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Promotion of short duration rice variety *Gotra Bidhan-1 (IET 17430)* through frontline demonstrations in *terai* region of West Bengal

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ABSTRACT

Rice is a main crop in the terai region of West Bengal, India where it grows extensively under rainfed condition during monsoon months. The participatory approaches revealed the real problem associated with rice cultivation and it has been found that the farmers of this geographic regions are in urgent need of a short duration high yielding rice variety in lieu of the traditional long duration variety MTU-7029 to catch the rabi season in time. Considering the factual need of the farming community, the front line demonstration has been planned by the KVK and FLDs were conducted in an area of 56.53 hectares involving 306 farmers in eleven adopted villages of the KVK across five different blocks of Coochbehar district. It was revealed that the yield of newly introduced rice variety Gotra Bidhan-1(G-B-1) increased successively over the years in demonstration plots and with little increase in cost of cultivation under demonstration a higher return was achieved. The technology gap, ranging between 14.0-7.0 q ha^{-1} with an average of 10.83 q ha^{-1}, reflected the farmers' cooperation in carrying out the demonstrations with encouraging results. The extension gap increased slightly during the successive years (8.50 to 9.00 during 2010-11 and 9.00 to 11.50 during 2011-12). The successive decreased value of technology index reflected the feasibility of the variety in farmers' field.

Key words: Extension gap, frontline demonstration, Gotra Bidhan-1, technology index

Rice crop holds the key for food security of West Bengal as well as the country. In West Bengal presently the crop is grown in 59.35 lakh hectare areas with a production of 150.37 lakh tonnes (Anon., 2010). Unlike many other places of the state *terai* region is also extensively occupied by rice crop during monsoon months. Mostly the farmers of this region are going for cultivation of medium-long duration (140-150 days) rice varieties as rainfed crop. MTU-7029, Mashuri, Ranjit, BPT-5204, Pratiksha, etc are the popular rice varieties mostly grown in this region; but among these MTU- 7029 is the predominant variety which covers more than 75% of the rice growing area. As the cropping systems followed here are rice-based, the crops grown during *rabi* season after rice face the problem of late sowing; due to which the productivity of *rabi* field crops remain low. There is hardly any scope to replace the rice crop considering the precipitation of more than 2200 mm rainfall during the monsoon season. However, multiple cropping system using short duration rice varieties and intensive input management may enhance the land use efficiency and increase the production level if sowing of *rabi* crops are made in time (Khanda *et al.*, 2005). Hence, there remains a scope to introduce a short duration high yielding rice variety in the existing rice-based cropping system in *terai* region of West Bengal.

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The participatory approaches are followed here to identify the real problem associated with the rice cultivation during monsoon season, it has been noticed that the farmers are in factual need of a short duration high yielding rice variety. If the farmers are able to harvest their rice crop 25-30 days earlier than usual harvesting time of the traditional varieties then they could be able to sow their next crop in time during *rabi* season. Under the circumstances, the front line demonstration had been planned to assess the performance of the newly introduced rice variety Gotra Bidhan-1(G-B-1) under real farm situation.

MATERIALS AND METHODS

Frontline demonstrations were conducted to demonstrate the production potential of newly released variety or proven technologies in farmers' field under real farming situation. These types of on-farm demonstration are so far the most effective extension methods (Chizari *et al.*, 1999; Eke and Emah, 2001). Technology transfer refers to the spread of new ideas from originating sources to ultimate users (Prasad *et al.*, 1987). The available technology should reach the farmers, the ultimate users through KVK activities and adoption of the technology by the farmers will reflect the feasibility of the technology (Mazumder *et al.*, 2012).

The study was conducted during *kharif* season in 11 adopted villages (Khagrabari, Bararangras, Barashakdal, Sakunibala, Dhalaguri, Dhangdhinguri, Barosolmari, Maruganj, Elajaner Kuthi, Morongabari, and Bhogdabri- Kesribari) across the five different blocks (Coochbehar- I and II, Dinhata-II, Mathabhanga-I and Tufanganj-I) of Coochbehar district for wider dissemination and popularization. Before demonstration, group meetings were conducted in each and every village where the problems associated with medium-long duration rice varieties were discussed and the advantages of growing a short duration variety were addressed. A probable list of interested farmers has been prepared from the meeting. Further, KVK scientists visited the land of the selected farmer in presence of the villagers. Before implementing the programme, the skill-training programmes were organized involving the selected farmers. Field days and other extension programmes were also organized inviting the farmers of the said and nearby villages, Krishi Projukti Sahayaks (KPSs) and important personalities of the locality. The fertilizer dose was fixed on the soil test values. Average N status of experimental site was medium whereas P and K status was low. Foliar application of B and Zn was not preferred considering erratic and uneven distribution of rainfall in this region.

In three years FLDs were conducted in an area of 56.53 hectares involving 306 farmers. The demonstrations were conducted on block concept with an area varying from 0.4-0.7 ha involving 7-10 farmers per block. Following packages of practices were adopted for raising high yielding short duration rice crop variety Gotra Bidhan-1 while front line demonstration (Table1).

Table 1: Package of practices adopted for demonstration and farmers' practice

Particulars	Demonstration	Farmers' practice
Farming situation	Rainfed medium land	Rainfed medium land
Variety	Gotra Bidhan-1	MTU-7029
Seed treatment	Tricyclazole 75WP@ 2g kg^{-1} of seed	Carbendazim @ 2 g kg^{-1} of seeds
Time of sowing in the nursery	6-12 June	4-5 June
Seedlings' age at transplanting	19-22 days	32-38 days
Time of transplanting	First week of July	Mid. July-Mid. August
Fertilizer application	50-30-30 (N-P-K);Use of B (10 kg ha^{-1} of borax) an Zn ($ZnSO_4$ @ 25 kg ha^{-1}) during final land preparation	60-30-30(N-P-K); no application of micronutrients
Plant protection	Two rounds of spray of Tricyclazole 75WP, each @ 350g ha^{-1} before flowering	Indiscriminate use of pesticides as prescribed by local pesticide retailers
Harvesting	110-115 days	140-150 days

Data on grain yield were collected from both demonstration and control plots. Technology gap, extension gap and technology index were worked out using the formulae given by Samui *et al*. (2000). The formulae are cited below:

Technology gap (q ha^{-1}) = Potential yield (q ha^{-1}) - Demonstration yield (q ha^{-1})

Extension gap (q ha^{-1}) = Demonstration yield (q ha^{-1}) - Farmaers' yield (q ha^{-1})

Technology Index (%) = (Potential yield - Demonstration yield) /Potential yield × 100

RESULTS AND DISCUSSION

The yield of newly introduced rice variety G-B-1 was increased successively over the years in demonstration plots. The maximum demonstration yield (46.50 q ha^{-1}) was achieved during 2011-12, which was17.72% higher than the demonstration yield of 2009-10 (39.50q ha^{-1}). Three years' average demonstration yield of rice variety G-B-1 was recorded as 42.66q ha^{-1} (Table 2). Three consecutive years (2009-10 to 2011-12) of demonstration with the rice variety G-B-1 revealed that increase in yield was from 27.27-32.85 per cent with the mean of 29.27%

Table 2: Yield performances of G-B-1 under demonstration

Year	No. of demonstrations	No. of farmers involved	Area (ha)	Potential yield (q ha^{-1})	Demo. yield (q ha^{-1})	Local check (q ha^{-1})	Yield increment (%)
2009-10	17	63	9.60	53.5	39.5	31.0	27.41
2010-11	30	91	18.33	53.5	42.0	33.0	27.27
2011-12	43	152	28.60	53.5	46.5	35.0	32.85
Mean				**53.50**	**42.66**	**33.00**	**29.27**

Table 3: Comparison of yield attributes of rice between demonstration and control plots

Yield attributes	Demonstration	Farmers' practice (control)
No. of matured panicles m^{-2}	275-290	220-240
No. of filled grains panicle^{-1}	160-185	140-150
Test weight (g)	23-23.5	22.5-23.5

(Table 2). The results clearly speak of the positive effects of frontline demonstration over existing practice towards the enhancement of yield of rice with its positive effects on yield attributing characters. The number of matured panicles m^{-2} as well as number of filled grains panicle^{-1}are the two major yield attributing characters showed a significant increase under demonstration as compared to the control plots (Table-3). The variation in yield in the successive years could be attributed to variation in climatic condition prevailing during the crop growth period. Depending upon the farming situation specific interventions may have greater implication in enhancing system productivity (Mukherjee, 2003).

As far as production economics are concerned (Table 4), the data clearly indicated the advantages of growing newly introduced variety G-B-1 over the traditional local varieties. With little increase in cost of cultivation under demonstration, a higher return could be achieved. In three years of study, the net return and benefit-cost ratio were much higher in demonstration plots over the control plots. The variation in net return and benefit-cost ratio in the successive years of the study may be attributed to the variation in the price of agri inputs and produce as well.

The technology gap, ranging from 7.0-14.00 q ha^{-1} with an average of 10.83 q ha^{-1}, reflected the farmers' cooperation in carrying out the demonstrations with encouraging results (Table 5). The differences in technology gap may be attributed to variability in soil status and prevalent weather condition.

The extension gap increased slightly in the successive years (8.50 - 9.00 during 2010-11 and 9.00 -11.50 during 2011-12).The increasing trend of

Table 4: Comparative economics of rice cultivation between demonstration and farmers' practice

Year	Demonstration				Farmers' practice (control)			
	Cost of cultivation (Rs.ha^{-1})	Gross return (Rs.ha^{-1})	Net return (Rs.ha^{-1})	B:C	Cost of cultivation (Rs.ha^{-1})	Gross return (Rs.ha^{-1})	Net return (Rs.ha^{-1})	B:C
2009-10	16250	33575	17325	2.36	14500	26350	11850	1.81
2010-11	17250	46200	28950	2.67	14800	27625	12825	1.87
2011-12	18200	46500	28300	2.55	15100	31500	16400	2.09

Table 5: Technology gap, extension gap and technology index in rice (var.G-B-1) under FLDs

Year	Technology gap (q ha^{-1})	Extension gap (q ha^{-1})	Technology index (%)
2009-10	14.0	8.50	26.16
2010-11	11.5	9.00	21.49
2011-12	7.0	11.50	13.08
Mean	**10.83**	**9.67**	**20.24**

extension gap reflected that there is a need to educate farmers for adoption of newly introduced short duration rice variety to reverse the trend. Wider adoption of a technology may reduce the extension gap.

Technology index was recorded to be decreased over the successive years of study. The technology index was varying from 26.16-13.08% with an average of 20.24%. The successive decreased value of technology index reflected the feasibility of the variety, G-B-1 in farmers' field following improved package of practices. The lower the values of technology index more will be the feasibility of the demonstration (Jeengar *et al*., 2006; Sager and Chandra, 2004).

From the study it can be concluded that Frontline Demonstration can be considered as an effective tool for promotion of short duration rice variety Gotra Bidhan-1 in *terai* region of West Bengal.

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