Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; Sp9(2): 303-305
Received: 15-01-2020
Accepted: 16-02-2020

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Frontline demonstration on paddy variety KPR 1 by KVK in Chikkamagaluru district of Karnataka, India: An impact study

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Abstract
Paddy is an important cereal crop in Malanad region of Chikkamagaluru district, Karnataka. The productivity is low due to non-adoption of improved package of practices. Therefore, efforts have been made to demonstrate improved production technologies in paddy to increase productivity. The present study was carried out by Krishi Vigyan Kendra, Chikkamagaluru, Karnataka to assess the impact of frontline demonstration on popularization of paddy variety KPR-1. Results showed the paddy variety KPR 1 had highest grain yield (50.5 – 60.5q/ ha) under rainfed condition in hill zone of chikkamagaluru during kharif season (2016-17 to 2018-19). An average yield of 55.73 q/ha was recorded in frontline demonstration and in farmer practices it was just 44.67q/ha. Thus, the average technology gap, extension gap and technology index of 6.43, 11.07 and 10.10 percent were observed between demonstration and farmer practices. The average yield of paddy increased by 24.61 percent over farmers' practices.

Keywords: Extension gap, Technological gap, Paddy, KPR 1, FLD, Impact, Adoption Gap.

Introduction
Agriculture is one of the most important sector of the Indian economy. It is the only means of living for almost two third of workers in India's geographical area contributing about 14 % of India GDP. Paddy is one among the oldest cultivated crop as evident from Vedic literature & Archeological excavation. Paddy (*Oryza sativa*) is the most widely grown tropical cereal and over 400 million tonnes of milled rice is produced each year. The importance of paddy has been recognized for many countries. In India it was once known as "Dhanya" meaning the sustainer of the human race. Rice is a staple food of south Asia and a vast number of people are employed in its cultivation. India is one of the world's largest producers of white rice and brown rice.

Paddy is the only rainfed cereal crop cultivated in hill zone of chikkamagaluru district during kharif season. Paddy cultivation in chikkamagaluru district has steadily shrunk due to many factors, including the growth of cash crops. Cultivation of paddy area in chikkamagaluru district has reduced to 44.56 per cent in the 2015. The crop's economic viability has steadily dropped due to the growth of more profitable cash crops. Many paddy lands in the district has reduced leaving fewer work days for farmers skilled in paddy cultivation. Cash crops now dominate the paddy fields with crops like coffee, pepper, arecanut, cardamom constituted 66 per cent of total cultivated area in 2015-16. Food crops like rice accounted for just 44 per cent of the total cultivated area in the same period. The district have a paddy area of 24275 ha with production 2 lakh tonnes & productivity 45 q/ha. (Statistical bulletin, 2015-16). Keeping this in view, krishi vigyan kendra, mudigere chikkamagaluru district demonstrated frontline demonstration on improved paddy variety KPR 1 to increase the Paddy production in chikkamagaluru district, karnataka".

Methodology
Frontline demonstration (FLD's) on paddy variety KPR1 was conducted by Krishi Vigyan Kendra, mudigere during the year 2016-17 to 2018-19 in different villages like Gonibeedu hosahalli, Bannuru, siguvani and badavanadinne of chikkamagaluru district. 100 number of demonstration was conducted in four villages. In general soil of the area under study was loam or sandy loam with low to medium fertility status and acidic with Ph range from 5.5 to 6.5. Paddy Variety KPR 1 is resistance to 'paddy blast, grows upto 110 to 115 centimetre long, duration of 145 days of harvest with a potential yield 0f 55 – 62 quintal per hectare. The component demonstration of frontline technology in paddy was comprised

of improved variety KPR 1, Proper tillage, proper seed rate, sowing method, balance dose of fertilizer (100:50:50 NPK kg/ha), weed management and protection measures (Table 1). Total 40ha area was covered in three consecutive years. In the demonstration, one control plot was also kept where farmers practices was carried out. The FLD was conducted to study the technology gap between the potential yield and demonstrated yield, extension gap between demonstrated yield and yield under existing practices and technology index. The yield data was collected from both the demonstration and farmers practice by random crop cutting method and analyzed by using simple statistical tools. The technology gap, extension gap and technology index (Samui *et al*., 2000) [5] were calculated by using formula as given below.

$$\text{Percent increase yield} = \frac{\text{Demonstration yield- Farmers yield}}{\text{Farmers yield}} \times 100$$

Technology gap = Potential yield - Demonstrated yield

Extension gap = Demonstrated yield - Yield under existing practices.

$$\text{Technology index} = \frac{\text{Potential yield – Demonstrated yield}}{\text{Potential yield}} \times 100$$

Results and discussion

The gap between the farmer practice and recommended technologies of paddy in chikkamagaluru district is presented in table 1. Full gap was observed in case of use of HYVs, seed treatment, planting seedlings, fertilizer dose and weed management, while partial gap was observed in plant protection measures which definitely was the reason of not achieving potential yield. Farmer was not aware about recommended technology. Farmers in general used local or low yielding varieties - instead of the recommended high yielding, and disease resistant varieties. Unavailability of seed in time and lack of awareness were the main reasons. Farmers followed manual planting/broadcast method of sowing against the recommended line sowing or machine transplanting and because of this, they applied higher seed rate than the recommended leading to higher cost of cultivation with low yield.

Yield

During three years of front line demonstration implementation of improved variety KPR 1 with technologies results obtained are presented in table 2. The results revealed that due to front line demonstration on paddy variety KPR 1 recorded an average yield of 55.73q/ha under demonstrated plots as compared farmers practice 44.67 q/ha. The highest yield in the FLD plot was 60.5 q/ha and in farmers practice 46.50 q/ha during in 2016-17 and lowest yield was recorded in 2018-19 due to excess rainfall. This results clearly indicated that the higher average grain yield in demonstration plots over the years compare to local check due to knowledge and adoption of paddy variety KPR 1 with adopting mechanization, timely sowing, seed treatment with saaf @2 g/kg of seeds, use of balanced dose of fertilizer (100 kg N+50kg P2O5+50 kg K2O /ha), method and time of sowing, timely weed management (preemergent weedicide – bisulfuran methyl and pertialachlor) and need based plant protection. The average yield of paddy (KPR 1) increased 24.61 percent over farmer practice.

Table 1: Technological intervention and farmers practices under FLD on paddy variety KPR 1

Particulars	Technological intervention	Existing practices	Gap
Variety	KPR 1	Local or low yielding	Full gap
Land preparation	Three ploughing and pudling	Three ploughing and pudling	Nill
Seed rate	45 kg/ha	75 kg/ha	Full gap
Seed treatment	Trichoderma@5g/kg seed or Saaf @ 2 g/kg seed	-	Full gap
Transplanting	Machine transplanting	Manual	Full gap
Fertilizer dose	100: 50: 50 Kg NPK/ha	150kg DAP	Imbalance
Weed management	Londex power @10 kg/ha	Butachlor @ 20kg/ha and manual	Lower cost with no manual weeding
Plant protection	Need based	No	Full gap

Table 2: Gap in grain yield production and economic impact of paddy variety under FLDs

Year	Variety	No. of FLDs	Area (ha)	Avg. yield (q/ha)		% increase over FP	Technological gap (q/ha)	Extension gap (q/ha)	Technology Index (%)	Net return (Rs/ha)		B C ratio	
				Demo	FP					Demo	FP	Demo	FP
2016-17	KPR 1	25	10	60.5	46.5	30.1	1.5	14	2.41	79825	47726	1.77	0.88
2017-18	KPR 1	25	10	56.2	45.3	24.06	6.3	10.9	9.35	72730	45745	1.62	0.85
2018-19	KPR 1	50	20	50.5	42.2	19.66	11.5	8.3	18.54	63325	40630	1.41	0.75
Average		33.33	13.33	55.73	44.67	24.61	6.43	11.07	10.10				

*FLD- Frontline demonstration, FP – Farmer practice

The yield of demonstrated (KPR 1) paddy could be increased over the yield obtained on farmers practices (Use of non-descriptive local variety, no. use of the balanced dose of fertilizers, untimely sowing/ transplanting and no control measures adopted for pest management) of paddy cultivation. The above findings are in similarity with the findings of Singh (2018) [9].

Technology gap

The differences between potential yield and yield of demonstration plots were 1.50, 6.30 and 11.50 q/ha during 2016-17, 2017-18 and 2018-19 respectively on an average technology gap under three year FLD programme was 6.43 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation.

Extension gap

Extension gap of 14, 10.9 and 8.30 q/ha was observed during 2016-17, 2017-18 and 2018-19 respectively. On an average extension gap was observed 11.07q/ha which emphasized the need to educate the farmers through various extension means *i.e*. front line demonstration for adoption of improved paddy variety and protection technologies to revert the trend of wide

extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap.

Technology index

The technology index shows the feasibility of the demonstrated technology at the farmer's field. The technology index varied from 2.41 to 18.54 percent (Table 2). On an average technology index was observed 10.10 percent during the three years of FLD programmes, shows the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of paddy.

Economic return

The cultivation of paddy under adopting high yielding KPR 1 variety gave higher net return of Rs 79825, 72730 and Rs.63325 per ha respectively as compared to farmers practices with Rs. 47726, 45745 and 40630 respectively during 2016-17, 2017-18 and 2018-19. Similar findings were observed by kirar *et al*., (2016). The benefit cost ratio of paddy cultivation under improved cultivation practices were 1.77, 1.62 and 1.41 as compared to 0.88, 0.85 and 0.75 under farmers practices. This may be due to higher yield obtained under improved technology compared to local check (farmers practices) this finding is in corroboration with the findings of Mokidue *et al*., (2011) [3], The producers of FLD had a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (interventions) under real farming situation, which they have been help in transfer of technology for long time.

Impact of technology (Horizontal Spread)

The technology had a greater impact in adoption of blast resistant paddy variety KPR 1 to an extent of 830ha in past three years. The variety had a quality parameters like blast resistance, early maturity (compare to local varieties by 15 days) and higher yield potential up to 62q/ha. The demonstration also had promotion of mechanisation starting from transplanting, weeding, harvesting, processing and paddy straw bundler which reduced the cost of cultivation to Rs. 36,881/ha compare to manual cultivation Rs. 47,831 per hectare. The demonstration had a higher paddy yield of 60.5q/ha compared to manual with 46.5q/ha which had a benefit cost ratio of 1.77 & 0.88, respectively. The technology had a greater impact with farming community for horizontal spread and the cost of cultivation had been reduced by saving of Rs. 10950/ha. The Improved technology and variety KPR 1 had been linked to seed chain with line department to get subsidy to farmers for both paddy seeds and mechanisation.

Economic gains to district

In Chikkamagaluru district Mudigere taluk alone have an paddy area of 1600 ha where by adoption of this above mentioned technologies Rs. 160 lakh profit can be gained by saving the cost of cultivation by Rs. 10,000 per hectare.

Conclusion

There has been significant change in the income of farmers owing to adoption of paddy cultivation with variety KPR 1 through mechanisation. This is an evident from the income realised by the farmers from three years in comparison with local variety and manual cultivation. This demonstration had a greater acceptance with variety, weedicide application and mechanization by realizing higher profitability. In the years to come paddy farmers would contribute much to the district economy.

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