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Performance of Shalimar Rice-4 (SR -4) underFront Line Demonstration Programme in DistrictBudgam, of Jammu and Kashmir

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Front Line Demonstration (FLD) Programme on Shalimar Rice-4 was carried out during the four successive years of 2018, 2019, 2020and 2021on the farmers field. The farmers were selected from different villages of the district Budgam. The variety SR-4 was used in the demonstrated plots atfarmers' field where different field operations were carried out according to the package of practices of SKUAST-K. During the FLD programme the average seed yield of SR-4 during the four years was 85q/hain demonstrated fields as compared to50.5q/ha seed obtained from the local check (China-1039).The average technology gap over the four years was found to be 2.08q/ha and extension gap 34.56q/ha. The average technology index was 3.18 per cent. Higher gross returns (Rs. 1,30,013 ha^{-1}), net returns (89,637.5 ha^{-1}) with a benefit-cost ratio of 2.22 were found in demonstrated fields as compared to 1.38 in case of local check. The higher yield is attributed to the introduction of newly released SKUAST K high yielding variety of rice (SR-4).

Keywords: Rice; SR-4; Yield; B:C ratio; technology index.

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1. INTRODUCTION

According to the IRRI rice is the basic food to all most one half of the world's population and is produced all over the world as a nutritional food [1]. Rice is the staple food to the majority of the people of Jammu and Kashmir (UT),hence it plays an important role in food security [2]. About 40% rice area is concentrated in high productivity group (plains) and is contributing more than 55% of total production in the state. The area under the rice has shown a declining trend due to the conversion of paddy land into orchard or for non-agricultural practices which affects the production of rice. The people of Jammu and Kashmir are also facing the problems of inadequate and unorganized marketing infrastructure which have compelled the producers of rice for other commercial crops. Rice production in Jammu and Kashmir is entirely traditional in nature, subsistence farming is still in vogue and farmers are quiet ignorant about the scientific methods of cultivation despite the efforts are made but still state is deficient of food grains and have to import from outside. Apart from this the yield gap exists as the farmers use suboptimal doses of inputs, traditional varieties and hardly fallow any recommended technology. That is why Jammu and Kashmir is not sufficient to fed its own people as a result on an average 4.97 lakh quintals are drawn from the central pool to meet the deficit requirement of the state. One of the main causes for poor cultivar replacement is a lack of exposure to new cultivars; as a result, old cultivars are still grown on a larger scale. Despite expanded choices of rice cultivars authorised for general cultivation since 1995, Jhelum and a few old cultivars occupy a considerable part of the area under rice production in Kashmir Valley. The possible reason may be that the newly developed varieties may or may not have satisfied the farmers or end users because the farmers of hilly and mountainous regions do not have the higher yield as the only priority. Keeping in view, the significance of high yielding varieties for increasing the production of rice, the FLDs at farmer's field were carried out for consecutive four years to exploit the potential of SR-4 (80q/ha). The possible reason may be that the newly developed varieties may or may not have reached the farmers or end users or may be because the farmers of hilly and mountainous regions do not have the higher yield as the only priority but mostly prefer the higher biomass (straw) for feeding their livestock during the lean period. Keeping in view, the significance of high yielding varieties for increasing the production of rice, the FLDs at farmer's field was carried out for consecutive four years to exploit the potential of SR – 4. Front-Line Demonstrations' major goal is to exhibit newly released crop production and protection technologies, as well as their management methods, in the field of farmers in various agro-climatic zones and farming conditions [3].

2. MATERIALS AND METHODS

The study was carried out on farmer's field of District Budgam under the supervision of KVK Budgam scientists during the kharifseason of 4 successive years*i.e* 2018, 2019, 2020 and 2021. Most of the farmers of District Budgamsow the rice crop after the harvest of either fodder oats or of brown sarson.The size of the field was of variable size. The texture of the farmer's field was clay loam with average pH 5.1. The fertility of the soil in case of available Nitrogen, Phosphorus and organic carbon was also tested.The details of farmers of Budgam District selected under FLD Programme are presented in Table 1. The selected farmers of the District Budgam were supplied with the critical inputs like seed and fertilizers by the KVK while the other inputs like herbicides, irrigation and agro chemicals were managed by the farmers according to the SKUAST K recommended package of practices. The rice variety "SR-4" was sown during the second fortnight of April and transplanted during the second fortnight of May adopting line sowing manually. This variety was released 2017. High yielding, early maturing, cold tolerant *indica* variety having moderately resistance to blast, erect plant type, easy threshability and recommended for cultivation in plains of the valley (upto 1650 m amsl) . It matures in 135 -140 days and has a yield potential of 7.5-8.0 t/ha. A spacing of 20cmx20 cm was maintained with seed rate of 50 to 60 Kg/ha for variety planted in lower belts. Half dose of nitrogen along with full dose of Phosphorus and Potassium as basal at the time of sowing was applied. The FLD was carried out to investigate the technological gap between potential and demonstrated yield, as well as the extension gap between demonstrated yield and yield under current practises and the technology index. The yield data was acquired using a random crop cutting strategy from both the demonstration and farmers' practises and examined using simple statistical tools. The technology gap, extension gap and technology

index [4] were calculated by using formula as given below.

Technology gap=Potential yield-Demonstration yield
Extension gap=Demonstration yield-Farmers yield
Technology index (%) = Technology gap/ Potential yield×100

3. RESULTS AND DISCUSSION

3.1 Yield

The Results of 37 demonstrations (average) conducted during the *kharif* seasons of 2018, 2019, 2020and 2021at Farmers' field in different villages of Budgam District are shown in Table 3. Farmers adopted the SKUAST K package of practices and supervised bythe scientists of KVK Budgam. The data depicts the remarkable impact of FLD over the farming community. The comparison of yield and other parameters between local check and demonstrated variety and practices are shown in Table 3. The average seed yield of SR-4 was 85.0 q/ha in demonstration field as compared to average seed yield obtained from farmers field (50.5 q/ha). Demonstration plot resulted in 40.64 per cent higher seed yield over local check. This may be attributed to higher number of tillers/hill, higher number of effective panicles and higher number of grains/panicle in case of SR-4 as compared to farmers practices (Use of local variety, no use of the balanced dose of fertilizers, untimely sowing/ transplanting and no control measures adopted for pest management) of paddy cultivation. Similar findings were also observed [5-8].

3.2 Technology Gap

The technology gap is the gap between potential yield and yield of demonstration plots and were 6.65, 2.60, 1.70 and 0.50 q/ha during year2018, 2019, 2020and 2021respectively. Under the four-year FLD initiative, the average technology gap was 2.86 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation. This indicates the gap between technology evolved and technology adoption at farmer's field. In order to reduce this gap, location specific recommendations for varieties and timely sowing appear to be necessary. There is the need to educate the farmers regarding improved agricultural technologies so that the trend can be reversed [9]. Similar findings were observed by [8] and [5]

Table 1. Details of farmers of budgam district under FLD programme

Year	Number of Demos.	No. of clusters	Location	Block
2018-19	37	1	Hakermullah	Soibugh
2019-20	25	2	Hamchipora	Khag
2020-21	33	2	Arina	Watrihail
2021-22	38	2	Warasangum	Soibugh
Average	37			

Table 2. Comparison of cultural practices and SKUAST K recommended package of practices

Cultural operations	Prevailing Practices	SKUAST K recommended package of practices
Source of Seed	Local seed	NSP, SKUAST K
Seed quality	Small and non graded seed	Bold graded seed
Seed treatment	No seed treatment	Treated with Bavistin 50 WP @ 2g per litre of water for 1 kg of seeds.
Seed rate	2-2.4q/ha	60-80 kg /ha
Sowing time	1st week of April	1st week of April to 1st fortnight of May.
Method of sowing	Broadcasting	Line sowing
Fertilizer application	Broadcasting	Band application
Weed management	Manual weeding	Manual weeding +chemical Control.
Water management	Unscientific method	Scientific method
Control measures	No use of pesticides	Use of pesticides according to SKUAST-K recommended package of practices

Table 3. Yield, Technology gap, extension gap and technology index of rice (sr-4) in District Budgam

Year	No. of Demonstration	Yield (q/ha)						Yield increase (%)	% increase over check	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
		Demonstration			Check							
		Max.	Min.	Av.	Max.	Min.	Av.					
2018	22	86.5	80.2	83.35	55	43	50.0	40.00	66.70	6.65	33.35	7.39
2019	24	87.4	81.3	84.35	57	44	50.5	40.13	67.03	2.60	33.85	2.89
2020	28	88.3	82.5	85.40	58	45	50.6	40.74	68.77	1.70	34.80	1.89
2021	30	89.5	84.4	86.95	59	47	50.7	41.69	71.49	0.50	36.25	0.56
Mean	26	87.92	82.1	85.00	57.25	44.75	50.5	40.64	68.50	2.86	34.56	3.18

Table 4. Gross cost, gross return, net return and B:C ratio on paddy variety SR-4

	Check Plots				Demonstration Plots			
	Gross cost(Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C ratio	Gross cost (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C ratio
2018	40320	95000	54680	1.36	40000	128350	88350	2.21
2019	40500	95500	56000	1.38	40250	129350	89100	2.21
2020	40750	95600	56250	1.38	40500	130400	89900	2.22
2021	41000	95700	57150	1.39	40750	131950	91200	2.24
Mean		96800	54670	1.38	40375	130013	89637.5	2.22

Sale rate of paddy straw Rs. 45000/ha

3.3 Extension Gap

Extension gap is the difference between demonstration yield and Farmers yield and observed as 33.35, 33.85, 34.80 and 36.25q/ha during 2018, 2019, 2020 and 2021respectively. On an average extension gap of 34.56q/ha was observed which emphasized the need to aware the farmers about the high yielding varieties and about the latest technologies through trainings and method demonstrations. These findings are in accordance with [10].

3.4 Technology Index

The technology index indicates if the presented technique is feasible on the farmer's field. The technology index fluctuated between 7.39 and 0.56 percent (Table 3). During the four years of FLD programmes, an average technology index of 3.18 percent was found, demonstrating the usefulness of good technical intervention performance. This will hasten the deployment of proven technical interventions to improve paddy yield performance.This finding is in accordance with the findings of [11].

3.5 Economics

An analysis on economics (Table 4) revealed that SR-4 under FLD programme recorded higher gross returns (1,30,013 ha^{-1}), net returns (89,637.5ha^{-1})with a benefit-cost ratio of 2.22 as compared to 1.35 in case of local check .The average sale rate of paddy was Rs. 1000/q while the paddy straw accounts about Rs. 45000/ha. The increased benefit-to-cost ratio in demonstrated plots is attributable to higher yields obtained using upgraded technologies versus farmers' practises during the demonstrating years. [12] came up with similar results.

4. CONCLUSION

It is concluded from the study that under FLD programme the high yielding variety SR-4 along with improved technologies has remarkable impact on yield and economics of paddy (SR-4) in Budgam District. Thus, existing local variety of rice (China-1039) may be replaced with HYV SR 4 because of higher productivity and income. HYV SR-4 was found to be suitable since it fits well to the existing agro climatic zone and farming situation and also it had been appreciated by the farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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