YIELD GAP IN PADDY AND EXTENT OF ADOPTION OF IMPROVED PADDY TECHNOLOGIES

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In India, rice is the major food crop. India, with its present acreage of 43.42 million hectares and a production of 84.7 million tonnes, is the second largest rice growing country in the world. It is reliably estimated that in the year 2020, the total domestic foodgrains demand will be 294 million tonnes (mt) comprising 122 mt of rice. By 2020, India's population is likely to be around 1.3 billion, retaining 30 per cent of the population below the poverty line (Singh, 2002). Though much progress has been made in the field of agricultural research and education, the full benefits of these development could not be realized by the farming community because of low adoption of technologies.

Research findings have indicated that there is an alarming knowledge practice gap in agriculture. It is estimated that the Indian farmers, inspite of huge human and financial resource allocation, have adopted only 30 per cent of the available technologies (Saravanan and Shivalinge, 2000).

In order to meet the future demand of foodgrains for Indian population, the gaps between recommended and existing practices should be removed or minimised so that the farmers must adopt the recommended paddy technologies. Keeping this in view, the present study was undertaken with the following specific objectives :

1. To establish the yield gap in paddy crop.
2. To identify the potential technologies of paddy for adoption.
3. To study the extent of adoption of improved paddy technologies.
4. To explore the reasons for low yield and yield gap of paddy crop.

METHODOLOGY

Two villages, namely Bhopani and Mahavatpur under Faridabad block of District of Faridabad (Haryana) were selected purposively as these villages had considerable number of paddy growers with small and marginal land holdings.

To identify the potential technologies of paddy for adoption in order to reduce the yield gap, a transect walk (Participatory Rural Appraisal Technique) was organised with local paddy growers. A semi-structured interview schedule was prepared to have detailed investigation. The randomly selected paddy growers numbering 100 were considered as respondents for the purpose of data collection through personal interview method.

The yield gap refers to the quantitative difference between the potential and actual farm yields obtained by the farmers. The yield gap was worked out by using the following formula :

$$\text{Yield gap} = \frac{\text{Potential yield} - \text{Average actual yield}}{\text{Potential yield}} \times 100$$

Potential yield is the highest yield recorded in the study area during past five years, whereas average actual yield referred to mean of individual actual yield during these years.

RESULTS AND DISCUSSION

The data presented in Table-1 indicate that yield gap is wider (42%).The gap does reflect the non-adoption of improved paddy practices/ technologies by the paddy growers as a reason for this situation.

Table 1. Yield gap of paddy crop

Crop	Potential yield (q/ha)	Average actual yield (q/ha)	Yield gap (%)
Paddy	25.0	14.5	42.0

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Potential Technologies–The transect walk, PRA technique resulted in identification of few potential technologies in getting high production of paddy crop. They are as follows :

- High yielding, improved and disease tolerant varieties.
- Chemical seed treatment for control of rice-blast disease.
- Seed treatment with bio-fertilizers.
- Time of nursery planting.
- Plant population maintenance per square meter.
- Fertilizer application in nursery as well as in standing crop.
- Plant protection measures.

1. Variety–It could be seen from Table 2. that majority of farmers (68%) were cultivating the recommended varieties of paddy. Farmers also reported that some of these varieties were prone to insect-pests and diseases but at the same time they described these varieties as high yielding varieties.

2. Chemical seed treatment for control of seed borne diseases–Only a few respondents (5%) followed chemical treatment for control of seed borne diseases. They used locally available chemicals for seed treatment in excess quantity. This might be due to less knowledge with regard to chemical seed treatment for control of seed borne diseases.

3. Seed treatment with bio-fertilizers–None of the paddy growers has treated the seed with recommended bio-fertilizer i.e. Azospyrillum. This might be due to less complete information with regard to Azospyrillum seed treatment and non-availability of Azospyrillum. Also, majority of the farmers felt hat there was no advantage in using Azospyrillum, resulting in such a high level of non-adoption.

4. Nursery soil treatment for nematode control– Only nine per cent of the paddy growers used recommended chemical for treating the soil in nursery for control of nematodes. This might be due to less complete information about the loss of seedings in the nursery due to nematode attack.

Table 2. Extent of adoption of improved practices in paddy cultivation N = 100

Sl. No.	Improved practice	Recommended spractices	Existing practices	Adoption (%)
1.	Variety	Jaya, PR-106, HKR-106, HKR-126, IR-64, Pusa-33, Govind, Basmati-370 and Taraori Basmati	Jaya, HKR-126, PR-106, Pusa Basmati, Basmati-370, IR-64	68
2.	Chemical seed treatment for control of seed borne diseases	Soaking of 10 kg seed in fungicidal solution of 5g emisan and 10g streptocycline in 10 litres of water for 24 hours.	Emisan or Bavistin @ 5-10g/10kg seed	5
3.	Seed treatment with bio-fertilizer	Azospyrillum @ 250g (1 packet) per 10kg seed	-	-
4.	Nursery soil treatment for nematode control	Carbofuran @ 3-4g/m^2	Carbofusan @ 2-4g/m^2	9
5.	Fertilizer application at nursery stage (kg/acre)			
	(i) Nitrogen (N)	10	10	85
	(ii) Phosphorus (P)	10	10	77
	(iii) Zinc Sulphate ($ZnSO_4$)	10	10	31
	(iv) Ferrous Sulphate ($FeSO_4$)	0.5% spray at the appearance of iron deficiency	–	5
6.	Chemical weed control in nursery	1.2 litre butachlor with 60kg sand after 6 days of germination	Any weedicide @ one litre/ acre	23
7.	Plant population	35-40 plants/m^2	25-30 plants/m^2	36
8.	Fertilizer application in standing crop (kg/acre)			
	(i) Nitrogen	60	60	85
	(ii) Phosphorus	24	12	69
	(iii) Zinc Sulphate	10	10	31
	(iv) Potash	12	–	5
9.	Plant protection measures	(i) Integrated Pest Manage-ment	–	–
		(ii) Chemical Control	(i) Use of indigenous chemical control measures	18
			(ii) Use of chemicals	33

5. Fertilizer application at nursery stage–The recommended doses of N, P and $ZnSO_4$ were applied by 85, 77 and 31 per cent of the farmers, respectively in paddy nursery. Only 5 per cent of the paddy growers used ferrous sulphate as spray in the recommended dose at the appearance of iron deficiency. This might be due to less knowledge with regard to identification of iron deficiency.

6. Chemical weed control in nursery–Of the total respondents, 23 per cent used recommended chemical at proper dose and time for weed control in nursery. This might be due to less knowledge about chemical weed control at nursery stage.

7. Plant Population–The optimum plant population of paddy i.e. 35-40 plants per square meter was maintained only by 36 per cent of the paddy growers. Non-availability of labour might be a reason for non-adoption of optimum plant population.

8. Fertilizer application in standing crop–Regarding the basal dose application of N, P, K and zinc-sulphate, 85 per cent of the farmers applied recommended doses of nitrogen whereas 69 and 31 per cent of the farmers put recommended basal doses of phosphorus and zinc sulphate, respectively. Only a few (5%) paddy growers applied the recommended dose of potash. This might be a less knowledge about the importance of potassic fertilizers for paddy crop. The farmers also preferred DAP application. This might be due to visible impact of DAP application. Majority of farmers did not apply fertilizers at recommended time. This might be due to less knowledge with regard to application of chemical fertilizers.

9. Plant protection measures–Regarding plant protection measures in paddy crop, none of the paddy growers adopted the Integrated Pest Management. This might be due to less complete information regarding the use of IPM. Chemical control of insect-pests and diseases was adopted by 33 per cent of the farmers whereas 18 per cent of the respondents also used indigenous chemical control measures. Less knowledge among farmers might be a reason for non-adoption of chemical control measures in paddy crop.

CONCLUSION

There was a wide difference between potential yield and actual yield resulting in high yield gap in paddy crop. A few improved practices i.e. improved varieties, application of nitrogen and phosphatic chemical fertilizers at nursery stage and in the standing crop were adopted by majority of the paddy growers. The adoption of improved practices i.e. chemical seed treatment for control of seed borne diseases, seed treatment with bio-fertilizers, nursery soil treatment for the control of nematodes, application of zinc and ferrous sulphated at nursery stage and in standing crop, chemical weed control in nursery, maintenance of optimum plant population and plant protection measures, was very low. This may be due to less knowledge regarding recommended technologies, non-availability of inputs, labour and unfavourable attitudes towards some of the technologies. The yield gap could be minimised by identifying the training needs of paddy growers, selecting potential technologies by participatory rural appraisal technique and organising intensive extension activities. The extension activities like method demonstration, home and farm visits, group meetings, Kisan Diwas, field days and exhibitions have great potential for imparting skill and changing the attitude of paddy growers. The PRA was found to be effective in identifying the training needs of the farmers.

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