



Research Article

KNOWLEDGE LEVEL OF FARMERS ABOUT RECOMMENDED PRACTICES OF AROMATIC RICE CULTIVATION: A STUDY OF ALIGARH DISTRICT OF UTTAR PRADESH

MALIK NETRAPAL^{*1} AND RATHI P.K.²

¹Scientist-Agricultural Extension, Krishi Vigyan Kendra, Mohanpura, 207401, CSA University of Agriculture & Technology, Kanpur, 208002, Uttar Pradesh, India

²Associate Director Extension, Directorate of Extension, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, 208002, Uttar Pradesh, India

*Corresponding Author: Email - netrapalmalik1@gmail.com

Received: March 30, 2020; Revised: April 12, 2020; Accepted: April 13, 2020; Published: April 15, 2020

Abstract: The study was conducted to assess the knowledge level of farmers about recommended practices of aromatic rice cultivation in *kharif* season. Sample size of the study comprised 180 farmers of district Aligarh of Uttar Pradesh, growing aromatic rice. Majority of the aromatic rice growing farmers were having medium family size (5-8 members), educated up to high school and intermediate, and possessing land up to four acres with electricity operated tube-well as major source of irrigation. Fellow farmers, friends/relatives and shopkeepers of agricultural inputs were the most frequently used information sources for agricultural information by the rice growers. Few farmers also participated in the extension activities organized by the different extension service providers in the district. Maximum numbers of farmers were having knowledge about green manuring, suitable varieties, optimum age of seedlings for transplanting, appropriate time of irrigation in nursery, recommended dose of Diammonium phosphate (DAP) in main field, benefits of neem coated urea and summer ploughing. More than half of the rice growers were having knowledge about recommended dose of urea in main field and compost in nursery, water management in nursery and recommended dose of zinc sulphate in both nursery and main field. Near about half of the rice growing farmers were having knowledge about seed rate, soil sampling method, application of urea in main field, and association between infestation of weeds and insect-pest in paddy crop. However, most of the farmers were lacking in knowledge about appropriate area for nursery, nutrient and weed management in nursery, insect and disease management, seed treatment, recommended dose of Muriate of potash (MoP), chemical methods of weed management, micro-nutrients management, critical stages of irrigation, bio-fertilizers and bio-control agents in rice cultivation. Based on the study it can be stated that there is need to enhance the extension activities on cultivation practices of rice, with special emphasis on nursery management, Integrated Pest Management (IPM) and Integrated Nutrient Management (INM). Agricultural inputs providers must be trained in insect-pest, disease, nutrient and weed management in rice, and motivated to provide right information to the farmers when farmers come to them, because a large number of farmers depends on them for adopting input oriented technological interventions.

Keywords: Sources of agricultural information, Participation of farmers in extension activities, Farmers profile of district Aligarh

Citation: Malik Netrapal and Rathi P.K. (2020) Knowledge Level of Farmers About Recommended Practices of Aromatic Rice Cultivation: A Study of Aligarh District of Uttar Pradesh. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 12, Issue 7, pp.- 9668-9671.

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Academic Editor / Reviewer: Dr P K Bhanja, M K Singh, Dr A. S. Jeena, Dr A D Kalola, P. T. Patel, S. M. Zofair, Ajit Kumar Singh

Introduction

Rice (*Oryza sativa* L.) is one of the important staple food crops of India. In India, it contributes 43% and 46% of the total food grain production and cereal production, respectively [1]. At the same times, it solely contributes nearly 1/3 of the total calories in the Indian diet [2]. During the year 2015-16 in India, total area under rice cultivation was 43.50 million hectares, production was 104.41million tonnes and average yield was 2400 kg/ha. In Uttar Pradesh, during the year 2015-16, area under rice cultivation was 5.86 million hectares, production was 12.50 million tones and average yield was 2133 kg/ha. During 2016-17 Uttar Pradesh was second largest producer of rice with the total production of 12.95 million tonnes [3]. Aromatic rice gets consumers' preferences in all the aspects due to its delightful fragrance, taste and texture. It includes both basmati and non-basmati types, which fetch high premium price [4]. In Uttar Pradesh during *kharif* 2019, estimated area under basmati rice was approximately 4.636 lakh hectares and in district Aligarh it was 62,900 hectares [5]. Normally, in this area farmers usually prefer to grow aromatic / basmati rice varieties, like Pusa Basmati 1, Pusa Basmati 4 (Pusa 1121), Pusa Sugandh 5 (Pusa 2511) and Pusa Basmati 1509. For getting higher productivity and profitability from aromatic rice cultivation, knowledge of recommended package of practices *vis-à-vis* its application in crop cultivation is a pre-requisite. In fact, assessment of knowledge level of farmers is essentially required for message designing and developing appropriate extension

strategy for promotion of scientific cultivation practices of aromatic / basmati rice. Keeping these facts in view, the present study was conducted to describe the general profile of the rice growing farmers, to find out the extent of usage of agricultural information sources by farmers, participation level in extension activities, and to assess the knowledge level of farmers about the improved package of practices of aromatic / basmati rice cultivation in *kharif* season.

Materials and Methods

Study was conducted in Aligarh district of Uttar Pradesh. For this study, out of the total twelve blocks in the district, six blocks were selected. Thereafter, from each of the selected block, two villages were selected, amongst which a total of fifteen aromatic rice growers were randomly selected. Thus, total sample size of the study was 180 aromatic rice growing farmers of district Aligarh. For data collection, personal interview schedule was used. The interview schedule comprised of four parts viz. general profile of the farmers, extent of use of sources of agricultural information by the farmers, participation of farmers in extension activities and knowledge level about the aromatic / basmati rice cultivation practices. The general profile related variables selected for the study were age, educational level, land holding, source of irrigation and family size. To assess the extent of use of agricultural information sources, list of agricultural information sources was

prepared and farmers were asked to denote their frequency of use of each information source on five-point continuum viz. always, often, sometimes, seldom and never. Further, the extent of use of agricultural information sources was ranked according to their weighted mean score, whereas, the extent of participation of farmers was also measured on five-point continuum, similarly to extent of use of agricultural information sources. To assess the knowledge level, a test was developed based on the recommended package of practices for scented rice cultivation. Sixty-six items were selected from package of practices for aromatic/basmati rice cultivation after reviewing the recommendations and discussion with the scientists of the University. Each selected practice was put in question form to obtain responses from the farmers. The correct answer was given a score of 'one' and incorrect responses 'zero'. The maximum and minimum obtainable score from each respondent was 66 and 0, respectively.

Results and Discussion

General profile of the respondents

Data pertaining to general profile of the respondents presented in [Table-1] shows that 27.78 percent of the respondents belongs to the age group of greater than 45 to 55 and greater than 55 to 65 years, independently. Near about one-fourth of the respondents were from age group of greater than 35 to 45 years. Educational level of 28.89 percent of respondents was up to intermediate and high school, separately. The majority of the respondents were having medium family size (58.33%), possessing the land between two to four acres (41.67%) and electricity operated tube-well (48.33%) as a source of irrigation.

Table-1 General profile of the respondents, n= 180

SN	Aspect of general profile	No. of respondents	Percentage
1	Age		
	i. 25 and less than 25	3	1.66
	ii. >25 to 35 years	21	11.67
	iii. >35 to 45 years	43	23.89
	iv. >45 to 55 years	50	27.78
	v. >55 to 65 years	50	27.78
	vi. Above 66 years	13	7.22
2	Educational level		
	i. Illiterate	14	7.78
	ii. Primary	6	3.33
	iii. Middle	28	15.55
	iv. High School	52	28.89
	v. Intermediate	52	28.89
	vi. Graduate	14	7.78
	vii. Post Graduate	14	7.78
3	Family Size		
	i. Small (Up to 4 members)	34	18.89
	ii. Medium (5 to 8 members)	105	58.33
	iii. Large (>8 members)	41	22.78
4	Land holding		
	i. Up to 2 acres	56	31.11
	ii. >2 to ≤ 4 acre	75	41.67
	iii. >4 to ≤ 6 acre	19	10.56
	iv. >6 to ≤ 8 acre	10	5.56
	v. >8 to ≤ 10 acre	12	6.67
	vi. >10 to ≤ 12 acre	2	1.11
	vii. Above 12 acres	6	3.33
5	Source of irrigation		
	i. Tube-well with electricity	88	48.89
	ii. Tube-well with diesel pump set	60	33.33
	iii. Canal	30	16.67
	iv. Nil	2	1.11

Extent of use of sources of agricultural information by the respondents

It is clear from the data presented in [Table-2] that, the fellow farmers, friends/relatives, shopkeepers of agricultural inputs, officers/extension functionaries of department of agriculture and representatives of private agricultural inputs companies were the most frequently used information sources for agricultural information by the respondents with the weighted mean score of 3.227, 3.138, 2.772, 2.500 and 2.044, respectively. Television occupied the sixth position in the rank order followed by agricultural extension literature, agricultural magazines, scientists of Krishi Vigyan Kendra (KVK) and radio, respectively.

Newspapers, Kisan mobile advisory service (mKisan), internet, Kisan Call Centre, scientists of Agricultural Research Stations and representatives of NGOs were the least used information sources, as these were placed on last six positions in the rank order. This study corroborates with the previous research conducted at Jashpur district of Chhattisgarh where friends, relatives and progressive farmers were the frequently used sources of agricultural information by the scented rice growing tribal farmers [6].

Table-2 Extent of use of sources of agricultural information by the respondents

SN	Source of information	Weighted Mean score	Rank order
1	Fellow farmers	3.227	I
2	Friends/ relatives	3.138	II
3	Shopkeepers of agricultural inputs	2.772	III
4	Officers/Extension functionaries of department of agriculture	2.500	IV
5	Representatives of private agricultural inputs companies	2.044	V
6	Television	1.972	VI
7	Agricultural extension literature	1.927	VII
8	Agricultural magazines	1.900	VIII
9	Scientists of Krishi Vigyan Kendra (KVK)	1.872	IX
10	Radio	1.527	X
11	News papers	1.511	XI
12	Kisan mobile advisory service (mKisan)	1.500	XII
13	Internet	1.294	XIII
15	Kisan Call Centre	1.238	XIV
16	Scientists of Agricultural Research Station	1.450	XV
17	Representatives of NGOs	1.361	XVI

Extent of participation of respondents in extension activities

Data pertaining to extent of participation of the respondents in extension activities organised by different extension service providers in the district is presented in [Table-3]. It is clear from the data that only few farmers 'always' participate in extension activities. Majority of the farmers participate in extension activities 'sometimes' followed by 'seldom'. Among the extent of participation in extension activities, participation in the *Krishak Gosthies* (Farmers meetings) occupied the first position in the rank order with weighted mean score 2.577. Participation in the *Kisan Melas* (Farmers Fairs) secured second position followed by Farmers Training Programmes, Exposure Visits and Field Demonstrations with weighted mean score of 2.183, 1.9277, 1.844 and 1.644, respectively. Amongst the extent of participation in extension activities, the respondent's participation in the field days was observed on last position in the rank order with weighted mean score 1.561.

Knowledge of the respondents regarding aromatic rice cultivation practices

It is evident from the [Table-4] that most of the respondents (88.33 percent) were having the knowledge about green manuring before transplanting of paddy followed by suitable varieties of aromatic/basmati rice (80.56 percent) and knowledge about optimum age of seedlings for transplanting. Majority of the respondents (70.55 percent) were having the knowledge about appropriate day-time of irrigation. A sizeable number of respondents (68.33 percent) were having knowledge about recommended dose of diammonium phosphate (DAP) in main field followed by knowledge about benefits of *neem* coated urea and summer ploughing, 64.44 and 62.22 percent, respectively. Near about sixty percent of the respondents were having the knowledge about appropriate time of incorporation of green manuring crops in the field, soil testing laboratories of the district and recommended dose of urea in aromatic/basmati rice. Percentage of respondents having knowledge about recommended dose of zinc sulphate and compost in nursery, and having awareness about the fact that fertilizers must applied in the crop on the basis soil test value was 57.22, separately. Near about fifty-six percent of the respondents were having knowledge about water management in nursery followed by recommended dose of zinc sulphate in main field and appropriate seed rate, 53.89 and 51.11 percent, respectively.

Near about half of the respondents were having knowledge about soil sampling method, status of water in field at the time of urea application. Forty-seven percent of the respondents were having knowledge about appropriate time of urea application and association between infestation of weeds and insect-pests followed by recommended dose of urea in nursery. Moreover, forty-one percent of the respondents correctly reported the sowing time of nursery and cultural method of weed management in transplanted paddy.

Table-3 Extent of participation of respondents in extension activities

SN	Extension activity	Extent of participation					Weighted mean score	Rank Order
		Always	Often	Sometimes	Seldom	Never		
1	Krishak goshthies (Farmers meetings)	13	30	56	30	51	2.577	I
2	Kisan Mela (Farmers fairs)	15	4	52	37	72	2.183	II
3	Farmers Training programmes	6	13	36	32	93	1.9277	III
4	Exposure visits	7	8	34	32	99	1.844	IV
5	Field Demonstrations	0	2	32	46	100	1.644	V
6	Field days	0	1	28	42	109	1.561	VI
Total		41	58	238	219	524		

Table-4 Knowledge level of the respondents regarding aromatic rice cultivation practices, n =180

SN	Percentage of respondents having knowledge	Technological events / interventions
1.	More than 80 percent	Green manuring before transplanting of paddy (88.33%) Suitable varieties (80.56 %)
2.	>70 and ≤ 80 percent	Optimum age of seedlings for transplanting (71.67%) Appropriate day-time of irrigation (70.55%)
3.	>60 and ≤ 70 percent	Recommended dose of diammonium phosphate (DAP) in main field (68.33%) Benefits of neem coated urea (64.44%) Benefits of summer ploughing (62.22%) Facilities available in the district for soil testing (60.56%) Appropriate time of incorporation of green manuring crops in field (60.56%)
4.	>50 and ≤ 60 percent	Recommended dose of urea in main field (58.89%) Recommended dose of zinc sulphate in nursery (57.22 %) Recommended dose of compost in nursery (57.22 %) Application of fertilizers on the basis of soil test value (57.22%) Water management in nursery (56.11%) Recommended dose of Zinc sulphate in crop (53.89%); Seed rate (51.11 %)
5.	>40 and ≤ 50 percent	Soil sampling method (49.44%), Status of water in the field at the time of urea application (49.44%) Time for application of urea in main transplanted paddy (47.22%) Association between infestation of weeds and insect-pest (47.78%) Recommended dose of urea in nursery (46.11 %) Sowing time (41.67 %) Cultural method of weed management (41.11%) Time for application of diammonium phosphate (DAP) in main field(39.44%), Recommended dose of compost application in field before transplanting (40.56%)
6.	>30 and ≤ 40 percent	Appropriate area for nursery (39.44 %) Recommended dose of diammonium phosphate (DAP) in nursery (39.44 %) Recommended dose of muirite of potash (MoP) in nursery (32.78%) Recommended dose of muirite of potash (MoP) in main field (31.67%) Time for application of zinc sulphate in main field (31.11%) Association between high dose of urea and infestation of insect-pest (30.33%)
7.	>20 and ≤ 30 percent	Optimum plant population per meter square (28.33%) Time for application of MoP in main field (28.33%), Appropriate time for application of compost in field (26.67%), Use of neem cake (21.67%)
8.	Less than 20 percent	Use of neem oil (19.44%); Seed treatment (18.33 %) Critical stages of irrigation (14.44%) Identification of stem borer insect (13.33%) Pre and post emergence herbicides (13.33%) Identification of brown plant hoper insect (12.78%) Identification of rice leaf folder insect (11.67%) Chemical management of brown plant hoper insect (11.11%) Weed management in nursery (16.11%) Beneficial insects (10.00%) Identification of gundhi bug (9.44%) Symptoms of iron deficiency in nursery (08.33%) Management of iron deficiency in nursery (08.33%) Chemical management of gundhi bug insect (8.33%) Seed treatment for prevention of neck blast disease (8.33%) Symptoms of bacterial leaf blight disease (08.33%) Chemical management of bacterial leaf blight disease (08.33%) Seed treatment for prevention of bacterial leaf blight (07.78%) Initial symptoms of neck blast disease (7.78%) Chemical management of stem borer insect (7.78%) Chemical management of rice leaf folder insect (7.78%) Use of light trap (6.11%) Chemical management of neck blast disease (04.44%) Bio fertilizers (4.44%) Cultural methods of management of brown plant hoper insect (4.44%) Use of trichogramma cards (2.78%) Chemical management of sheath blight disease (02.78%) Symptoms and management of khaira disease (02.78%) Continuous flooding of water (02.22%) Symptoms and management of false smut disease (01.11%) Use of pheromone trap (0%)

Nearly forty percent of the respondents were having knowledge about recommended quantity of compost must be incorporated in field before transplanting and appropriate time for application of DAP in main field. Percentage of respondents having knowledge about appropriate area for nursery, recommended dose of DAP in nursery, recommended dose of muriate of potash (MoP) in nursery, recommended dose of MoP in main field, time of application of zinc sulphate in main field and association between high dose of urea and infestation of insect-pest in the paddy crop was in range of less than 40 to equal or greater than 30. Very few numbers of respondents were having knowledge about optimum plant population per meter square, time for application of MoP, appropriate time for application of compost in the field and use of *neem* cake.

Cultivation of aromatic rice in traditional rice growing belts of Uttar Pradesh is having enormous potentials in enhancing the income of farmers. This research clearly identifies the key areas of information gap between the existing technology and knowledge level of farmers, where less than twenty percent of the respondents having the knowledge of technological interventions like, seed treatment; bio fertilizers; water management [critical stages of irrigation vs. continuous flooding]; insect management [identification and chemical management of insects like, stem borer, leaf folder, brown plant hopper, gundhi bug, cultural methods of management of brown plant hopper insect, use of trichogramma cards, light trap, use of *neem* oil] and beneficial insects; weed management; nutrient management; disease management [symptoms and management of iron deficiency (in nursery) and *khaira* disease, symptoms and chemical management of bacterial leaf blight, neck blast, sheath blight and false smut, seed treatment for prevention of bacterial leaf blight and neck blast disease]. Not a single respondent was having knowledge about use of pheromone trap. During the data collection, most of the farmers revealed that if they observe any disease or insect in the crop they just go to nearest shopkeeper of agricultural inputs and tell him about their observations in the crop, whatever chemical(s) the shopkeeper gives, they apply to the crop.

Thus, for further enhancement in productivity, above-mentioned knowledge gap needs to be filled by appropriate message designing and implementing effective extension strategies.

Similar to this study, previous study conducted in Haryana revealed that more than 80 percent farmers were having knowledge about high yielding varieties and optimum age of seedlings for transplanting, whereas, only 2.5 percent farmers were having knowledge of the symptoms of blast disease in rice [7].

Further, the research results showed that as the technologies were moving from cultural practices to input oriented and simultaneously simple to complex in nature farmers' knowledge level was decreasing. There is need of organising result oriented intensive extension activities on the key identified priority technologies, like nursery management, integrated pest and nutrient management. Furthermore, the shopkeepers of agricultural inputs must be trained in insect-pest, disease, nutrient and weed management in rice, and motivated to provide right information to the farmers when farmers come to them.

Conclusion

On the basis of present study, it can be concluded that the maximum number of aromatic rice's growing farmers were educated up to high school and intermediate, having land up to four acres with irrigation facility. Family size of most of the aromatic rice growing farmers was medium (5 to 8 members). Major sources of agricultural information for aromatic rice growing farmers were fellow farmers, friends/relatives' shopkeepers of agricultural inputs and officers/extension functionaries of department of agriculture and representatives of private agricultural inputs companies. Few farmers participated in the extension activities organised by different extension service providers in the district. Further, the finding identifies the key areas of knowledge gap regarding aromatic rice cultivation practices. The identified areas of knowledge gap are nursery management, pest management, including insect, disease and weeds, and integrated nutrient management. It can be stated on the basis of the study that there is need to enhance the extension activities on cultivation practices of rice with special emphasis on nursery management, Integrated Pest Management (IPM) and Integrated Nutrient Management (INM). Agricultural inputs providers

must be trained in insect-pest, disease, nutrient and weed management in rice, and motivated to provide right information to the farmers when farmers come to them, because a large number of farmers depends on them for adopting input oriented technological interventions.

Application of research: Findings of the study will be helpful in designing messages and developing extension strategy for promoting scientific cultivation practices of aromatic/basmati rice in the study area.

Research Category: Agricultural extension, agricultural communication

Acknowledgement / Funding: Authors are thankful to the Director Extension, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, 208002, Uttar Pradesh, India and Krishi Vigyan Kendra Chherat, Aligarh, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, 208002, Uttar Pradesh, India

****Principal Investigator or Chairperson of research: Dr Netrapal Malik**

University: Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, 208002, Uttar Pradesh, India

Research project name or number: Field study

Author Contributions: All authors equally contributed

Author statement: All authors read, reviewed, agreed and approved the final manuscript. Note-All authors agreed that- Written informed consent was obtained from all participants prior to publish / enrolment

Study area / Sample Collection: Aligarh district of Uttar Pradesh

Cultivar / Variety / Breed name: Rice (*Oryza sativa* L.)

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

References

- [1] CRRI (2011) Vision 2030. Central Rice Research Institute. Indian Council of Agricultural Research, Cuttack (Odisha), India, 1.
- [2] Singh M.K. and Prasad S.K. (2014) Proceedings of the National Academy of Sciences, India Section B, Biological Sciences, 84(3), 613-623.
- [3] Directorate of Economics and Statistics (2018) Ministry of Agriculture and Farmers Welfare, Agricultural Statistics at a Glance 2017.
- [4] Singh S.P., Singh M.K., Kumar S. and Sravan U.S. (2019) In, Hasanuzzaman M. (ed.), *Agronomic Crops, Vol 1, Production Technologies*, Springer Nature Singapore Pte Ltd., 175-198.
- [5] NCML (2019) Basmati Survey Report Kharif 2019 Vol ,1 Submitted to Basmati Export Development Foundation, APEDA, New Delhi, 4.
- [6] Pradhan S.K., Khan M.A. and Sharma M.L. (2019) *International Journal of Agriculture Sciences*, 11(23), 9258-9262.
- [7] Singh R., Hansra B.S. and Chand R. (2013) *Journal of Community Mobilization and Sustainable Development*, (8)1, 24-28.