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# Farmers Participatory Assessment of Biological Control Measures in Rice Based Coastal Agro-ecosystem

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**A farmer's participatory field study was undertaken on the use of biological agents, viz. *Pseudomonas fluourescens* and *Trichogramma japonicum* in the coastal agro-ecosystem of Tiruvallur district of Tamilnadu. It has created an awareness among farmers that *P. fluorescens* was effective in the management of grain discolouration and *T. japoricum* in the management of stem borer.**

(***Key words:*** *Participatory rural appraisal, Biological control in rice, Grain discolouration, Stem borer)*

The two most important pest problems of rice cultivation in the coastal agro-ecosystem of Tiruvallur district of Tamilnadu are grain discolouration (a complex disease due to fungal and bacterial infection) and stem borer due to *Scipophaga incertules*. Farmers in this area either resort to indiscriminate use of pesticides or never apply any pesticides even when the pests seriously affect the crop. Venkateswaralu (1992) made an assessment of the potentialities for increase in rice production under different ecosystem in the eastern belt and came to the conclusion that through improved agronomic and other crop management practices, the yield could be improved. Chattopadhyay (1993) stated that in order to achieve the desired results and to evolve appropriate technology for an area, on-farm trials are to be conducted involving farmers. The participatory farmers will be allowed to manage the trials themselves in their own way in collaboration with researchers and extension agencies. Farmers prefer this type of experimentation because it fosters immediate and observable feedback on potentially useful technologies (Ohlmer and Borechmer *et al.*, 1998). In the above background, a study was undertaken to manage the problems of grain discolouration and stem borer under farmers participatory field trials.

## MATERIALS AND METHODS

The grain discolouration and stem borer incidence were assessed as major problems in rice cultivation by the farmers through Participatory Rural Appraisal (PRA) techniques. The study on assessment of efficiency of various measures in controlling grain discolouration in rice and assessment of the efficiency of the biological agent, viz. *Trichogramma japonicum* for control of rice stem borer were conducted in fields of 30 and 50 farmers, respectively under the project entitled 'Institution Village Linkage Programme for Technology Assessment and Refinement in the Coastal Agro-Ecosystem of Tiruvallur district of Tamilnadu'. This project was implemented at Kattur village, 50 km north of Chennai.

The study was conducted during August 2001 to January 2002 (Samba season). The size of the treatment plot was 2000sq m. The weather was moderately warm with rains received between October to December. The soil was moderately drained clay loam with a pH of 7.4, low in nitrogen, medium in phosphorus, and high in potassium.

The following treatments were given:

| Treatment | Dosage | Time of application |
|---|---|---|
| $T_1$ Carbendazim | 250 g $ha^{-1}$ | 45 and 55 DAT |
| $T_2$ Neem oil 3% | 500 ml $ha^{-1}$ | 45 and 55 DAT |
| $T_3$ *Pseudomonas fluourescens* | 1 kg $ha^{-1}$ | 45 and 55 DAT |
| $T_4$ *Trichogramma japoricum* | 5 cc $ha^{-1}$ | 20,27,34 and 41 DAT |

No insecticides were applied to the plots released with Trichogramma parasites, DAT – Date of transplanting

Carbendazim and neem oil were obtained from the market. The biocontrol agents, viz. P. *fluourescens and T. japonicum* were obtained from Sun Agro Biosystem Pvt. Ltd.[1], Chennai. All the plots were monitored by scientists and farmers for natural enemies, pests, pest infections, crop management practices and yields.

## RESULTS AND DISCUSSION

The results of both technological interventions are discussed below:

### Assessment of efficiency of various measures in controlling of grain discolouration in rice

After harvest 1000 grains were selected at random from each treated plot and number of discoloured grains were counted. From this percentage of discoloured grains was calculated and intensity of damage was graded as below.

[1]Does not suggest preference for the product

***Table 1.*** *Effect of treatment in grain discolouration*

| Observation | Farmers practice | Treatment | | |
|---|---|---|---|---|
| | | Carbendazim | Neem oil | *Pseudomonas fluourescens* |
| Intensity of infection | High | Low | Low | Low |
| Weight of 1000 grains (in g) | 15.4 | 15.8 | 15.6 | 15.5 |
| Grain yield (kg/ha) | 3719 | 4180 | 4080 | 4010 |
| Straw yield (kg/ha) | 4830 | 5420 | 5320 | 5350 |
| Cost of production (Rs/ha) | 10840 | 11145 | 20945 | 22040 |
| Gross return (Rs/ha) | 27531 | 30951 | 30270 | 29640 |
| Net return (Rs/ha) | 16691 | 19806 | 19325 | 18600 |
| Benefit-Cost ratio | 2.53 | 2.77 | 2.77 | 2.68 |

- 50 percent discoloured grain – High incidence
- 10 percent discoloured grain – Low incidence

The weight of the 1000 grains and the total plot yield of straw and grain were determined. The results are given in Table1.

It could be observed from Table 1 that the percent infestation was high in farmers practice resulting in reduction of grain and straw yield. Even though the treatments of carbendazim, neem oil and *P. fluourescens* are at par with each other, the application of P. *fluourescens* can be recommended, since it was not only useful in the management of grain discolouration, but also for the control of other major diseases of rice such as blast, helminthosporium leaf spots, bacterial leaf blight and sheath blight (Nandakumar *et al.*, 2000, 2001, Vidyasekaran *et al.*, 1997).

Assessment of efficiency of *Trichogramma japonicum* in controlling stem borer incidence

Plants affected by stem borer were counted in each plot released with parasite from 2nd release onward to harvest. From this percent incidence was calculated. After harvest, weight of 1000 grains were recorded. Further, weights of straw and grain yield were measured. The results are given in Table 2.

It could be seem from Table 2 that the incidence of stem borer in the parasite released plot remained below the economic threshold level, resulting in higher straw and grain yield. Hence it can be concluded that the release of *T. japonicum* @ 5 cc $ha^{-1}$ for four times at weekly intervals can effectively control the stem borer problem in rice.

## CONCLUSION

The farmers who participated in the programme got the awareness about this new concept in pest management and gained the practical knowledge of using *P. fluourescens* and *T. japonicum*. It can be concluded that technological innovations should be linked closely with what farmers are already doing, thereby reducing the cost of dissemination and ensuring the appropriateness of the technology.

***Table 2.*** *Effect of* Trichogramma japonicum *on control of stem borer in rice*

| Observation | Farmers practice | Parasite released plot |
|---|---|---|
| Incidence of white ear (Stem borer attack) | > 2 percent | < 2 percent |
| Weight of 1000 grains (in g) | 15.2 | 15.4 |
| Grain yield (kg/ha) | 3850 | 4125 |
| Straw yield (kg/ha) | 5230 | 5450 |
| Cost of production (Rs/ha) | 10420 | 10330 |
| Gross return (Rs/ha) | 28500 | 30495 |
| Net return (Rs/ha) | 18080 | 20165 |
| Benefit-Cost ratio | 2.73 | 2.95 |

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