Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue [3] 2017: 323-327

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.533
Universal Impact Factor 0.9804
NAAS Rating 4.95
FULL LENGTH ARTICLE **OPEN ACCESS**

Promotion Of Short Duration Rice Variety Through Front Line Demonstration In Upland Condition Of Eastern Uttar Pradesh

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ABSTRACT
Rice is a main crop of eastern Uttar Pradesh where it grows extensively during monsoon months. The participatory approaches revealed the problem associated with rice cultivation and it has been found that there is need of a short duration high yielding rice variety in lieu of the traditional medium long duration varieties like Sarjoo 52, NDR 359, BPT 5204, Mehsuri, etc to catch the rabi season in time. Considering the factual need of the farming community, front line demonstration has been planned by the KVK and conducted in an area of 30.0 hectares involving 75 farmers in five adopted villages in five different blocks of Mau district. The results show that the yield of newly introduced rice variety NDR 1045-2 increased successively over the years in demonstration plots and with little increase in cost of cultivation under demonstration a higher net return was achieved The extension gaps for improved technologies were more than technology gaps and also the technology index was low, highlighted the need to educate the farmers in rapid adoption of improved technologies in rice crops. These results indicate that there are great possibilities of increasing productivity and profitability of rice crop with adoption of improved techniques in eastern plain zone of Uttar Pradesh.
Key Words: *Rice, Front line demonstration, Technology gap, Extension gap, Technology index, NDR 1045-2*

Received 29.07.2017 Revised 12.08.2017 Accepted 27.08. 2017

INTRODUCTION

India is one of the leading rice producing countries of the world with cultivated area varies from 38 to 43 million hectares and productivity of 2.6 t/ha only (Singh *et al*, 2009 and Singh *et al.*, 2013). Rice is the major crop in Uttar Pradesh and is grown in about 5.60 million hectare which comprises of 13.5% of total rice in India. The area has been fluctuating between 5.2 and 6.1 million ha during the last seven years. Annual rice production is around 12 million metric ton in the state. The average productivity of the state is 2.0 t/ha. However, the average productivity of irrigated areas is more than 3.0 t/ha while upland area's productivity is 1.00 t/ha only. Rainfed areas are vulnerable to the vagaries of rain and therefore, the fluctuations in their output. The average rice productivity from rainfed ecology is low and fluctuates between 0.5 to 1.6 tonnes/ha. The irregularites in south-west monsoons do result in moderate to severe droughts in rainfed rice growing areas especially in eastern Uttar Pradesh. Such moisture stress with varying duration may occur during any stage (vegetative, flowering and terminal) of the crop growth in uplands. Effects at inintial and terminal stage depends on sowing time and growth duration of the varieties. Unlike many other places of the state rainfed region is also extensively occupied by rice crop during monsoon months. Mostly the farmers of this region cultivated medium duration (120-140 days) rice varieties as rainfed crop. Sarjoo 52, NDR 359, BPT-5204, Mehsuri, etc are the popular rice varieties mostly grown in this region. There is hardly any scope to replace the rice crop in the uplands as market supports the rice commodity, however, pulses and oilseeds could be introduced under rainfed upland conditions if government supports the procurement of pulses. Growing short duration rice varieties and intensive input management in upland rice eosystem may enhance the land use and water efficiency and increase the overall production level of unit area if sowing of *rabi* crops was done 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 rainfed uplands of eastern Uttar Pradesh.

The participatory approaches are followed here to identify the real problem associated with the rice cultivation during monsoon season. It was found that farmers were using old long duration varieties without proper use of chemical fertilizers, herbicides and pesticides. 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. Keeping in view the constraint, Krishi Vigyan Kendra, Mau conducted on farm trials and front line demonstrations on paddy variety NDR 1045-2 with crop management practices under rainfed condition.

MATERIALS AND METHODS

On farm trials (OFT) and front line demonstrations (FLDs) on paddy variety NDR 1045-2 was conducted by Krishi Vigya Kendra Mau, Uttar Pradesh (India) during the period from 2014-15 and 2016-17 in five villages *viz.* Basarikhpur, Khukhundwa, Dighera, Rampur Sohne and Bara of five different blocks in the district. Front line demonstrations were conducted to demonstrate the production potential of upland variety or proven technologies in farmers' field under real farming situation. These types of on farm demonstration are so far the most effective extension tools. 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 five adopted villages across the five different blocks (Ratanpura, Kopaganj, Ghosi, Badraon, Mohammadabad Gohna) of Mau district for wider dissemination and popularization. Before demonstration, group meetings and problem solving sessions were conducted in each and every village where the problems associated with prevailing rice varieties were discussed and the advantages of growing short duration variety were addressed. Probable lists of interested farmers have 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. The fertilizer dose was fixed on the soil test values. The fertility status of the demonstration plots was medium in N, low in P and medium in K.

The component demonstration of front line technology in paddy was comprised of improved variety NDR 1045-2, proper tillage, proper seed rate and direct seeding through seed cum ferti seed drill, balance dose of fertilizer (100 kg Nitrogen + 40 kg P_2O_5 and 40 kg K_2O/ha), seed treatment with streptocycline and carbendazim, weed management and protection measure (Table 2). An area of 45.0 ha was covered in five consecutive years. In the demonstration, one control plot was also kept where farmers practices was carried out. The demonstrations were conducted on block concept with an area varying from 0.4 ha involving 10 farmers per village or block.

The OFTs and 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 the 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 equations as given below:

Technology gap (q/ha) = Potential yield (q/ha) - Demonstration yield (q/ha)

Extension gap (q/ha) = Demonstration yield (q/ha) – Farmer's yield (q/ha)

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

RESULTS AND DISCUSSION

Selection of short duration varieties for rainfed condition in rice can improve productivity of crop. Suitable varieties with good agronomic practices can overcome the effects of biotic and abiotic stresses. The technological gap between the existing and recommended technologies of rice in district Mau is presented in Table 1. Full technological gap was observed in case of use of HYVs, seed treatment, sowing method and weed management, while partial gap was observed in seed rate, sowing & harvesting time, fertilizer dose and plant protection measure, causes the reason for low yield. Farmers were not aware about the advanced frontier technologies. Farmers in general used old-age long duration varieties instead of the recommended high yielding short duration varieties. Unavailability of varieties, technical information and lack of awareness were the main reasons for shortfall. Farmers followed nursery method of sowing and transplanted old age nursery (25-30 days) seedlings of paddy and closer spacing (15X15cm) against the recommended direct dry seeding and proper spacing (20-25 cm row to row spacing).

Yield Analysis

Results of front line demonstrations (Table 2) conducted during 2014-15 to 2016-17 in 30 ha area on farmers' fields of five villages of Mau district under upland conditions indicated that average paddy yield was recorded 35.50 q/ha under demonstrated plots as compared to existing farmers practice of 21.60 q/ha. The highest yield was 36.7 q/ha in plots of FLDs and in farmers practice 23.2 q/ha during 2015-16. The fluctuation in the yields of rice was due to the environmental factors under the study period. These results clearly indicated higher average grain yield in demonstration plots compared to local check was due to knowledge of full package of practices and adoption gained by farmers during the due course of time. The yield of introduced rice variety NDR 1045-2 was increased successively in demonstrated plots as compared to control plots. Average demonstration yield (35.5 q/ha) was 64.39 per cent higher than the existing farmers' practice yield of 21.60 q/ha. The yield of rice could be increased over the yield obtained under farmers practices was mainly due to use of high yielding varieties, proper establishment method, balanced fertilizer, proper and judicious weed and pest management. The above findings are in similarity with the findings of Singh (2002), Verma *et al.* (2015) and Singh *et al.* (2015). Three years (2014 to 2016) of front line demonstration with the rice variety NDR 1045-2 revealed that increase in yield over existing farmers' practice was 58.19 to 76.00 per cent with the mean of 64.39 per cent towards the enhancement of yield of rice. 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; Mitra *et al.*, 2014; Verma et al. 2016).

Technology gap analysis

The data depicted in Table 3 revealed that the short duration rice variety NDR 1045-2 produced average yield of 35.50 q/ha under demonstrations as against the potential yield of 40.0 q/ha. Thus, there is average technology gap of 4.5 q/ha between the demonstrations yield and potential yield. However, demonstrations were conducted under close supervision of scientists but the technology gap was found there. It might be due to varied agro-ecosystems, soil fertility status and weather conditions of the area. The highest extension gap ranged from 12.8 to 15.2 q/ha during the period indicates that there is a gap existed between the yield of demonstrations and local check (farmers' practice). It was observed that the farmers did not apply proper herbicide and plant protection measures at appropriate time, local medium duration varieties sown without seed treatment and optimum plant population. Thus, the farmers were failed to adopt recommended package of practices under conventional system and lead to extension gap. The extension gap in the yield indicates that there is big scope to increase the yield of rice at farmers' fields by adopting the recommended package of practices. Therefore, to bridge the extension gap, there is a need to give due emphasis on transfer of improved technologies and management practices of rice through strengthening of extension network. The extension gap for crop was higher as compared to the technology gap, which also indicates that there is a need to train and educate to the farmers about improved technologies. More and more use of latest frontier production technologies during further years with high yielding varieties will subsequently change this alarming trend of galloping extension gap. Similar findings were also observed by Verma *et al.* (2015) and Verma *et al.* (2016).

The technology index shows the feasibility of the demonstrated technology at the farmers' fields. The lower the value of technology index more is the feasibility of the technology. Technology index was minimum (8.25 per cent) during 2015-16 compared to 2014-15 (12.00 per cent). Technology index shows the feasibility of the demonstrated scientific technological interventions at the farmers' field. Therefore, technology index ranging from 8.25 to 13.75% (Table 3) indicates of higher scope for further improvement in production technologies of rice in upland conditions of eastern plain zone of Uttar Pradesh. Similar findings were also observed by Mitra *et al.* (2014) and Singh *et al.* (2015).

Economics analysis:

The use of improved techniques required more cost for crop production than farmers practice in the crop under studied (Table 4). Increase in expenditure due to improved techniques over conventional system was lowest of Rs. 21,850/ha during the year 2014-15 and gradually increased during the subsequent years due to rise in prices of inputs. The use of improved techniques increased net economic gain of crop under demonstrations considerably. Maximum increase of Rs. 28,337/ha in net profit was observed in the crop during the year 2015-16. On an average, net profit of Rs. 26,396/ha and B:C ratio of 2.12 was found with demonstrations and was much higher when compared with farmers' practices (Rs. 7,984/ha and 1.35, respectively) in the crop under studied. It might be attributed to quantity wise highest increased in yield with improved techniques over conventional system of rice. Benefit cost ratio on improved techniques was worked out highest of 2.21 during the year 2015-16. These results showed that investment on improved cultivation techniques is more profitable on rice under rainfed upland in eastern plain zone of Uttar Pradesh. This finding is in corroboration with the findings of Singh *et al.*, (2015). The crops, which gave higher profitability, proved economically beneficial.

CONCLUSION

The productivity gain under front line demonstration over existing practices of rice cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of rice under rainfed upland condition in the district. There is technology gap, which need to be bridged by promoting the scientific production and protection technologies in varied condition. Therefore, for enhancing the production and productivity of rice crop, strategy should be made for enhancing more and more recommended technologies adopted by the farmers.

REFERENCES

1. Khanda, C.M., Mandal, B.K. and Garnayak, L.M. (2005) Effect of nutrient management on nutrient uptake and yield of component crops in rice-based cropping systems. *Indian Journal of Agronomy,* 50: 1-5.
2. Mazumder, G., Das, J.K., Mazumdar, D. and Ghoshal, R. (2012) Assessment of yield in KVK programme: A multivariate approach. *Journal of Crop and Weed,* 8:102-108
3. Mitra, B., Mookherjee, S. and Biswas, S. (2014) Promotion of short duration rice variety Gotra Bidhan-1 (IET 17430) through frontline demonstrations in *terai* region of West Bengal. *Journal of Crop and Weed*, 10(1): 111-114
4. Mukherjee, N.2003. Participatory Learning and Action, Concept publishing company, New Delhi, India pp 63-65
5. Samui, S. K., Maitra, S., Roy, D. K., Mandal, A. K. and Saha, D. (2000) Evaluation on frontline demonstration on groundnut. *Journal of Indian Socety for Coastal Agriculture Research* 18: 180-183
6. Singh, D., Singh, A.K., Singh, A., Patel, A.K. and Baghel, M.S. (2015) Impact assessment of short duration paddy variety Birsa Vikas Dhan-109 in Sidhi district of Madhya Pradesh. *Journal of AgriSearch* 2(1): 53-56
7. Singh, A.K., Verma, V.S., Nigam H.K., Manibhushan, Chandra, N. and Bharti, R.C. (2009) Studies on growth, development, yield attributes and yields of upland rice (*Oryza sativa*) under varying environmental condition and genotypes. *Environmental Ecology* 27(2A): 880-884
8. Singh, A.K., Meena, M.K., Bharati, R.C. and Gade, R.M. (2013) Effect of sulphur and zinc management on yield, nutrient uptake, changes in soil fertility and economics in rice (*Oryza sativa*) – lentil (*Lens culinaris*) cropping system. *Indian Journal of Agricultural Science*, 83(3): 344-348
9. Singh, P.K. (2002) Impact of participation in planning on adoption of new technology through FLD. *MANAGE Extension Research Review,* July-Dec pp 45-48
10. Verma, D.K., Verma, Saurabh, Pandey, Alok, Giri, S.P., Tripathi, R.M., Dwivedi, J.L., Singh, Janardan, Singh, R.B. and Gopal, Ram (2016) Yield evaluation of early duration rice variety Sushk Samrat on farmers in Faizabad district of Uttar Pradesh. *International Research Journal of Agricultural Economics and Statistics,* 7(1): 63-66
11. Verma, Saurabh, Verma, D.K. and Giri, S.P. (2015) Promotion of short duration rice variety NDR 1045-2 through front line demonstration in rainfed lowland condition of eastern Uttar Pradesh. *Annals of Plant and Soil Research,* 17(Special Issue 4): 138 - 142

Table 1: Package of practices adopted for demonstration and existing practice in upland conditions

Particulars	Improved practices demonstrated	Existing practices	Gap analyzed
Farming situation	Rainfed upland	Rainfed upland	-
Variety	NDR 1045-2	Sarjoo 52	Full gap
Land preparation	Three ploughing	Three ploughing	Nil
Planting method	Direct seeded rice under dry condition trough seed drill	Transplanting rice under puddle condition	Full gap
Seed rate	40-50 kg/ha	25-30 kg/ha	Partial gap
Seed treatment	Streptocycline @ 8.0 g per 50 kg seed for BLB & carbendazim @ 100 g/50 kg seed for ShB & blast	No seed treatment	Full gap
Time of sowing/ transplanting	22-28 June	15-20 July	Partial gap
Seedling age at transplanting	-	28-38 days	Full gap
Fertilizer application	100:40:40 (NPK); Zn ($ZnSO_4$@ 25 kg/ha) during final land preparation	150:60:0 (NPK); no application of micronutrients	Partial gap
Weed management	Integrated weed management	No weeding or delayed manual weeding	Full gap
Plant protection	Need based plant protection measures with special attention on bacterial leaf blight & sheath blight	Indiscriminate use of pesticides as prescribed by local pesticide retailers	Partial gap
Harvesting	100-110 days	125-145 days	Partial gap

Table 2: Yield performances of short duration var. NDR 1045-2 under demonstration

Year	No. of demonstrations	Area (ha)	Potential yield (q/ha)	Demo yield (q/ha)	Local check (q/ha)	Yield increment (%)
2014-15	25	10.0	40.0	35.2	20.0	76.00
2015-16	25	10.0	40.0	36.7	23.2	58.19
2016-17	25	10.0	40.0	34.5	21.7	58.99
Mean	**75**	**30.0**	**40.0**	**35.5**	**21.6**	**64.39**

Table 3: Gap analysis and technology index in front line demonstrations

Year	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
2014-15	4.8	15.2	12.00
2015-16	3.3	13.5	08.25
2016-17	5.5	12.8	13.75
Mean	**4.5**	**13.8**	**-**

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

Year	Demonstration				Farmers' practice (control)			
	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
2014-15	22375	47872	25497	2.14	21850	27200	5350	1.24
2015-16	23410	51747	28337	2.21	22500	32712	10212	1.45
2016-17	25360	50715	25355	2.00	23510	31899	8389	1.36
Mean	**23715**	**50111**	**26396**	**2.12**	**22620**	**30604**	**7984**	**1.35**

CITATION OF THIS ARTICLE

Saurabh Verma, D.P. Singh, S.N.S. Chauhan, V.K. Singh and P.S. Pandey. Promotion Of Short Duration Rice Variety Through Front Line Demonstration In Upland Condition Of Eastern Uttar Pradesh. Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue [3] 2017: 323-327

