IDM- In Combating Blast Disease in Rice Crop in Temperate Environment

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ABSTRACT

Integrated Disease Management (IDM) is important for reducing threat to environment and for sustaining higher yields. There is need to test and demonstrate IDM technique at farmers' field for their wide adaptability. On-farm trials and frontline demonstrations were conducted by Krishi-Vigyan-Kendra Anantnag to popularize IDM module to boost, rice production in blast prone area of district Anantnag. Yield improved to the tune of 36 per cent by IDM module over farmers practice plots. Net returns (Rs.47,952/ha) and benefit cost ratio (1.5) were also higher in same practice. An additional income of Rs.16,589/ha was obtained over the farmer's practice.

Key words: IDM, Rice, Blast.

INTRODUCTION

Indiscriminate use of agricultural chemicals in general and pesticides in particular has become a great concern. Emphasis is, therefore, being laid on Integrated Pest Management (IPM) for environmental safety, good health and sustainable agriculture.. Technologies developed by SKUAST-Kashmir needs to be popularized among farming community to boost agricultural productivity and production. Since rice is a staple food of the people of Kashmir valley and blast disease a major biologic threat to crop, an Integrated Disease Management (IDM) module was needed to be tested at Farmers' field to combat the menace of blast disease in district Anantnag. Krishi-Vigyan-Kendra Anantnag (Pombay) conducted On-farm trials and Frontline Demonstrations to popularize the IDM module in rice.

MATERIALS AND METHODS

Analysis of Factors Responsible For the Outbreak of Disease

A joint survey was conducted by KVK scientist and the officers of agriculture development department to identify hot spots of this disease. During survey it was found that the microclimate of the area and farming practices, were quite favourable for blast disease incidence.

Factors Which Favoured the Spread of Disease

- **Growing varieties which lack resistance against Blast disease**

  Farmer use varieties (Table 1) which are prone to disease and if proper disease management practices are not taken in time there always remains risk of crop being badly hit by blast disease particularly under fluctuating weather conditions as prevalent in the study area.

- **Imbalanced use of fertilizers**

  Farmers have tendency towards using heavy doses of nitrogenous fertilizers without and a small number of them apply Potassium supplying fertilizer. This makes plant tissues succulent and more prone to blast disease. Continuously use organic manures striking a balance in the application of N and K fertilizer help some to escape severe disease attack. This signifies the importance of balanced nutrient supply in IDM.

- **Lack of plant protection measures against the disease**

  Apple is the major fruit crop of the valley. Farmers pay much attention to their apple crop in comparison to paddy. Though the management technology for blast disease is well established but unfortunately farmers do not follow the same resulting in considerable decline in crop yield due to the disease. Not a single farmer even uses a simple technique of seed treatment against the disease.

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Blast affected rice plant and Shalimar rice 1 plot

Survey of Blast affected Plot of Jehlum rice

- **Other causes**

  Poor water management, dense planting of seedlings with 5 to 14 seedlings per hill and lack of coordination between farmers and the line department at zonal level are some other reasons which aggravated the situation.

Action Plan

All Important causes of outbreak of blast disease in paddy were taken into consideration while framing a strategy to combat this disease and *vis-à-vis* to improve rice production. On-farm trials were conducted (Table 1) which revealed that the disease incidence and severity was remarkably higher with farmers practice against improved technology. Yield was appreciably higher in improved technology compared to the farmers practices. In view of these results, front line demonstration programme with following technical inputs were conducted in the area (Table1).

1. **Variety:** Jehlum and K-39 varieties which lack resistance against the blast disease were replaced by Shalimar Rice -1(SR-1) which exhibits resistance to blast disease. This variety was released in 2005 for lower belts of the valley located up to an altitude of 1600m MSL.
2. **Seed Treatment:** Seed treated with the chemical against paddy diseases(Mancozeb@ 2g + Carbendazim @1g per Kg of seed) was distributed free of cost among the farmers associated with the FLD progamme.
3. **Seedbed treatment:** Temperature fluctuation during nursery raising period may cause *rhizoctonia* rot disease. Spray of Captan 50 WP and Hexaconazole 5 EC 0.15% each in cocktail was done as it has been found effective against disease.
4. **Sowing time:** Early sowing of the rice variety SR-1 for timely maturation of the variety which is essential for successful double cropping in the valley.
5. **Balanced dose of fertilizer:** Use of balanced Fertilizers was demonstrated to the FLD beneficiaries as per the package of practices. They were advised to strictly follow the recommendations with regard to the dose and time of fertilizer application. In some cases farmers were advised to reduce urea fertilizer dose owing to inherent nitrogen fertility/ consistent use of organic manures in plenty. Emphasis was laid on the application of well decomposed Farmyard Manure.
6. **Plant population:** Farmers were given training programmes on raising of healthy rice seedlings and at the same time were instructed to transplant 2-3 healthy rice seedling per hill with 35-45 Plants/sq.m.
7. **Water management:** Impounding of water (5cm) was advocated for the first 15 days after transplanting followed by intermitted irrigation to keep the soil saturated with moisture.

RESULTS AND DISCUSSION

Integrated disease management in rice against the menace of blast disease in demonstration plots gave excellent results compared to the farmers practice. Yield ranged from 61 to 73 q/ha in demonstration plots. Average yield was 66.6 q/ha (Table 1) against the farmers' practice (48.7 q/ha.). Demonstration yield was 36 per cent higher than

Table 1. Performance of different rice cultivars against blast disease in the plains of district Anantnag.

Rice cultivar	Disease incidence		Disease severity(leaf blast)	Grain yield(q/ha)
	Leaf blast	Neck blast		
Jhelum	33 %	10.7	13.8	38
K-39	27.1%	6.3	8.3	41
Shalimar Rice -1	2%	0	0.1	63

Table 2. Summery of farmers' practice and Technology demonstrated(FLD)

Parameter	Farmers' practice(Control)	Technology demonstrated(FLD)
Variety	K-39 , K-448	Shalimar Rice-1
Seed rate for one hectare	>50 kg	60 Kg
Seed treatment/ Kg seed	No seed treatment	Seed treated with Carbendazim (1g) + Mancozeb (2g)
Seed sowing	1st May-10th May	Last week of April
Fertilizer dose(N,P_2O_5,K_2O)	Haphazard	120:60:20
Age of seedling at transplanting	35- 41 days	25-30 days
Plants per hill	5-14	2-3
Time of fertilizer application	No knowledge	½ basal, ¼ at active tillering stage, ¼ at panicle initiation stage
Water management	Running water	Intermitted irrigation
Crop yield/ha	48.7 q	66.6 q/ha
Net returns /ha	Rs.31363	Rs.47952
B : C ratio	0.98	1.5

the yield realized in the control plots. Gross returns, net profit and benefit cost ratio per hectare for demonstration were Rs.79,900, Rs.47,952 and 1.5, respectively against Rs.58,444, Rs.31,363 and 0.98 registered in the control. An additional income of Rs.16,589/ha was obtained with the demonstrated technology over the farmers practice (control). Moreover SR-1 enhanced paddy straw production which is an important component of ration for cattle in the winter. Most important aspect of the demonstrated technology was that not a single case of blast incidence was observed. Results also show that in few cases the crop maturity delayed beyond normal which reduced yield of the crop. Analysis of such cases revealed that the reason for delay were;

- Late sowing and transplanting of the crop compared to recommended one due to one or the other reason.
- Some plots were situated near to the irrigation source(canal) with lower water temperature. Some farmers follow traditional system of irrigation through running water which prolongs the vegetative phase and pushes reproductive phase to unfavourable weather conditions, resulting in increased sterility and chaffy grain.
- Inherent higher nitrogen status might be one of the reason.

Early sowing preferably under protected nursery conditions, intermitted irrigation and reduction in nitrogen dose was recommended for such cases.

Impact

Successful demonstration of SR-1 paddy variety and related technology has highly convinced the other farmers of the area to adopt the technology at much greater speed. Higher yield potential , more recovery percentage and resistance against blast disease makes SR-1 versatile paddy variety. Interaction with farmers and the officers of Development Department confirm that more than 50 per cent farmers used the same technology next year. Adaptation was dramatic in villages most severely hit by blast disease. Exchange of seed among farmers paved the way for speedy spread of the technology.

CONCLUSION

Jhelum, no doubt is an excellent rice variety but under the microclimatic conditions which favour blast disease adopting recommended management practice against the disease becomes essential. Under the situation when farmer fails to execute the disease management practices in time, there always remains a risk of crop being damaged by diseases. Moreover, Integrated Disease Management (IDM) which is a well established technology to reduce the disease pressure on a crop not only reduced cost of cultivation by curtailment in expenditure on pesticide purchase and labour but also increases farm income through improvement in crop yield. This approach is environmentally safe and farmers friendly. It promises higher yield and at the same time minimizes threat to the environment. In IDM approach, development and adaptation of disease resistant/ tolerant high yielding crop variety plays a pivotal role.