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Increasing the Productivity and Profitability of Paddy through Front Line Demonstrations in Irrigated Agro Ecosystem of Kaymore Platue and Satpura Hills

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ABSTRACT

Krishi Vigyan Kendra laid down Front Line Demonstration in the year 2010-11 and 2011-12 introducing new, high yielding and scented variety "Pusa Sugandha-3" and applying scientific practices in their cultivation. The FLDs were carried out in village "Dainiha" of Sidhi district in supervision of KVK scientist. The productivity and economic returns of paddy in improved technologies were calculated and compared with the corresponding farmer's practices (local check). Improved practices recorded higher yield as compared to farmer's practices. The improved technology recorded higher yield of 30.83 q/ha and 32.65 q/ha in the year 2010-11 and 2011-12, respectively than 22.13 and 24.21 q/ha. The average yield increase was observed 37.15 per cent. In spite of increase in yield of paddy, technology gap, extension gap and technology index existed. The improved technology gave higher gross return (37020 & 39180 Rs./ha), net return (16820 & 18920 Rs./ha) with higher benefit cost ratio (1.83 & 1.93) as compared to farmer's practices. The variation in per cent increase in the yield was found due to the poor management practices, lack of knowledge and poor socio economic condition. Under sustainable agricultural practices, with this study it is concluded that the FLDs programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of paddy adoption.

Keywords: Scented Paddy, FLDs, Economic impact, Adoption, B:C ratio

INTRODUCTION

Rice is the staple food of over half of the world's population. It is the predominant dietary energy source for 34 countries in Asia, Pacific, North and South America and Africa (Singh *et al.*, 2009). Rice provides 20% of the world's dietary energy supply. It is the most important food crop of the developing world and the staple food for more than 60% of the Indian population (Anomymous, 2012). It is one of the most important food crops of India in term of area, production and preferred food item throughout the country (Singh *et al*., 2012). India is the second largest producer and consumer of rice in the world, where production crossed the mark of 100 million MT in 2011-2012, which accounts for 22.81% of global production in that year. India needs to produce 120 million tons by 2030 to feed its one and a half billion plus population (Anonymous, 2013). The scenario needs cutting edge technologies for increasing rice production in India. Although productivity of rice has increased from 1984 kg per hectare in 2004-2005 to 2372 kg ha-1 in 2011-2012, due to development of high yielding varieties with site specific technology, but huge technological and extension gaps are constantly being reported, which tantamount to identify causes through in-depth research.

Krishi Vigyan Kendra an innovative science based institution plays an important role in bringing the research scientists face to face with farmers. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different micro farming situation at district (Das, 2007). Front line demonstration is a long term educational activity conducted in a systematic manner in farmer's field to worth of new practices/ technology. Farmers in India are still producing crops based on the knowledge transmitted to them by their forefathers leading to a grossly unscientific agronomic, nutrient management and pest management practices. As a result of these, they often fail to achieve the desired potential yield of various crops and new varieties. The baseline survey was conducted by Krishi Vigyan Kebdra and it was found that farmers were using old varieties without proper use of chemical fertilizers, herbicides and pesticides. Keeping in view the constraint, Krishi Vigyan Kendra, Sidhi conducted front line demonstration on paddy variety Pusa Sugandha-3 with crop management practices under rain fed condition.

MATERIALS AND METHODS

Front line demonstration (FLDs) on paddy variety Pusa Sugandha-3 was conducted by Krishi Vigya Kendra, Sidhi (M.P.) during the period from 2010-11 and 2011-12 in village Dainiha of district Sidhi. The total 10 number of demonstration was conducted in this village. In general soil of the area under study was sandy loam with low to medium fertility status. The component demonstration of front line technology in paddy was comprised i.e. improved variety Pusa Sugandha-3, proper tillage, proper seed rate and

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sowing method, balance dose of fertilizer (100:60:40:25 (N:P:K:Zn), use of PSB @ of 5g/kg of seed as seed treatment, proper irrigation, weed management and protection measure (Table 1).

Table 1: Differences between technological intervention and farmers practices under FLDs in paddy

Particulars	Technological intervention	Existing practices	Gap
Variety	Pusa Sugandha -3	Old and degenerated	Full gap
Land preparation	Three ploughing	Three ploughing	Nil
Seed rate	10 kg/ha	100 kg/ha	Higher seed rate
Sowing Technique	Transplanting	Broadcasting	Full gap
Seed treatment	*PSB* powder@ 5g/kg of seed	No seed treatment	Full gap
Fertilizer dose	100:60:40:25 (N:P:K:Zn)	60:30:0:0 (N:P:K:Zn)	Partial Gap
Weed management	Butachlor @ 1.5 l /ha	No weeding	Full gap
Plant protection	Need based plant protection measure	No plant protection	Full gap

The total 08 ha area was covered in two consecutive years. In the demonstration, one control plot was also kept where farmers practices was carried out. The FLDs was conducted to study the technology gap between the potential yield and demonstrated yield, extension gap between demonstrated yield and yield under existing practice and technology index. The yield data were 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 technological index (Samui *et al.*, 2000) were calculated by using following 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 practice

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

RESULTS AND DISCUSSION

The gap between the existing and recommended technologies of paddy in district Sidhi was presented in table 1 and 3. Full gap was observed in case of use of HYVs, sowing method, seed treatment and weed management and partial gap was observed in fertilizer dose and plant protection measure, which definitely was the reason of not achieving potential yield. Farmers were not aware about recommended technologies. Farmers in general used local or old-age varieties instead of the recommended high yielding resistant varieties. Unavailability of seed in time and lack of awareness were the main reasons. Farmers followed broadcast method of sowing or old days (25-30 days) seedlings of paddy and closer spacing (10-15 cm) against the recommended line sowing, newly seedlings (15-20 days) and proper spacing (15-20 days) and because of this, they applied higher seed rate than the recommended.

Paddy Yield

During two years of frontier technologies results obtained are presented in table 2. The results revealed that the FLDs on paddy an average yield was recorded 31.75 q/ha under demonstrated plots as compare to farmers practice 23.17 q/ha. The highest yield in the FLDs plot was 32.65 q/ha and in farmers practice 24.21 q/ha during 2011-12. 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 full package of practices i.e. appropriate varieties such as Pusa Sugandha-3, timely sowing, proper spacing, seed treatment with *PSB* @ 5g/kg of seed, use of balanced dose of fertilizer (100:60:40:25 (N:P:K:Zn)), method and time of sowing, timely weed management and need based plant protection. The average yield of paddy increased 37.15 per cent. The yield of paddy could be increased over the yield obtained under farmers practices (use of non-descriptive local variety, no use of the balanced dose of fertilizer, untimely sowing and no control measure adopted for pest management) of paddy cultivation. The above findings are in similarity with the findings of Singh *et al*, (2015).

Technology gap

The technology gap, the differences between potential yield and yield of demonstration plots were 9.15 and 7.35 q/ha during 2010-11 and 2011-12 respectively. On an average technology gap under two year FLDs programme was 8.25

Table 2: Yield and yield attributing character of paddy variety Pusa Sugandha-3 under FLDs

Year	Trial (No.)	Area (ha)	Average yield (q/ha)		Per ce nt increase in yield	No. of Panicle/hill	
			Trial	Farmers practice		Trial	Farmer's Practice
2010-11	10	4.0	30.85	22.13	39.4	27.4	13.3
2011-12	10	4.0	32.65	24.21	34.9	35.0	18.0
Total/Average	20	8.0	31.75	23.17	37.15	31.2	15.65

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 8.75 and 8.44 q/ha was observed during 2010-11 and 2011-12 respectively. On an average extension gap was observed 8.59 q/ha which emphasized the need to educate the farmers through various extension means i.e. front line demonstration for adoption of improved production 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 farmers field. The technology index varied from 22.9 and 18.4 per cent (Table 3). On an average technology index was observed 20.65 per cent during the both the years of and FLDs programme, which 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.

Table 3: Technology & Extension gap and Technological Index of paddy variety Pusa Sugandha-3 under FLDs

Year	Trial (No.)	Area (ha)	Technology gap (q/ha)	Extension gap (q/ha)	Technological index (%)
2010-11	10	4.0	9.15	8.75	22.9
2011-12	10	4.0	7.35	8.44	18.4
Total/Average	20	8.0	8.25	8.59	20.65

Economic return

The inputs and outputs prices of commodities prevailed during the study of demonstration were taken for calculating net return and benefit: cost ratio (Table 4). The cultivation of paddy under improved technologies gave higher net return Rs. 16820 and 18920 per ha in 2010-11 and 2011-12 respectively as compared to farmers practices. Similar findings were reported by Kirar *et al,* (2006). The benefit: cost ratio of paddy cultivation under improved cultivation practices were 1.83 and 1.93 as compared to 1.31 and 1.43 under farmer's practice. This may be due to higher yield obtained under improved technologies compared to farmer's practice. This finding is in corroboration with the findings of Mokidue *et al,* (2011).

Table 4: Economic Impact of paddy variety Pusa Sugandha-3 under FLDs

Year	Trial (No.)	Area (ha)	Gross Income (Rs./ha)		Net Return (Rs./ha)		B:C Ratio	
			Trial	Farmers practice	Trial	Farmer's Practice	Trial	Farmer's Practice
2010-11	10	4.0	37020	26556	16820	6356	1.83	1.31
2011-12	10	4.0	39180	29052	18920	8852	1.93	1.43

CONCLUSION

The FLD produces a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time. This could be circumventing some of the constraints in the existing transfer of technology system in the district, Sidhi of Madhya Pradesh. The productivity gain under FLD over existing practices of paddy cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of paddy in the district. The constraints faced by the farmers were different for different technologies. Efforts should, therefore, be made by the extension agencies in their transfer of technology programmes to consider the constraints as perceived by the farmers in this investigations as well as personal. Therefore, for enhancing the production & productivity of paddy crop, strategy should be made for getting the more and more recommended technologies adopted by the farmers.

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