Technological interventions	Farmer's practices	Gaps
Farming Situation	Irrigated	Irrigated	No gap
Varieties	HNG-123and GJG-19	GG 10, GG 20	~50%
Seed rate	80 kg/ha	120 kg/ha	~40-50%
Soil treatment	*Trichoderma* at 2.5 kg/ha cultured with 100 kg FYM	Not using	~100%
Seed treatment	Carbendazim 50 WP at 2 g/kg seed; quinalphos 25 EC 25 ml/kg seed	Not following seed treatment before sowing	~100%
Sowing time	Second week of June	Second week of June	No gap
Sowing method	Line sowing	Line sowing	No gap
Spacing	45 × 10-15 cm	22.5 × 10-15 cm	~50%
Fertilizer management	15:60:0 (NPK kg/ha)	DAP based fertilizers	~50%
Weed management	One manual weeding at 30-35 DAS *fb* pre-emergence application of pendimethalin 30 EC at 1 kg/ha	One manual weeding at 30-35 DAS	~50 %
Plant protection measures	For management of white grub, Used chlorpyriphos 20 EC at 4 l/ha or Imidacloprid 17.8 SL at 300 ml/ha within 21 days after beetle mass emergence.	Chlorpyriphos 20 EC at 6-8 l/ha	~70 %

inputs, as well as the guidance provided by agricultural extension specialists from KVK. The consistent increase in yield percentage over the years indicates the successful implementation of these practices and their contribution to higher agricultural productivity. The higher yields under the demonstrated plots may be attributed to improved varieties, i.e., GJG 19 and HNG 123, groundnut seed rate, timely sowing, weed and pest control and balanced nutrient management (Undhad *et al.,* 2019; Lakhani *et al.,* 2020; Dash *et al.,* 2021).

Gap analysis: Technology gap: Findings of the study stated that a technology gap of 0.25 to 0.45 t/ha was calculated between demonstrated technology and farmer's practice, and on average, the technology gap was 0.34 t/ha during three years of demonstrations for groundnut cultivation (Table 3). The technology gap was maximum (0.45 t/ha) with demonstrated varieties HNG-123 during 2019 and minimum with GJG-19 (0.25 t/ha) during 2020. Our results reinforcing previous findings Kumari *et al.,* 2020. Hence, location-specific, high-yielding varieties with specific practices addressing higher yields, fertility status, and tolerance to pests and diseases must be developed to narrow the technology gap. These findings are in accordance with Pawar *et al.,* 2018 and Solanki and Nagar (2020).

Extension gap: This study showed an extension gap ranging from 0.37-0.52 t/ha between demonstrated technology and farmer's practice during three years of demonstrations (Table 3). The extension gap was highest in GJG-19 during 2020 and minimum during 2018. On the basis of the average, the extension gap was 0.46 t/ha during three years of demonstrations for groundnut cultivation. These findings are in line with the findings of Meena *et al.,* 2021.

Technology index: A technology index was calculated for each demonstration to determine whether the evolved technology is feasible for farmers. Results showed that it varied from 8.92-15% during three years of demonstrations, and the

highest technology index was 15% and the lowest 8.92% recorded in 2019 and 2020, respectively (Table 3). The lower the index, the more feasibility of the evolved technology. Awareness programs, field days, group discussions and farmer's feedback help in the horizontal spread of the technology. These findings are in agreement with Lakhani *et al.,* 2020.

Input-cost relationships: The economics of demonstrated technology over farmer's practices were calculated depending upon the prevailing market prices of inputs and outputs for the particular year. It was observed that the cost of cultivation varied from Rs. 43577-Rs. 49990/ha with an average of Rs. 45715/ha under demonstrated technology. In contrast, the cost of cultivation varied from Rs. 42100- Rs. 48120/ha with an average of Rs. 44341/ha under the farmer' practice. Also, demonstrated technologies have higher net returns varied from Rs. 70360-Rs. 78823/ha with an average of Rs. 75898/ha under demonstrated technology. Whereas, the net returns of groundnut varied from Rs. 53744-Rs. 55598/ha with an average of Rs. 54074/ha recorded under farmer's practices (Table 4). The average additional cost and net returns of Rs. 1374 and Rs. 21824/ha, respectively, were recorded with the incremental cost-benefit-cost ratio of 18.3. On average, the benefit-cost ratio (BCR) under demonstrated technology and farmer's practices were 2.7 and 2.2, respectively. The higher BCR ratio in the demonstration can be attributed to the realization

Table 2: Performance of CFLDs on groundnut yields and % increment over farmers practices in Jodhpur district of Rajasthan.

Year	Demons-tration numbers	Area (ha)	Varieties	Potential yield (t/ha)	Pod yields under CFLDs (t/ha)			Pod yields under FP (t/ha)	% increase over FP
					Highest	Lowest	Average		
2018	50	20	-	-	2.45	2.21	2.33	1.96	18.9
2019	25	20	HNG 123	3.00	2.68	2.43	2.55	2.05	24.4
2020	69	45	GJG-19	2.80	2.67	2.42	2.55	2.03	25.6
Total	144	85	Average	2.90	2.60	2.35	2.47	2.01	23.0

Table 3: Yield gap analysis studies of groundnut under CFLDs in Jodhpur district of Rajasthan

Years	Varieties	Technological gaps (t/ha)	Extension gap (t/ha)	Technology index (%)
2018	-	-	0.37	-
2019	HNG 123	0.45	0.05	15.0
2020	GJG-19	0.25	0.52	8.92
Average	-	0.34	0.46	11.6

Table 4: Economics analysis under CFLDs and farmer's practices in Jodhpur district of Rajasthan

Year	Gross costs (₹/ha)		Add. costs (₹/ha)	Gross returns (₹/ha)		Net returns (₹/ha)		Add. net returns (₹/ha)	B:C Ratio		ICBR
	CFLD	FP		CFLD	FP	CFLD	FP		CFLD	FP	-
2018	43577	42100	1477	113937	95844	70360	53744	16616	2.61	2.27	11.2
2019	43577	42802	775	122400	8400	8823	55598	23225	2.80	2.29	29.9
2020	49990	48120	1870	128500	101000	78510	52880	25630	2.57	2.09	13.7
Av.	45715	44341	1374	121612	98415	75898	54074	21824	2.70	2.2	18.3

Table 5: Adoption level and gap of technological interventions under CFLDs (n=144) of Jodhpur district of Rajasthan

Technological interventions	Adoption level				% change in adoption	% adoption gap
	Before CFLDs		After CFLDs			
	N	%	N	%		
HYVs	60	41.6	105	72.9	31.3	27.1
Recommended seed rate	25	17.3	95	65.9	48.6	34.1
Soil treatment	14	9.7	80	55.5	45.8	44.4
Seed treatment (FIR)	28	19.4	87	60.4	41.0	39.6
Time of sowing	88	61.1	123	85.4	24.3	14.6
Spacing	19	13.1	90	62.5	49.3	37.5
Fertilizer method	40	27.7	96	66.6	38.9	33.3
Weed management	40	27.7	101	70.1	42.4	29.9
Plant protection measures	55	38.1	95	65.9	27.9	34.1

of higher yields compared to farmer's practices. Raghava and Punna Rao (2013) and Lakhani *et al.,* 2020 were also reported similar findings.

The study revealed that the adoption of new technologies was initially low due to a lack of technological knowledge. However, after CFLDs and training programs conducted by KVK, the adoption of these technologies increased significantly. After demonstrations, the extent of adoption of various technological interventions increased as follows:

1. Spacing: 49.3 %
2. Recommended seed rate: 48.6 %
3. Soil treatment: 45.8 %
4. Weed management: 42.4 %
5. Seed treatment: 41 %
6. Methods of fertilizer application: 38.9 %
7. High-yielding varieties (HYVs): 31.3 %
8. Plant protection measures: 27.9 %
9. Time of sowing: 24.3 %

The adoption gap represents the difference between the current adoption rate and the full adoption. It indicates the stage for improvement in adopting a specific technology. The adoption gap was highest in soil treatment practice at 44.5 % and lowest in the time of sowing at 14.6 %. This study highlights the positive impact of CFLDs and training programs conducted by KVK on increasing the adoption of groundnut production technologies. The results suggested that these initiatives have helped bridge the knowledge gap and promote the adoption of beneficial practices among the communities involved in groundnut production.

CONCLUSION

It's clear that the Cluster Frontline Demonstrations conducted at Jodhpur had positive outcomes. The demonstrations helped farmers achieve higher yields and improved economic returns, which in turn enhanced their livelihoods. The success of these demonstrations was attributed to various factors, including promoting a comprehensive package of practices for groundnut cultivation. One significant outcome of these demonstrations was the strengthening of the relationship and trust between the farmers and the scientists from the Krishi Vigyan Kendra' (KVK). This mutual trust is vital for the successful implementation of agricultural innovations and the adoption of new technologies. Effective extension methods will further disseminate these improved practices and technologies. These include training sessions, farmer gatherings, field days, exposure visits, and demonstrations. These methods ignite curiosity and motivation among farmers who have not yet adopted advanced groundnut cultivation practices.

REFERENCES

Anonymous. 2019. Agriculture statistics at a glance.

Government of India, Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare, Directorate of Economics and Statistics. New Delhi

Badhala, B. S. and Bareth, L. S. 2013. Constraints of moth bean production technology in thearid region of Rajasthan. *Agriculture update*. **8**(1/2): 93-97.

Choudhary, A. K., Yadav, D. S. and Singh, A. 2009. Technological and Extension gaps in oilseeds in mandi district of Himachal Pradesh. *Journal of Community Mobilization and Sustainable Development,* **5**(1):1-6

DOA. 2022. Production and productivity of kharif oilseeds in the Agro-climatic zone of Rajasthan.

GOR. 2022. Vital Agricultural Statistics, Govt. of Rajasthan, Pant Krishi Bhawan, Jaipur. : 04-05.

Ingale, S. and Shrivastva, S. K. 2011. Nutritional study of new variety of groundnut (*Arachis hypogaea L.*) JL 24 seeds. *African journal of food science*. **5**(8): 490-498.

Kadian, K. S., Sharma, R. and Sharma, A. K. 1997. Evaluation of Frontline Demonstrations trials on oilseeds in Kangra valley of Himachal Pradesh. *Annals of Agricultural Research*. **18**(1): 40-43.

Kirar, B. S., Mahajan, S. K. and Nashine, R. 2004. Impact of technology practices on the productivity of soybean in CFLD. *Indian Research Journal of Extension Education*. **5**(1): 15-17.

Kumari, N., Thakur, A. K. and Kaith, N. S. 2020. Assessment of yield gaps in chickpea production in Shimla district of Himachal Pradesh. *International Journal of economic plants*. **6**(3): 143-146.

Patil, N. G., Ekale, J. V. and Dhoke, S. P. 2019. Constraints faced by beneficiaries and non-beneficiaries of KVK and their suggestions. *International Journal of chemical studies*. **5**: 3387-3389.

Pawar, Y. D., Malve, S. H., Chaudhary, F. K., Dobariya, U. and Patel, G. J. 2018. Yield gap analysis of groundnut through cluster front line demonstration under north Gujarat condition. *Multilogic in Sci*. **7**(25): 177-179.

Priya, N. K., Padmodaya, B., Srinivasulu, D. V. and Shilpakala, V. 2021. Production constraints in groundnut in kapada dist of Andra pradesh. *J. Krishi Vigyan*. **10**(1): 218-222.

Raghava, N. V. and Parisa, P. R. 2013. Impact of frontline demonstrations on groundnut production technology in Guntur district of A.P. *Agriculture Update*. **8**(1&2): 283-290.

Samui, S. K., Maitra, S., Roy, D. K., Mandal, A. K. and Saha, D. 2000. Evaluation of Frontline Demonstrations trials on groundnut. *Journal of Indain Society of Coastal Agricultural Research.* **18**(2): 180-183.

Singh, D., Choudhary, M. and Meena, M. L. 2012. Indian rural technology of frontline demonstrations enhances agriculture productivity under rainfed conditions of Rajasthan. *Indian Journal of Social Research*. **53**(2):141-151.

Solanki, R. L. and Nagar, K. C. 2020. Yield and gap analysis of groundnut (*Arachis hypogaea L.*) productivity through frontline demonstration in district Chittorgarh of Rajasthan, India. *Int. J. Curr. Microbiol. Appl. Sci.* **9**(6): 4119-4125.

Undhad, S. V., Prajapati, V. S., Sharma, P. S., Jadav, N. B. and Parmar, A. R. 2019. Role of cluster frontline demonstrations in enhancement of groundnut production. *Journal of Pharmacognosy and Phytochemistry*. **8**(4):1862- 1863.

Yadav, D. B., Kambhoj, D. K. and Garg, R. B. 2004. Increasing the productivity and profitability of sunflowers through frontline demonstrations in irrigated agroecosystem of eastern Haryana. *Haryana Journal of Agronomy*. **20**(1): 33-35.

❑❑❑

Recevied : 15.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

PROFILE CHARACTERISTICS OF BENEFICIARIES AND NON-BENEFICIARIES OF NATIONAL AGRICULTURAL INNOVATION PROJECT IN THE BANSWARA DISTRICT

Santosh Devi Samota*, K.L. Dangi, S.L. Yadav***, G.N. Yadav**** and S.K. Meena*****

ABSTRACT

The present study was conducted to assess the personal profile of NAIP beneficiaries and non-beneficiaries in the Banswara District of Rajasthan. The data collected from 152 NAIP beneficiaries and non-beneficiaries. The majority of respondents belonged to the middle-aged group (49.35%) with illiterate education levels (48.02%), the 55.26 per cent belonged to nuclear families and 50.65 per cent belong to small families and the majority of the respondent belonged to medium farming experience.

INTRODUCTION

National Agricultural Innovation Project (NAIP) was launched to facilitate an accelerated and sustainable transformation of Indian Agriculture so that it could support poverty alleviation and income generation. This would be achieved through collaborative development and application of agricultural innovations by the public organizations in partnership with farmers' groups, the private sector and other stakeholders. The project focuses on four components which aim at ICAR as the catalyzing agent for the management of change in the Indian National Agricultural Research System; Research on Sustainable Rural Livelihood Security and Budget Basic & Strategic Research in Frontier Areas of Agricultural Sciences multiple technology options in a holistic and integrated manner to increase their productivity and profitability. The project is for 5 years (2007-2012). This project is currently being run in four districts of Rajasthan, namely, Udaipur, Banswara, Dungarpur, and Sirohi. The beneficiaries of the project are tribals only. Good efforts under the project are being made to replace local seeds of wheat with High high-yielding varieties along with important interventions such as Integrated Nutrient Management (INM), Integrated Pest Management (IPM) and Irrigation Water Management (IWM).

RESEARCH METHODOLOGY

The NAIP project is in operation in four tribal populated districts namely, Udaipur, Banswara, Dungarpur and Sirohi. Therefore, district Banswara was selected based on maximum households covered under the project. The NAIP is in operation in two Panchayat Samities of Banswara district, namely Talwara and Garhi. Panchayat Samiti Talwara was selected for the study. After having drawn sample of 19 respondents (beneficiaries) each from every beneficiary village, similar size of sample of non-beneficiaries (19) from each of the non- beneficiary villages was drawn with the help of random sampling procedure. Hence, control sample was of 76 farmers. Total size of sample was of 152 respondents, combining beneficiaries and non - beneficiaries. In accordance with the objectives, an interview schedule was developed for the collection of data from the selected respondents by the researcher herself. Relevant data

*Assistant professor, Department of Agricultural Extension Education, SKNAU Jobner, Jaipur
**Professor, Department of Agricultural Extension Education, MPUAT, Udaipur
***Assistant Professor (Agronomy), Agriculture University, Kota
**** Ph.D. Scholar, Department of Agronomy, SKN Agriculture University, Jobner, Jaipur
*****Ph.D. Scholar, Department of Agricultural Extension Education, SKNAU Jobner, Jaipur

were collected from the selected respondents with the help of a constructed interview schedule.

RESULTS AND DISCUSSION

Age: It is indicated that the majority of respondents, i.e.75 (49.35 per cent) of the total, belonged to the middle age group of 35 to 45 years. The respondents in old and young age groups were found to be 52 (34.21 per cent) and 25 (16.44 per

Table.1 Distribution of respondents on the basis of personal profile of the beneficiaries and non-beneficiaries under the NAIP project

(n=152)

S.No	Category	Beneficiaries (n_1)	Non-beneficiaries (n_2)	Total
A.	**Age**			
1	Young (up to 34 years)	17 (22.37)	8 (10.53)	25 (16.44)
2	Middle (35-45 years)	39 (51.31)	36 (47.37)	75 (49.35)
3	Old (above 45 years)	20 (26.32)	32 (42.10)	52 (34.21)
Total		76 (100.00)	76 (100.00)	152 (100.00)
B.	**Education**			
1	Illiterate	27 (35.53)	46 (60.53)	73 (48.02)
2	Can read-only	5 (6.57)	3 (3.95)	8 (5.26)
3	Can read and write	0 (0.00)	1 (1.31)	1 (0.65)
4	Primary	8 (10.53)	14 (18.42)	22 (14.47)
5	Middle	17 (22.37)	10 (13.16)	27 (17.78)
6	Secondary	12 (15.79)	2 (2.63)	14 (9.21)
7	Senior Secondary	3 (3.94)	0 (0.00)	3 (1.98)
8	Graduate	4 (5.27)	0 (0)	4 (2.63)
Total		76 (100.00)	76 (100.00)	152 (100.00)
C.	**Family type**			
1	Nuclear	44 (57.89)	40 (52.63)	84 (55.26)
2	Joint	32 (42.11)	36 (47.37)	68 (44.74)
Total		76 (100.00)	76 (100.00)	152 (100.00)
D.	**Family size**			
1	Small	39 (51.31)	38 (50)	77 (50.65)
2	Big	37 (48.69)	38 (50)	75 (49.35)
	Total	76 (100.00)	76 (100.00)	152 (100.00)
E.	**Distance from the KVK**			
1	Near (Up to 20 km)	19 (25.00)	19 (25.00)	38 (25.00)
2	Far (More than-20 km)	57 (75.00)	57 (75.00)	114 (75.00)
	Total	76 (100.00)	76 (100.00)	152 (100.00)
F.	**Experience of the respondents in farming**			
1	Low (up to 15 years)	30 (39.47)	14 (18.42)	44 (28.95)
2	Medium (16-30 years)	37 (48.69)	45 (59.21)	82 (53.95)
3	High (More than 30 years)	9 (11.84)	17 (22.36)	26 (17.10)
Total		76 (100.00)	76 (100.00)	152 (100.00)

Figures within the parentheses are percentage to the total, n=n1 + n2, n1=Size of sample for beneficiaries, n2= Size of sample for non- beneficiaries

cent), respectively. It was also noted that 39 (51.31 per cent) of beneficiary farmers and 47.37 per cent of non-beneficiary farmers belonged to the middle age group, whereas, in the young age group, beneficiary farmers and non-beneficiaries' farmers were found to be 17 (22.37 per cent) and 8 (10.53 per cent) respectively. Likewise, the representation of beneficiary farmers and non-beneficiary farmers in the old age group were 20 (26.36 per cent) and 32 (42.10 per cent), respectively. The majority of both the categories of respondents fall under the young to middle age group. The present findings are similar to the findings of Nikhitha *et al.* (2021), Bandi *et al.* (2023) and Meena & Badhala (2024).

Education: The maximum respondents were Illiterate 73 (48.02 per cent), while 27 (17.78 per cent) were educated up to middle. Few 4 (2.63 per cent) were graduate. The most of the respondents were illiterate. The present findings are similar to the findings of Deshmukh *et al.* (2011) and Nikhitha *et al.* (2021)

Family type and size: The majority of the respondents belonged to nuclear families 84 (55.26 per cent) and 44.73 per cent were joint families and 77 (50.56 per cent) belong to small families and 49.35 per cent respondents were belonged to the big families. The present findings are similar to the findings of Gopal and Mazhar (2023).

Distance from the KVK: The majority 57 (75 per cent) of the respondents were far from KVK Banswara (More than 20 km) category and remaining 25 per cent of respondents reside near (in the vicinity of 20 kms) the KVK. The present findings are similar to the findings of Nikhitha *et al.* (2021) and Gaur *et al.* (2023).

Experience of the respondents in farming: The nearly half of the respondents 82 (53.95 per cent) were found to have 16-30 years of experience, followed by 44 (28.95 per cent) and 26 (17.10 per cent) having low and high level of experience respectively. Both the categories of respondents possessed a medium level of experience in farming. It may be because the study's locale is near the Banswara city and they may be pursuing other jobs in addition to farming. The present findings are similar to the findings of Gopal and Mazhar (2023).

CONCLUSION

The majority of respondents belonged to the middle-aged group (49.35%) with Illiterate education levels (48.02%) and nuclear families (55.26 %) and small families (50.65 %). The majority of the respondents (75.00 %) belonged to the distance of more than 20 km from KVK and medium farming experience.

REFERENCES

Bandi, S., Kumar, R.V., Krishnamurthy, B. and Nataraju, O. 2023. Profile Characteristics, Constraints and Suggestions of Beneficiaries and Non-Beneficiaries of Pashu Bhagya Scheme. *Mysore Journal of Agricultural Sciences,* **57**(3): 276-287.

Gaur, R.S., Paswan, A.K., Mallick, B. and Bunkar, R.C. 2023. Socio-economic and Personal Characteristics of the Beneficiaries under PM-KISAN Samman Nidhi Scheme. *Biological Forum - An International Journal,* **15**(10): 473-477.

Gopal, S.K. and Mazhar, S.H. 2023. Socio-Economic study of the Beneficiaries and Non-Beneficiaries of Kisan Credit Card Scheme in Kannuaj District of Uttar Pradesh, India. *Asian journal of agricultural extension, economics & sociology,* **41**(10): 842-848.

Meena, S.K. and Badhala, B.S. 2024. Personal Profile of Cooperative and Private Agri Input Dealers in the Jaipur Region of Rajasthan, India. *Asian Journal of Agricultural Extension, Economics & Sociology,* **42**(5): 431-437.

Nikhitha, A., Reddy, P.B.H., Sailaja, V. and Ramu, Y.R. 2021. Profile of Cluster Front Line Demonstrations (CFLDs) Beneficiary and Non-Beneficiary Farmers in Chittoor District Of Andhra Pradesh". *Andhra Pradesh Journal of Agriculture Science,* **7**(2): 118-124.

❑❑❑

Recevied : 12.06.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

IMPACT OF ALL INDIA NETWORK PROGRAMME ON ORGANIC FARMING IN SCHEDULE CASTE SUB PLAN OF UDAIPUR DISTRICT, RAJASTHAN

Hansa Devi*, Rajeev Bairathi, S.S. Sisodia*** and Hari Singh******

ABSTRACT

The All-India Network Programme on Organic Farming (AINPOF) within the Scheduled Caste Sub Plan (SCSP) holds significant potential in promoting sustainable agricultural practices and socio-economic empowerment among marginalized communities in India. The study was conducted in five villages of Udaipur District (Rajasthan). The study area selected on the basis of maximum beneficiary farmers were available. This part of research deals with the existing status of knowledge possessed by beneficiary farmers regarding organic farming practices. It was observed that out of the 104 farmers, the majority (63.46 %) had a medium level of knowledge about organic farming practices, while, 21.15 per cent of the farmers possessed high level of knowledge and remaining 15.38 per cent had low level of knowledge about organic farming practices.

INTRODUCTION

Organic farming practices are wide-ranging and necessitate the development of socially, ecologically and economically sustainable food production system.

In order to develop a technological package of organic farming including plant protection for different crops and cropping systems, a Network Project on Organic Farming (NPOF) was initiated during 2004-05 by Indian Council of Agricultural Research (ICAR), New Delhi with Indian Institute for Farming Systems Research (IIFSR) as nodal institute. In order to address, issues of comparison of organic, inorganic and integrated nutrient management practices, method and source of nutrient application, management of pest, diseases and weeds in various crops/ cropping systems, four experiments were planned and conducted at 13 centers.

The All-India Network Programme on Organic Farming (AINPOF) has been implemented in Udaipur district, Rajasthan, as part of the Scheduled Caste Sub Plan (SCSP) to promote sustainable agricultural practices among farmers.

RESEARCH METHODOLOGY

The study was conducted purposively in Udaipur District of Rajasthan, because All India Network Programme on Organic Farming (AINPOF) is currently running in service area of MPUAT, Udaipur so maximum number of beneficiaries were available. To select the beneficiary respondents, a complete list of beneficiaries was collected from the records available at Directorate of Research, MPUAT, Udaipur. It proposed to include 100 per cent beneficiaries for this study as total number was 104.

RESULTS AND DISCUSSION

Distribution of farmers according to their level of knowledge about recommended organic farming practices are given in Table 1.

According to Table 1, it was observed that majority (63.46 %) had a medium level of knowledge about organic farming practices, while, 21.15 per cent of the farmers possessed high level of knowledge and remaining 15.38 per cent had low level of knowledge about organic farming practices.

Aspect wise knowledge of farmers about recommended organic farming practices: Individual aspect wise knowledge of farmers was

*M.Sc. Scholar, Department of Extension Education, RCA, MPUAT, Udaipur (Raj.)
**Professor, Department of Extension Education, RCA, MPUAT, Udaipur (Raj.)
***Head, Department of Extension Education, RCA, MPUAT, Udaipur (Raj.)
****Associate Professor, Department of Agricultural Economics, RCA, MPUAT, Udaipur (Raj.)

Table 1: Distribution of farmers according to their level of knowledge about recommended organic farming practices

S. No.	Knowledge level	f	%
1.	Low (<90.87)	16	15.38
2.	Medium (90.87 to 108.98)	66	63.46
3.	High (>108.98)	22	21.15
	Total	**104**	**100**

f=frequency, % = per cent, Mean =99.92, S.D.= 9.06

Table 2: Aspect wise knowledge level of farmers about recommended organic farming practices

S. No.	Aspects	MPS	RANK
1.	Crops	99.70	I
2.	Improved varieties	80.77	III
3.	Seed rate	81.43	II
4.	Seed spacing	79.96	IV
5.	Organic manures and their preparation method	78.26	V
6.	Knowledge about herbal pesticide	77.35	VI
7.	Marketing management	66.35	VII
8.	Organic certification	52.40	VIII

MPS= Mean per cent score

also worked out for plotting a depiction about the areas where farmers had excellent knowledge and where they are deficient so that, wherever farmers had little knowledge, they can be given extra care in future.

Based on the information presented in Table 2, the aspect of "Crops" had the highest level of knowledge among the farmers with MPS of 99.70. The aspect of "Seed rate" was ranked second with MPS of 81.43. Further, aspect of "Improved varieties" ranked third with MPS of 80.77. The overall knowledge on aspect of "Seed spacing" stood at the fourth position with MPS of 79.96. Table further illustrates that the farmers had a good level of knowledge on "Organic manures and their preparation method" with total MPS of 78.26 with fifth position. The "Knowledge about herbal pesticide" received a total MPS of 77.35 and was ranked sixth by the farmers. Similarly, another knowledge aspect for the farmers was "Marketing management" which was placed at the seventh position with total MPS of 66.35 and another aspect for the farmers was "Organic certification" which was placed at the eighth position with total MPS of 52.40.

CONCLUSION

The finding concluded that majority (63.46 %) of farmers had a medium level of knowledge about organic farming practices. It was observed that the aspect of "crops" had the highest level of knowledge among the farmers with MPS 99.70. The aspect of "Seed rate" was ranked second with MPS 81.43. Further, aspect of "Improved varieties" ranked third in the heirarchy of knowledge with MPS 80.77.

On the basis of study results the following recommendation were framed.

1 It was found that many of the farmers were not aware about important aspects of organic farming in the study area. Therefore, government

personnel should organize awareness camps and farmers fair for providing the benefits about organic practices to emphasize the potential increase in farm profits and ecological benefits.

2 Training and Capacity Building programmes must be conducted on regular intervals for the farmers to enhance their knowledge about organic farming practices, including crops, improved varieties, organic manure management, herbal pesticide use, marketing management, and organic certification procedures.

3 It is suggested to evaluate the training programs at regular intervals, which will ensure the effective delivery of knowledge and skill to the farmers. Address any issues related to the quality and accessibility of training sessions to maximize their impact on knowledge and adoption among the farmers.

4 It is recommended that state government and central government may take initiative for creating knowledge hubs and e-kiosk on the organic farming at block level.

REFERENCES

Bhatia, R. 2015. Farmers' Knowledge and Adoption of Organic Paddy Farming Practices in Haryana, Ph.D. (Ag.) Thesis (Unpub.), Choudhary Charan Singh Haryana Agricultural University, Haryana.

Barik, R. 2018. A Study on Adoption of Organic Farming Technique in Khurdha District of Odisha. M.Sc. (Ag.) Thesis (Unpub.), Orissa University of Agriculture and Technology, Bhubaneswar.

Chandhana, B., Sashikala, G., Reddy, B. K. K., Madhavi, K., Sudharani, K. and Sadhineni, S. N. M. 2023. A study on knowledge level and attitude of farmers towards organic farming in Ananthapuramu District, Andhra Pradesh, India. *International Journal of Environment and Climate Change*, **13**(11): 1344-1349

Damor, K. C. and Khadayata, K. G. 2017. Knowledge and Constraints of Farmers about Organic Farming. *Int. J. of Chem. Studies.* **5**(3): 522- 524.

Manisha, B.K., Kumari, V., Boora, S. and Mukteshwar, R., 2023. Knowledge of farmers toward organic farming in Haryana. The pharma innovation **12**(4): 2618-2623.

Naik, M. 2015. Knowledge and Adoption of Organic Farming Practices in Red Gram in Dryland Areas of Karnataka. M.Sc. (Ag.) Thesis (Unpub), Jayashankar Telangana State Agricultural University, Hyderabad.

Sharma, R., Jadav, N. B., Chouhan, S., Singh, S. R. K. and Athare, T. 2016. Relational Analysis of Knowledge and Adoption of Organic Farming Practices in Gujarat State. *Indian Res. J. Ext. Edu.* **16**(3):33-38.

Shashikiran, Sankangoudar, S. and Hiremath, D. 2020. Knowledge level of farmers about organic farming practices. *Journal of Pharmacognosy and Phytochemistry*, **9**(5): 817-820.

❑❑❑

Recevied : 20.08.2024
Accepted : 29.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

PEOPLE'S PARTICIPATION IN SOIL AND WATER CONSERVATION ACTIVITIES IN UDAIPUR DISTRICT OF RAJASTHAN

Lekhraj Gurjar*, S.S. Sisodia and Rajeev Bairathi*****

ABSTRACT

The present study was conducted in Udaipur district of Rajasthan which include four-gram panchayat from 2 tehsils. The 120 farmers were selected for this study and personal interview technique was used for data collection. It was observed that out of 120 People, the majority (53.33%) Peoples belonged to medium participation category. Whereas, 24.17 per cent People had low participation in soil and water conservation practices and remaining 22.50 per cent people's participated in soil and water conservation activities at high level. Study also represents that People's participation in "Pre-implementation stage" was rank first with overall MPS 37.53, "Post implementation stage" assigned at second position with overall MPS 35.75. Whereas, people's participation "During implementation stages" assigned at third position with overall MPS 34.90.

INTRODUCTION

Soil and water are two important natural resources are of basic needs for agricultural production. These two resources are too precious for the mankind as they meet all the needs and protect the environment as well as the civilization. During the last century it has been observed that the pressure of increasing population has led to degradation of these natural resources. In other words, increase in agricultural production to feed the increasing population is only possible if there is sufficient fertile land and water are available for farming. In India, out of 328 million hectares of geographical area, 68 million hectares are critically degraded while 107 million hectares are severely eroded.

A country's water resources are one of the most critical assets for its People's lives, health and well-being. Four per cent of the world's water resources are available in India. Freshwater is limited in nature and is becoming increasingly rare day by day. In India, the warming climate, dried-up lakes and rivers, rapid urbanization and water pollution have exerted profound pressure on the quantity and quality of surface and ground water. As a result, the country's per capita water availability has decreased. India is a developing country with a large population, a diversified topography and vast areal coverage with a variety of climates.

The burgeoning population and their impact in every sphere of development, *viz*. agriculture, industry and urbanization depend primarily on water resources leading to ever increasing demands of water. Increasing water demand, over exploitation of ground water resources and inefficiency of tapping the surface water and also harvesting rain water created an imbalance resulting into dearth of water availability for sustainable food production and the domestic usage. FAO has reported that the global water withdrawal increased from less than 600 km3 year in 1900 to almost 4000 km3 year-1 in 2010. Further, it is assessed that it will increase to 5100 km3 during 2025 with a rise of 8.4-12.2 per cent from the current rate of withdrawal. In 1995, 76 per cent of the world population had water availability of less than 5100 m3 per annum per capita and it is predicted that in 2025, most of the Earth's population will be living under low water supply. It is programmeed that the situation of water user categories in the world will not shift much

*M.Sc. Scholar, Department of Extension Education, RCA, MPUAT, Udaipur (Raj.)
**Head, Department of extension education, RCA, MPUAT, Udaipur (Raj.)
***Professor, Directorate of extension education, RCA, MPUAT, Udaipur (Raj.)

excepting increase in water consumption due to urbanization in the developing countries. The water consumption for agriculture will be around 70.00 per cent, industry around 20.00 per cent and residential and commercial around 10.00 per cent.

RESEARCH METHODOLOGY

The study was conducted in Udaipur district of Rajasthan due to its location within the MPUAT service area and as limited research conducted on this aspect. People's participation in adoption of soil and water conservation technologies Udaipur district of Rajasthan. For data collection 120 respondents of 4 Gram Panchayats were selected from vallabhnagar and Bhinder tehsil of Udaipur District. Data collection was conducted through a pre-structured interview schedule. Subsequently, the collected data were analyzed and the results were interpreted as presented below.

RESULTS AND DISCUSSION

1. People's participation in soil and water conservation activities

To get an overview of People's participation in soil and water conservation activities, People were grouped into three groups *viz*., (i) low (ii) medium and (iii) high. The groups were formulated on the basis of calculated mean and standard deviation of participation obtained by People.

Table 1 indicates that out of 120 Peoples, majority (53.33%) of peoples belonged to medium participation category. Whereas, 24.17 per cent peoples had low participation in soil and water conservation practices and remaining 22.50 per cent peoples participated in soil and water conservation activities at high level.

Further examination of Table 1 reveals that 25.00 per cent Peoples of Vallabhnagar tehsil and 20.00 per cent Peoples of Bhinder tehsil had low level of participation in soil and water conservation activities. Whereas, 48.33 per cent and 58.33 per cent Peoples of Vallabhnagar and Bhinder tehsils possessed medium level of participation in soil and water conservation activities, respectively. On other hand, 26.67 per cent Peoples of Vallabhnagar tehsil and 21.67 per cent Peoples of Bhinder tehsil had high level of participation in soil and water conservation activities.

2. People's participation in programme activities implemented by the Department of Soil and Water Conservation

To determine the participation of Peoples regarding SWC activities, it was deemed important to calculate the extent of participation for each phase. Additionally, the mean Per cent Score of each phase was determined for this purpose. The results of the study are presented in Table 2.

In Table 2 found that participation of Peoples in "Pre-implementation stage" was rank first with overall MPS 37.53, in Vallabhnagar tehsil it also ranked first with MPS 38.40 and in Bhinder tehsil it held at first position with MPS 36.67. Overall participation of Peoples regarding the "Post

Table 1: People's participation in soil and water conservation activities

S. No.	Participation level	Vallabhnagar (n_1=60)		Bhinder (n_2=60)		Total (n=120)	
		f	%	f	%	f	%
1	Low (<9.22)	15	25.00	12	20.00	29	24.17
2	Medium (9.22 to 27.12)	29	48.33	35	58.33	64	53.33
3	High (>27.12)	16	26.67	13	21.67	27	22.50
	Total	60	100.00	60	100.00	120	100.00

f=frequency, % =per cent, Mean =18.17, S. D= 8.95

Table 2: People's participation in programme activities implemented by the Department of Soil and Water Conservation

S. No.	Aspects	Vallabhnagar (n_1=60)		Bhinder (n_2=60)		Total (n= 120)	
		MPS	RANK	MPS	RANK	MPS	RANK
1	Pre-implementation stage	38.40	1	36.67	1	37.53	1
2	During implementation stage	35.73	3	34.06	3	34.90	3
3	Post implementation stage	36.50	2	35.00	2	35.75	2

MPS= mean Per cent Score

implementation stage" assigned at second position with overall MPS 35.75, in Vallabhnagar tehsil it ranked second with MPS 36.50 and in Bhinder tehsil it held the second position with MPS 35.00. People's participation "During implementation stages" assigned at third position with overall MPS 34.90, in Vallabhnagar tehsil it ranked third with MPS 35.73 and in Bhinder tehsil it was on third position with MPS 34.06.

3. People's participation at programme Pre-implementation stage

The data presented in Table 3 represent Peoples participation during "Pre-implementation stage" and recorded that "Peoples consent taken for inclusion of his farm land in programme at the time of initiation of programme" was assigned at first position with overall MPS 57.08, in Vallabhnagar tehsil it ranked first with 59.17 MPS and in Bhinder tehsil it ranked second with 55.00. Peoples said that "Crop demonstrations were finalized as per Peoples suggestions" assigned at second position with overall MPS 55.83, it ranked second in Vallabhnagar and Bhinder tehsils with MPS 55.00 and 56.67, respectively.

According to Table 3 also depicts "People's consent taken before construction of various soil and water conservation structures", "Peoples gave some suggestion while forming the plan of work", "Peoples participation in the public meeting for formation of users committee", "Peoples visit was finalized as per Peoples suggestion", "Type of perennial trees and their species were finalized as per Peoples suggestions for the area" and "Fruit plants & their species were finalized to introduce in the area as per local requirement" were stand at third, fourth, fifth, sixth, seventh and eighth position with overall MPS 47.50, 45.00, 42.92, 37.50, 35.00 and 34.17, in Vallabhnagar and Bhinder tehsils it ranked third, fourth, fifth, sixth, seventh and eighth with MPS (49.17, 45.83), (45.83, 44.17), (44.17, 41.67), (36.67, 38.33), (35.83, 34.17) and (35.00, 33.33), respectively.

Furter examination of Table 3 reveals that the Peoples participation in "Construction of self-help group as per Peoples suggestions" assigned at ninth position with overall MPS 32.50, it ranked eleventh in Vallabhnagar and ranked ninth in Bhinder tehsil with same MPS 32.50, respectively. Peoples also reported that their "Consent taken prior to conduct agro forestry plantation" assigned at tenth position with overall MPS 32.08, it ranked ninth in Vallabhnagar and ranked tenth in Bhinder tehsil with MPS 34.17 and 30.00, respectively. Peoples stated that "Grass species were finalized prior as per Peoples suggestions" assigned at eleventh position with overall MPS 30.83, it ranked tenth in Vallabhnagar and ranked eleventh in Bhinder tehsil with MPS 33.33 and 28.33, respectively.

4. people's participation during programme implementation stages

Table 4 represent Peoples participation "During programme implementation stages" and found that

Table 3: People's participation at programme pre-implementation stage

S. No.	Statement	Vallabhnagar (n_1=60)		Bhinder (n_2=60)		Total (n= 120)	
		MPS	RANK	MPS	RANK	MPS	RANK
1	Peoples consent taken for inclusion of his farm land in programme at the time of initiation of programme	59.17	1	55.00	2	57.08	1
2	Peoples consent taken before construction of various soil and water conservation structures	49.17	3	45.83	3	47.50	3
3	Crop demonstrations were finalized as per Peoples suggestions	55.00	2	56.67	1	55.83	2
4	Type of perennial trees and their species were finalized as per Peoples suggestions for the area	35.83	7	34.17	7	35.00	7
5	Grass species were finalized prior as per Peoples suggestions	33.33	10	28.33	11	30.83	11
6	Fruit plants & their species were finalized to introduce in the area as per local requirement	35.00	8	33.33	8	34.17	8
7	Peoples consent taken prior to conduct agro forestry plantation	34.17	9	30.00	10	32.08	10
8	People’s participation in the public meeting for formation of users committee	44.17	5	41.67	5	42.92	5
9	Peoples gave some suggestion while forming the plan of work	45.83	4	44.17	4	45.00	4
10	Construction of self-help group as per Peoples suggestions	32.50	11	32.50	9	32.50	9
11	Peoples visit was finalized as per Peoples suggestion	36.67	6	38.33	6	37.50	6

MPS= mean Per cent Score

"People’s contributed in programme work in terms of labour" and "People’s conducted crop demonstration as per the guidance of WDT members" were stand at first and second position with overall MPS 60.42 and 56.67, in Vallabhnagar and Bhinder tehsils it ranked first and second with MPS (62.50, 58.33) and (56.67, 56.67), respectively. This table explains "Peoples planted

perennial tree as per the guidance of WDT" assigned at third position with overall MPS 35.00, it ranked third in Vallabhnagar and ranked fourth in Bhinder tehsil with MPS 36.67 and 33.33, respectively. Further "Peoples visit planned as par guidance of WDT member" assigned at fourth position with overall MPS 33.75 it ranked fifth in Vallabhnagar and ranked third in Bhinder tehsil with MPS 33.33 and 34.17, respectively. "Peoples planted fruit plants as the guidance of WDT member" assigned at fifth position with overall MPS 32.09, it ranked fourth in Vallabhnagar and ranked sixth in Bhinder tehsil with MPS 34.17 and 30.00. "Peoples participated for growing grasses in pasture land" assigned at sixth position with overall MPS 30.83, it ranked seventh in Vallabhnagar and ranked fifth in Bhinder tehsil with MPS 30.00 and 31.67. "Self-help group finalised as per the guidance of WDT member" assigned at seventh position with overall MPS 30.42 it ranked sixth in Vallabhnagar and ranked seventh in Bhinder tehsil with MPS 32.50 and 28.33, respectively.

5. People's participation at programme post implementation stage

Data of Table 5 indicates Peoples participation during programme "Post implementation stage" and found that "Peoples participated in maintenance of soil and water conservation structures", "Peoples participated in meeting called to solve the disputes", "Programme staff regularly conducted visit of site for look after the programme assets" and "Peoples participated in distribution of share either in the form of grass, fuel and wood etc." were stand at first, second, third and fourth position with overall MPS 58.75, 50.84, 43.34 and 25.84, in Vallabhnagar and Bhinder tehsils it ranked first, second, third and fourth with MPS (60.83, 56.67), (51.67, 50.00),

Table 4: People's participation during programme implementation stages

S. No.	Statement	Vallabhnagar (n_1=60)		Bhinder (n_2=60)		Total (n=120)	
		MPS	RANK	MPS	RANK	MPS	RANK
1	Peoples contributed in programme work in terms of labour	62.50	1	58.33	1	60.42	1
2	Peoples conducted crop demonstration as per the guidance of WDT members	56.67	2	56.67	2	56.67	2
3	Peoples planted perennial tree as per the guidance of WDT	36.67	3	33.33	4	35.00	3
4	Peoples participated for growing grasses in pasture land	30.00	7	31.67	5	30.83	6
5	Peoples planted fruit plants as the guidance of WDT member	34.17	4	30.00	6	32.09	5
6	Self-help group finalised as per the guidance of WDT member	32.50	6	28.33	7	30.42	7
7	Peoples visit planned as par guidance of WDT member	33.33	5	34.17	3	33.75	4

MPS= mean Per cent Score

Table 5: Peoples participation at programme Post implementation stage

S. No.	Statement	Vallabhnagar (n_1=60)		Bhinder (n_2=60)		Total (n=120)	
		MPS	RANK	MPS	RANK	MPS	MPS
1	Programme staff regularly conducted visit of site for look after the programme assets	45.00	3	41.67	3	43.34	3
2	Peoples participated in maintenance of soil and water conservation structures	60.83	1	56.67	1	58.75	1
3	Peoples participated in distribution of share either in the form of grass, fuel and wood etc.	25.00	4	26.67	4	25.84	4
4	Peoples participated in meeting called to solve the disputes	51.67	2	50.00	2	50.84	2

MPS= mean Per cent Score

(45.00, 41.67) and (25.00, 26.67), respectively.

CONCLUSION

It is concluded that out of 120 Peoples, majority (53.33%) of Peoples belonged to medium participation category. Whereas, 24.17 per cent Peoples low participation in soil and water conservation practices and remaining 22.50 per cent peoples participated in soil and water conservation activities at high level.

Peoples also stated that "Pre-implementation stage" was rank first with overall MPS 37.53, that People's participation in "Pre-implementation stage" was rank first with overall MPS 37.53, "Post implementation stage" assigned at second position with overall MPS 35.75. Whereas, people's participation "During implementation stages" assigned at third position with overall MPS 34.90.

It was found that "People's consent taken for inclusion of his farm land in programme at the time of initiation of programme" was assigned at first position with overall MPS 57.08 at pre implementation stage. Whereas, "Peoples contributed in programme work in terms of labour" was stand at first position with overall MPS 60.42 at during programme implementation stage and "Peoples participated in maintenance of soil and water conservation structures" was stand at first position with overall MPS 58.75.

REFERENCES

Indrawati, D. R., Supangat, A. B., Wahyuningrum, N. and Subandrio, B. 2022. Community participation in soil and water conservation as a disaster mitigation effort. In IOP Conference Series: Earth and Environmental Science **1109**(1): 012030).

Mengistu, F. and Assefa, E. 2020. Towards sustaining watershed management practices in Ethiopia Asynthesis of local perception, community participation, adoption and livelihoods. *Environmental Science & Policy.* **112**: 414-430.

Ketema, K., Jafer Mume, S. A., Abro, H. and Elemo, R. 2020b. Impact of Integrated Soil and Water Conservation Practices on Farm Household Income in East Harerghe Zone of Oromiya Region, Ethiopia. In Regional Review Workshop on Completed Research Activities : 133.

Bayu. and E. K. 2020. Determinant variables for women's participation in soil and water conservation practices in north western Ethiopia: The case of Shebel Berenta District (Woreda), East Gojjam Zone, Amhara National Regional State. *Air, Soil and Water Research*, **13**:

1178622120942199.

Alemu, M. D., Kebede, A. and Moges, A. 2019. People's perception of soil erosion and adoption of soil conservation technologies at Geshy Sub-Catchment, Gojeb River Catchment, Ethiopia. *Agricultural Sciences*, **10**(01): 46.

Bagdi, G. L. and Joshi, U. 2018. Peoples Participation in Implementation of Soil and Water Conservation Programme: Case Study of Antisar Watershed in Kheda District of Gujarat. *Indian Journal of Extension Education*, **54**(4): 74-83.

Akkaraboyina, M. K. and Tareke, B. M. 2018. Community Perception and Participation towards Soil and Water Conservation Practices: A Case Study of Gubalafto District of Amhara Region, Ethiopia, **6**(2): 2321-9939

Agidew, A. M. A. and Singh, K. N. 2018. Factors affecting farmers' participation in watershed management programs in the Northeastern highlands of Ethiopia: a case study in the Teleyayen sub-watershed. *Ecological processes*, **7**: 1-15.

Vaidyanath, D. 2016. A Study on Peoples Participation, Benefits and Constraints in Integrated Watershed Management Programme (IWMP) in Medak District of Telangana State (Doctoral dissertation, Professor Jayashankar Telangana State Agricultural University Rajendranagar, Hyderabad).

Biratu, A. A. and Asmamaw, D. K. 2016. Farmers' perception of soil erosion and participation in soil and water conservation activities in the Gusha Temela watershed, Arsi, Ethiopia. *International Journal of River Basin Management*, **14**(3): 329-336.

❑❑❑

Recevied : 21.08.2024
Accepted : 30.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

GAIN IN KNOWLEDGE THROUGH TRAINING PROGRAMME FOR INPUT DEALERS IN NAGAUR DISTRICT OF RAJASTHAN

L.R. Choudhary*, M.M. Puniya, A.S. Jat*** and D.K. Bagri******

ABSTRACT

In view of recent advancement in the agricultural technologies and more and more involvement of Input Dealers in agriculture, the role of Input Dealers is not just to educate the Input Dealers regarding agriculture technologies but they have to pay equal attention towards dissemination of agro-based new technologies for the socio-economic upliftment of the rural families. Hence, the National Institute of Agricultural Extension Management (MANAGE) has launched a program titled "Diploma in Agricultural Extension Services for Input Dealers (DAESI)" to enhance the technical competency of input dealers with a view to facilitate better advisory to the farmers. Currently, this program is being implemented as a Central Sector Plan Scheme with the help of various Nodal Training Institutes (NTIs) such as Agricultural University, Krishi Vigyan Kendra's, Farmers' Training Centres, Agricultural Technology Management Agency (ATMA), Directorate of Extension Education etc. For this, it is imperative that these functionaries should have through knowledge in agriculture and allied areas. Keeping this in view a 48 days training on agriculture information ,and new agricultural technology for Input Dealers was organized at Krishi Vigyan Kendra, Maulasar Nagaur-II in collaboration with MANAGE Hyderabad.

INTRODUCTION

The concept of Ministry of Agriculture and farmer welfare, New Delhi was introduced in 2015-16 by providing flexible working environment with objective of integrating research, extension and all other stake holders at the district level to support. Department of Agriculture and Farmers Welfare mandated one year diploma of DAESI (Diploma in Agriculture Extension Service for Input Dealers Program) or B. Sc Agriculture degree for fertilizers and seed sellers

According to state Department of agriculture Rajasthan, the people who want to open fertilizer pesticide and seeds store required either diploma in agriculture or B.Sc. degree in agriculture. If a person who is just 10^{th} pass want to get a license for a fertilizer store, then they will get it easily. But for this the person will have to do 48 days training in Krishi Vigyan Kendra for diploma certificate in agriculture.

According to new rules, like agricultural graduates and 10^{th} pass can also get license to become fertilizer, Pesticides and seed seller. They will get certificate from the National Institute of Agricultural Extension Management (MANAGE) but before that they will have to take 48 days training from the office of Krishi vigyan Kendra, State agriculture department and Agriculture University. After this, they will be given with a certificate of having and on behalf of this certificate that can get licence provided from Agriculture department. As the government has amendment these rules, it has also decided a separate course for training. Here proper information will be given about how to sell fertilizers, pesticide and seed. To get the license of fertilizer pesticides and seed seller, it is mandatory for a normal applicant to be between 18 & 45 years old. The 35 - 40 youth will be trained in a batch. Applicants will be given preference on first come, first serve basis for getting training.

The farmer's needs and interest through an

*SMS (Ext), Krishi Vigyan Kendra, Maulasar, Nagaur-II, Rajasthan
**SMS (Agronomy), Krishi Vigyan Kendra, Maulasar, Nagaur-II, Rajasthan
***Senior Scientist and Head, Krishi Vigyan Kendra, Maulasar, Nagaur-II, Rajasthan
****SMS (AH), Krishi Vigyan Kendra, Maulasar, Nagaur-II, Rajasthan

Integrated approach of strategic plan. Input Dealers is a society of key stake holders involved in Agricultural activities for sustainable agricultural development in the district. Involvement of farmers can be achieved at the village level through farmer's interest group. There is a need of a person who acts as extension worker in a Block level, so a farmer's Friend from the same Block is selected under for this purpose through the agriculture department. Input Dealers will serve as a vital link between extension system and farmers at village level. The Input Dealers will be available in the village to advice on agriculture and allied activities. The Input Dealers will mobilize farmers groups and facilitate dissemination of information new technology to such groups, individual farmers and farm women directly through one to one interaction individually or in groups and also by accessing information/services on behalf of farmers as per need basis through Common service Centres. The responsibility to train these Input Dealers on various aspects of agriculture was given to the Krishi Vigyan Kendra of the District. One of the main tasks of Krishi Vigyan Kendra is to provide and improve the level of knowledge of trainees about the improved farm practices, because knowledge is cognitive of individuals mind and plays an important role in convert as well as overt behaviour and individual with a greater knowledge of technical nature of improved practices would lead to high adoption. Once knowledge is acquired and retained, it undergoes and produces changes in the thought process and mental alchemy. This study was, therefore, conducted to ascertain the prevailing level of knowledge of Input Dealers training programme.

RESEARCH METHODOLOGY

The present study was undertaken in the entire Nagaur district of Rajasthan. The respondents were selected as Input Dealers from three on campus training programme organized in the year 2020 to 2023. The 48 days DAESI (Diploma in Agriculture Extension Service for Input Dealers) training program at Krishi vigyan Kendra was conducted. The selection of 100 Input Dealers through the Random sampling method was done for the study. These 100 were trained on various aspects of Fertilizer, pesticides and seeds in training programme at KVK for the period of 48 days. A knowledge test was developed to ascertain the knowledge of Fertilizers Retailers on various aspects of agriculture. The gain in knowledge was operational zed as difference between the knowledge regarding various aspects of agriculture as livelihood before and after the exposure of trainings. Knowledge scores were calculated for both the test separately. The difference between the two scores i.e. before the training and after the training was considered as gain in knowledge. The gain in knowledge was converted into percentage.

RESULTS AND DISCUSSION

The ultimate objective of training was that each Input Dealers must gain knowledge of the subjects which were taught to them. Table 1 depicts the average knowledge score of the trainees before and after the training programme gain in knowledge and average per cent gain in knowledge. Data in Table 1 show that there was significant impact of the training on the knowledge of the trainees. The difference between the knowledge of the trainees before and after receiving training was markedly high. This may be supported by value which was significant of probability. While going into the details it was noted that gain in knowledge of the trainees was ranging from 50.40 to 96.13 per cent in all aspects and average gain was 83.87 per cent. This wider variation in the gain in knowledge shows that most of input dealers gained more knowledge whereas, as few respondents gained very little knowledge. One of the obvious reasons for this difference might be because of lack of homogeneity among the trainees. Almost similar results were reported by Aiswal *et al.,* (2008), Bhati *et al.,* (2012), Dubey *et al.,* (2008) Prakash , De (2008), Pagriya (2015). Victor, (2019) and Choudhary *et al.,* (2021)

CONCLUSION

On the basis of the above findings it could be concluded that the trainings course was effective in terms of increasing the existing knowledge of the

Table.1 Per cent gain in knowledge of different aspects through training programme

n=100

Sr. No.	Subjects	Before training (average score)	After training (average score)	Gain in knowledge (y-x)	Per cent gain in Knowledge
1	Agro ecological situation	29.45	60.43	30.98	95.06
2	Soil Health Management	31.67	67.42	35.75	88.58
3	Dry land farming	30.63	66.05	35.42	86.47
4	Seed and seed production	21.46	57.97	36.51	58.77
5	Irrigation Methods and their Management	26.23	58.34	32.11	81.68
6	Weeds management	24.45	53.76	29.31	83.41
7	Important of agriculture machinery in agriculture	.25.63	54.56	28.93	88.59
8	Insect and disease Management in Agriculture crops	28.45	61.43	32.98	86.26
9	New agriculture technique in local crops for more production	18.67	56.07	37.04	50.40
10	Knowledge about Agriculture input –Laws, Rules, Regulation	19.63	40.05	20.42	96.13
11	Govt Scheme about Agriculture sector	20.46	41.97	21.51	95.11
12	Agriculture Extension – Methods and tools for transfer of New technology	21.23	43.34	22.11	96.01

Input Dealers about different agricultural aspects about seeds, fertilizers and Pesticides which would certainly help them in dissemination of new technology and agricultural information among the Farmers community. Hence, in the post-DAESI period, the input dealers should be given continuous training to keep them updated with latest technologies and innovations so as to make them as para-extension professionals.

REFERENCES

Aiswal, B.L., Singh, S. and Khan, I.M. 2008. Knowledge level of beneficiary and non-beneficiary farmers of FLD regarding improved mustard production technology in Sikar district of Rajasthan. *Rajasthan J. Extn. Edu.*, **16** :119-123.

Bhati, D.S., Verma, J.R., Jasuja, Seema, Srivastava, A.K. and Sidhu, B.S. 2012. Impact of on campus training conducted by the KVK Sriganganagar on the knowledge level of farmer's friends (Krishak Mitras). *Agric. Update*, **7**(1 & 2): 33-36.

Dubey, A.K., Srivastava, J.P., Singh, R.P. and Sharma, V.K. 2008. Impact of KVK training programme on socio-economic status and knowledge of trainees in Allahabad district.

Indian Res. J. Extn. Edu., **8**(2&3): 60-61.

Kumari, Maya, Srivastava, A.K. and Sinha, Nidhai. 2010. Extent of knowledge of farm women on nutrients. *Indian Res. Extn. Edu.,* **10**(1): 65-68.

Pagriya, P. 2015. Gap in knowledge of krishak mitra through training. *Agriculture update*. **10**(2): 177-179.

Parkash, Satya and De, D. 2008. Knowledge level of ATMA beneficiaries about bee keeping. *Indian Res. J. Extn. Edu.*, **8**(2 & 3): 62-64.

Rai, D.P., Singh and Bhupendra. 2010. Extent of knowledge and Constraints in cotton production technology in Madhya Pradesh. *Indian Res. J. Extn. Edu.,* **10**(2): 78-80.

Singh, M. and Verma, N.C. 1998. Gain and relation of nutrition knowledge in Santhal trible women in weaker section: In: The psychosocial perspective. N. Hasnain (Ed.) Gayan Publishing House, New Delhi. : 182-187

Victor L.D., Kathaluwage, K.C.D., 2019. The Impact of Training and Development on Knowledge Management. *International Journal of Advance Research and Innovative Ideas in Education*. **5**: 2395-4396.

Choudhary L.R., Pagaria, P. and Choudhary, H.D. 2020. Gain in knowledge of fertilizer retailers through fifteen days training. *Journal of Plant Development Sciences*, **12**(12): 749-751.

❑❑❑

Recevied : 15.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

IMPACT OF ZINC FORTIFICATION ON PRODUCTION AND ECONOMIC OF KHARIF MAIZE (*Zea mays L.*) IN SOUTHERN EAST PART OF RAJASTHAN

Divya Chouhan* and Preksha Nagar**

ABSTRACT

A field experiment was conducted during Kharif season of 2021 at Instructional Farm, Rajasthan College of Agriculture, Udaipur to ascertain suitable zinc fertility level for Kharif maize. Treatment consisted eight fortification way of zinc *viz.*, T_1: Control, T_2: 100 per cent zinc-25 kg ha^{-1}, T_3: 75 per cent zinc-18.75 kg ha^{-1}, T_4: 50 per cent zinc-12.5 kg ha^{-1}, T_5: 100 per cent zinc 25-kg ha^{-1} + 0.5 per cent zinc foliar spray T_6: 50 per cent zinc-12.5 kg ha^{-1} + 0.5 per cent zinc as foliar spray, T_7: Zinc through zinc solubilising bacteria, T_8: Zinc through zinc solubilising bacteria + 75 per cent zinc-18.75 kg ha^{-1} + 0.5 per cent zinc foliar spray and T_9: Zinc through zinc solubilising bacteria + 50 per cent zinc-12.50 kg ha^{-1} + 0.5 per cent zinc foliar spray. The soil of experimental site was having medium fertility status in terms of N, P_2O_5, K_2O and Zinc. The Pratap Maize Hybrid-3 was used as test variety. The crop was raised with recommended packages and practices and N, P_2O_5 and K_2O levels. Zinc as per treatment level was applied through $ZnSo_4$. The result indicated that highest grain and stover yield (39.29 & 61.29 q ha^{-1}, respectively) was recorded under application of 100 per cent Zinc + 0.5% Zinc as foliar spray. The above level of zinc application also proved economically beneficial with highest net return (Rs. 62684 ha^{-1}) and B C ratio (3.09).

INTRODUCTION

Maize is an important cereal of our country as well as Rajasthan. In Rajasthan the crop occupies 0.94 m ha area with production of 2.34 m t and productivity of 24.69q ha^{-1} (GOR, 2024). Out of total production, 25 per cent of maize is consumed as staple food in various forms. Due to its immense nutritionally rich food and high remunerative commercial value responsiveness to micro fertilizer is considered essential for exploiting higher yield of maize in south eastern part of Rajasthan. Although zinc is an essential micronutrient for plant growth, zinc input has received much less attention than nitrogen, phosphorus and potassium (Mueller *et al.*, 2012). Nearly half of the cereal growing areas worldwide have soils with low plant-available zinc. Therefore, the application of zinc fertilizers is necessary in such soils to ensure cereal yield (Cakmak, 2008 and Singh *et al.*, 2021). Many studies have demonstrated that the maize grain yield increases significantly with the application of zinc fertilizer to Zn-deficient soils (Liu *et al.*, 2017). Further due to sterility and limited re translocation of resources, maize grains located on the apical part of the ear often develop poorly, and are classified as inferior grains, while the middle and basal parts of the ear represent superior grains (Zhao *et al.*, 2018). Some reports also showed that a lack of zinc decreases pollen viability and leads to pollen sterility in maize (Sharma *et al.*, 1990) and then to low kernel numbers. A way to improve inferior and number of grains can thus be obtained with increasing zinc fertilization (Liu *et al.*, 2017). Thus considering these facts and paucity of research findings on micro fertilizer in south-east part of Rajasthan, the present study was carried out with objectives to ascertain economically viable zinc nutrient recommendation for hybrid maize.

RESEARCH METHODOLOGY

The field experiment was conducted during rainy season of 2021 at the Instructional farm Rajasthan College of Agriculture, Udaipur. The soil was clay loam, slightly alkaline (pH 7.5) in reaction having medium in available nitrogen (276.1 kg

*Asst. Prof., College of Agriculture, Agriculture University, Jodhpur
**Asst. Prof., B. N. College of Agriculture, Udaipur

Table 1. Impact of zinc fortification on productivity and economic importance of Kharif maize

Treatments	Plant height (cm)	(000 ha^{-1}) at maturity		Days to 50%		Yield (q ha^{-1})		Net return (Rs ha^{-1})	B:C ratio
		Plants	Cobs	Tasseling	Silking	Stover	Grain		
Control	229.63	64.22	70.38	45.00	50.33	46.75	31.28	46954	2.51
100 % Zinc	235.43	64.44	70.71	45.00	50.33	59.24	38.26	60561	3.01
75 % Zinc	233.40	64.00	69.13	45.00	50.67	57.29	37.17	58570	2.96
50 % Zinc	231.43	64.22	70.71	45.00	50.67	50.44	33.40	50783	2.61
100 % Zinc + 0.5% Zinc (FS)	238.46	64.66	70.95	45.00	50.00	61.29	39.29	62684	3.09
50 % Zinc + 0.5 % Zinc (FS)	231.71	64.11	70.47	45.00	50.00	52.26	34.15	52357	2.68
Zinc through (ZSB)	230.47	64.44	70.62	45.00	50.33	48.44	32.12	48750	2.60
ZSB + 75 % Zinc + 0.5% Zinc (FS)	235.15	64.66	71.29	44.67	49.67	58.65	38.13	60371	3.02
ZSB + 50 % Zinc + 0.5 % Zinc (FS)	233.24	64.22	70.62	45.00	49.33	57.24	37.16	58699	2.99
S Em ±	2.51	0.96	2.07	0.76	0.78	2.01	1.31	2752	0.14
C.D. (P = 0.05%)	7.53	NS	6.28	NS	NS	6.11	3.96	8347	0.42

ZSB: *Zinc solubilising bacteria,* ***FS:*** *Foliar spray*

ha^{-1}), phosphorus (18.7 kg ha^{-1}), potassium (214.3 kg ha^{-1}) and zinc (9.00 ppm). The treatment consisting eight fortification way of zinc *viz.*, T_1: Control, T_2: 100 per cent zinc-25 kg ha^{-1}, T_3: 75 per cent zinc-18.75 kg ha^{-1}, T_4: 50 per cent zinc-12.5 kg ha^{-1}, T_5: 100 per cent zinc 25-kg ha^{-1} + 0.5 per cent zinc foliar spray T_6: 50 per cent zinc-12.5 kg ha^{-1} + 0.5 per cent zinc as foliar spray, T_7: Zinc through zinc solubilising bacteria, T_8: Zinc through zinc solubilising bacteria + 75 per cent zinc-18.75 kg ha^{-1} + 0.5 per cent zinc foliar spray and T_9: Zinc through zinc solubilising bacteria + 50 per cent zinc-12.50 kg ha^{-1} + 0.5 per cent zinc foliar spray were conducted in randomized block design with four replication. The crop was sown with onset of rain on 3rd July 2021. In well prepared field, furrows were opened at 60 cm apart and seeds were placed manually at 25 cm spacing at a depth of 3-4 cm. Recommended dose of nitrogen, phosphorous and potassium were applied through urea, DAP and MOP. One third of nitrogen and full dose of phosphorus and potash were given as basal application at the time of sowing by drilling fertilizer in crop rows about 4-5 cm below the seeds. The remaining nitrogen was given in two equal splits *viz.*, knee high stage and at 50 per cent tasseling stage as top dressing. As per treatment the zinc was supplied through ZnSo4. The zinc solubilising bacteria was applied through seed treatment using liquid bacterial strain. The foliar application of zinc was carried out at knee high stage of maize plants. In order to minimize weed competition, pre-emergence application of atrazine at 0.5 kg ha^{-1} followed by one hoeing and earthing up were carried out at 20 and 30 days after sowing, respectively. Different growth and yield attributes were computed on basis of average of five samples. The crop was harvested at physiological maturity which was determined by formation of black/brown layer in placental region of maize grain. Before harvesting the plants under each experimental unit, border row were harvested and removed from experimental field. Cobs from net plots were picked up and kept in gunny bags. After through drying these were shelled. After picking cobs, stover from net plot was harvested and sun dried for few days and weighed for individual plot and final stover yield was expressed in q ha^{-1}. Data obtained were statistically analyzed in randomized block design using the standard techniques of analysis of variance. To workout the most profitable treatment, economics of different treatments was calculated on the basis of prevailing market prices in terms of net return (Rs ha^{-1}) and BC ratio.

RESULTS AND DISCUSSION

Application of 100 per cent zinc (25 kg ha^{-1}) followed by one foliar application of zinc sulphate (0.5%) at knee high stage of crop significantly enhanced plant height, number of cobs consequently grain and stover yield over control and proved economically beneficial with highest net return (Rs.62684 ha^{-1}) and B C ratio (3.09). The studied fertility levels of zinc did not show variation in plant population and days taken to tasseling and silking. These improvements might be on account of better growth of plant due to enrichment of soil with zinc nutrients to the level of sufficiency. Further the larger canopy development and foliar spray of zinc could be reasoned for increased interception, absorption and utilization of radiant energy which in turn increased overall growth, photosynthesis, LAI and consequently dry matter plant height and yield under the above treatment application. The results corroborate findings of Danyu *et al.* (2022), Hafeez *et al.* (2023) and Zhao *et al.* (2018).

CONCLUSION

It is concluded from the above findings that application of 100 pre cent + zinc 0.5% zinc as foliar spray resulted highest grain and stover yield in *kharif* maize in southern east part of Rajasthan.

REFERENCES

Cakmak, I. 2008. Enrichment of cereal grains with zinc. *Plant Soil* **302**: 1-17.

Danyu, K., Sabaz, A. K., Huilan, W., Yi, L. and Hong, Q. I. 2022. Bio-fortification of iron and zinc in rice, wheat and maize. *Journal of Integrative Plant Biology* **64**(6): 1157-1167.

GOR. 2024. Government of Rajasthan,

Commissionerate of Agriculture, Jaipur, crop-wise first advance estimate of area, production and yield of various principal crops during *Kharif* 2024 : 24.

Hafeez, B., Khanif, Y. M. and Saleem, M. 2023. Role of zinc in plant nutrition. *American Journal of Experimental Agriculture* **3**(2): 374-391.

Liu, D., Zhang, W., Yan, P., Chen, X., Zhang, F., and Zou, C. 2017. Soil application of zinc fertilizer could achieve high yield and high grain zinc concentration in maize. *Plant Soil* **411**: 47-55.

Mueller, N. D., Gerber, J. S., Johnston, M., Ray, D. K., Ramankutty, N., and Foley, J. A. 2012. Closing yield gaps through nutrient and water management. *Nature* **490**: 254-257.

Sharma, P. N., Chatterjee, C., Agarwala, S. C., and Sharma, C. P. 1990. Zinc deficiency and pollen fertility in maize (Zea mays L). *Plant Soil* **124**: 221-225.

Singh, J., Partap, R., Singh, A., kumar, N. and Krity. 2021. Effect of nitrogen and zinc on growth and yield of maize (Zea mays L.). *International Journal of Bio-resource and Stress Management* **12**(3): 179-185

Zhao, F., Jing, L., Wang, D., Bao, F., Lu, W., and Wang, G. Y. 2018. Grain and starch granule morphology in superior and inferior kernels of maize in response to nutrient. *Science Report* **8**: 1-11.

❑❑❑

Recevied : 15.07.2024
Accepted : 20.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

SUGGESTIONS OF FARM WOMEN TO OVERCOME THE CONSTRAINTS ABOUT PARTICIPATION AND DECISION-MAKING IN BT. COTTON CULTIVATION

Krishna Kumari Purbia*, F.L. Sharma, Abhilasha Gehlot***, Surbhi Jangir**** and P.N. Kalla*******

ABSTRACT

The present study was conducted in Rajsamand and Railmagra tehsil of Rajsamand district of Rajasthan. Total 120 respondents were randomly selected for data collection. The data were collected personally through structured interview schedule. Farm women play a pivotal role in agricultural activities, including Bt. cotton cultivation. However, they face numerous constraints that limit their productivity and decision-making capacity. This study focuses on the suggestions provided by farm women to overcome these constraints, namely organizing extension exposure trips, developing gender-appropriate farm machinery, enhancing input supply through cooperatives and improving time management and decision-making skills. The findings also highlight the need for targeted interventions and policy reforms to empower farm women in Bt. cotton cultivation and enhance their agricultural productivity.

INTRODUCTION

Agriculture plays a crucial role in rural livelihoods, especially for women who contribute significantly to the labor force. Bt. cotton has transformed cotton farming in many parts of the world, including India. It offers pest-resistant qualities, reducing the reliance on chemical pesticides and increasing yields. Women play a significant role in agriculture. In the world, about 70 per cent of the agricultural workers, 80 per cent of the food producers and 10 per cent of those who process basic food stuffs are women and they also undertake 60 to 90 per cent of the rural marketing, thus making up more than two-third of the work force in agricultural production. The scenario of agriculture has completely changed with change in time but from centuries one thing that didn't change is the visualization of women as key labour in this industry. Agriculture sector as a whole has developed and emerged immensely with the infusion of science and technology, but this latest emergence is not capable of plummeting the ignorance of women labour as an integral part of this industry. In female work force but fails to developing countries like India, agriculture continues to absorb and work force but fails to employ 2/3rd of the female give them recognition of employed labour. The Female labour force in developing nations still faces the oppressive status of being majorly responsible for family and household maintenance. However, farm women, who contribute significantly to Bt. cotton cultivation, face numerous challenges, such as limited access to agricultural resources, exclusion from decision-making and inadequate extension services. These challenges impede their full participation and productivity in Bt. cotton farming. This study explores suggestions for overcoming these barriers to improve their socio-economic conditions, agricultural productivity, decision making capacity and women's empowerment.

RESEARCH METHODOLOGY

The present study was conducted in purposely selected Rajsamand district of Rajasthan.

*Ph.D. Research Scholar, Department of Extension Education, RCA, MPUAT, Udaipur (Rajasthan)
**Professor, Department of Extension Education, B.N. College of Agriculture, Udaipur (Rajasthan)
****Ph.D. Research Scholar, Department of Extension Education, RCA, MPUAT, Udaipur (Rajasthan)
****Ph.D. Research Scholar, Department of Extension Education, RCA, MPUAT, Udaipur (Rajasthan)
*****Dean, Faculty of Agriculture, Jagnath University, Udaipur (Rajasthan)

Rajsamand district is situated in southern part of Rajasthan. Rajsamand district consists of seven tehsils, out of which two tehsil namely Rajsamand and Railmagra tehsil were selected on the basis of the highest area and production under Bt. cotton cultivation and from these two tehsils 10 villages were selected on the basis of highest area and production of the Bt. cotton. From each selected village, 12 farm women were identified on the basis of random sampling technique. Thus total 120 farm women were selected using a stratified random sampling method. The data were collected through structured interviews and focus group discussions. Mean percent scores (MPS) were calculated to rank the suggestions provided by the farm women.

RESULTS AND DISCUSSION

Efforts were made to gather suggestions from farm women on their participation and decision-making in Bt. cotton cultivation practices. These suggestions, aimed at enhancing their roles and improving their socio-economic conditions, can be viewed as feedback to address and overcome the constraints they face. MPS for each suggestion was calculated and ranked accordingly.

Table 1 indicates the most significant suggestion made by the farm women organizing extension exposure trips, with an MPS of 82.50, ranked first. This emphasizes the strong need for practical, hands-on experiences that allow farm women to observe and learn from successful agricultural practices. Such exposure could significantly expand their knowledge base and inspire innovation in their farming activities. The second most significant suggestion was the development of gender-appropriate farm machinery and implements, with an MPS of 80.83. Traditional farm equipment is often designed for male users, limiting the productivity of farm women. Developing tools and machines tailored to women's physical capabilities would improve efficiency and reduce their physical workload.

Another key suggestion involved enhancing the supply of agricultural inputs through cooperative societies at the village level, with an MPS of 79.16 and ranked third. Improved access to resources such as seeds, fertilizers, and pesticides would reduce dependence on middlemen and increase input affordability for farm women. The fourth-ranked suggestion, with an MPS of 78.33, emphasized the need for training in time management for farm and household activities. Farm women often juggle multiple roles, and improving their time management skills would help them balance their responsibilities more effectively, leading to increase productivity and reduced stress. Fifth, with an MPS of 77.50, was the suggestion to provide accessible information about solutions to agricultural problems. Farm women highlighted the need for timely and accurate advice on pest management, crop selection, and overall farm management, which could reduce crop losses and boost productivity. Encouraging women to take part in decision-making was ranked sixth, with an MPS of 75.83. Empowering women with decision-making authority at both the household and farm levels could lead to better farm management practices and greater community involvement.

Other notable suggestions included emphasizing women's empowerment through government initiatives (MPS 75.00, ranked seventh), reducing family pressure during decision-making (MPS 74.16, ranked eighth), and promoting societal transformation through gender awareness programs (MPS 71.66, ranked ninth). The presence of more female extension staff was ranked tenth with an MPS of 70.00. The women suggested that having more female extension workers would promote better communication and trust, encouraging greater engagement with agricultural services.

Further analysis revealed suggestions for timely loans for Bt. cotton cultivation (MPS 69.16), increased teaching and learning facilities after work (MPS 68.33), and support and guidance from family members (MPS 67.50). Additional suggestions included giving due importance to women in decision-making (MPS 66.66), fostering cooperation among family members (MPS 64.16), organizing more skill-oriented training (MPS 63.33), and improving the availability of input resources (MPS 56.66). Lower-ranked suggestions included enhancing self-confidence through special programs

Table 1: Suggestions of farm women to overcome the constraints in Bt. cotton cultivation

n=120

S.No.	Suggestions	Rajsamand		Railmagra		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Due importance should be given to women in decision making	66.66	XIV	66.25	XI	66.66	XIV
2.	More female extension staff should be appointed in the area	71.66	XI	68.33	IX	70.00	X
3.	Teaching and learning facilities should be increased for women after work	70.00	XII	66.66	X	68.33	XII
4.	There should be cooperation among the family members	63.33	XVII	65.00	XII	64.16	XV
5.	Family members should give support and guidance to the women	68.33	XIII	64.78	XIII	67.50	XIII
6.	There should be no family pressure during the decision making	76.22	V	71.66	VIII	74.16	VIII
7.	Transformation of society through awareness programmes on gender issues	75.00	IX	64.66	XIV	71.66	IX
8	Government should give emphasis for women empowerment	78.23	IV	72.66	VII	75.00	VII
9.	Women should be given knowledge about time management in farm and home activities	80.00	II	78.33	IV	78.33	IV
10.	Encouraging the women to take decision	75.58	VIII	76.02	V	75.83	VI
11.	More skill oriented trainings should be organized for farm women	76.05	VI	50.00	XVII	63.33	XVI
12.	Development of farm machinery and implements suitable to farm women	78.33	III	83.33	II	80.83	II
13.	Information should be provided about the availability of latest input resources	61.66	XIX	51.66	XVI	56.66	XVII
14.	Providing information about the solution to problems	90.00	I	64	XV	77.50	V
15.	Supply of inputs through cooperative society at village level	75.66	VII	81.66	III	79.16	III
16.	Timely Loan should be granted for *Bt.* cotton cultivation	65.00	XV	73.33	VI	69.16	XI
17.	Extension exposure trips should be organized	73.33	X	91.66	I	82.50	I
18.	Self-confidence of farm women should be improved by organizing special programmes	62.07	XVIII	48.33	XVIII	55.83	XVIII
19.	Market facilities for farm women should be improved	64.00	XVI	41.66	XIX	52.50	XIX

MPS = Mean percent score

(MPS 55.83) and improving market facilities for farm women (MPS 52.50).

CONCLUSION

The study concluded that the pressing need to overcome the constraints faced by farm women in Bt. Cotton cultivation by implementing practical and targeted interventions. Organizing extension exposure trips, developing gender-appropriate machinery, improving access to resources through cooperatives and enhancing decision-making roles for women are crucial steps toward creating an inclusive and equitable agricultural sector. Additionally, government policies must focus on empowering farm women by providing them with the skills, resources, and autonomy needed to thrive in agriculture.

REFERENCES

Kalam, U., Banwari Lal, Sharma, M. , Rani, R. and Kalla, P.N. 2023. Perceptions and suggestions of beneficiary farmers towards agricultural interventions of mpower project in western Rajasthan. *Ind. J. Ext. Educ. & R.D.* **31**(1): 133-139.

Obariya, J.B., Poshiya, K. and Kasyap, V.P. 2021. Constraints and suggestions in adoption of recommended finger millet production technologies, *Ind. J. Ext. Educ. & R.D.* **29**(1): 25-30.

Mahadik, R.P., Punjabi, N.K., Upadhyay, B. and Sharma F.L. 2019. Suggestions from mango orchardists to improving the knowledge and adoption of eco-friendly management practices, *Ind. J. Ext. Educ. & R.D.* **27**(1): 135-140.

Vaghasiya, K.P. 2018. Pattern of participation of farm women in agricultural activities and decision making in Rajkot district. M. Sc. Thesis submitted to J.A.U., Junagadh (Gujarat).

Badodiya, S.K. and Mishra, P. 2015. Role performance of rural women in agricultural activities. *J. of community mobilization and sustainable development* **10**(2): 206-208.

Das, L. 2015. Work participation of women in agriculture in Odisha. *J of Humanities and Social Science* **20**(1): 66-78.

Bhairva, V. 2013. A study on women's participation and decision making pattern in agriculture activities in Sehore district of Madhya Pradesh. M. Sc. (Agri.) thesis submitted to J.N.K.V.V., Jabalpur (M.P.).

Gondaliya, R. H. 2011. Participation of farm women in decision making process in relationship to agriculture activities. M. Sc. (Agri.) Thesis submitted to A.A.U., Anand.

❑❑❑

Recevied : 14.06.2024
Accepted : 20.07.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

CONSTRAINTS FACED BY NGO PERSONNEL IN TRANSFER OF AGRICULTURE TECHNOLOGY IN UDAIPUR DISTRICT OF RAJASTHAN

Poka Malini*, Rajeev Bairathi and S.S. Sisodia*****

ABSTRACT

The study was undertaken during 2020-21 at Udaipur District of Rajasthan state in order to identify constraints faced by NGO Personnel in transfer of agriculture technology. A sample of 120 NGO Personnel from six NGOs (BAIF, Arpan Sansthan, Gayatri Seva Sansthan, Seva Mandir, Alert Sansthan and Gandhi Manav Kalyan Society) were taken on the basis of proportionate random sampling. The study revealed that most of the NGO Personnel were facing medium level of constraints. From the study, we came to know that, 'very few interested in building their capacity through training' was the major technological constraint followed by'lack of information on latest technology within time'. In case of General constraints, 'insufficient Government support' and 'transportation problems' were the important constraints. Similarly, 'insufficient funds' and 'less salary to workers than private sector' were the major Economic constraints faced by NGO Personnel. In case of Organizational constraints, 'lack of sufficient staff' and 'poor governance' was important constraint. 'Lack of commitment' and 'high tension due to mental and physical work' were the major Socio-psychological constraint faced by NGO Personnel. The study shows that NGO personnel were facing technological constraints to maximum severity than other categories of Constraints.

INTRODUCTION

In a country like India with huge population, increase in production and productivity of crops is must to meet food requirements of people. Green revolution tried to increase production in India but there is still gap between the resources and need. To increase production and productivity of crops, transfer of latest technology to farmers is very much required. Transfer of technology is a complex process and it requires many organizations like government, non-governmental organizations, private organizations etc. NGOs play important role in transfer of technology along with government. NGO means non-governmental organization. They are legal institutes working voluntarily for the benefit of society by providing services to people without expecting profit from them. In India, Bengal Home Industries was the first NGO founded in the year 1917 by Sri Ravindra Nath Tagore for helping weavers and artists belonging to Kolkata handloom. At present there are 3.3 million NGOs in India according to the statistics of Central Statistical Institute of India. The people working in NGOs are called as NGO personnel or NGO staff. These people are responsible for implementation of NGO programmes and projects.

In transfer of agricultural technology, NGO personnel face various constraints which are technical, organizational, general, economic and socio-psychological in nature. Constraints are the hurdles that one face while doing some work which prevents them from doing it effectively. In order to transfer agricultural technology effectively and avoid constraints affecting technology transfer, we should know the constraints majorly faced by NGO personnel. Hence this study was undertaken with specific objective to know about constraints faced by NGO personnel in transfer of agricultural technology.

*Ph.D. Research Scholar, Dept. of Agricultural Extension Education, OUAT, Bhubaneshwar
**Professor, Extension Education, Directorate of Extension Education, MPUAT, Udaipur
***Professor & Head, Deptt. of Extension Education, MPUAT, Udaipur

RESEARCH METHODOLOGY

The present study was conducted in Udaipur district of Rajasthan state during the year 2020-2021 with a total of 120 NGO Personnel selected from six NGOs i.e. Seva Mandir, Gayatri Seva Sansthan, Alert Sansthan, Arpan Sansthan, Gandhi Manav Kalyan Society and BAIF on the basis of proportionate random sampling. In the present study, Constraints means hurdles one faces in transfer of agriculture technology. A list of possible constraints was prepared with the help of Job Chart of NGO workers, review of literature and discussion with NGO workers. Data were collected with the help of interview schedule. Face to face interview was used for collection of information from respondents. For identifying constraints, mean percentage score was calculated and accordingly ranks were assigned on the basis of severity of constraints.

RESULTS AND DISCUSSION

Results in Table 1 show that majority (59.10 %) of respondents were facing medium level of constraints followed by 21.60 per cent respondents who were facing high level of constraints and 19.16 per cent respondents were facing low level of constraints. It was concluded from the table that majority of NGOs personnel were facing medium level of constraints.The results imply that directors of NGOs need to take proper care about the constraints faced by NGOs personnel which reduces the quality of work and efficiency. Only 19.00 per cent respondents expressed that they faced low constraints. The findings are similar to results of Misha Madhavan (2017) who concluded that majority of extension personnel faced medium level of constraints.

Aspects of Constraints: The constraints occurring frequently were studied under five headings i.e., Technological Constraints, General Constraints, Economic Constraints, Organizational Constraints and Socio-psychological Constraints.

Table 2 shows that 'very few are interested in building their capacity through training' and 'lack of information on latest technology within time' were the major technological constraints faced by NGOs personnel in transfer of agricultural technology with MPS 79.16 and 71.10, respectively. These two constraints were assigned 1st and 2nd rank accordingly.

Results from Table 3 depicts that 'insufficient government support' and 'transportation problems'

Table 1: Classification of NGOs personnel according to their overall constraints

N=120

S. No	Category	Total	
		f	%
1	Less (Up to 75)	23	19.16
2	Medium (76 to 106)	71	59.10
3	High (107 and above)	26	21.60
Mean=91.225		Sd=15.85	

Table2: Technological constraints faced by NGO Personnel in transfer of agricultural technology

S. No	Technological Constraints	MPS	Rank
1	Very few are interested in building their	79.16	I
2	Lack of information on latest technology within time	71.10	II
3	Lack of internet Connection	61.38	III
4	Non availability of electronic Equipment	60.50	IV
5	Limited technical Capacity	58.80	V

were the major general constraint faced by NGOs personnel in transfer of agricultural technology with MPS 68.30 and 65.27, respectively and they were ranked at 1st and 2nd position as per the severity of general constraints.

Table 4 shows that 'insufficient funds' and 'less salaries to workers than private workers' were the major constraints faced by NGOs personnel with MPS 68.61 and 67.50, respectively and were ranked at 1st and 2nd position. Insufficient funds are a common problem faced by many NGOs because they depend mainly on sponsors and public funds. These results are in line with findings of Brophy, (2020).

Table 5 depicts that 'lack of sufficient staff' and 'poor governance' were the major constraints faced by NGOs personnel with MPS 69.16 and 58.61, respectively and were assigned 1st and 2nd rank as per severity of organizational constraints. Financial resources available with NGOs are not sufficient to maintain more staff and most of them are multi taskers. These may be the probable reasons for short number of staff in NGOs. These lines are similar to Padmini Devi, (2004) and Aryal, (2011).

Table 6 shows that lack of commitment and high tension due to mental & physical work were the major socio-psychological constraints faced by NGOs personnel with MPS 76.60 and 58.00, respectively and were assigned 1st and 2nd rank accordingly. People feel that NGOs jobs are not secure, so they don't show much interest in joining NGOs. This may be a reason for lack of

Table 3: General Constraints faced by NGO Personnel in transfer of agriculture technology

S. No	General Constraints	MPS	Rank
1	Insufficient Government Support	68.30	I
2	Difficulty in going to interior villages in rainy seasons	65.27	II
3	No rewards/awards to good work	65.20	III
4	Less chance for promotion	63.80	IV
5	Takes donors area of interest instead of NGOs interest	63.61	V

Table 4: Economic Constraints faced by NGO Personnel in transfer of Agriculture technology

S. No	Economic Constraints	MPS	Rank
1.	Insufficient funds	68.61	I
2.	Less salaries to workers than private sectors	67.50	II
3.	Less salary to more work	67.20	III
4.	No additional payment for extra work	67.00	IV
5.	High cost of inputs	64.10	V

Table 5: Organizational Constraints faced by NGO Personnel in transfer of Agriculture technology

S. No	Organizational Constraints	MPS	Rank
1.	Lack of sufficient staff	69.16	I
2.	Poor Governance	58.61	II
3.	Lack of feed back	58.30	III
4.	Lack of Maintenance	56.60	IV
5.	Time bound and Target oriented programme which affects the quality of work	56.38	V

Table 6: Socio-psychological Constraints faced by NGO Personnel in transfer of agriculture technology

S. No	Socio-psychological Constraints	MPS	Rank
1	Lack of Commitment	76.60	I
2	High Tension due to Mental and Physical work	58.00	II
3	Lack of Volunteerism among members	56.30	III
4	Interference of political persons in work	55.00	IV
5	Lack of Co-operation& Coordination among members	52.50	V

Table 7: MPS of different categories of constraints faced by NGOs personnel in transfer of agricultural technology

n=120

S. No	Constraints	MPS	Rank
1	Technological Constraints	79.16	I
2	Socio-psychological Constraints	76.60	II
3	Organizational Constraints	69.16	III
4	Economic Constraints	68.61	IV
5	General Constraints	68.30	V

commitment in NGOs personnel. While, most of NGO staff is multi taskers handling lot of work, this may be the reason for high tension in NGOs personnel due to mental & physical work.These results are similar to Nayak (2004).

Therefore, it was concluded that 'Very few are interested in building their capacity through training' was the major technological constraint faced by NGOs personnel with MPS 79.16. The major general constraint faced by NGOs personnel was 'insufficient government support' with MPS 68.3, while the major economic constraint faced by NGOs personnel was 'insufficient fund' with MPS 68.61. 'Lack of sufficient staff' was the major organizational constraint faced by NGOs personnel. In socio-psychological constraints, 'lack of commitment' was the majorly faced constraint by NGOs personnel.

The results are in line with findings of More *et al.* (2014) where the major constraints are Lack of sufficient staff, lack of government support, lack of commitment, limited funds, poor training and transportation problems.

Seriousness of different categories of Constraints: Table 7 depicts that 'less people showed interest in building their capacity through training' was the major technological problem faced by NGOs personnel with MPS 79.16 followed by socio-psychological constraints standing in second position with MPS 76.6. While other constraints like organizational, economic and general constraints stood at third, fourth and fifth position with MPS 69.16, 68.61 and 68.30, respectively. So, NGOs higher officials should take proper care to handle these constraints. In these constraints, all aspects are important where NGOs higher officials should take corrective measure to avoid these constraints.

CONCLUSION

To increase production and productivity of crops, transfer of latest technology to farmers is very much required. Transfer of technology is a complex process and it requires many organizations like government, non-governmental organizations, private organizations etc. Constraints are the hurdles that one face while doing some work which prevents them from doing it effectively. From results it was clear that NGO personnel facing majorly technological constraints than other aspects of constraints. 'Very few showing interest in building their capacity by training' was the major problem

faced by NGO Personnel. NGOs have to address these constraints for effective transfer of technology.NGO staff should be motivated to build their capacity through training. However long-term research is required to know about its effect over long time.This study creates a way to conduct the related research in other NGOs of Udaipur and other districts of Rajasthan. This may help in knowing more valid and general constraints faced by NGOs in transfer of agricultural technology. This may help in drawing important lessons to apply at relevant places.

REFERENCES

Aryal, N. 2011. Changing Strategies of Non-Government Organizations: Slogan Shouting or Income-Generating Programmes- Case studies from Gandhian NGOs of North India. Fukino project. pp.26.

Brophy, M. 2020. The Role of NGOs in Supporting Education in Africa. *Journal of Internationaland Comparative Education*, **9**(1):45-56.

Misha Madhavan M. 2015. Constraints faced by extension Personnel from Kolhapur district. M.Sc. (Ag) thesis, M.P.K.V, Rahuri, Maharashtra.

More, B. D., Kale, B. R., Singh, K. and Avhad, S. 2014.Constraints faced by the tribal dairy farmers and NGO Personnel for sustainable Livelihood generation in Nandurbar district of Maharashtra, *India. agric. Sci. Digest*, **35**(1):63-65.

Nayak, R. 2004. National Conference on Tribes, State Policies and NGOs, Indian Anthropological Association (abstracts).

Padminidevi, G. 2004. Role of voluntary organizations in rural development in Andhra Pradesh. A Critical Analysis. M.Sc. (Ag) thesis, Acharya N.G. Ranga Agricultural University, Hyderabad, India.

❑❑❑

Recevied : 10.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

IMPACT OF AICRP FOR DRYLAND AGRICULTURE ON BENEFICIARY FARMERS OF BHILWARA AND RAJSAMAND DISTRICT OF RAJASTHAN

Banwari Lal Bhatheswar*, R.S. Rathore, S. S. Sisodia*** and Rajeev Bairathi******

ABSTRACT

The present study was conducted in Bhilwara and Rajsamand districts of Rajasthan which was purposively selected. There are 6 villages, out of which two tehsils namely Bhilwara, and Railmagra were selected on the basis of maximum number of beneficiary's farmers. From each selected villages, 20 respondents (10 beneficiaries and 10 non- beneficiaries) were selected on the basis of maximum dry land area. Thus, total 120 respondents were selected for the study. This part of the research deals with the existing status of knowledge possessed by beneficiary and non-beneficiary farmers regarding improved dry land farming practices. Knowledge is one of the important component of farmer's behavior and plays a significant role in adoption of improved dry land farming practices. So, it is important to know the extent of knowledge possessed by the beneficiary and non-beneficiary farmers.

INTRODUCTION

In India 75 per cent cultivated land is contributing 42 per cent of the total food grains production is rain fed. As many as 115 districts in the country fall in the category of dryland farming spread over two third of cultivated area of the country and about 280 million people are living in this belt. In Rajasthan 80 per cent area is under dryland agriculture. Only 15 per cent area has irrigation facilities in Rajasthan which cannot be increased to more than 25 per cent of the total cropped area. Nearly 56 per cent of the total cropped area of the state is affected by chronic scarcity conditions. (DFRS, Annual Report 2022-23)

The average rainfall in Rajasthan ranges from 315 to 675 mm accompanied with dry spells of longer or shorter duration. The rainfall is erratic inadequate and uncertain. Dryland farming is practiced in Rajasthan about 61 per cent of the area where the crops are grown within the available rainfall. Out of the area, major comes under the category of drought prone distributed in 118 tahsils of 12 districts. (DFRS, Annual Report 2022-23)

The state has made pioneering efforts in evolving improved dryland farming technologies/practices by Dryland Farming Research Station, Bhilwara. The government of India has also sponsored a scheme on a pilot basis for making comprehensive efforts to introduce and popularize dryland farming technologies among the farmers. One such project is operating at Arjia in Bhilwara district.

The major crops grown in dryland farming areas in Bhilwara and Rajsamand districts are Black gram, Cluster bean, Green gram, Groundnut, Maize, Sorghum and Soybean etc. The dryland farming research station has evolved and recommended improved package of practices for dryland farming. The dryland farming research emphasizes on better moisture conservation and its use, timely preparatory and seeding operations, establishment of adequate

*M. Sc. Scholar, Department of Extension Education, Rajasthan College of Agriculture (MPUAT), Udaipur, Rajasthan
**Emeritus Professor, Department of Extension Education, Rajasthan College of Agriculture (MPUAT), Udaipur, Rajasthan
***Professor & Head of Department, Department of Extension Education, RCA, MPUAT, Udaipur, Rajasthan
****Professor, Directorate of Extension Education, (MPUAT), Udaipur, Rajasthan

crop stand, satisfactory weed control, efficient fertilizer use, new cropping patterns, crop life saving techniques and mid-season correction in crop planning in the drought prone area. The operational research projects attached to the dryland farming research stations are helping to identify the socio-economic and operational constraints in the transfer of recommended dryland technologies from research stations to farmer's fields.

Major dryland farming technologies developed by the scientists working at Dryland Agricultural Research Station, Arjia Bhilwara i.e. intercropping, sequence cropping, ploughing once in three years, weed control, inter cultivation, use of surface mulch timely sowing, use of drought resistant varieties, keeping optimum plant density, optimum use of fertilizers, adoption of plant protection measures, contour bunding, leveling of land, contour cultivation, farm pond development, cropping according to soil depth and optimum use of water etc.

Therefore, it is necessary to study the perception of farmers regarding the dryland agriculture use of these technologies and problem faced during the utilization of dryland technologies considering all these aspects the present study entitled "Impact of AICRP for Dryland Agriculture on Beneficiary Farmers of Bhilwara and Rajsamand Districts of Rajasthan.

RESEARCH METHODOLOGY

The present study was conducted in Bhilwara and Rajsamand districts of Rajasthan which were purposively selected. There are 6 villages, out of which two tehsils namely Bhilwara, and Railmagra were selected on the basis of maximum number of beneficiary farmers. From each selected villages, 20 respondents (10 beneficiaries and 10 non-beneficiaries) were selected on the basis of maximum dryland area. Thus, total 120 respondents were selected for the study.

RESULTS AND DISCUSSION

Distribution of beneficiary and non-beneficiary dairy farmers on the basis of their level of knowledge: Knowledge level of beneficiary and non-beneficiary farmers regarding improved dryland farming practices were presented in the Table 1.

Three categories low (<58.00), medium (58.00-67.06) and high (>67.06) were made on the basis of S.D and mean of the total obtained score of the respondents.

It was observed that 70.00 per cent of beneficiary at medium level of knowledge and 66.67 per cent of non-beneficiary had medium level of knowledge, whereas 8.33 per cent of beneficiary at low and 26.67 per cent of non-beneficiary had low level of knowledge regarding improved dryland farming practices. Remaining 16.67 per cent of beneficiary and 6.67 per cent of non-beneficiary had high level of knowledge regarding improved dryland farming practices.

These findings are supported by the findings of Awasthi *et al.* (2000) reported that less than half of the members were under medium level of knowledge (38.75%) followed by high and low level of knowledge (33.50 and 7.50%) respectively about improved dryland farming practices. Verma *et al.* (2018) reported that 60.00 per cent of total respondents possessed medium level of knowledge

Table 1. Distribution of beneficiary and non-beneficiary farmers on the basis of their level of knowledge

S.No.	Knowledge level	Beneficiary (n=60)		Non-Beneficiary (n=60)	
		f	%	f	%
1	Low (<58.00)	5	8.33	16	26.67
2	Medium (58.00-67.06)	45	75.00	40	66.67
3	High (>67.06)	10	16.67	4	6.67
Total		**60**	**100**	**60**	**100**

about various improved animal husbandry practices, while only 19.17 per cent respondents were observed in the high knowledge group and 20.83 per cent respondents possessed poor knowledge about the improved dryland farming practices.

2. Aspect-wise knowledge of the respondents regarding improved dryland farming practices: The aspect-wise extent of knowledge on beneficiary and non-beneficiary farmers about AICRP dryland agricultural technologies was given in Table 2. The data presented in Table 2 show that the knowledge possessed by beneficiary respondents regarding maximum milk production from dryland areas by which animals is 63.89 MPS and 63.33 MPS by non- beneficiary respondents. The beneficiary farmers had more knowledge about dryland farming practices as they accorded first rank whereas the non-beneficiary farmers accorded second rank to the same practice.

The knowledge possessed by beneficiary respondents and non-beneficiary respondents regarding soil is suitable for sorghum cultivation were 59.72 MPS with second rank and 60.28 MPS with forth rank accordingly. Whereas, the knowledge regarding disadvantages of late sowing was 59.17 MPS and 63.89 MPS with third rank possessed by beneficiary respondents and first rank possessed by non-beneficiary respondents respectively. The knowledge about agency provided HYV seeds in dryland agriculture among beneficiary respondents and non-beneficiary respondents was 59.89 MPS and 58.99 MPS with fourth and fifth rank respectively. In case of advantages of timely sowing is knowledge possessed by beneficiary respondents and non-beneficiary respondents were 58.33 MPS and 61.67 MPS with fifth and third rank, respectively. In case of major problem in dryland farming, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 54.54 MPS and 40.56 MPS with sixth and eighth rank, respectively.

The knowledge regarding mulching method use in dryland agriculture among the beneficiary respondents and non-beneficiary respondents was 51.67 MPS and 38.33 MPS with seventh and fifth rank, respectively. In case of seed treatment of sorghum in dryland agriculture, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 50.83 MPS and 36.11 MPS with eighth and eleventh rank, respectively. In case of sorghum variety in dryland agriculture in dryland agriculture, the extent of knowledge possessed by beneficiary respondents and non-beneficiary respondents were 48.33 MPS and 49.44 MPS with ninth and sixth rank, respectively.

In case of micro irrigation method use in dryland agriculture, the knowledge recorded among beneficiary respondents and non-beneficiary respondents was 41.39 MPS and 41.99 MPS with tenth and seventh rank, respectively. In case of drought tolerant variety of sorghum in dryland agriculture, it was found the knowledge among beneficiary and non-beneficiary respondents was 38.06 MPS and 39.17 MPS with eleventh and ninth rank, respectively. In case of fertilizer is used for dryland agriculture, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 37.78 MPS and 33.33 MPS with twelfth and thirteenth rank, respectively. In case of method used for reducing the mid-season drought on crops, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 37.78 MPS and 33.33 MPS with thirteenth and twelfth rank, respectively.

The knowledge possessed by beneficiary respondents and non-beneficiary respondents regarding sowing pattern in dryland agriculture was 32.22 MPS with fortieth rank and 31.11 MPS with fortieth rank accordingly. In case of soil borne insect pest in sorghum, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 31.39 MPS and 30.28 MPS, respectively. In case of suitable characteristics for dryland crop varieties is knowledge possessed by beneficiary respondents and non-beneficiary respondents was 26.11 MPS and 25.28 MPS with sixteen and sixteen rank, respectively. In case of nutrient deficiency found in dryland areas is

knowledge possessed by beneficiary respondents and non-beneficiary respondents was 25.28 MPS and 25.40 MPS with seventeen rank in cases, respectively. In case of method used for weed control, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 24.44 MPS and 24.54 MPS, respectively.

The knowledge about techniques used for rain

Table 2. Aspect wise knowledge of beneficiary and non-beneficiary farmers about AICRP dryland agricultural technologies

S. No.	Aspect	Beneficiary (n=60)		Non beneficiary (n=60)	
		MPS	Rank	MPS	Rank
1.	Major area under the Southern Rajasthan for dryland agriculture	17.50	XXX	18.33	XXX
2.	Crop is growing maximum area under dryland agriculture	23.89	XX	22.22	XXIII
3.	Maximum milk production from dryland agriculture by which animals	63.89	I	63.33	II
4.	Manure is maximum using in dryland agriculture	19.72	XXVIII	20.28	XXVII
5.	Soil is suitable for sorghum cultivation	59.72	II	60.28	IV
6.	Soil borne insect pest in sorghum	31.39	XV	30.28	XV
7.	Fertilizer is use for dryland agriculture	37.78	XII	33.33	XIII
8.	Sorghum variety in dryland agriculture	48.33	IX	49.44	VI
9.	FYM per hectare is recommended for cultivation of sorghum	22.22	XXII	23.33	XIX
10.	Agency provided HYV seeds in dryland agriculture	58.89	IV	58.99	V
11.	Disadvantages of late sowing	59.17	III	63.89	I
12.	Advantages of timely sowing	58.33	V	61.67	III
13.	Micro irrigation method use in dryland agriculture	41.39	X	41.99	VII
14.	Insecticide used for termite control	18.33	XXIX	20.00	XXVIII
15.	Nutrient deficiency found in dryland agriculture	25.28	XVII	25.28	XVI
16.	Method use for weed control	24.44	XVIII	24.44	XVIII
17.	Major problem in dryland farming	51.94	VI	40.56	VIII
18.	HYV seeds are not reaching for dryland farming	20.83	XXIV	22.78	XXI
19.	Mulching method used in dryland agriculture	51.67	VII	38.33	X
20.	Method used for reducing the mid-season drought on crops	35.83	XIII	35.56	XII
21.	Height of bunds in dryland agriculture	20.28	XXVI	20.83	XXVI
22.	Suitable crop rotation for dryland agriculture	22.50	XXI	22.50	XXII
23.	Suitable mixed farming practices in dryland agriculture	20.00	XXVII	19.72	XXIX
24.	Drought tolerant variety of sorghum in dryland agriculture	38.06	XI	39.17	IX
25.	Techniques used for rain water harvesting in dryland agriculture	24.17	XIX	23.06	XX
26.	Suitable characteristics for dryland crop varieties	26.11	XVI	25.28	XVI
27.	Suitable fodder crop for dryland agriculture	20.56	XXV	21.11	XV
28.	Suitable implement for dryland agriculture	21.67	XXIII	21.94	XXIV
29.	Sowing pattern in dryland agriculture	32.22	XIV	31.11	XIV
30.	Seed treatment of sorghum in dryland agriculture	50.83	VIII	36.11	XI

water harvesting in dryland areas among the beneficiary and non-beneficiary respondents was 24.17 MPS and 23.06 MPS with nineteenth and twenty rank, respectively. In case of crop is growing maximum area under dryland areas, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 23.89 MPS and 22.22 MPS with twenty and twenty three rank, respectively. In case of suitable crop rotation for dryland areas, knowledge possessed by beneficiary and non-beneficiary respondents was 22.50 MPS and 22.60 MPS, respectively.

In case of knowledge regarding FYM per hectare is recommended for cultivation of sorghum among the beneficiary and non-beneficiary respondents was 22.22 MPS and 23.33 MPS with twenty-two and fortieth rank, respectively. In case of suitable implement for dryland agriculture, the extent of knowledge possessed by beneficiary respondents and non-beneficiary respondents was 21.67 MPS and 21.94 MPS with twenty-three and twenty-four rank, respectively. The knowledge of HYV seeds are not reaching for dryland farming among the beneficiary respondents and non-beneficiary respondents was 20.83 MPS and 22.78 MPS with twenty-four and twenty- one rank, respectively.

In case of suitable fodder crop for dryland areas, the knowledge possessed by beneficiary and non-beneficiary respondents was 20.56 MPS and 21.11 MPS with twenty-five and fifteen rank, respectively. In case of height of bunds in dryland areas, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 20.28 MPS and 20.83 MPS, respectively. In case of knowledge about suitable mixed farming practices in dryland agriculture among the beneficiary and non-beneficiary respondents was 20.00 MPS and 19.72 MPS with twenty-seven and twenty-nine rank, respectively. In case of manure is maximum using in dryland areas, the knowledge possessed by beneficiary and non-beneficiary respondents was 19.72 MPS and 20.28 MPS with twenty-eight and twenty- one rank, respectively.

The knowledge regarding insecticide used for termite control among the beneficiary and non-beneficiary respondents was 18.33 MPS and 20.00 MPS with twenty-nine and twenty-eight rank, respectively. In case of major area under the Southern Rajasthan for dryland agriculture, the knowledge possessed by beneficiary respondents and non-beneficiary respondents was 17.50 MPS and 18.33 MPS with thirty and twenty-one rank, respectively.

CONCLUSION

It is evident from the study that the highest level of Knowledge was found in maximum milk production from dryland areas by which animals is 63.89 MPS and 63.33 MPS by beneficiary and non-beneficiary respondents, respectively practice.

The knowledge possessed by beneficiary respondents and non-beneficiary respondents regarding soil is suitable for sorghum cultivation was 59.72 MPS with second rank and 60.28 MPS with forth rank, respectively. Whereas the knowledge regarding disadvantages of late sowing was 59.17 MPS and 63.89 MPS with third rank possessed by beneficiary respondents and first rank possessed by non-beneficiary respondents, respectively. The knowledge about agency provided HYV seeds in dryland agriculture was possessed by beneficiary and non-beneficiary respondents was 59.89 MPS and 58.99 with fourth and fifth rank, respectively.

Most of the respondents were found to possessed medium knowledge about dryland farming practices followed by high and low knowledge of dryland farming practices.

REFERENCES

Fidelugwuowo, Ugonna B. 2021. Knowledge and skills for accessing agricultural information by rural farmers in South-East Nigeria. *IFLA journal,* **47**(2): 119-128.

Niranjan, D. A. And Bose, D. K. 2020. Dryland farmer's knowledge towards climate change and constraints in adoption of climate resilient practices. *Asian Journal of Agricultural*

Extension Economics social, **38**(4): 10-15.

Rai, D.P and Singh, B. 2010. Extent of knowledge and constraints in cotton production technology in Madhya Pradesh. *Indian Research Journal of Extension Education*, **10**(2): 78-80.

Romade, B. D., Pulate, S. L., and Khose, A. S. 2015. Sources of Information for Knowledge and Adoption of Dryland Technologies in Western Maharashtra. *Trends in Biosciences*, **8**(15): 3781-3784.

Sandeep, Y., Prajapati, R.R and Prajapati, M.R. 2014. Knowledge and adoption of tomato growers about improved tomato production technology. *Gujarat Journal of Extension Education*, **25**(2): 172-174.

Tidke, G.R., Rathod, M.K and Mandve, R.P. 2012. Knowledge and adoption of farmers about the management of pod borer complex in pigeon pea. *International Journal of Extension Education*, **8**: 71-75.

Umar, A., Muazu, M., & Abdullahi, U. 2023. Women farmers knowledge and adoption of dryland farming techniques in north eastern, Nigeria. *Advance Journal of Science, Engineering and Technology*, **5**(12): 13-21.

Verma, Kumar, S., Rai, D.P. and Verma, L.R. 2015. Knowledge and adoption of recommended chilli production technology by the farmers of Raipur district. *Agricultue Update*. **10**(2): 120-125.

❑❑❑

Recevied : 20.08.2024
Accepted : 30.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

PROFILE OF LAVENDER FARMERS IN DISTRICT DODA OF JAMMU AND KASHMIR

Ankush Saini*, Sudhakar Dwivedi, Narinder Paul*** and Pawan Kumar Sharma******

ABSTRACT

In developing countries like India, the production of medicinal and aromatic crops like lavender can be a breakthrough option for increasing the farm income and strengthening the overall farmers' economy. The present study on profiling of lavender farmers in Doda District of J&K was conducted during the year 2020-22 to investigate their socio demographic profile. Data was collected using personal interview technique on comprehensively designed interview schedule from 80 farmers undertaking lavender cultivation from Bhaderwah and Bhalla Tehsils of District Doda, J&K. This work primarily aimed to analyse the degree of involvement of farmers in lavender farming in the District and. This study proves that for the transition to sustainable agriculture lavender plant farming plays a pivotal role in medicine and economy. Majority of the lavender farmers were of 35-60 years, majority were literate, average land under lavender cultivation has been reported to be 0.23 Ha and a gradual increase in the number of farmers undertaking lavender cultivation has been observed.

INTRODUCTION

Lavender (*Lavandula spica*) belongs to Lamiaceae family plant that is a cross pollinated plant. This aromatic crop was originated in mediterranean region. For the growth of lavender cool winters and cool summers are desirable. It is a temperate plant that can withstand drought and frost. Cultivating it at greater altitudes increases its output. Large amount of sunlight is also required for the lavender harvest and poor lighting might result in a lower floral production and a reduction in essential oil concentration.

It is a perennial flowering scented herb or shrub that grows to the height of 40cm to 80cm. The lavender plant's leaves are opposite, oblong-linear, and have little flowers. The purple flowers are sparingly grouped on spikes at the tops of long naked stems, and the nutlet fruits are tiny. The plant's aroma is provided by gleaming oil glands embedded among relatively small star-shaped trichomes (plant hairs) that cover the flowers, leaves, and stems. The plants of lavender rarely produce seed thus propagation is accomplished through cuttings or root division. It can be cultivated in backyards, as well as pots and containers.

Lavender cultivation was introduced in Bhaderwah area of District Doda during 2007-08 by importing plants from Palampur (HP) by Krishi Vigyan Kendra Doda, SKUAST Jammu. Later on, with the launch of Aroma Mission by CSIR-IIIM Jammu in Doda Kishtwar and Rajouri districts of Jammu region, Lavender cultivation gained momentum.

Over 800 farmers have planted lavender over 200 acres of land in J&K. Due to the presence of a cold temperature and a favorable development environment, it is being cultivated in many districts of Kashmir. There are over 450 different varieties which are characterized into 45 different species of lavender plants, with some of the most well-known being ballerina, kew red, anoukh, bettes blue, impress purple and so on. The natural conditions in Jammu and Kashmir are ideal for lavender

*Ph.D. Scholar, Division of Agril. Economics & Agribusiness Mgt., FoA, SKUAST, Jammu
**Professor, Division of Agril. Economics & Agribusiness Mgt., FoA, SKUAST, Jammu
***Head, Krishi Vigyan Kendra, Kishtwar, SKUAST, Jammu
****Chief Scientist (Ag. Economics), KVK Kathua, SKUAST, Jammu

cultivation, and it is now a viable crop for the agriculture industry in Jammu and Kashmir. The most common variety used by the farmers of Doda district is RRL12 which grows upto 15 years. Undertaking lavender cultivation and its success has been named as purple revolution in J&K. With all this in perspective, present investigation has been undertaken to gain an insight into the profile of the lavender farmers of District Doda of J&K.

RESEARCH METHODOLOGY

The present study was conducted in Doda district of Jammu Division of UT of Jammu & Kashmir. The district was purposively selected due to the largest number of farmers undertaking lavender cultivation. From the selected District, Bhaderwah and Bhalla Tehsils were selected for being the hub of purple revolution. A comprehensive list of lavender growers was collected from Krishi Vigyan Kendra, Doda as lavender production has been technically supported by Krishi Vigyan Kendra, Doda through training programmes and farmers consultancy services. Using proportionate method, 80 lavender growing farmers, 40 from each of the selected tehsils were selected from the list of 160 farmers. The primary data was collected from the selected respondents using personal interview technique on a pre-tested schedule. Tabular analysis has been used to obtain the result of the study.

RESULTS AND DISCUSSION

(a) Socio-demographic profile of lavender farmers: Data incorporated in Table 1 reveal distinct trends of the socio demographic profile of the farmers engaged in lavender cultivation in terms of age, marital status, education, land holdings, family size, and experience in cultivation. It is evident from the data that more than1/3rd of the lavender farmers (36.25%) belonged to age group of 46-60 years, followed by 31.25 per cent in the age group of 36-45 years. Besides, 22.5 per cent of the farmers belonged to 25-25 years ager group. Only 10 per cent of the farmers were more than 60 years of age. It can also be seen that a significant majority i.e.87.50% were married, suggesting that farming practices are often supported by family structures with the involvement of family members in varied activities.

A perusal of data incorporated in Table 1 further reveals that the educational qualifications show a diverse trend with 30.00 per cent having completed intermediate education, while 22.50 per cent were educated upto middle standard. This was followed by 18.75 per cent middle, 12.50 per cent illiterate, 8.75 per cent diploma holders and 7.5 per cent graduate farmers. This variation points to a mix of traditional knowledge and formal education among the farmers. Analysis of landholding and lavender land use pattern indicate that the lavender farmers had an average holding of 0.79 hectares with 0.23 hectares average land brought under lavender cultivation reflecting a relatively small scale of operation. Family size data shows that nearly more than half of the farmers (51.25%) have 3-6 family members, 37.50 per cent had 7-8 members and 11.25 per cent had 9 or more than 9 members suggesting a reasonable availability of labour.

This moderate family size, combined with the small area under lavender, indicates that farmers may be balancing lavender cultivation with other agricultural activities or economic considerations, potentially impacting their overall productivity and income. The results are in agreement with those of Abay *et al.* (2016), Challa & Tilahun (2016), Simtowe (2011), Simtowe *et al.* (2011) , who found that the education status of farmers increases the likelihood of adopting agricultural technology. This may be because advance in education status make farmers to be cautious in analyzing the cost and benefits of adopting new technology.

CONCLUSION

The demographic analysis of farmers engaged in lavender cultivation reveals important insights into the age distribution, marital status, education levels, land holdings, family sizes, and recent participation trends in this agricultural sector. The predominance of middle-aged, married farmers with varied educational backgrounds indicates a foundation of traditional knowledge complemented by formal education, which could enhance farming practices.

Table 1: Socio demographic profile of farmers

N=80

S. No.	Socio-demographic variables	Categories	No. of farmers	Percentage
1	Age (Years)	25-35	18	22.5
		36-45	25	31.25
		46-60	29	36.25
		Above 60	8	10
2	Marital status	Unmarried	10	12.5
		Married	70	87.5
3	Qualification	Middle	18	22.5
		Matriculate	15	18.75
		Intermediate	24	30
		Graduate	6	7.5
		Diploma	7	8.75
		Illiterate	10	12.5
4	Area (ha)	Average land holding	0.79	100
		Average area under Lavender	0.23	29.11
5	Family size (No.)	3-6	41	51.25
		7-8	30	37.5
		Above 9	9	11.25
6	Farmer's involvement in lavender Cultivation (years)	2010-2013	5	6.25
		2014-2017	19	23.75
		2018-2021	56	70

N=No. of respondents

The small average land holdings and recent surge in involvement suggest a growing recognition of lavender's economic potential, highlighting the necessity for targeted support and training programs. Overall, understanding these demographics is crucial for developing effective policies and initiatives aimed at promoting sustainable lavender cultivation and improving farmers' livelihoods.

RFERENCES

Abay, K. A., Berhane, G., Taffesse, A. S., Koru, B., & Abay, K. (2016). Understanding Farmers' Technology Adoption Decisions: Input Complementarity and Heterogeneity. ESSP Working Paper 82,Ethiopian Strategy Support Program (ESSP), Ethiopian Development Research Institute (EDRI), International Food Policy Research Institute (IFPRI).

Adam, K.L. 2006. Lavender Production, Products, Markets, and Entertainment Farms. A Publication of ATTRA -*National Sustainable Agriculture Information Service*, **5**(1): 1-12.

Agarwal, D., Singh, J.M. and Horo, A., 2022. An Economic Analysis of Mentha Cultivation in Punjab. *Indian Journal of Economics and Development*, **18**(2): 501-506.

Buchbauer, G., Jirovetz, L., Jaeger, W., Dietrich, H., Plank, C., Karamat, E. 1991. Aromatherapy: Evidence for sedative effects of the essential oil of lavender after inhalation. *Zeitschrift Fuer Natur for schung*, **46**(11-12): 1067-1072.

C., Vaidya, M.K., Sharma, R. and Dogra, D., 2014. Economics of production and marketing of important medicinal and aromatic plants in mid hills of Himachal Pradesh. *Economic Affairs,*

59(3): 363-378.

Challa, M., & Tilahun, U. (2014). Determinants and Impacts of Modern Agricultural Technology Adoption in West Wollega: The Case of Gulliso District. **4**: 20.

Chen, X., Zhang, L., Qian, C., Du, Z., Xu, P. and Xiang, Z., 2020. Chemical compositions of essential oil extracted from (Lavandula angustifolia) and its prevention of TPA-induced inflammation. *Microchemical Journal*, **153**(1): 104-158.

Choudhary, Harshika & Shah, Ritu., 2017. Marketing of Menthol Mint (Mentha) in Uttar Pradesh, India. *International Journal of Pure & Applied Bioscience*. **5**(6): 1323-1327.

Giannoulis, K.D., Evangelopoulos, V., Gougoulias, N. and Wogiatzi, E., 2020. Could bio-stimulators affect flower, essential oil yield, and its composition in organic lavender (Lavandula angustifolia) cultivation. *Industrial Crops and Products*, **70**(8): 648-656.

Giray, F.H., 2018. An analysis of world lavender oil markets and lessons for Turkey. *Journal of Essential Oil Bearing Plants*, **21**(6): 1612-1623.

Chilev, C., Simeonov, E., Dimitrova, B., Yonkova, V., Pietsch, S., Heinrich, S. and Peshev, D., 2022. Valorization of waste lavender residue from the essential oil industry for production of rosmarinic acid-a study on the solid-liquid extraction. *Journal of Chemical Technology and Metallurgy*, **57**(3): 522-532.

Simtowe, F. (2011). Determinants of agricultural technology adoption: The case of improved pigeonpea in tanzania. Munich Personal RePEc Archive (MPRA Paper No. 41329).

Simtowe, F., Kassie, M., Diagne, A., Asfaw, S., Shiferaw, B., Silim, S., & Muange, E. (2011). Determinants of agricultural technology adoption: The case of improved pigeonpea varieties in tanzania. *Quarterly Journal of International Agriculture*, **50**(4): 325-345.

Wani, N.A. and Jangale, B., Impact of lavender plant farming in district budgam of Kashmir valley. *IOSR Journal of Humanities And Social Science (IOSR-JHSS)* **26**(2): 51-54.

❑❑❑

Recevied : 12.08.2024
Accepted : 22.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

EFFECT OF PLANT GROWTH SUBSTANCES ON VEGETATIVE, FLORAL TRAITS AND CORM YIELD OF GLADIOLUS (*Gladiolus hybrida L.*) cv. PUSA KIRAN

Yagyesh Purohit, * Preksha Nagarand Divya Chouhan*****

ABSTRACT

An experiment was conducted at horticulture farm, department of horticulture, School of Agricultural Sciences, Dabok, Udaipur with objective to study effect of plant growth substances on vegetative, floral traits and corm yield of gladiolus (*Gladiolus hybrida* L.) cultivar "Pusa kiran" during Rabi 2022-23. The experiment was laid out in randomized block design and replicated thrice comprising ten treatment combinations (T1:GA3100 ppm, T2:GA3150 ppm, T3:GA3 200 ppm, T4: NAA 100 ppm, T5: NAA 150 ppm, T6: NAA 200 ppm, T7: CCC 200 ppm, T8: CCC 400 ppm, T9: CCC 600 ppm, T10: Control, dipping of corm in normal water for 24 hours. The soil of experimental site was having medium fertility status in terms of N, P2O5, and K2O. The crop was raised with recommended packages and practices. The maximum plant height and number of leaves were recorded in treatmentT3-GA3 200 ppm.The days to spike let emergence, days to first and last floret show color was maximum in control treatment and the use of all growth substances reduce this period. The minimum days to spike emergence was recorded under T6: NAA 200 ppm whereas minimum days to first and last floret show color was recorded in T1: GA3 100 ppm. The maximum spile length, rachis length and weight of corm per plant was recorded under T3: GA3 200 ppm treatment which were significantly higher over control.

INTRODUCTION

Gladiolus (*Gladiolus hybrida* L.) belongs to the family Iridaceae is native of South Africa. Gladiolus flower and foliage are resembled as sword and thus also known as sword lily. The majority of the species are diploid (2n=30) but hybrids are tetraploid (2n=4x=60). The gladiolus is grown in a flower bed in gardens for cut flower production and its floral and foliage parts are used in floral arrangements for interior decoration as well as making high-quality bouquets (Lepcha *et al.,* 2007). The popularity of gladiolus is increasing day by day for its majestic spike having attractive florets, various color that covers the spectrum of white, pink, red, purple, yellow, orange, salmon, and even green are available along with many bicolorand multicolors. Gladiolus is an important cut flower in the international cut flower trade after rose, carnation and chrysanthemum. Gladiolus is cultivated in most of the tropical and subtropical countries of the world. Its spikes take 60 to 100 days after planting to be harvested depending upon the cultivars and time of year. The plant growth substances are the chemical compounds that modify or regulate physiological processes in an appreciably quantum in plants when used in small concentrations. Gladiolus is propagated by corm and physiological functions inside the corms are controlled by plant growth substances. The number of researches conducted in country and abroad proved that application of growth substances such as GA3, NAA and CCC had positive effects on the growth and development of gladiolus plants and increase the number of flowers (Lal and Das., 2017).Thus, considering these facts and paucity of research findings on gladiolus in south-east part of Rajasthan, the present

*M.Sc. Scholar, School of Agricultural Sciences, Dabok, Udaipur
**Asst. Prof., B.N. College of Agriculture, Udaipur
***Asst. Prof., Agriculture University, Jodhpur

study was carried out with objectives to ascertain economically viable concentration of growth substances for vase-life and production gladiolus flower.

RESEARCH METHODOLOGY

The field experiment was conducted during rabi season of 2022-23 at the at Horticulture farm, Department of Horticulture, School of Agricultural Sciences, Dabok, Udaipur. Geographically, Udaipur is located at 24° 34' N latitude and 73° 42' E longitude at an elevation of 582.17 mean sea levels. The gladiolus corms of cultivar "Pusa Kiran" was obtained from AICRP on the Floriculture, MPUAT Udaipur. The soil was clay loam, slightly alkaline (pH 7.2) in reaction having medium in available nitrogen (195.8 kg ha-1), phosphorus (16.8 kg ha-1) and potassium (256.4 kg ha-1). The treatment consisting ten treatments *viz*., T1:GA3100 ppm, T2:GA3150 ppm, T3:GA3 200 ppm, T4: NAA 100 ppm, T5: NAA 150 ppm, T6: NAA 200 ppm, T7: CCC 200 ppm, T8: CCC 400 ppm, T9: CCC 600 ppm, T10: Control, dipping of corm in normal water for 24 hours were conducted in randomized block design with three replications. The crop was sown during first week of November 2021. In well prepared field, ridges were prepared at 30 cm and corms were sown manually at 20 cm spacing at a depth of 5-6 cm. Recommended dose of nitrogen, phosphorous and potassium were applied through urea, DAP and MOP. In order to minimize weed competition periodic weeding was carried out at 30 days after sowing followed by two hoeing and earthing up were carried out at 30 and 60 days after sowing. Different growth and yield attributes were recorded using standard techniques and data collected were computed on basis of average of five samples. The crop was harvested at physiological maturity when foliage turned to yellow colour. Data obtained were statistically analyzed in randomized block design using the standard techniques of analysis of variance. To workout the most profitable treatment, economics of different treatments was calculated on the basis of prevailing market prices in terms of net return (Rs ha-1) and B:C ratio.

RESULTS AND DISCUSSION

The maximum plant height was observed in treatmentT3-GA3 200 ppm, followed by T2-GA3 150 ppm, while minimum plant height was observed in T7-CCC 200 ppm. Treatments showed a significant influence on a number of leaves. Among the treatments, plant under T3- GA3 200 ppm produced greater number of leaves per plant, followed by T2-GA3 150 ppm whereas the lowest leaves were produced under treatment T7- CCC 200 ppm. Further a minimum number of days to spike emergence was observed with treatment T4-NAA 100 ppm, followed by T5-NAA 150 ppm and they were statistically at par par. The maximum days to spike emergence were observed in T10-Control. Likewise the earliest days to the first floret show color were observed in treatment T4-NAA 100 ppm, followed by T9-CCC 600 ppm, however, the maximum days to the first floret show color were observed in treatment T10-Control. The minimum days required to last floret show colour was observed with treatment T4-NAA 100 ppm, followed by T1-GA3 100 ppm. The maximum days to last floret show colour was observed T10-Control. Among the treatments maximum spike length was observed in treatment T3-GA3 200 ppm, followed by T2-GA3 150 ppm, whereas minimum spike length was observed in treatment T7-CCC 200 ppm. The lowest rachis length was recorded under control. Whereas the plant raised with T3-GA3 200 ppm dipped corm recorded the highest rachis length closely followed rachis length recorded under T2-GA3150 ppm.

Application of T9- CCC 600 ppm proved best treatment in terms of highest corm yield (57.40g plant-1), net return (Rs. 75200 ha-1) and B:C ratio (2.10). Under present investigation the results are variable in terms of flower vase-life, corm yield, net returns and B:C ratio. The treatments of gibberellic acid enhance vegetative growth and proved best for flower quality. Application of gibberellic acid-induced active cell division and cell elongation reported by Jadhav et al. (2015). Vegetative growth might also be increased due to osmotic uptake of

Table 1: Effect of plant growth substances on vegetative, floral traits, gladiolus corm yield and economics

Treatment	Plant height (cm)	No. of leaves plant^{-1}	Days to			Length (cm)		Corm yield (g plant^{-1})	Net Return (Rs ha^{-1})	B:C Ratio
			Spike Emergence	First FSC	Last FSC	Spike	Rachis			
T_1-GA_3 100 ppm	90.27	9.00	85.00	92.00	98.20	84.30	70.30	52.80	507900	1.52
T_2-GA_3 150 ppm	92.00	9.50	86.60	93.80	100.00	86.40	71.90	54.40	577750	1.68
T_3-GA_3 200 ppm	94.40	9.90	87.00	95.00	104.00	88.20	73.80	55.00	591325	1.77
T_4-NAA 100 ppm	82.00	7.90	79.40	90.40	97.30	76.50	63.00	45.00	476525	1.43
T_5-NAA 150 ppm	83.40	8.70	80.80	93.60	99.60	77.40	64.20	49.80	617700	1.84
T_6-NAA 200 ppm	84.50	8.90	82.80	95.80	105.00	78.90	65.12	51.20	700525	2.04
T_7-CCC 200 ppm	80.50	7.30	83.60	92.40	100.40	74.00	61.60	54.70	484550	1.45
T_8-CCC 400 ppm	83.40	7.80	84.40	93.20	103.00	77.80	63.80	56.00	627225	1.82
T_9-CCC 600 ppm	85.40	8.00	85.40	90.80	98.40	79.60	64.60	57.40	752900	2.19
T_{10}-Control ppm	86.00	9.10	87.60	97.40	106.40	80.50	67.60	50.60	528925	2.19
S.Em±	2.08	0.10	0.89	1.34	0.94	1.60	1.77	1.16	--	--
CD (0.05)	6.17	0.29	2.65	3.97	2.79	4.76	5.26	3.45	--	--

FSC: Flower show colour

water and nutrients under the influence of gibberellic acid, which maintains swelling force against the softening of cell wall and thereby increasing the vegetative growth in terms of plant height and number of leaves (Baskaran and Abirami (2016). The results are in close conformity with findings of Baskaran *et al.* (2017) working on gladiolus. Further different levels of NAA and gibberellic acid also improved quality parameter of flower. The early completion of vegetative phase was on account of rapid cell division and cell elongation under these growth substances which is quite effective in reducing the juvenile phase of plant (Ashwini *et al.* 2019) and at the same time also divert assimilates towards corm for development. The CCC is a plant growth regulator that inhibits gibberellic acid, which shortens and strengthens plant stems. It can also reduce branching and foliage in certain trees and shrubs thus the poor vase-life of flower and higher corm yield might be on account of diversion of more assimilate form source to sink (Laishram and Hatibarua, 2013).

CONCLUSION

It is concluded that maximum net return (Rs. 752900/ha) and B:C ratio (2.19) was noted in treatment T9-CCC 600 ppm in the present research.

REFERENCE

Ashwini, A., Munikrishnappa, P.M., Kulkarni, B.S., Kumar, R., Taj, A. and Mohan, K.S. 2019. Effect of plant growth regulators on vegetative and flowering parameters of gladiolus (*Gladiolus hybridus L.*) cv. Adigo Yellow. *International Journal of Chemical Studies,* **7**(2): 1553-1556.

Baskaran, V. and Abirami, K. 2016. Effect of growth substances on growth, flowering and corm production in gladiolus (Gladiolus grandifloras) cv. White Prosperity under bay island condition. *Indian Journal of Agricultural Sciences,* **86**(2): 216- 219.

Baskaran, V., Abirami, K. and Simhachalam, P. 2017. Effect of growth regulating chemicals on flowering, corm production and postharvest life of gladiolus (Gladiolus grandifloras) cv. Punjab Dawn in bay Islands. *Indian Journal of Agricultural Sciences,* **87**(4): 551-554. .

Jadhav, P.B., Mangave, B.D., Singh, A., Dekhane, S.S. and Patel, D.J. 2015. Effect of plant growth regulators and natural growth substances on growth and flowering of gladiolus cv. American Beauty. *International Journal of Current Research,* **7**(07):17674-17676.

Laishram, N. and Hatibarua, P. 2013. Effect of corm splitting and GA3 application on growth and flowering of gladiolus cv. 'Pusajyotsna'. *Annals of Horticulture,* **6**(2): 383-388.

Lal, N and Das, R.P. 2017. Effect of Plant Growth Regulators on Yield and Quality of Guava (Psidium guajava L.) cv. Allahabad Safeda. *International Journal of Current Microbiology and applied Sciences,* **6**(5): 857-863.

Lepcha, B., M. C. Nautiyal and V. K. Rao 2007. Variability studies in gladiolus under mid hill conditions of Uttarakhand. *Journal of Ornamental Horticulture,* **10** (3):169-172.

❑❑❑

Recevied : 16.07.2024
Accepted : 20.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

A STUDY ON PRELIMINARY SELECTION OF HONEY BEES (*Apis mellifera L.*) COLONIES FOR DESIRABLE TRAITS

Komal Sharma*, R.S. Bandral, Devinder Sharma*** and Narinder Paul******

ABSTRACT

The present was carried out in the Experimental Learning Unit of Beekeeping, Division of Entomology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Chatha (SKUAST-J) from March 2022 to May, 2022. In the study, twenty colonies with uniform number of frames covered with bees were selected for screening hygienic behavior, gentleness, colony development and honey yield. Whereas, this study aimed at determining selection of better performing colonies on the basis of colony parameters *viz*. Nectar, capped brood, uncapped brood, Bee bread and sealed honey. However, final honey yield per each hive have also been recorded during honey harvest. The results recorded on hygienic behavior showed that after 24 and 48 hrs the colony number 20 was the best performer in term of hygienic behavior. The study on gentleness colony number 3 (attained 4 score) was very moderate gentleness. However, the significant variations were observed in various colony development parameters *viz*., nectar (884.66 cm2), capped brood (1451.30cm2), uncapped brood (815.33 cm2, bee bread (763.72 cm2) and sealed honey (1878.94 cm2) in colony number 9, 11, 11, 11, 11 and 2, respectively. Whereas, honey yield was observed highest in colony number 2 (9.86 kg). The experiment concluded that colony number 11 is the best performer among all the colonies. Therefore, colony number 11 should be selected for further multiplication of colonies and also serves as breeding stock for further improvement in colonies.

INTRODUCTION

The ability to select higher performing honey bee colonies is essential for beekeeper success. Honeybees are very important social insect and also known as the most commercially valuable insect because they produce honey, pollinate flowers, fruits, vegetables (Lawal and Banjo, 2010).

Being eusocial insects, honey bees live in societies that are characterized by an age-dependent division of labor among workers for work related to colony homeostasis, growth and development (Seeley, 1995). There are many species of honeybees in India, but four species are most common namely *Apis mellifera* L., *Apis florea* L., *Apis cerana* L. and *Apis dorsata* L. Among these, *A. mellifera* is the most popular species in worldwide and have a vast number of workers, ranging from 15,000 to 60,000 bees (Southwick and Heldmaier, 1987) and this honeybee can be easily migrated from one place to other place. A. mellifera species carried more pollen, less aggressive and provide more honey than the native bee, A. cerana and also less prone to swarming, which is ideal for beekeepers who want to lose their colonies as little as possible (FAO, 1986). In social insects, the quality of the reproductive individuals, such as the queen and drones in A. mellifera, has a certain impact on the colony's development. The queen's reproduction and fertilization are important stages in the life cycle of a honey bee colony because they define the colony's future fitness. Honey bees have a variety of behavioral features e.g., foraging, swarming and hygienic behavior that contribute to their strong

*Former, M.Sc. Scholar, Division of Entomology, FOA SKUAST, Jammu
**Professor, Division of Entomology, FOA SKUAST, Jammu
***Professor, Division of Entomology, FOA SKUAST, Jammu
****Head, Krishi Vigyan Kendra, Kishtwar, SKUAST, Jammu

establishment and survival in the environment. Hygienic behavior is the capability of worker bees to detect and remove parasitized and dead larva brood (Boecking & Spivak, 1999; Rothenbuhler, 1964; Spivak, 1996). The Hygienic behavior is specifically important for the population dynamics of bees since it can avoid or limit the development of brood illnesses and regarded the major defense of honey bees against American foulbrood (AFB), European foulbrood Chalk brood and Varroa infestation (Park *et al.*, 1937., Woodrow and Hoist, 1942., Rotherbuhler, 1964ab., Gilliam *et al.* 1983., Spivak and Downey, 1998). There is a lack of knowledge among local beekeepers about the optimal hive management systems for reducing the problem of colony illnesses and parasite infections. However, beekeepers have lack of attention for the management of colony diseases, parasites and pests. Studies show that bees have relied on self-defense or natural response. Some of the most important measurable characteristics that could be used to choose colonies in an apiary are spring colony development, gentleness and a tendency to remain calm on the comb, overwintering ability and honey production. Bee's feeding patterns are influenced by colony strength and the productivity of bees in a given region is determined by bee bread and bee forage, with the foraging index being one of the most important determinants in colony performance. The primary source of nutrition (major source of energy) is pollen (protein-rich food) and nectar is collected by bees from flowers. The amount of pollen in the hive plays an important role in the growth of healthy honeybees and a strong bee colony. The colony's population has a stronger impact on its productivity and efficiency. A strong colony has an advantage not just in terms of honey yield, but also in fighting off predators. For survival, the important member to a colony is queen honey bee. Modern queen rearing, selection and mating control procedures provide highly potent tools for improving honey bee economic, behavioral and adaptive features. High-quality queens are a requirement for any research on colony formation and behavior, as well as for economically successful beekeeping.

RESEARCH METHODOLOGY

The present investigation on, "Preliminary selection of honey bees, *Apis mellifera* L. colonies for desirable traits" were conducted at the Experiential Learning Unit of Beekeeping (Division of Entomology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Chatha (SKUAST-J) during March 2022 to May, 2022. In the studies, twenty hives without colony were selected. These hives disinfected and cleaned by means of smoke using smoker and sulphur powder. Four frames covered with honey bees along with same aged queen were shifted in each disinfectant hives in the month of March, 2022. Beside this six drawn combs frame were provided in each hive.

Hygienic behaviour:

Hygienic behaviour evaluated by using the pin-killed test technique as per Shakeel *et al.* (2020) to examine the number of removal killed capped brood. For hygienic behaviour, a disposable plastic bottle was cut into circular shape for marking the capped brood in each colony. This circular shaped bottle was first pressed on the drawn frame and found that the number of cells covered in marked area were 70 cells. The covering of marked capped brood 70 cells were punctured by making a single hole at the centre of the cell, thereby piercing and rotating the dissecting needle to kill the capped brood beneath the capping. The numbers of cleaned cells by honey bees were counted for assessment of hygienic behaviour and the data was recorded at weekly interval. The hygienic behaviour data was recorded after 24 and 48 hrs.

Gentleness:

The gentleness recorded in the A.mellifera. Colonies at weekly interval and data observed on the basis of scores were allotted as per Ruttner, 1988 (Table1).

Colony development:

Observation on colony development *viz.*, nectar, uncapped brood, capped brood, beebread and

Table 1: Four point score

Points/Score	Gentleness
4	**Very moderate :** Protection from stinging or smoke is not needed,
3	**Moderate :** There is no need for protection, just little smoke/ beekeeper is not attacked by bees,
2	**Aggressive :** Smoke and protection clothes (veil, gloves) are necessary,
1	**Very aggressive**: The work is not possible without help of smoke, face protection and gloves are necessary.

sealed honey and the data was recorded at 15 days interval. A wire grid of the size of hive frame having 70 squares each of 1x1 inch size was used for recording the observations for colony development and the data taken on both side of a frame. Whereas, the recorded observation taken on inch square and inch square converted into centimetre square. However, final honey yield per each hive have also been recorded during honey harvest.

RESULTS AND DISCUSSION

(1) Overall Performance of *Apis Mellifera L.* colonies:

(i) Hygienic behaviour:

Data on performance of 20 *A. mellifera L.* colonies clearly revealed that the maximum Hygienic behaviour showed that on the basis of pooled mean after 24 hours that the range of removal of dead larvae varied from 54.50 to 69.33. The maximum hygienic behaviour recorded in colony number 20 which differ statistically significant from other colonies but at par with colony number 1, 2, 11, 17 and 19.whereas the minimum was in colony number 3. The data recorded after 48 hours on the basis of pooled mean the range of larval removal varied from 58.93 to 70.00. The colony number 2, 11 and 20 was best performer and statistically differ from other colonies but at par with 1, 17 and 19. The overall result indicates that after 24 and 48 hrs colony number 20 is the best performer. Similar findings have been recorded by Gregorc *et al.* (2010) in Apis mellifera carnica colonies using the pin-killed method during the month of May-July and the data recorded after 24 hrs. They found that brood removal was 84.7 numbers out of 100 numbers punctured capped brood.

(ii) Gentleness:

The maximum gentleness was recorded in colony number 3 was very moderate (obtained 4 scores) and other colonies received scores less than 4. Almost similar findings has been observed by Gregorc *et al.* (2010), who reported that gentleness behaviour (score 4) in almost all the colonies except few colony which receive less than 4 score.

(iii) Colony development:

The mean area covered with nectar ranged from 541.49 to 884.66 cm^2 and the maximum nectar area was recorded in colony number 9 (884.66 cm^2), whereas minimum was in colony number 3 (541.49 cm^2). The maximum uncapped brood was recorded in colony number 11 (815.33 cm^2) and least in colony number 3 (432.09 cm^2). Similar studies have been carried out by Kumar *et al.* (2018) who also reported that area covered by uncapped brood was different in different colonies. The maximum capped brood data was observed in colony number 1 (1451.30 cm^2), whereas minimum in colony number 18 (1001.69 cm^2). These studies are in conformity with Gregorc *et al.* (2010) and Kumar *et al.* (2018) who also reported that capped brood area coverage varied in different colonies. The data recorded on bee bread area was more in colony number 11 (763.72 cm^2) and less in colony number 20 (359.26 cm^2). The results are in similar with Kumar *et al.* (2018) who also reported that range of area covered in ten colonies by beebread varied from 73.12 to 1184.38 cm^2 and the observation recorded in sealed brood is maximum in colony number 2 (1878.94 cm^2), whereas minimum in colony number 3 (872.25 cm^2). .

Similar findings have been reported by Kumar *et*

al. (2018) who studies ten colonies and found that area covered by sealed brood ranged from 256.25 to 2741.20 cm^2. However, in term of honey yield colony number 2 (9.86kg) and 10 (9.74 kg) was the best performer. The overall results of swarming tendency showed that the maximum number of queen cells was found in colony number 12 having 13 queen cells.

CONCLUSION

The overall performance of experimental colonies of A.mellifera L. result clearly revealed that under normal conditions, colony development and honey yield of the colony increases. Our result showed that, colony number 20 showed the highest hygienic behavior among all the colonies after 24 hours and some colonies have clear the brood after 24 hrs. However, almost all the remaining colonies have also cleaned the brood after 48 hrs. The Gentleness data was observed highest in colony number 3. The maximum nectar was found in colony number 9 (884.66cm^2), uncapped brood in colony number 11 (815.33cm^2), capped brood in colony number 11 (1451.30cm^2), beebread in colony number 11 (763.72cm^2) and sealed honey in colony number 2 (1878.94cm^2). However, honey yield was recorded highest in colony number 2 (9.86kg). It may be concluded from the present study that the different colonies were selection of better performing, whereas colony number 11 is best performer. Therefore, colony number 11 could be selected for multiplication of colonies as well as breeding stock for further improvement in colonies. Also, selected queens of specific colonies in the experimental apiary exhibit a high genetic potential for hygienic behaviour and other desired qualities of gentleness, low swarming tendency and good honey production. However, so many studies on honey bees have conducted but Jammu and Kashmir India's most important bee keeping regions. It has a lot of potential for bee keeping because of the availability of bee flora. Hence, our experiments finding may make a way for future research with selection of better performing colonies in an apiary these important traits should be considered by beekeepers.

REFERNCES

Boecking, O. and Spivak, M .1999. Behavioral defences of honey bees against Varroa jacobsoni Oud. *Apidologie*, **30**: 141-158.

Buchler, R., Berg, S. and Le conte, Y. 2010. Breeding for resistance to Varrora destructor in Europe. *Apidologie*, **41**: 393-408.

Ditez, 1975. Nutrition of the adult honeybee. In: C.P.Dadant, C.C.dadant, M.G.dadant and J.C.Dadant (eds.) The Hive and the Honey Bee. Dadant and Sons, Inc. Hamilton, U.S.A. : 125-156.

Fewell, J. H. and Page, Jr. R. E. 2000. Colony-level selection effects on individual and colony foraging task performance in honeybees, *Apis mellifera L. Behaviour Ecology and Sociobiology*, **48**: 173-181.

Gregorc, A. and Lokar, V. 2010. Selection criteria in an apiary of Carniola honey bee (Apis mellifera carnica) colonies for queen rearing. *Journal of Central European Agriculture*, **11**(4): 401-408.

Goyal, N.P., Kumar, P. and Atwal, A. S. 1989. Transfer of beekeeping technology to the field in Punjab. *Indian Bee Journal*, **51**: 115-118.

Kumar, R. and Mall, P. 2018. Important traits for the selection of honey bee, *Apis mellifera* L. colonies. *Journal of Entomology and Zoology Studies*, **6**(3): 906-909.

Kumar, J. and Mall, P. 2017. Hygienic behavioral response of *Apis mellifera* Ligustica against pin-killed and infectious brood. *Journal of Entomology and Zoology Studies*, **5**(1): 913-915.

Lawal, O.A. and Banjo, A.D. 2010. Appraising the bee keeping knowledge and perception of pests problem in beekeeping business at different ecological zones in South-Western Nigeria. *World Journal of Zoology*, **5**(2): 137-142.

Rothenbuhler, W.C. 1964a. Behaviour genetics of nest cleaning in honey bees. IV. Responses of F1 and back cross generations to diseases killed

brood. *American Zoologist*, **4**: 111-123.

Rothenbuhler, W. C. 1964b. Behaviour genetics of nest cleaning in honey bees. I. Responses of four inbred lines to disease killed brood. *Animal Behaviour*, **12**: 578-583.

Ruttner, H. 1972. Technical recommendations for methods of evaluating performance of bee colonies. In: Breeding Techniques and selection for Breeding of honey. Apimondia Publishing House; Bucharest, Romania : 87-92.

Seeley, T.D. 1995. The wisdom of the hive: The social physiology of honey bee colonies. Cambridge: MA. : Harward University Press.

Southwick, E.E. and Heldmaier, G. 1987. Temperature control in honey bee colonies. *Biological Science*, **37**: 395-399.

Spivak, M. 1996. Honey bee hygienic behaviour and defense against Varroa jacobsoni. *Apidologie*, **27**: 245-260.

Spivak, M. and Downey, D. L. 1998. Field assays for hygienic behavior in honey bees (Hymenoptera : Apidae). *Journal of Economic Entomology*, **91**(1):64-70.

Spivak, M. and Reuter, G.S. 1998b. Honey bee hygienic behaviour. *American Bee Journal*, **138**: 283-286.

Shakeel, M., Ali, H. and Ahmad, S. 2020. Comparison of hygienic behaviour of exotic honey bee Apis mellifera L. and indigenous honey bee Apis cerana of Pakistan. *Sociobiology*, **67**(1): 74-79.

Zakour, M., Ehrhardt, K. and Bienefeld, K. 2012. First estimate of genetic parameters for the Syrian honey bee Apis mellifera syriaca. *Apidologie*, **43**: 600-607.

❑❑❑

Recevied : 15.08.2024
Accepted : 20.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024

DESCRPTIVE PROFILE, EXTENSION CONTACTS AND SOCIAL PARTICIPATION OF SAFFRON (*Crocus sativus* L.) FARMERS IN DISTRICT KISHTWAR OF JAMMU AND KASHMIR

Vibhore Khajuria*, P.S. Slathia and Narinder Paul*****

ABSTRACT

The present study was conducted with 150 saffron farmers of Hidyal and Pochhal Panchayats of District Kishtwar of UT of Jammu and Kashmir to explore their descriptive profile, extension contacts and social participation. Findings revealed that the saffron growers, on an average exhibited a mean age of 52.74+13.47 years, majority of the saffron growers were educated as only 16 percent of them were illiterate. 68 per cent of the farmers had small families with an average family size of 6.06+ 2.51. More than half of the saffron farmers (51.33%) were exclusively involved in agricultural profession whereas, remaining were involved in both agriculture and other professions. Average operational landholding for saffron growers was found to be 0.69 hectares. 55.33 per cent of saffron growers communicate with the Department of Agriculture and majority cite the department as their primary source of information. 16 per cent of saffron farmers were active members of village panchayats, indicating their active participation in local governance. In contrast, a smaller proportion, 6 per cent, exhibited activity in Farmers' Producer Organizations (FPO), and just 1.33 per cent were found participating in self-help and cooperative groups.

INTRODUCTION

Saffron (*Crocus sativus* L.) is a valuable spice crop that originated in Iran and spread throughout the world owing to the dehydrated labels of the Iridaceae family plant *Crocus sativus* Linnaeus. Currently, Iran produces around 90% (430 tons) of the 450 tons of saffron produced worldwide. India comes at second place with 22 tons, followed by Greece with 7.2 tons, Afghanistan with 6 tons, Morocco with 2.6 tons, Spain with 2.3 tons, Italy with 1 ton, China with 1 ton, and Azerbaijan with 0.23 tons (Anonymous, 2020). Iran's main saffron-producing location is the province of Khorasan, particularly in the Bala Velayat area. Iranians have come up with many saffron-based items throughout the years, including saffron cake powder, saffron rock candy, saffron tea, and saffron sugar candies (Cardone *et al.*, 2020).

In India, saffron is primarily cultivated in the UT of J&K on an area of about 3,715 hectares. The saffron of J&K is acclaimed internationally as of superior quality with high demand. Recently, saffron of Kashmir got a Geographical Indication (GI) tag (Kothari *et al.*, 2021). This includes saffron grown in three districts of Kashmir and One district of Jammu Division. The annual production of saffron in J&K is 16 MT and the productivity per hectare is 3.0 - 4.0 kg. Saffron in J&K is mainly cultivated on Karewas also known as Wudur (Iqbal *et al.*, 2023). Major contribution of Saffron comes from four districts i.e, (Pulwama, Budgam, Srinagar and Kishtwar) with 86 per cent saffron farming practiced in heritage town of Pampore under Pulwama district covering an area of over 3,200 hectares (Trak and Hussain, 2021). Saffron in Kishtwar District of Jammu Division is grown on an area of about 120 ha. The saffron grown in Kishtwar is of superior quality than that of Pampore. It all depends upon the quality of the land and climate of the place. The present investigation has been carried out to study the descriptive profile, extension contacts and social participation of the saffron farmers in District

*Ph.D. Scholar, Division of Agriculture Extension Education, FoA, SKUAST Jammu
**Professor, Division of Agriculture Extension, FoA, SKUAST Jammu
***Head, Krishi Vigyan Kendra. Kishtwar, SKUAST Jammu

Kishtwar of UT of Jammu & Kashmir.

RESEARCH METHODOLOGY

The present investigation was purposively conducted in District Kishtwar of UT of Jammu and Kashmir as saffron is majorly cultivated in this District of Jammu Division. A comprehensive list of 322 saffron growers was obtained from the Saffron Development Officer, Agriculture Production and Farmers Welfare department Kishtwar. From the list, 150 saffron growers were selected through random sampling technique. These 150 number of farmers belonged to 4 villages of Hidyal and 6 villages of Pochhal Panchayat of the District. Primary data was collected on a pre-tested structured interview schedule through personal interview technique. Statistical tools as appropriate for the study were applied for analysis of data and arriving at the specific findings.

RESULTS AND DISCUSSION

(1) Descriptive profile of the respondents

(1.1) Age : In Table1, the comprehensive data analysis reveal that the saffron growers on average exhibited a mean age of 52.74+13.47 years. Employing Singh's cube root method (1975) for age categorization, a predominant proportion of farmers was identified in the age group of above 46-64 years, comprising 52.66% followed by 23-45 years (29.33%) and 65-90(18%), respectively.

(1.2) Education : It has been found that 28 per cent of the group or most farmers had completed higher secondary education. Remarkably, only 5.00 per cent of the farmers had a high school diploma, and 16 per cent were found illiterate. In addition, 12.6 per cent had finished middle school, 9.3 per cent had reached the graduation level, and 5.3 per cent had obtained a higher certification. (2.6%) were among the minority who had only completed elementary school. The Kishtwar district's saffron producers have an average educational attainment of 9th standard (±4.62). Experience of the growers in saffron cultivation on an average was found to be 30 years.

(1.3) Family type and size of saffron farmers: A perusal of data presented in Table 2 reveal that 68 per cent of saffron growers had small families, whereas 19.3 per cent and 12.6% were classified under medium and big family groups respectively. Furthermore, the family structure of saffron farmers indicates that majority (66 per cent) had nuclear families, while only 33% were living in joint families and the average family size was 6.06+

Table 1: Descriptive profile of the saffron farmers/ respondents

Particular	Overall (n=150)
Average age (in years)	52.74 ± 13.47
Age of growers(in years)	
23 – 45	44 (29.33)
46-64	79 (52.66)
65-90	27 (18)
Average education (in years)	9.26 ± 4.62
Educational status of the growers (% farmers)	
Illiterate	24 (16)
Primary	4 (2.6)
Middle	19 (12.6)
Matriculate	39 (26)
12^{th}	42 (28)
College	14 (9.3)
University	8 (5.3)
Average experience in saffron cultivation of the growers (in years)	30.11 ± 13.35

2.51

(1.4) Occupational status of saffron farmers: The findings in Table 3 provide a thorough understanding of the saffron growers professional involvement. A noteworthy observation is that a majority, constituting 51.33%, were exclusively involved in agricultural profession. On the other hand, 49.00% of saffron growers work in both agriculture and other professions.

Perusal of data further reveal that 10 per cent of people were involved in both non-agricultural and agricultural commercial endeavours. Remarkably, 16.6 per cent of saffron growers continue to work in secondary occupations after retiring from government job. Furthermore, 15.3 per cent hold active roles in government service concurrently and 8 percent work as additional contractors in the private sector. A smaller group or 1.33% work on a contract basis in addition to farming and a negligible percentage or 0.6% work in labour intensive secondary jobs other than farming.

These results highlight the complex occupational landscape of saffron growers and offer a detailed picture of the various economic activities that support people's lives in this farming community.

(1.5) Land holding: The average operational landholding for saffron growers as reported in Table 4 was calculated to be 0.69 hectares (±0.07), which reflects the extent of agricultural operations carried out by this community.

(1.6) Distance: Regarding proximity variables, the data indicates that saffron growers were located approximately 3.07 km and 3.03 km away from the nearby market and the seed store of the agricultural department, respectively. Furthermore, average distance to Private seed store and fertilizer store was 3.09 and 3.10 km, respectively.

(1.7) Extension contacts of the saffron farmers: Analysis of extension contacts reveals that 55.33 per cent of the saffron growers communicate with the Department of Agriculture, whereas just 0.66% report communication with scientists at KVK/SKUAST Jammu. The majority (55.33%) cite the department as their primary source of

Table 2: Average family size of farm households

Family type (% farmers)	Overall (n=150)
Average family size	6.06±2.51
Joint families	50 (33.3)
Nuclear families	100(66.6)
Family size category (% Farmers)	
Small family (< 6 members)	103 (68)
Medium family (7-8 members)	29 (19.3)
Large family (>8 members)	19 (12.6)

Table 3: Occupational status of respondent farmers (in per cent)

Occupation of saffron growers	No. of farmers	Percentage of farmers
Only Agriculture	77	51.33
Agriculture+ Labour	1	0.6
Agriculture + Business	15	10
Agriculture + Government service	23	15.3
Agriculture + Retired Employee	25	16.6
Agriculture +Shopkeeper	1	0.6
Agriculture + Contractual	2	1.33
Agriculture + Private Job	12	8

Table 4: Landholding, extension contact and social participation of saffron growers

Owned Land	**Overall**
Average Land holding (ha)	.69 ± .07
Distance of market (in km)	
Agriculture department Store	3.07±1.49
Nearest Market	3.03±1.50
Fertilizer Store	3.10±1.47
Private seed store	3.09±1.48
Extension Contacts of respondent	
Department of Agriculture	83 (55.33)
Scientist of KVK/SKUAST-Jammu	1 (.66)
Source of information	
Department of Agriculture	83 (55.33)
Private seed dealer	3 (2)
Fellow farmer	63 (42)
Social participation	
Village Panchayat	24 (16)
Cooperatives	2 (1.33)
FPO	10 (6.66)
Self Help Group	2 (1.33)

information, where as fellow farmers and private seed dealers were the sources of information for 42 per cent and 2 per cent of the saffron growers, respectively.

(1.8) Social participation of the saffron farmers: Examining social participation, the data highlights the involvement of 16 per cent of the saffron producers in village panchayats, indicating their active participation in local governance. In contrast, a smaller proportion, 6 per cent, exhibits social activity in Farmers' Producer Organizations (FPO), and just 1.33 per cent participate in self-help and cooperative groups.

CONCLUSION

It can be concluded from above findings that pertinent to the occupational diversity in terms of professional involvement, more than half of the saffron growers were exclusively engaged in agriculture, while others worked in both agriculture and other professions. Social participation revealed 16 per cent involvement in village panchayats, emphasizing active participation in local governance. The operational characteristics of saffron cultivation indicated an average land holding of 0.69 hectares. Farmers were situated approximately 3.07 km from the nearby market and 3.03 km from the seed store, with varying distances to private seed dealers and fertilizer sources. Extension initiatives must be specifically designed with regional characteristics in mind. In order to provide particular assistance and extension services, it is essential to comprehend the wide range of jobs held by saffron growers. Being close to agricultural departments is important for the sharing of knowledge.

RFERENCES

Anonymous. 2020. Report on National Saffron Mission. Agriculture Production and Farmers Wellfare Department, J&K India.

Iqbal, A.M., Lone, A.A., Khan, M.H., Uddin Sofi, M., Alie, B.A., Hassan, M.G., Dar, N.A., Khan, A., Fayaz, U., Dar, S.A. and Nehvi, F.A., 2023. Genetic variability assessment of indigenous and exotic saffron germplasm through morpho-agronomic characterization at Jammu and Kashmir, India. *Plant Genetic Resources,* **21**(5): 389-398.

Thakur, R. and Kumar, R. 2021. Saffron (*Crocus sativus* L.): Gold of the spices-A comprehensive review. *Horticulture, Environment, and Biotechnology*, **62**(5): 661-677.

Trak, T.H. and Hussain, N. 2021. Saffron an expensive herb, its medicinal virtues and as stimulant food: A review. *Journal of Fundamental & Comparative Research*, **6**(20): 19-22.

❑❑❑

Recevied : 16.08.2024
Accepted : 30.08.2024

REPEAT BREEDING: A HIT TO THE ECONOMY OF DAIRY FARMS

Rohitash Kumar*, Rahul Kumar Meena and Vipin Chandra*****

ABSTRACT

The present paper highlights the direct or indirect causes of repetitive breeding in dairy cattle. The main causes related to repetitive breeding are metabolic disorders, pre-parturient diseases, order of parity and age of female and poor nutrition to the animals. Animals showed be provided high quality food in accordance with Indian Standards Bureaus' recommendations to avoid repeat breeding in animals.

INTRODUCTION

A repeat breeder is a cow or buffalo with a sound reproductive system that is unable to conceive even after three or four artificial inseminations. Due to a decline in lactation production, an increase in medical costs, calving time, insemination costs, and the death rate of cattle and buffalo, it causes a financial catastrophe.(Aghamiri *et al.*, 2020). The main obstacle facing dairy farmers today is getting high-yielding cow to gestate quickly and affordably. (K A Weigel, 2004). One of the most important genital tract disorders affecting cattle and buffalo is repeat breeding, which varies depending on factors such fecundate failure, early fetal death, area, management, and environment. Numerous studies have shown that a number of factors, including genital tract infections, any anatomical dysfunction of the genital tract, hormonal imbalances, and host defense mechanisms against semen, contribute to recurrent breeding syndrome.(Asaduzzaman *et al.*, 2016). However, other factors that may potentially affect how repeat breeding manifests in cattle include age, parity, body condition score, and high milk production. The most important factor for repetitive breeding in cattle and buffalo is heat stress, which shortens the time and weakens the vigor of estrus indicators, resulting in silent ovulation. (Singh *et al.*, 2017). Even though RB is a multifactor illness, poor egg quality can lead to low conception rates and early fetal death, hence it is necessary to consider the role that egg quality plays in the disease's expression. (Roberta Machado Ferreira, 2016).Compared to buffaloes (12.74%) and native cows (8.64%), crossbred cows have a far higher rate of repeat breeding (17.57%). (Shailendra Verma *et al.*, 2018). Because buffaloes are better acclimated to the hot heat than cows are, productivity issues with buffaloes are uncommonly found, and only a small number of cases of RB syndrome are looked into. During the first 42 days of gestation, when organ implantation and growth occur, early embryonic death occurs. Embryonic mortality occurs at day 17 up to 80%, at day 17 and 42 approximately 10-15%, and after day 42 5%. The strong reproductive health of dairy cattle is the foundation for high yielding and healthful dairy products (Rashed Khan Barson *et al.*, 2019). Because the blood of dairy calves with large milk yields contains less progesterone and estradiol, the uterine secretions have a negative effect. (Dagvajamts, BADRAKH, 2020).

Getting high-yielding animals to gestate quickly and affordably is the main difficulty facing dairy farmers today (Weigel, 2004). Some of the direct or indirect causes of repetitive breeding in dairy cattle are discussed in this review article.

Predisposing factors for repeat breeding in dairy cattle

Numerous factors, such as the quantity of calves, diseases of the reproductive system, milk production, semen quality, and low fecundity-all of which are

*Department of Veterinary and Animal Husbandry Extension Education, PGIVER, Jaipur
**Department of Veterinary Parasitiology, PGIVER, Jaipur
***Department of Livestock Production Management, PGIVER, Jaipur

discussed below-are to blame for repetitive breeding in dairy cattle.

The Calving Season Due to their seasonal breeding habits, dairy cattle and buffaloes exhibit lower rates of fertilization and decreased estrus cycle functioning during the warmer season. Few studies have reported that temperature negatively affects dairy cattle fertility features. The highest fertility of dairy animals occurs in India from September to December, as indicated by the incidence of peak calving during the monsoon and cold season (Abayawasna *et al.*, 2011). Because blood prolactin levels are higher in the summer, there is a reduction in the release of LH and progesterone. While Nyman *et al.* (2018) found a 90% breeding rate and 29% embryonic death in cattle, Francesco *et al.* (2012) observed that during the breeding season, the gestation rate and fetal death rates in buffaloes were 58.0% and 7.3%, respectively. Maintaining a pregnancy that shows the highest rate of fetal death and leads to recurrent breeding requires an ideal corpus luteum and progesterone level in the blood.

Metabolic disorders

Dairy cattle with high yields need high-quality feed to suit their needs for milk production and maintenance. Because of the negative energy balance caused by low feed quality, metabolic diseases such as subclinical ketosis are more common. Repeat breeding is also linked to body condition score (Asaduzzaman *et al.*, 2016). Prolificacy is negatively impacted by metabolic diseases.

Peri-Parturient Diseases

Uterine involution is the shrinkage of the uterus, endometrial regrowth, and elimination of caruncle remains. The microbial infections that cause delayed uterine involution are supported by postpartum uterine abnormalities. Low productivity and fertility lead to repeated breeding; unnatural calving and postpartum illnesses such as endometritis, metritis, dystocia, and retained placental membranes are associated with these outcomes (Sheldon *et al.*, 2008). A negative energy balance can lead to delayed uterine involution, which can increase the risk of post-partum uterine illnesses, and host immune system malfunction (Adnane *et al.*, 2017). (Abuelo *et al.*, 2014).

Order of Parity and Age of Female

In high-yielding dairy calves, the rate of fertilization is remarkably reduced by 0.6 times and is 0.75 times greater than in cows with medium parity (Hay *et al.*, 2019). The prevalence of RB syndrome is highest in the age range of 4 to 6 years old (17.07%), and lowest in the age group of 6 to less than 8 years old (14.15%). According to reports, an animal's prolificacy is negatively impacted by age (Nishi *et al.*, 2018). Buffalo show both notable and unremarkable effects of parity.(Thirunavukkarasu and Kathiaravan, 2009).

Nutrition

Maintaining an animal's health and fertility depends heavily on nutrition. Reproduction and nutrition are related, and research has shown that this relationship may be important for future reproductive capacity (Ibtisham *et al.*, 2018). For normal cattle growth and performance, micronutrients like Cu, Co, Zn, Fe, Se, I, Mo, and Mn, as well as some macro elements like K, Ca, Na, Cl, and P, are proven to be highly essential. Micro and macromineral deficiencies are typically found in roughages and green fodder (Satapathy *et al.*, 2018). Minerals are essential for the robust fertility of animals since imbalances and insufficiency of these minerals lead to reproductive tract disorders (Ibtisham *et al.*, 2018).

Causes of repeat breeding in dairy cattle

Repeat breeding syndrome has several underlying causes. The etiology of RB is classified in a number of ways, although the classification of causes of repeat breeding previously included early fetal death and infertility. Repeat breeding is caused by both male and female factors, as well as environmental and management factors, which are covered in more detail below.

Female factor responsible for RB

Ovulation disruption

Conception failure is partly caused by failure and delay in the release of ova and cysts on the ovary. According to Cattaneo *et al.* (2014), the prevalence of cystic ovaries varies from 2.7% to 15.1% in cows and from 0.5% to 1.48% in buffalo (Raju *et al.*, 2007).

Other Ovarian Pathologies

Fertilization is inhibited by fallopian tube blockage due to hydrosalpinx, pyosalpinx, salpingitis, and any development in the fallopian tube. According to Kumar and Singh (2018), the incidence of oviduct anomalies varies from 6-15% in adult cows and from 0.04% to 6.4% in buffaloes. (Modi *et al.*, 2011) (Vala *et al.*, 2011).

Metritis and Endometritis

Cattle's cervix opens within fifteen days following calving, increasing the risk of microbial infection. However, it has been noted that although cows are quite good at clearing their uteruses of debris and pollutants, their high milk production and negative energy balance cause them to miss some of the particles, which can lead to endometritis and metritis. Puerperal issues affect over 40% of dairy calves (Opsomer and Kruif, 2009). Gahlot *et al.*,(2016) studied that prevalence of clinical endometritis was 16.67%.

The quality of the oocyte is crucial for successful implantation. It is not known how postpartum illnesses affect the quality of eggs.

Male factors responsible for Repeat breeding

Early selection and training are used to choose bulls for breeding and semen donation. At any age, a few bulls are killed because issues with reproduction that could be caused by bad bull management, the environment, or heredity.

Much like with dairy cows, a bull's fertility is greatly influenced by his environment (Khatun *et al.*, 2013). The frequency and interval of collecting are other factors. A bull's fertility is crucial since it may be utilized to artificially inseminate thousands of cows and breed 40 cows from a single bull. Bulls that are not fertile can have a negative impact on the finances and upkeep of cattle and dairy farms (Kastelic, 2013). In dairy cattle, repeat breeding syndrome can result from poor semen quality. The most significant element influencing the rates of conception for both natural mating and artificial insemination is the quality of the semen (Kumar *et al.*, 2014).

The three most important observations for maximal fertility in cows and buffaloes are the insemination technique, the timing of insemination, and the site of semen deposition. These observations also grow with time. AI conception rates vary from 25.40% to 37.83% in buffaloes (Sharma *et al.*, 2008) and from 46.15% to 54.91% in cows (Potdar *et al.*, 2018) depending on the technician's skill level.

Early Embryonic Death

Early embryonic death occurs when a fetus dies within the first 15 to 21 days following artificial insemination or spontaneous mating. There are two categories of causation for early fetal mortality: infectious and non-infectious. According to Vanroose *et al.* (2000), non-infectious factors account for about 70% of EED cases. Chromosome abnormalities, hormone imbalances, disruptions in mother-fetus relations, inbreeding, and other factors are examples of non-infectious causes. In dairy cows, chromosomal abnormalities account for 20% of overall early fetal loss (Shah, 2019; King, 1990). Early embryonic mortality, which happens infrequently, is caused by a progesterone deficit. Progesterone is produced by the CL and is necessary for the development and continuation of pregnancy.

The spread of certain types and non types of bacteria, viruses, and protozoa can lead to infectious causes, which in turn create an environment in the uterus that is not conducive to fetal implantation.

Infectious causes can arise from the spread of specific and nonspecific bacteria, viruses, and

protozoa, which in turn alter the uterine environment to a state that is unfavorable to fetal implantation.

CONCLUSION

As was previously noted, the climate has a significant impact on the fertility of cows and buffaloes during hot, humid seasons. Cool environments should be created through plantations. Animals should be provided high-quality food in accordance with the Indian Standards Bureau's recommendations. Supplements containing a mineral mixture are necessary at a rate of 2% of the animal's daily feed to meet its needs. Animals with any kind of congenital reproductive abnormality should be culled. Redistributing a heifer underweight of less than 300 kg is not advised. AI should only be performed by veterinarians or veterinary technicians; laypeople should not be permitted to perform the same tasks (Bilby and Jordan, 2009).

REFERENCES

Abayawansa, W. D., Prabhakar S., Singh A K and Brar P S. 2011. Effect of climatic changes on reproductive performance of Murrah buffaloes in Punjab: A retrospective analysis. *Indian Journal of Animal Sciences*. **81**(4): 334-39.

Abuelo, A., Hernández, J., Benedito, J. L. and Castillo, C. 2014. A comparative study of the metabolic profile, insulin sensitivity and inflammatory response between organically and conventionally managed dairy cattle during the periparturient period. Cambridge University Press. **8**(9): 1516-25.

Adnane, M., Kaidi, R., Hanzen, C. and England, G. C. W. 2016. Risk factors of clinical and subclinical endometritis in cattle: a review. *Turkish Journal of Veterinary and Animal Sciences*. **41**: 1-11.

Aghamiri, M. S., Ahmadi, M. R., Haghkhah, M., and Derakhshandeh, A. 2020. Identification of pathogenic microorganisms of repeat breeder dairy cows and a hyperimmune treatment approach. *Asian Pacific Journal of Reproduction,* **1**(9): 44-48.

Ahar Ibtisham, Aamir Nawab, Guanghui LI, Ahar Ibtisham, Aamir Nawab, Guanghui LI, and H.H Orteg Arthur, G.H., Noakes, D.E. and Pearson, H. 1989. Veterinary Reproduction and Obstetrics. 7th Edition., E.L.B.S. publication. 417.

Asaduzzaman, K. M., Bhuiyan, M. M. U., Rahman, M. M. and Bhattacharjee, J. 2016. Prevalence of repeat breeding and its effective treatment in cows at selected areas of Bangladesh. *Bangladesh Journal of Veterinary Medicine.* **14** (2): 183-190.

Bilby, T. R., and Jordan, E. R. 2009. Strategies to improve fertility in the repeat breeder. Texas Dairy Matters. Bonneville-Hébert A, Bouchard E, Tremblay D D., Lefebvre R. 2011. Effect of reproductive disorders and parity on repeat breeder status and culling of dairy cows in Quebec. *The Canadian Journal of Veterinary Research*. 147-51.

Badrakh, D., 2020. Effect of seminal plasma proteins on the normalization of endometrial epidermal growth factor profile and fertility in repeat breeder dairy cows. Graduate School of Veterinary Medicine, Hokkaido University.

Ferreira, R. M., Chiaratti, M. R., Macabelli, C. H., Rodrigues, C. A., Ferraz, M. L., Watanabe, Iaz, Ibtisham, F., Nawab, A., Li, G., Xiao, M., An, L. and Naseer, G. 2018. Effect of nutrition on reproductive efficiency of dairy animals. Medycyna weterynaryjna.

Weigel, K. A.. 2004. Improving the Reproductive Efficiency of Dairy Cattle through Genetic Selection. *Journal of Dairy Science,* **87**: 86-92.

Kasteli, C.J.P., 2013. Male involvement in fertility and factors affecting semen quality in bulls. *Animal Frontiers*. **3**(4): 20-25.

Khatun, M., Kaur, S., Kanchan and Mukhopadhyay, C. S. 2013. Subfertility problems leading to disposal of breeding bulls. *Asian-Australasian Journal of Animal*

Sciences. **26**(3): 303-08.

King, W. A., 1990. Chromosome abnormalities and pregnancy failure in domestic animals. *Advances in Veterinary Science and Comparative Medicine*. **34**: 229-50.

Kumar, P. and Singh, M. 2018. Prevalence of various etiological factors responsible for causing infertility in cows of Himachal Pradesh, India. *Explor Anim Med Res.* **8**(2): 164-67.

Modi, L. C., Patel, P. A., Patel, S. P., Patel, G.G., Joshi, A. H. and Suthar, D. N. 2011.Prevalence of reproductive problems in Mehsana milk shed area of Gujarat. *International Journal of Animal and Veterinary Medicine Sciences*. **5**: 424-42.

Nishi, S A., Sarder, M. J. D., Islam, M. H., Kamruzzaman, S. M., Islam, M. A. and Khaton, R. 2018. Factors Affecting the Incidence of Repeat Breeding in Dairy Cows in Rajshahi district, Bangladesh. *International Journal of Livestock Research*. **8**(10): 90-96.

Nyman, S., Gustafsson, H. and Berglund, B. 2018. Extent and pattern of pregnancy losses and progesterone levels during gestation in Swedish Red and Swedish Holstein dairy cows. *Acta Veterinaria Scandinavica*. **60**: 68.

Opsomer, G., and Kruif, A. D. 2009. Metritis and endometritis in high yielding dairy cows. *Vlaams Diergeneeskundig Tijdschrift*. **78**: 83-88.

Potdar, V. V., Marimuthu, S. and Khadse, J. R. 2018. Effect of sire, AI operator, lactation number and year of insemination on conception rates in Khillar cattle under field conditions. *International Journal of Pure and Applied Biosciences*. **6**(6): 488-91.

Raju, K. G. S., Naidu, K. V. and Rao, K.S. 2007. Incidence of reproductive disorders in buffaloes under field conditions of Andhra Pradesh. *Indian Journal of Animal Reproduction.* **28**: 46-48.

Satapathy, D., Mishra, S. K., Swain, R. K., Sethy, K., Barik, S., Sahoo, J. K. and Boitai, S. S. 2018. Incidence of reproductive problems and blood mineral status of crossbred cattle in Kakatpur block of odisha, india. *International Journal of Current Microbiology and Applied Sciences*. **7**: 471-80.

Shah, B. R. 2019. Factors leading to early embryonic death. *Nepalese Veterinary Journal.* **36**: 118 -25.

Sheldon, M. I., Williams, J. E., Miller, N.A .A., Nash, D. M., Herath, S. 2008. Uterine diseases in cattle after parturition. *The Veterinary Journal*. **176**(1): 115-121.

Singh, M., Sharma, A., Sharma, A. and Kumar, P. 2017. Repeat breeding and its treatment in dairy cattle of Himachal Pradesh (India) - A review. *Indian Journal of Animal Reproduction.* **38**:(2).

Thirunavukkarasu, M. and Kathiaravan, G. 2009. Factors affecting conception rates in artificially inseminated bovines. *Indian Journal of Animal Sciences*. **79**: 871- 75.

Vala, K. B., Panchal, M. T., Ghodsara, D. J., Hadiya, K. K., Trangadia, B. J. and Vagh, A. A. 2011. Studies on histopathological changes in genitalia of culled buffaloes (*Bubalus bubalis*). *Indian Journal of Veterinary Pathology*. **35**: 197-99.

Vanroose, G., Kruif, A. de., and Van, Soom, A. 2000. Embryonic mortality and embryo pathogen interactions. *Animal Reproduction Science*. **60-61**: 131-43.

Verma, S., Srivastava, S. , Verma, R. K., Saurabh, Kumar, A. and Yadav, S. K. 2018. Incidence of repeat breeding in cows in and around Kumarganj, Faizabad (Uttar Pradesh), India. *International Journal of Current Microbiology and Applied Sciences*. **7**:4860-70.

Yusuf, M., Nakao T., Ranasinghe, R.M.S., B. K., Gautam, G., Long, S. T., Yoshida, C., Koike, K. and Hayashi, A. 2010. Reproductive performance of repeat breeders in dairy herds. *Theriogenology*. **73**: 1220-29.

❑❑❑

Recevied : 15.07.2024
Accepted : 16.08.2024

Ind. J. Ext. Educ. & R.D. 32 : 2024 *Review Paper*

EXTENSION SYSTEM IN UTTARAKHAND: A META ANALYSIS

Arpita Sharma Kandpal*

ABSTRACT

Extension System in India fill the gap between the labs to field. University has three mandates. Extension is one of them. Present paper aim is to review the agricultural extension system in Uttarakhand. For the development of extension system in India, we should improve the extension system state wise. University has different units in the extension system for the improvement of human life. The results reported that there is an urgent need for the development of new initiatives in extension. So that farmers can use the new technologies for the development of themselves.

INTRODUCTION

Extension system plays a very important role in Agricultural productivity and farm income. This system strengthen the food security. This system is helpful to improve livelihood. This system also useful to promote Agriculture. This system makes our country as self-sufficient. Cloete *et al.* (2019) reported that Agricultural Extension is a fundamental tool in the agricultural sector as it facilitates knowledge transfer and enhances yields from agricultural activities. According Ali *et al.* (2018) for sustained growth in agriculture, there is need to improve productivity and cut down on costs by improving efficiency. There is, therefore, an urgent need to provide package of initiatives for transfer of technology improving input use efficiency, promoting investments in agriculture both in private and in public sectors and creating a favourable and enabling economic environment. The emerging needs in agriculture sector now are adoption of location specific skill and knowledge based technologies, promote greater value addition to agriculture produce, forge new partnerships between public institutions, technology users and the corporate sector, harness IT more effectively to realize financial sustainability and compete in the International market. Present research investigation was done with the following objectives: [1] To study the historical perspective of extension system. [2] To analyse the extension system in Uttarakhand.

RESEARCH METHODOLOGY

Material related to extension system in India and Uttarakhand was collected by the secondary as well as primary sources. Primary sources includes the experts from the different Departments and scientists. Secondary data was collected through books, journals, internet etc. After that data was analysed through proper statistical tools. Meta-Analysis was used in this research investigation. Meta-analysis is a quantitative, formal, epidemiological study design used to systematically assess the results of previous research to derive conclusions about that body of research.

RESULTS AND DISCUSSION

Historical Perceptive of Extension System: According to Ray (2000) term extension originated in England in 1866 with a system of University Extension and the term extension education was first used in 1873 by Cambridge University. He said that Extension is the science of developing capability of the people for sustainable improvement in quality of life. According to De and Jirli (2010) number of approaches are available for agriculture and rural development. There are so many experiments are involved in extension system in India. Extension system was first introduced in 1952. Before this year several efforts were done for the upliftment of rural life. The list of extension programme has been given as follows:

*Assistant Professor, Deptt of Agricultural Communiocation, College of Agriculture, GBPUA&T, Pantnagar-263145

Table 1: Historical Perspective of Extension Education

1950s	Agriculture extension service (AES) interventions were started.
1952	Community Development Program
1953	National Extension Service
1960	Intensive Agricultural District Program
1964	Intensive Agriculture Area Program launched. National Demonstration project was also launched.
1966	High Yielding Varieties Program launched
1967	Farmers Training Centres were created to educate farmers about high yielding varieties.
1970s	The Indian public agriculture extension system witnessed a slow decline.
1971	ICAR established a section of Extension Education.
1974	Operational Research Project was also initiated. KVKs were also came into existence. World Bank's Training & Visiting (T&V) program was introduced.
1979	Lab to Land Programme was also launched.
1998	Indian Government, with the support of the World Bank, introduced the Agriculture Technology Management Agency (ATMA) under the Innovation in Technology Dissemination (ITD) component of the National Agricultural Technology Project (NATP)
2014-15	The National Mission on Agriculture Extension and Technology (NMAET) was launched by the Department of Agriculture and Farmers' Welfare (DACFW) in 2014-15 and take a holistic view of extension by embedding components for technical support and training in four major sub-schemes. It aims to make the system farmer-driven and accountable by restructuring and strengthening existing agriculture extension program to enable the delivery of technology and to improve the current agronomic practices of farmers.

Extension experiments in India: There are various objectives of extension system in India. The fundamental objective is to develop the rural people economically, socially, culturally by the mean of education. To fulfil this objective several experiments have been started in India. Before Independent several programme, projects and experiments have been started for the development of rural people. List of the extension efforts presented below with the name of year and initiators.

University Extension System: University Education Commission (1949) headed by Dr. S. Radhakrishnan, recommended the establishment of Rural Universities in India. First Agricultural University came into existence at Pantnagar, Uttarankhand in 1960. All the major states in India have one Agricultural University. There are many roles of Universities in the field of Extension. Review Committee of Agricultural Universities are headed by Dr. M.S. Randawa (1978). According to this report every University has state wise responsibility of teaching, research and extension. It also includes multidisciplinary team work in development programmes. Communication is very important to promote new knowledge among the students. Training organization for the adults, youth and different other groups.

Extension system in Pantnagar, Uttarakhand: Directorate of Extension Education, Pantnagar is dynamically involved in transfer of latest and innovative technologies to the farmer's field and this system is also providing feed back also. Directorate of Extension Education in this University started functioning in 1962 in Nainital District with a team of only three scientists. University has 09 Krishi Vigyan Kendra (6 districts of hills and 3 districts of Tarai /Bhabhar and plains).

Table 2 : List of extension experiments in India

Year	Experiments	Initiators
Pre-Independent Era Programme		
1901	Famine Commission	Govt of India
1904	Cooperative Movement	F. Nicholson
1921	Sriniketan project	R.N. Tagore
1924	Mathandam project	Spencer Hatch
1927	Gurgaon project	F.L. Bryne
1928	Royal Commission on Agriculture	Govt. Of India
1932	Rural Reconstruction	T. Krishnamachari
1936	Sewa Gram	Mahatma Gandhi
1945	Indian Village Service	W. H. Wiser
1946	Firka Development Scheme	Madras Govt
1947	Grow More Food Compaign	Govt of India
1947	Nilokeheri Project	S. K. De
1948	Etawah Project	Albert Mayer
1949	Fiscal Commission	Govt of India
1950	Sarvodaya	Vinobha Bhave
Post Independence Era Programme		
1950	Planning Commission	Govt of India
1952	Community Development programme	Govt of India
1952	Grow More Food Compaign	Govt of India
1953	All India Khadi Industry Board	Govt of India
1953	National Extension Service	Govt of India
1954	Community Development Blocks	Govt of India
1957	Panchayati Raj	Govt of India
1960	Multiple Cropping Scheme	Govt of India
1960	Intensive Agriculture District Programme	Govt of India
1964	Intensive Agriculture Area Programme	Govt of India
1964	All India Coordinated Project on National Demonstration	ICAR
1964	Intensive Cattle Development Programme	Govt of India
1966	High yielding Programme	Govt of India
1970	Small Farmers development agency	Govt of India
1970	Marginal Farmers and Agricukltural Labourers programme	Govt of India
1970	Drought Prone Area Programme	Govt of India
1972	Pilot project for tribal development	Govt of India
1972	Employment Guarantee scheme of Maharastra	Govt of India
1974	Training and Visit	Govt of India
1974	Command area development programme	Govt of India
974	Krishi Vigyan Kendra	ICAR
1974	Operational Research projects	ICAR
1975	Twenty Point programme	Govt of India
1975	Agriculture Refinance Development programme	Govt of India
1975	National Seed Programme	Govt of India

1977	Desert Development programme	Govt of India
1977	Food for Work Programme	Govt of India
1977	Antyodaya programme	Govt of India
1978	Integrated Development Programme	Govt of India
1979	Lab to Land programme	ICAR
1979	Training for Rural youth for self-employment	Govt of India
1979	National Agriculture Research project	Govt of India
1980	National Rural Employment Programme	Govt of India
1982	Development of women and children in rural area	Govt of India
1983	National Agriculture Extension project	Govt of India
1983	Farmers Agriculture Service Centre	Govt of India
1983	Rural Landless Employment Guarantee programme	Govt of India
1984	National Fund for Rural Development	Govt of India
1985	Comprehensive Crop Insurance Scheme	
1986	Technology Mission on Oilseed	Govt of India
1986	Council for Advancement of People Action and Rural Technology	Govt of India
1987	Support to Training and Employment Programme for Women	Govt of India
1988	Kisan Credit Card Scheme	Govt of India
1989	Jawahar Rojgar Yojana	Govt of India
1992	Supply of improved toolkits to Rural Artisans	Govt of India
1993	Employment Assurance Scheme	Govt of India
1993	District Rural Development Agency	Govt of India
1993	Mahila Samvridhi Yojana	Govt of India
1994	Small Farmers Agribusiness Consortium	Govt of India
1995	Institutional Village Linkage Programme	ICAR
1995	National Social Assistance Programme	Govt of India
1998	National Agriculture Technology Project	ICAR
1998	Agriculture Technology Management Agency	ICAR
1999	Swarna Jayanti Gram Swarojgar Yojana	Govt of India
1999	Jawahar Gram Samvridhi Yojana	Govt of India
1999	National Agriculture Insurance Scheme	Govt of India
2000	Antyodaya Anna Yojana	Govt of India
2000	Pradhan Mantri Gram Sadak Yojana	Govt of India
2001	Sampoorna Gramin Rozgar Yojana	Govt of India
2001	Krishi Samajik Yojana	Govt of India
2002	Grameen Bhandaran Yojana	Govt of India
2004	National Food for Work Programme	Govt of India
2004	Farm Income Insurance Scheme	Govt of India
2004	National Project on Ogranic Farming	Govt of India
2005	Bharat Nirman Yojana	Govt of India
2005	National Rural Health Mission	Govt of India
2005	National Horticulture Mission	Govt of India

2006	National Rural Employment Guarantee Scheme	Govt of India
2006	National Agricultural Innovation Programme	ICAR
2006	National Bamboo Mission	Govt of India
2007	National Food Security Mission	Govt of India
2007	Rashtriya Krishi Vikash Yojana	Govt of India
2000	Pradhan Mantri Gram Sadak Yojana	Govt of India
2011	Deen Dayal Antyodaya Yojana	Govt of India
2014	Sansad Adarsh Gram Yojana (SAGY)	Govt of India
2014	Integrated Scheme for Agricultural Marketting	Govt of India
2015	Soil health card	Govt of India
2015	Pradhan Mantri Krishi Sinchai Yojana	Govt of India
2016	Pradhan Mantri Awaas Yojana	Govt of India
2016	National Rurban Mission	Govt of India
2016	e-National Agriculture Market (eNAM)	Govt of India
2016	Pradhan Mantri Fasal Bima Yojana	Govt of India
2018	Pradhan Mantri Kissan Samman Nidhi	Govt of India
2018	Pradhan Mantri Annandata Aay Sanraks Han Abhiyan	Govt of India
2018	Kisan Kalyan Abhiyan Scheme	Govt of India
2019	Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyaan (PM-Kusum) schem	Govt of India

Extension activities:

1. Technology Transfer: The main role of extension system is to transfer the technologies for the farmers.
2. Training: Training is also a major component of extension system.
3. Single Window system: Extension system provides all information regarding agriculture, providing inputs like seeds & planting material through Agricultural Technology Information Centre (ATIC).
4. Demand Driven Technology: Extension system acts as a mediator for researchers. This system updates field problems of farmers and to help them in development of Demand Driven Technology.
5. Kisan Mela: Kisan mela or farmers fair is another important extension activity which helps the farmers to adopt innovative technologies. According to Sharma (2019) In Uttarakhand, 'Farmers' Fair'was organized by GovindBallabh Pant University of Agriculture & Technology, Pantnagar, twice in a year mainly to benefit the farming community. This is also called "KrishiKumbh" as its main purpose is to upliftthe rural population by displaying valuable products, innovative ideas and techniques to achieve its objectives in a most efficient manner.
6. Development of extension literature: University is publishing different types of magazines or books which will be very useful for farmers.

Different units of Extension:

[1] KVKs: There are 13 KVKs in Uttarakhand. Total 9 KVKs are run by GBPUA&T, Pantnagar and 2 KVKs are run by VPKAS, Almora and two KVKs were run by VCSG UUHF, Bharsar. The very first KVK was established in 1984 at Ranichauri (Tehri Garhwal) under the jurisdiction of GBPUA&T, Pantnagar. In 1998 total 11 KVKs and one KVK was established. Out of these KVKs, only two KVKs and one ZARS Majhera (Nainital) remained with this University after the bifurcation of U.P. Presently, a total 09 KVKs are running under guidance of University. The major work of KVKs are front line demonstration and to organize training.

[2] Agriculture Technology Information

Table 3 : List of KVKs in Uttarakhand

SN	KVK	District	Establishment Year	Address
1.	Lohaghat	Champawat	Oct. 1994	GBPUA&T, Pantnagar
2.	Dhanauri	Haridwar	Feb. 2004	
3.	Jakhdhar	Rudraprayag	Feb. 2004	
4.	Gwaldam	Chamoli	Feb. 2004	
5.	Matela	Almora	Feb. 2004	
6.	Kashipur	U.S. Nagar	June 2004	
7.	Gaina- Aincholi	Pithoragarh	June 2004	
8.	Dhakrani	Dehradun	June 2004	
9.	Jeolikote	Nainital	June 2004	
10.	Sinduri-Baskhola, Kafligair	Bagheshwar	2007	Director, Vivekananda Parvatiya Krishi Anusandhan Sansthan, ICAR, Almora
11.	Chinyalisaur,	Uttarkashi	2004 ICAR	
12.	Chaubatia, Ranichauri	Almora	2004	VCSG UUHF, Bharsar
13.	Bharsar, Via Chipalghat	Pauri Garhwal	2004	

Centre (ATIC): ATIC was established in 26th August 2001. This is supported by ICAR. ATIC acts as one stop shop for all farmers. ATIC provides coordination and rigorous interaction between the researchers and technology users. This contributes towards the dissemination of information. ATIC works on "Single Window System" approach. Main objective of this single window system is to help Farmers and other stake holders such as Farmer-Entrepreneurs, Extension workers, Development agencies, Non-Government Agencies (NGOs) and private sector organisations to provide solutions to their location- specific problems in agriculture and make available all the technological information along with technology inputs and products for testing and use by them. The other main task of ATIC is to build up required confidence among farmers and to strengthen linkage between the University and the farmers. ATIC also helps to overcome technology dissemination loss by providing direct access of farmers to improved expertise as well as technological products.

[3] State Agricultural Management and Extension Training Institute (SAMETI), Uttarakhand: SAMETI (State Agriculture Management & Extension Training institute) is an autonomous body. This institute has greater litheness in structure and functioning. This institute is responsible for organizing need based training programmes for agriculture and allied sectors, and exposure visits for members of the farming community. SAMETI conducts programme-oriented research in the area of agricultural extension management as a consequence to provide feedback from training programmes. SAMETI has recognised its efforts through publication of leaflets, booklets and postures for effective and sustainable transfer of agricultural technologies for the benefit of the farming community. The vision of SAMETI is to see self-reliant and vigorous rural population with rich agricultural knowledge and good marketing intelligence. The ultimate goal of the institute is to empower the farming community for improved management of production resources and agricultural operations for better living. This institute

was established in September, 2005 under 'Support to Extension Reform Programme with the financial support of Govt. of India and registered under Society Act 1860 on August 30, 2006. In Uttarakhand, it is headed by Director Extension Education. The major function of SAMETI is to provide capacity building support in extension management related areas to the extension functionaries both from public and private sectors. This Institute is also helpful to provide need based consultancy services to ATMA. This Institute is also helpful to organize need based training programmes for middle level and grass-root level agricultural extension functionaries. This is also helpful to develop modules on management, communication.

[4] Agricultural Technology Management Agency: Agricultural Technology Management Agency (ATMA) Scheme was launched during

Table 4 : List of projects funded by different organizations

District	Projects	Funded by
Pithoragarh	Establishment of Mushroom Span Unit at KVK	NABARD
	Quality vegetable seedling production	AJIVIKA
	Collection, refinement and production of Elite planting material of stone fruits, Kiwi, Strawberry and Cardamom	AJIVIKA
	Development of poly-house technology in border district of Uttarakhand	DST
	Front Line Demonstration	Deptt of Ag, Uttarakhand under ATMA
	Tribal Sub Plan	ICAR
Almora	Adoption of Integrated Farming System for improving soil health, crop productivity and sustainable development	
	Front Line Demonstration	Deptt of Ag, Uttarakhand under ATMA
Haridwar	Upliftment of Socio economic and livelihood security	NABARD
	Transfer of Technology- Organic Vegetable Production	NABARD
Champawat	Centre of Excellence in Agri-Horticulture at KVK Lohaghat, Champawat	AJIVIKA
	Attracting and Retaining Youth in Agriculture (ARYA) funded by ICAR	
Chamoli	Front Line Demonstration	Deptt of Ag, Uttarakhand under ATMA
	Tribal Sub Plan	ICAR
Nanitial	Tribal Sub Plan	ICAR
Dehradun	Tribal Sub Plan	ICAR
US Nagar	Tribal Sub Plan	ICAR
	Farmer FIRST (Farm Innovation Resources Science Technology)	ICAR

2005-06. It aims at making extension system farmer driven and farmer accountable by way of new institutional arrangements for technology dissemination at district level to operationalize the extension reforms. ATMA has active participation of farmers/farmer-groups, NGOs, Krishi Vigyan Kendras (KVKs), Panchayati Raj Institutions and other stakeholders operating at district level. Release of funds under ATMA scheme is based on State Extension Work Plans (SEWPs) prepared by the State Governments. Allocation of resources for activities related to extension is linked to number of farm households and Blocks. In Uttarakhand ATMA has been implemented by State Department of Agriculture. Kumar *et al*. (2018) reported that KVKs and ATMA are the backbone of extension activities for a district and hence there should be strong convergence between ATMA and KVKs at each stage of planning and implementation of extension activities. To enhance ATMA-KVK convergence, it may be ensured that the agricultural technology updates is communicated by KVKs to the ATMA well in advance before the onset of Kharif and Rabi cropping season.

Extension projects for empowerment of rural people in Uttarakhand: In Uttarakhand, various projects are running by different funded organization. These projects are running in different KVKs under GBPUA&T, Pantnagar. These projects are very much useful to empower women, farming community as well as youth. The details about projects are given in Table 4.

New Initiatives in Extension:

1] Emphasis on e-extension

2] Participatory Rural Extension Approaches

3] Identification, documentation and validation of Indigenous Technological Knowledge

4] Uttarakhand Kisan Gyan Portal

CONCLUSION

Extension System in India are focusing on crop production and Transfer of Technology (ToT). Currently extension agents are very less in number as 1: 750. There is an urgent need to develop an online extension system strategy for the development of rural people. New initiatives should be introduced in the extension system. Focuses should be given on rural extension approaches also.

REFERENCES

Cloete, P., Bahta, Y. T., Marunga, M. and Lombard, W. A. 2019. Perception and understanding of agricultural extension: perspective of farmers and public agricultural extension in Thaba nchu. *S. Afr. J. Agric. Ext.* **47**(3): 14 - 31.

Kumar, U., Singh R. K. P., Singh, D. K., Kumar, A, Kumar, S. 2018. Agricultural Extension System in Bihar, India : An Overview. *Journal of AgriSearch*, **7**(4): 192-197.

Ali, S.S., Karanje, S. V. & Godse, S. S. 2019. Innovation in Extension Methodology for Reaching to Unreached. *Asian journal of Extension Education*, **37**: 17-23.

Directorate of Extension Education. https://www.gbpuat.ac.in/directorates/Extension_Edu/index.html.

Sharma A. 2019. Perception of farmers towards farmers' fair organized in GBPUA&T, Pantnagar. *The J. Res. ANGRAU*, **XLVII**(3): 1-84.

❑❑❑

Recevied : 14.07.2024
Accepted : 20.08.2024

Indian Journal of Extension Education and Rural Development

The Indian Journal of Extension Education and Rural Development is an annual official publication of Rajasthan Society of Extension Education located at Department of Extension Education, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur which publishes original research papers, reviews, case studies, research note and popular articles on aspects related to Agricultural Extension, Extension Education and allied extension and rural development.

Membership Fee:

Life Member (India)	Rs. 2000
Life Member (Foreign)	$ 100
Life Member (Institutional)	Rs. 3000

The research papers for publication should be sent to The Secretary or Chief Editor, Indian Journal of Extension Education and Rural Development, Department of Extension Education, Rajasthan College of Agriculture, Udaipur-313001 in prescribed format available at official website the society i.e. www.rseeudaipur.org. The paper must be sent only thorough email-rseeudaipur@rediffmail.com. All the authors of paper should be the life member of the society. The life membership fee and printing charges of the paper be sent through cash/cheque /DD/RTGS/NEFT. The details of society account is given here under:

A/c. No. 693901131641

IFSC Code : ICIC0006939

Name of Bank : ICICI Bank, RCA Campus, Udaipur

All remittances and correspondence relating to subscription, sales, advertisement etc. should be addressed to Secretary, Rajasthan Society of Extension Education, Department of Extension Education, RCA, Udaipur 313001 (Rajasthan).

Advertisement Rates:

Full page	Rs. 1000
Half page	Rs. 600
Quarter page	Rs. 300
Back cover page	Rs. 1500

ADDRESS

RAJASTHAN SOCIETY OF EXTENSION EDUCATION

Department of Extension Education
Rajasthan College of Agriculture
Outside Surajpole, Udaipur-313001, Rajasthan, INDIA
Phone: 0294-2410491 Fax: 0294-2418976
e-mail: rseeudaipur@rediffmail.com
website : www.rseeudaipur.org

Office address:

DEPARTMENT OF EXTENSION EDUCATION

Rajasthan College of Agriculture

Maharana Pratap University of Agriculture and Technology, Udaipur (Raj.) INDIA

Phone: 0294-2410491 Fax: 0294-2418976

e-mail: rseeudaipur@rediffmail.com Website: www.rseeudaipur.org