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Knowledge Level of the Farmers about Hybrid Rice Cultivation in Jammu District

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ABSTRACT

Hybrid rice technology is crucial for securing the food security of the burgeoning population of India. The study carried out in 2021 aims to assess the knowledge level of farmers regarding hybrid rice technology. Three specifically chosen sub-divisions of Jammu District; Marh, Akhnoor, and R.S. Pura, having the cultivation of hybrid rice and using the proportionate and purposive random techniques 38 from R.S. Pura, 13 from Akhnoor and 99 respondents from Marh, making a total sample size of 150 hybrid rice growers. A standardized knowledge test with reliability 0.86, was developed for assessing the knowledge level of hybrid rice growers. The Cube root method was applied to devise different knowledge categories of hybrid rice growers, which varied from medium to high. According to the results of the ANOVA test, there was no discernible difference between the knowledge levels of hybrid rice growers in the three sub-divisions.

INTRODUCTION

Agriculture is a significant contributor to economic activity in other areas of the economy as a provider of industrial raw materials (Blandford, 2011). It is predicted that India's agricultural sector will expand by 3.9 per cent in 2022–2023, which is better than the current fiscal year. To feed the rising population there is need for improved technologies like hybrid rice cultivation which gives higher yield than other rice varieties (Gogoi et al., 2022). According to the International Rice Research Institute (IRRI), hybrid rice is crossbred from two very different parents and compared to other rice types, it has a higher yield potential. The extension agents can help farmers as they proceed along their knowledge-acquisition and decision-making paths (Van den Ben & Hawkins, 1996). Asian rice that has been crossbred from two extremely dissimilar parent kinds is known as hybrid rice (Rout et al., 2020). When grown under the same conditions as equivalent purebred rice varieties, hybrid rice can generate up to 30 per cent greater yield. Rice is the one of the most important cereal crops in India and has been highly labour and energy-intensive crop (Bhatt & Singh, 2022). China is the world's top producer of rice, with India coming in second and Indonesia coming in third (Statista, 2021). The staple food crop of the majority of South, South-East, and East Asia, rice is India's greatest contribution to global agriculture (Directorate of Economics & Statistics, 2020). According to the recent data from the Directorate of Economics and Statistics (2018-19), Jammu and Kashmir planted 262010 acres of rice, producing 616100 tonnes wherein 63882 acres of rice were planted in the Jammu district, yielding 283900 tonnes (DES, 2021). In the Jammu district, the average production of rice in 1964–1965 was 10.57 quintals per hectare, and in 2018–19 it was 21.58 quintals per hectare, nearly doubling it during the 55 years from 1960 to 2019 (DES, 2021). A large portion of the untapped potential farm yield could be exploited by using optimum inputs and by adopting appropriate production techniques without incurring additional cost (Singh et al., 2011). Awareness generation was advocated specifically concentrating on ecological sustainability through rice production by Rejula et al., (2017), so that people start thinking rejuvenating the existing paddy fields. In the years 2015–16 and 2016–17, the total area with hybrid rice in the Jammu division was 13544 ha and 12533 ha, respectively (Directorate of Agriculture). Knowledge about different cultivation practices is pre-requisite for farming community to obtain the maximum output under actual field conditions. Although number of stakeholders such as field

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extension functionaries, research stations of different SAUs etc. are actively engaged in the job of disseminating knowledge about different cultivation practices of hybrid rice cultivation to farmers, but still the knowledge gap exists shown by different research studies. Farmers' knowledge is directly and significantly associated with the adoption of hybrid rice. Farmers, who are well informed about the usage of hybrid rice and are likely to embrace it and raise their revenue, can be influenced by knowledge (Sarma et al., 2022). The present research effort entitled "Knowledge Level of the Farmers about Hybrid Rice Cultivation Practices in Jammu District" was undertaken to assess the status of knowledge level of hybrid rice growers.

METHODOLOGY

Due to the highest area under hybrid rice cultivation, the study was carried out in three agricultural sub-divisions of Jammu division of Jammu and Kashmir UT namely; Marh, Akhnoor, and R.S. Pura. Descriptive research design was employed for the study. Purposive sampling was employed to choose the sub-division. The respondents were chosen using the proportionate random sample technique. With the assistance of the relevant agencies, a list of hybrid rice growers was obtained for each chosen agricultural sub-division. From a total list of 1123 hybrid rice growers in the selected sub-divisions, 38 hybrid growers were selected from R.S Pura, 13 from Akhnoor and 99 from Marh by proportionate random sampling technique, making a total sample size of 150 hybrid rice growers. A well devised pre-tested interview schedule was used for collection of primary data. Secondary data was collected from different published resources. Cube root technique given by Singh (1975) was applied for devising different knowledge categories. ANOVA technique given by Fisher (1958) was applied to find out the difference among knowledge level of hybrid rice growers belonging to three sub-divisions.

RESULTS AND DISCUSSION

Data in the Table 1 revealed that 100.00 per cent of the farmers were well versed with the knowledge about methods of sowing seed in the nursery, 61.00 per cent had correct knowledge about recommended time of nursery sowing, correct knowledge about the recommended seed rate were 73.00 per cent. It was an astounding finding that only 10.00 per cent of the farmers had knowledge about the seed treatment and very less (6%) knew about the dosage of the seed treatment chemical. It showed that 43.00 per cent farmers had knowledge about dosage of urea which was recommended whereas least per cent i.e. 1.00 per cent of them knew about the recommended dosage of DAP and 11.00 per cent had knowledge about the quantity of FYM used during nursery raising. Knowledge of hybrid rice growers about recommended weed management indicated that 100 per cent of the farmers had knowledge about both weed controlling method as well as the weeds attacking the seedlings. Here, 97.00 per cent of the farmers were well versed with the knowledge of the name of herbicide but only 17.00 per cent of the farmers knew about its dosage. All the farmers were able to identify the insects attacking the nursery of

Table 1. Knowledge of the hybrid rice growers about different aspects of nursery raising

Knowledge about	District wise per cent of respondents			Overall
	R.S. Pura (n=38)	Akhnoor (n=13)	Marh (n=99)	percent (n=150)
Recommended time of nursery sowing (first fortnight of June)	25(66)	4(31)	63(64)	92(61)
Methods of sowing seed in nursery (wet/dry method)	38(100)	13(100)	99(100)	150(100)
Recommended seed rate (15-20 kg/ha)	26(68)	8(62)	75(76)	109(73)
Name of chemical used for seed treatment (Carbendazim= Bavistin)	5(13)	4(31)	6(6)	15(10)
Dosage of seed treatment chemical (2.5-3 gms/kg of seed)	4(11)	2(15)	3(3)	9(6)
Knowledge about recommended nutrient management practices				
Dosage of urea (60-65g/10 sqm)	19(50)	2(15)	43(43)	64(43)
Dosage of DAP (100g/10 sqm)	0(0)	0(0)	2(2)	2(1)
Quantity of FYM (15 kg/10 sqm)	8(21)	1(8)	7(7)	16(11)
Knowledge about recommended weed management				
Weeds controlling method(Manual, chemical or both)	38(100)	13(10)	99(100)	150(100)
*Name the weed (*Cyperusrotundus, Cyperus difformis, Cyperus iris, Echino cholacolona, Echino cholacrus gallis* and *Cynodon dactylon*)	38(100)	13(100)	99(100)	150(100)
Name of herbicide (recommended are: Machete= butachlor 5% GR), nomini gold= Bispyribac Sodium 10% SC)	38(100)	13(100)	95(96)	146(97)
Dose of herbicide (Recommended for: Machete: 2.47 litre/ha (L)* 1.5 kg/ka (G) &; nominee gold: 200 ml/ha), (L)-Liquid form(G)-Granular form	4(11)	0(0)	22(22)	26(17)
Knowledge about plant protection practices				
Identified insects, attacking the nursery of hybrid rice (root weevil, stem borer, threadworm, leaf hopper, rice hispa, leaf folder and grasshopper)**	38(100)	13(100)	99(100)	150(100)
Knowledge of the insecticides (Cartaphcl= Padaan, Carbofuran=Furadan, Lindaine and Chloropyriphos=Lorsban and Dursban)	9(24)	4(31)	22(22)	35(23)
Knowledge about the dosage of insecticide (Cartaphcl=1 kg/500 m^2 carbofuram=1 kg/500 m^2, lindaine= 1.25-1.5 kg/500m^2 and chloropyriphos= 500-750 ml/acre)	12(32)	6(46)	52(53)	70(47)

hybrid rice. Less than half the respondents had knowledge about the dosage of the insecticide whereas only 23 per cent of the farmers had knowledge about the insecticide names. About the recommended seed rate similar results were reported by Chandawat et al., (2018). Another findings from the present study revealed that majority of the growers had good knowledge (100%) about the methods of sowing seed in the nursery which quite agreed with the findings of Pradeep et al., (2017).

The Table 2 showed that 27 per cent of farmers recognized the age of the seedling, 69 per cent of farmers were knowledgeable about the ideal period for transplanting, and 43 per cent of farmers knew the number of seedlings per hill. Majority of the farmers (65.00%) were aware that the first irrigation should be administered at the 4-6 leaf stage of the crop, while 72.00 per cent of farmers were aware of the number of irrigations. The current study found that knowledge about irrigation practice was higher, which may be because irrigation is a fundamental component of rice cultivation and farmers of all categories had good knowledge about the various stages of irrigation. The present findings also corroborated the findings of a study by Meena et al., (2012), in which it was found that growers had above 90 per cent knowledge of irrigation management, Prusty et al., (2020) also found higher knowledge about the irrigation practice followed by Pradeep et al., (2017). Regarding suggested nutrient management techniques for the main field, the Table showed that just 11 per cent of the farmers were aware of the suggested urea and FYM dosages for this area. The majority of farmers (83%) were aware of the split dosages that should be utilized, but just 15 per cent and 29 per cent of farmers, respectively, were aware of the suggested dosages for DAP and zinc. In the current study, it was discovered that farmers had strong understanding of the suggested seed treatments but very little awareness of the dosages of these treatments. In contrast to study conducted by Sharma et al., (2017), which found that more than 76.00 per cent of the farmers had complete knowledge about the chemical used for seed treatment, the current study revealed that only 10 per cent and 6 per cent of farmers knew the name of the chemical used for seed treatment and dosage of the chemical, respectively. The lack of interaction with SKUAST-J experts, who may provide them with improved understanding about the methods that can increase crop output, may be the cause of their poor level of expertise. According to the table's recommendations for managing weeds in the main field, all of the farmers were aware of the best practices for weed control and the types of weeds that pose a threat to the main field crop. Despite 100 per cent of them knowing the name of the herbicide being used to manage the weeds, only 17 per cent of them were aware of the dosage. It was

Table 2. Hybrid rice growers' knowledge about recommended nutrient management practices in main field

Knowledge about	District wise per cent of respondents			Overall
	R.S. Pura (n=38)	Akhnoor (n=13)	Marh (n=99)	percent (n=150)
Age of seedling (20-25 days)	8(21)	7(54)	26(26)	41(27)
Time of transplanting (Recommended time is first fortnight of July)	28(74)	7(54)	69(70)	104(69)
No. of seedlings per hill(recommended is 2-3 seedling/hill)	16(42)	8(62)	41(41)	65(43)
No. of irrigations (recommended are 10)	29(76)	3(23)	76(77)	108(72)
First irrigation at what stage(recommended is 4-6 leaf stage of crop)	26(68)	7(54)	64(65)	97(65)
Knowledge about recommended nutrient management				
Dosage of urea (200-210 kg/ha)	8(21)	7(54)	1(1)	16(11)
Split dosages of urea (2-3 recommended)	13(34)	13(100)	99(100)	125(83)
Dosage of DAP (130-140 kg/ha)	3(8)	3(23)	17(17)	23(15)
Quantity of FYM/ha (15 tonnes per ha)	8(21)	1(8)	7(7)	16(11)
Dosage of $ZnSO_4$ (20-25 kg/ha)	10(26)	5(38)	28(28)	43(29)
Knowledge about recommended weed management				
Weeds controlling method (Manual, chemical or both)	38(100)	13(100)	99(100)	150(100)
*Name the weed (*Cyperus rotundus, Cyperus difformis, Cyperus iris, Echino cholacolona, Echino cholacrus gallis* and *Cynodon dactylon*)	38(100)	13(100)	99(100)	150(100)
Name of herbicide (recommended is Machete=Butachlor)	38(100)	13(100)	99(100)	150(100)
Dose of herbicide (Recommended for: Butachlor: 30 kg/ha)	4(11)	0(0)	22(22)	26(17)
Knowledge about recommended plant protection practices				
*Identified insects attacking hybrid rice(root weevil, stem borer, threadworm, leaf hopper, rice hispa, leaf folder and grasshopper)	38(100)	13(100)	99(100)	150(100)
Insecticide used (Cartaphcl=Dartriz, Carbofuran=Furadan, Lindaine and Chloropyriphos=Lorsban and Dursban)	3(8)	1(8)	4(4)	8(5)
Dosage of insecticide (Cartaphcl=1 kg/500 m^2, Carbofuram=1 kg/500m^2, lindaine= 1.25-1.5 kg/500m^2, Phorate=10-15 kg/ha & Chloropyriphos=500-750 ml/acre)	2(67)	1(100)	2(50)	5(63)
*Diseases observed in hybrid rice crop (brown leaf spot, bacterial leaf blight, bacterial leaf streak, sheath blight, sheath rot, false smut, blast and khaira disease)	38(100)	13(100)	99(100)	150(100)
Fungicide (Carbendazim=Bavistin, tricylazole=Blastin, Hexaconazole=Trigger)	7(18)	2(15)	16(16)	25(17)
Dosage of fungicide (carbendazim=100-120g/ha, tricylazole=300-400g/ha, hexaconazole=750-1000 ml/ha)	12(32)	6(46)	52(53)	70(47)

*Multiple response

discovered that 100 per cent of farmers were aware of the insects that attacked hybrid rice crops and the diseases that were noticed in hybrid rice crops. Additionally, it revealed that 63.00 per cent of the farmers knew how much insecticide to use. The survey also revealed that only 17 per cent of farmers were knowledgeable with fungicides. However, it was astounding to learn that 47.00% of the farmers knew the fungicide dosages. In contrast to Kshash's (2018) study, which found a medium degree of knowledge regarding various aspects of fertilization, the current study showed that hybrid rice growers had little understanding of fertilizers and their management techniques. The hybrid rice farmers in the current study had a high level of weed control knowledge, which was consistent with the findings of a study by Pradeep et al., (2013).

Data depicted in the Table 3 showed that 100.00 per cent of the farmers had knowledge about the symptoms indicating that crop is ready for harvest, time of harvesting and proper way of drying the harvested produce. The findings regarding harvesting techniques showed that 100 per cent of the producers were aware of both harvesting and post-harvesting procedures, which was also the case for the findings of the study conducted by Pradeep et al., (2013).

Cube root method showed information about the level of knowledge of the farmers. The overall average knowledge score was 19.94, while it was 19.32, 19.86, and 20.22 in the R.S. Pura, Akhnoor, and Marh sub-divisions, respectively. Farmers' overall understanding of hybrid rice cultivation procedures ranged from medium to high, with 41.00 per cent having medium knowledge, 49.00 per cent having high knowledge, and 10.00 per cent having little awareness of it. This might be the case because farmers have a good understanding of the advantages of hybrid rice production, which has allowed them to learn enough about its various facets. These results are well associated with those of the Shah et al., (2016) study, which found that most farmers in the Navsari district had medium level (67%) knowledge of rice production technologies. However, only 14 per cent of the farmers in this study had the least amount of knowledge, which conflicts with the findings of the current study. The results also agreed with those of a study by Prasad et al., (2015), which showed that more farmers who received benefits had higher levels of knowledge about rice growing technology than non-beneficiary farmers. The average recipient farmer had a medium level of knowledge, followed by high and low level farmers with, respectively, 28.57 and 15.24 per cent of knowledge. The results of this study do not agree with those of Nagmani et al's study, which found that most tenant farmers had little to no understanding of critical rice farming interventions (80.00%), followed by medium (15.56%) and high (4.44%) knowledge. According to a 2018 study by Rahangdale et al. the majority of respondents (54.37%) had a medium level of knowledge about hybrid rice production technology, followed by 35.63 per cent of respondents with a high level of knowledge and 10 per cent of respondents with a low level of knowledge.

ANOVA test was applied to work out the significant difference in knowledge level of farmers about different practice of hybrid rice cultivation and the result obtained showed that there was no

Table 3. Knowledge of hybrid rice growers about different aspects of harvesting

Knowledge about	District wise per cent of respondents		
	R.S. Pura (n=38)	Akhnoor (n=13)	Marh (n=99)
Symptoms indicating crop ready to harvest *(recommended are: color of the crop becomes yellow when matured and ready to harvest; 80 per cent of panicles mature and become golden in color)	38(100)	13(100)	99(100)
Time of harvesting (recommended time is month of October)	38(100)	13(100)	99(100)
Proper way of drying the harvested produce (recommended is: drying in shade)	38(100)	13(100)	99(100)

*Multiple response

Table 4. Overall knowledge level of hybrid rice growers about the hybrid rice cultivation practices

Knowledge about	R.S. Pura (n=38)	Akhnoor (n=13)	Marh (n=99)	Overall (n=150)
Average knowledge score (10-26)	19.32±3.12	19.86±3.39	20.22±3.56	19.943.44
Knowledge level (per cent farmers)				
Low (10-15)	4(11)	2(15)	9(9)	15(10)
Medium (16-20)	19(50)	5(38)	37(37)	61(41)
High (above 20)	15(39)	6(46)	53(54)	74(49)

Table 5. Mean difference of knowledge in different sub-divisions

Dependent variable	(I)	Varieties (J)	Mean difference (I-J)	Std. error	p-value	Model summary
Knowledge	Marh	Akhnoor	-.29960	1.09666	.785	
		R.S Pura	-.94684	.65133	.148	
	Akhnoor	Marh	.29960	1.09666	.785	F=1.132
		R.S Pura	-.64724	1.00686	.521	P=.325
	R.S. Pura	Marh	.94684	.65133	.148	
		Akhnoor	.64724	1.00686	.521	

significant difference observed in the knowledge levels of hybrid rice growers among farmers of all three sub-divisions.

CONCLUSION

It is concluded that almost fifty percent farmers had high level of knowledge about hybrid rice technology. It needs to be improved as knowledge level is directly associated with the adoption of different cultivation practices at field level and moreover also associated with farmer's satisfaction. For better technical guidance, there should be more contacts between extension staff and farmers. The rice growers should have access to timely supply of hybrid seeds and related input. Farmers being exposed to demonstration plots are anticipated to hasten adoption. The reach of government programmes must be expanded to include small and marginal farmers. The success stories of hybrid rice growers should be highlighted through various forms of advertising in order to entice rice farmers to cultivate hybrid rice. Given the expanding population and the widespread consumption of rice as a staple meal in the future, hybrid rice will be crucial in maintaining food security.

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