Minimization of Technological Gap in Irrigated Rice Crop by Technology Assessment and Refinement (TAR) Through IVLP in Sone Command, Bihar

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ABSTRACT

ICAR-RCER, Patna carried out on-farm trials (OFTs), verification trials (VTs) and capacity buildings (training) on natural resource management and crop production management practices in rice under TAR–IVLP for 2 years from 2000–01 to 2001–02 in four adopted villages in Majhouli distributary under Sone command in dist. Patna having rice–wheat system. The study revealed that the technological gap of 40–70% in rice crop was minimized to 20–50% in various production components.

INTRODUCTION

The fertile land of Sone command in South Bihar under lower Indo-Gangetic plain has low productivity (2-3t/ha) of its major crop rice because of complex reasons. Among them, low adoption of improved practices due to lack of knowledge is key issue. Technology adoption gap is very high (40-70%) in this crop (Singh *et.al.* 2002). The ICAR Research Complex, Patna has made an effort to bridge this gap in command area of Sone canal system by Technology Assessment and Refinement through Institute Village Linkage Programme (TAR - IVLP) under NATP (Annon. 2000).

MATERIAL AND METHOD

The studies were conducted for 2 years from 2000 to 2002 in TAR-IVLP adopted 4 villages (*Bhelura Rampur, Birpur, Birenchak and Dosia tola*). The area is situated in Majhauli distributary of Sone canal system in district Patna. Initially the benchmark survey was conducted to find out technological gap. Interventions were required on improved crop practices in rice crop related to natural resource management (NRM) practices (tillage, irrigation and nutrient management). Other production practices like suitable HYV of Rice (short & long duration), use of herbicide at rice transplanting,

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and use of improve implements in Rice-Wheat cropping system were also identified for interventions. Farmers were randomly selected representing 4 villages for wider exposure and large-scale representation (small, medium and large category) Interview of farmers was done through questionnaire to assess the technological knowledge about improved method of rice cultivation. Farmer's capacity building was done through training. Technologies on NRM and crop production were assessed in form of on-farm trials (OFTs) and verification trials (VTs). After 2 years of intervention randomly selected 100 farmers were surveyed to study the adoption of various technologies that was under taken earlier. The no. of farmers under component technology assessment and its adoption by the farmers is given in table 1.

Table 1
Technological Intervention, Mode, Number of Farmers and Adoption per cent in Rice crop under TAR–IVLP in Sone canal Command Irrigated Ecosystem, Patna

Sl. No.	*Intervention*	*Mode*	*No. of farmers under OFT/VT after 2 years (2003)*	*Percentage of farmers that adopted technology*
A.	**Natural Resource Management**			
	Summer Ploughing	Training	-	20
	Manure and Fertilizer application	Training + OFT	12	20
	Water management	Training +VT	20	25
B.	**Crop Management**			
	Variety	Training + OFT	50	30
	Nursery	Training	-	30
	Weed management	Training +VT	9	30
	Insects pest management	Training	-	20
	Diseases management	Training	-	25

RESULT AND DISCUSSION

The following technological gaps were minimized after 2 years of intervention:

Natural Resource Management (NRM)

The NRM practices were improved through adoption of preparatory tillage (summer ploughing), use of manure and fertilizers and water management in rice that minimized the technological gap. The farmers were made aware about the benefits of summer ploughing as preparatory tillage. After training programme 20% fields were put under summer ploughing by the farmers. This could enhance rainwater use, reduced pest incidence and higher yield of rice by 10–15%.

Farmers were not applying manures, balance use of fertilizer and Zinc. There were 30-100% of technological gap, which was reduced to 20-55% after 2 years intervention on nutrient management in HYV of Rice. Around 60% farmers adopted use of NPK and Zinc in rice crop (Table 2). This practice reduced the pest attack and higher yield with quality grains.

The farmers were mostly doing field-to-field irrigation to rice with higher depth of water (15–25 cm). This excess water was causing wastage of water, nutrient and soil sediment. Ultimately there was low yield of rice as well as wheat. After OFT intervention on water management in Rice and on-campus training programmes the farmers were aware about improved practices. In 2nd year total 35% farmers adopted border method of irrigation in rice. Due to this change around 20% additional area could be irrigated with same amount of water. It enhanced the nutrient use efficiency especially in case of nitrogen and also reduced the insect pest incidence like Brown Plant Hopper (BPH), which is a serious pest of the area.

Table 2
Effect of Natural Resource Management Interventions on Minimization of Technological Gap in Sone canal System, Bihar (2000–01 and 2001–02)

Sl. No.	*Technology*	*Recommended practices*	*Farmers practice*	*Technological gap in adoption (%)*		*Reduction in Tech. gap (%)*
				2000	*2002*	
1.	Preparatory tillage	One deep summer planning followed by 2-3 ploughing and puddling	No summer planning puddling twice only	50	30	20
2.	Manure & fertilizer	Main field per ha				
	FYM	15 t	0–5 t	40	20	20
	N	100 kg	100–180 kg	30	5	25
	P_2O_5	60 kg	0 – 20 kg	50	25	25
	K_2O	40 kg	0 – 10 kg	80	25	65
	$ZnSo_4$	25 kg for 3 season	0 – 5 kg	80	50	30
3.	Irrigation	Border irrigation of 7±2 at 3cm at 3 DAD of ponded water	Field-field irrigation with high depth water (15 - 25 cm)	70	35	35

Crop Management

The technological gaps were minimized through use of varieties, improved weed management practices and suitable plant protection measures (Table 3). After OFT, total 20% area in upland, 25% in mid land 20% in low land were replaced by suitable high yielding variety of Rice. The replacement was due to better or similar type of available choice, higher yield and early field vacation for sowing of winter crops. The study area had major problem in nursery management i.e. use of high seed rate (100 to 120 kg/ha), untreated seed and no use of fertilizer in nursery. After off-campus training programme, 10-80% technological gap was minimized in nursery management. The seed rate was reduced to 25 to 30 kg/ha. Treatment of seed and use of P, K and Zn fertilizer was adopted by 70–80% farmers. Farmers had practice of hand weeding in rice. This costly affair had manpower shortage in the locality. After VT and capacity building total 20% area were replaced from hand weeding to use of herbicide (Butachlore 50 EC @ 3 L/ha). Less dependency on labour for weeding, low cost per unit area and

higher yield were reasons for such adoption. The farmers were using Endofil-45 in rice at boot stage for disease control. The technological gaps were minimized to 35% after training programme. 80% farmers adopted the seed treatment with Emisan-6/Bavistin. Need based spray of Endosulphan 35 EC and Endophill-M45 25–30% farmers.

Table 3
Effect of Crop Management Interventions on Minimization of Technological Gap in Sone Canal System, Bihar (2000–01 and 2001–02)

Sl. No.	*Technology*	*Recommended practices*	*Farmers practice*	*Technological gap in adoption (%)*		*Reduction in Tech. gap (%)*
				2000	*2002*	
1.	Variety	Upland- Saket-4, Pusa 2-21, Pusa-834, Prabhat	Saket-4, Sita,	50	30	20
		Mid land-Sujata, Jaya, IR-36, Kanak, Pant-4, Pusa 44	Local Basmati, Sita, MTU-7029 (Nata Mahsuri) MTU-1001	50	25	25
		Low land-Rajshree, Radha, Sugandha, Satyam, BPT 5204, Sakuntala	Pankaj MTU-7029	50	30	20
2.	Nursery raising Seed rate					
	Seed bed treatment	50kg	150kg/ha	60	30	30
	Seed Fertilizer	Bavistine 2g/kg In nursery per 1000m^2	No use	90	10	80
	FYM	1 t	0 – 0.5 t	60	0	60
	N	1 kg	2 kg	20	10	10
	P_2O_5	1 kg	0	90	10	80
	K_2O	05 kg	0	90	20	70
	$ZnSo_4$	2.5 kg	0	90	20	70
3.	Weed control	Butachlore @ 3 L/ha after 3-4 days of transplanting and one hand weeding at 35 DAT	Only hand weeding once	40	20	20
4.	Insect pest management	Spray of Endosulphan @ 1.5 l/ha or Monocrotophas 1l/ha in nursery prior to uprooting seeding	Application of Endosulphan 35 E.C only in case of at severe pest attack	75	55	20
5.	Disease management	Seed treatment with Emisan-6 @ 2g / kg. or Bovistin@1g/kg of seed. Need based Spray of Endofil M-45 and Endo-sulphan 35 EC.	Some farmers use Endofil M-45 at boot stage	65	30	35
6.	Yield (t/ha)	4.5-5	2-2.5	50	10	40

Yield increase

The yield of rice was found to increase by 2.0–2.5t/ha crop through intensive training programme and rice based crop interventions under TAR-IVLP Project. Efficient NRM and crop management practices could enhance the yield (Table 3) to such extent.

CONCLUSION

Recommended practice assessed by OFTs and VTs under TAR-IVLP on NRM, crop management as well as capacity building of the farmers has minimized the technological gap in rice crop by 20-70%. This may be taken by the state dept. of Agriculture, NGO's KVKs and other stakeholders to bridge the technological gap in similar area. Intensive training and OFT/VT should be conducted to reduce the technological gap.

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