

Factors Affecting the Adoption of Hybrid Rice Cultivation in Jammu District

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ABSTRACT

Rice (*Oryza sativa*) is the staple food of about 65% of Indian population. Its production and productivity has increased with the development of dwarf and input responsive varieties. Hybrid rice can be one of the drivers for accelerating the rice production and productivity to meet the growing consumption requirement of ever increasing population. Various factors affect the adoption of a new technology such as its attributes which includes relative advantage, compatibility, complexity, trialability and observability. Keeping in view the importance of hybrid varieties of rice in increasing the overall production a research pursuit was undertaken with 70 rice farmers and this paper access the present status of adoption of hybrid rice cultivation in Jammu district. The results show that relative advantage which augmented the adoption of hybrid rice cultivation as reported by the respondent farmers was higher yield (100%), non-lodging (80%) & high fertiliser responsive (85%) respectively and major constraints reported by farmers were threshing problem and less market price.

Keywords: *Oryza sativa*, hybrid rice, fertiliser, population, Jammu district

Rice is the staple food of half of the world population (Zeigler and Barclay, 2008) and about 65% of Indian population. Its production and productivity have increased with the development of dwarf and input responsive varieties. But our rice requirement by the year 2020 is estimated to be around 122mt as against the present production of about 106.65mt (Anonymous, 2014). On global level by 2035, rice consumption will be 555 mt globally compared with 439 mt in 2010, which means that, in less than 25 years, an extra 116 mt of rice need to be produced to meet global demand (GriSP, 2010). Hybrid rice can be one of the drivers for accelerating the rice production and productivity to meet the growing consumption requirement of ever increasing population. Under National Food Security Mission (NFSM) major thrust

is also being given on the production of hybrid seed for bridging the demand supply gap of rice in the country. The basic outcome of stable, better adapted, and commercially accessible hybrid rice could translate into a range of positive impacts: enhanced rice productivity; increased on farm incomes for smallholders; and reductions in the land required for intensive rice production, which in turn would allow for reallocation to other agricultural and non-agricultural activities (). At present area under hybrid varieties of rice in India is about 1.8 mha. In Jammu & Kashmir area under hybrid varieties of rice is 5000ha (FAO Stat, 2013-14). Various factors affect the adoption and diffusion of new technology such as its attributes which includes relative advantage, compatibility, complexity, trialability and observability (Fliegel

& Kivlin, 1966). Keeping in view the importance of hybrid varieties of rice in increasing the overall production a study was undertaken for studying the various factors adoption of hybrid rice cultivation in Jammu district with following objectives:

1. To study the factors affecting rate of adoption of hybrid rice cultivation.
2. To classify the hybrid rice cultivators into different adopter categories.
3. To study the constraints in the cultivation of hybrid rice.
4. To study the reasons behind non-adoption of hybrid rice.
5. To work out the cost-benefit ratio of hybrid rice cultivation

Methodology

The study was undertaken in R.S. Pura block of Jammu district because of maximum area under rice cultivation is in Jammu district. A list of villages growing hybrid varieties of rice was obtained from Sub-Divisional Agricultural Office, Miran Sahib, Jammu. From these villages Kirpind village was selected purposively as adoption of hybrid rice cultivation is more in this village. A list of about 150 farm families growing hybrid varieties of rice was prepared with the assistance of village panch (a Panchayat representative). Out of this, 50 farm families growing hybrid rice, 10 farm families who had discontinued cultivation of hybrid rice and 10 non-adopters of hybrid rice cultivation were selected randomly, thus making a total sample of 70 respondents. The primary data was collected by applying personal interview technique with farmers and secondary data obtained from different government publications.

RESULTS AND DISCUSSION

Attributes of hybrid varieties such as relative advantage, compatibility, complexity, trial ability and observability were mainly studied as factors affecting its rate of adoption. Although rate of adoption of an innovation is also affected by the socio-personal

characteristics of farmers, efforts of change agents, concentration of opinion leaders & communication behavior of the farmers. The relative advantage as reported by the farmers was higher yield (100%), non-lodging (80%) & high fertilizer responsive (85%) respectively as given in Table 1. Farmers reported that average yield of hybrid varieties was 64 q/ha in the study area. Farmers further reported that with present slump & high fluctuation in market price of Basmati rice, hybrid varieties are more profitable than Basmati. The hybrid varieties are fully compatible with their socio-economic conditions as reported by 100% sampled farmers where as 84% farmers reported non-compatible with their food habits as farmers did not like its taste but cultivating hybrid varieties only for marketing. Difficulty in threshing of hybrid varieties was main complexity as reported by 100% sampled farmers. Further 100% sampled farmers reported that they first grew hybrid varieties on small scale as a trial. After convincing from trial results they decided to grow it on large scale. Thus, its trialability attribute is accelerating its adoption rate in the study area. 100 per cent sampled farmers reported that better results of hybrid varieties such as higher yields, non-lodging, high fertilizer responsive, were clearly visible from fellow farmer's field which were augmenting its adoption rate in the study area.

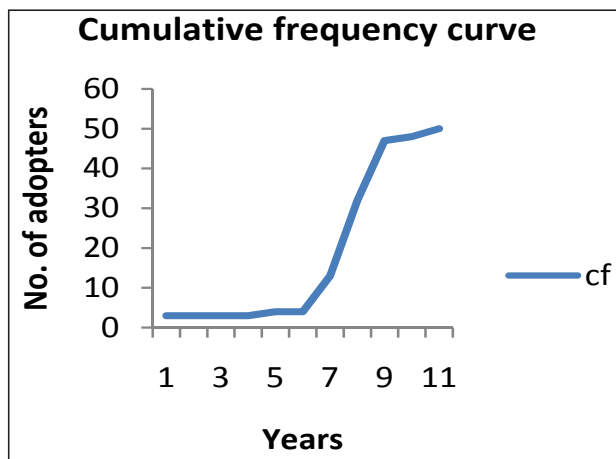
Classification of hybrid rice growers into different adopter categories on the basis of innovativeness

Data presented in table 1 show that hybrid rice cultivation started in the sampled village in the year 2001 as reported by the farmers selected for the present study. Sampled farmers took average time of 4 years to adopt cultivation of hybrid varieties with minimum time of 1 year and maximum of 12 years. Only 03 farmers adopted hybrid rice cultivation in the year 2001 and they may be regarded as innovators in the said village as for as cultivation of hybrid rice is concerned. None of the farmers adopted cultivation of hybrid varieties of rice in the sampled village in the following year's i.e. 2002, 2003 & 2004. Maximum number of 15 farmers adopted hybrid rice cultivation in the year 2012 in the sampled village. The cumulative frequency graph so obtained was near to S-shape as founded by Ryan & Gross (1942) in study on adoption

Table 1: Factors affecting adoption of hybrid rice cultivation

Attributes	Farmers (%age)	Rate of Adoption		
		Year	Frequency	Cumulative frequency
Relative advantage		2001	3	3
(i) Higher yield	100	2002	0	3
(ii) Non-lodging	80	2003	0	3
(iii) High-fertiliser's responsive	85	2004	0	3
		2005	1	4
Compatibility		2006	0	4
(i) As per socio-economic conditions	100	2007	9	13
(ii) Taste not as per food habits	84			
Complexity	100	2008	5	18
(i) Difficulty in threshing		2009	14	32
Trialability		2010	15	47
(i) Tested on small scale before full adoption	100	2011	1	48
		2012	2	50
Observability				
(i) Better results clearly visible	100			

of hybrid corn cultivation in Iowa state of U.S.A., which indicates that rate of adoption of hybrid rice was slow initially but with passage of time the rate of adoption increased and was maximum in the year 2010 and thereafter it decreased and became almost static in the succeeding years in the study area.

**Fig. 1:** Showing S-Shape rate of adoption curve as founded by Rogers

But frequency curve so obtained (Fig. 1) was more skewed and flat and not bell shape therefore with

the present data it is not possible to clearly classify hybrid rice growers into different adopter categories i.e. innovators, early adopters, early majority, late majority and laggards in the sampled village as for as adoption of hybrid rice cultivation is concerned. Thus it shows that adoption of hybrid rice cultivation was not uniform in the sampled village.

Table 2: Source of information about hybrid varieties of rice*

Sl. No.	Source of information	%age
1	Government Agricultural department	85
2	Fellow farmers	45
3	Relatives	32
4	Agriculture University	—
5	Private input dealers	60
6	Mass media (Newspaper, T.V, Radio etc.)	10

*Multiple responses

Analysis of data in table 2 depicts that 85%, 45%, 32%, & 60 per cent sampled farmers reported Government Agricultural Department followed by fellow farmers, relatives, private input dealers as their inter-personal source of information about hybrid varieties of

rice respectively. Further only 10 per cent sampled farmers utilized newspaper, television, radio etc. as the mass media source of information. None of the sampled farmers consulted agricultural university as the source of information about hybrid varieties of rice.

Table 3: Constraints in the cultivation of hybrid varieties of paddy

Sl. No.	Constraints	%age of farmers
1	Threshing problem	100
2	Labour shortage	80
3	Weedy rice (<i>Khursoo</i>)	84
4	Less market price	100
5	High cost of inputs	90
6	Less tasty	92

The close scrutiny of data depicted in table 3 shows that 100% sampled farmers reported threshing problem & less market price as the main constraint in hybrid rice cultivation. 96%, 90%, 84% & 80% farmers reported less taste, high cost of inputs, problem of weedy rice locally called as *khursoo*, labour shortage both at transplanting and harvesting stage respectively in the cultivation of hybrid varieties in the study area. The present findings are adequately supported by study conducted by Nirmala *et al.* (2013).

Table 4: Reasons behind non-adoption of hybrid varieties n=10

Sl. No.	Reasons	%age of farmers
1	Labour shortage	60
2	Non-preference of taste	80
3	Small size of land holding	100
4	Threshing problem	60

The close scrutiny of data given in table 4 shows that small size of land holding was the main reason for the non-adoption of hybrid varieties of rice as cited by 100% of sampled farmers and 80% sampled farmers reported that they prefer cultivation of Basmati rice due to its better taste than hybrid rice. 60 per cent farmers cited labour problems & threshing problem as the main reason for non-adopting the cultivation of hybrid varieties of rice in the study area respectively.

Table 5: Reasons for discontinuing the cultivation of hybrid rice*

Sl. No.	Reasons	%age of farmers
1	Labour constraint	85
2	Land constraint	45
3	Threshing constraint (manually)	70

*Multiple responses

Table 5 analyzes reasons behind discontinuing the cultivation of hybrid varieties of rice in the study area. 85 per cent of the farmers reported that they discontinued the cultivation of hybrid varieties because of non-availability of labour both at transplanting and harvesting stage. Data further depicts that 70% & 45% farmers reported threshing constraint & land constraint as the main reasons for discontinuing the cultivation of hybrid varieties of rice in the study area and these findings are adequately supported by study conducted by Ashish Parkash in 2017.

Table 6: Benefit-cost analysis of cultivation of hybrid varieties of rice

Average production	Expenditure or Cost of production (₹/ha)	Gross return (₹/ha)	Net return (₹/ha)	B:C ratio
64q/ha	26800	59600	32800	1:2.23

The data presented in table 6 shows benefit-cost analysis of hybrid varieties of rice in the study area. From the figures it is clear that average expenditure in the cultivation of hybrid varieties of rice is ₹ 26800/ha and gross profit is ₹ 59600/ha and thus B: C ratio so calculated on the basis of gross return is 2.23 which is greater than one in the study area, thus it is profitable for the farmers to adopt the cultivation of hybrid rice. The price of hybrid and other coarse varieties is also being affected by the slump in the price of Basmati. It is further mentioned that B: C ratio is not static and remains changing every year with the changing prices of inputs and output.

CONCLUSION

This report mainly examines the role of different attributes of hybrid varieties of rice in accelerating its

rate of adoption. Hybrid varieties have distinct edge of better yield compared to other varieties of rice including both coarse and fine. Problem of threshing and labour shortage are the two important constraints confronting the better prospectus of hybrid rice in the region. From the study it has been concluded that area under hybrid varieties is not increasing satisfactorily. Hybrid rice has the potential to transform rice cultivation in India. The hybrid rice cultivation could results into enhanced rice productivity; increased on farm incomes for smallholders; and reductions in the land required for intensive rice production. Provision of Hybrid varieties with good threshing characters even manually with better taste, better price, and agricultural machinery for small scale farmers for threshing could help a lot in improving the current scenario of hybrid rice cultivation. The ability of public policymakers, scientists, entrepreneurs, to understand these challenges and anticipate solutions is fundamental to the long-term prospects for hybrid rice in the study area.

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