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Biological control of blast of rice

YASHODA R. HEGDE
Department of Plant Pathology, College of Agriculture, University of Agriculture Sciences, Dharwad, Karnataka.

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SUMMARY

Seed treatment with *Pseudomonas fluorescens* @ 8g/kg seed followed by spraying of the same @ 0.2% during tillering and panicle initiation help to manage the leaf blast and neck blast under direct seeded condition in Karnataka.

Key words: Biological control, *Magnaporthe grisea*, blast.

Blast of rice caused by *Magnaporthe grisea* (Hebert) Barr. is generally considered as the principal disease of rice because of its wide distribution and destructiveness under favourable conditions. This disease is a severe production constraint particularly in dry land and upland rice where rice farmers generally have no access to fungicides. Control of blast through breeding for resistance has only partial success in favourable environments because of the ability of the rice blast fungus to evolve new races. Hence, an attempt was made to search an alternative disease management strategies that are non-polluting, eco-friendly and economical.

MATERIALS AND METHODS

Field trials were conducted at Agricultural Research Station, Mugad, during Kharif, 1998 and 1999. The total rainfall received during 1998 was 877 mm in 71 rainy days and during 1999 was 1081 mm in 81 rainy days. The experiment was laid out in Randomised block design (RBD) with 7 treatments and three replications. Vidhyasekaran *et al.*, (1977) developed *Pseudomonas fluorescens* Migula str. Pf-1, inhibitory to the growth of the rice blast pathogen *in vitro*, as a talc based powder formulation. Same was used for our study. In addition to biocontrol agents botanicals like neem products (neemgold, nimbicidine, wanis) were used during 1999. Variety used was HR-12 during 1999 and KMS-5914 during 1998. Leaf blast was not observed in KMS-5914 and hence only one spray was given during panicle initiation. Two sprays were given for HR-12 (during 1999) viz., during tillering and panicle initiation. Different treatments were as follows,

1. Untreated control
2. Treated control (seed treatment with carbendazim @ 2g/kg seed + spraying of tricyclazole @ 0.06%).
3. Seed treatment with *Pseudomonas fluorescens* @ 8g/kg seed.
4. Seed treatment with *P. fluorescens* @ 8g/kg seed + spraying of *P. fluorescens* @ 0.2%
5. Seed treatment with *Bacillus subtilis* @ 4g/kg seed + spraying of the same.
6. Seed treatment with *Trichoderma harzianum* @ 4g/kg seed + spraying of *T. harzianum.*
7. Seed treatment with *T. viridae* @ 8g/kg seed + spraying of *T. viridae*
8. Seed treatment with *P. fluorescens* @8g/kg + spraying of nimibicidine @ 5ml/L.
9. Seed treatment with *P. fluorescens* @8g/kg + spraying of wanis. @ 5ml/L.
10. Seed treatment with *P. fluorescens* @8g/kg +spraying of neem gold @ 5ml/L.
11. Seed treatment with *T. harzianum* @ 4g/kg seed + spraying of neem gold @ 5ml/L.

0-9 SES scale was used for scoring and per cent disease index (PDI) for leaf blast was calculated by using the following formula.

$$PDI = \frac{\text{Sum of individual ratings}}{\text{No. of leaves assessed x maximum disease grade}} \times 100$$

Per cent neck blast was calculated by counting the number of panicles showing the typical blast symptoms in one square metre area.

$$\text{Per cent neck blast} = \frac{\text{Number of infected panicles}}{\text{Total number of panicles}} \times 100$$

RESULTS AND DISCUSSION

Leaf blast (PDI) and per cent neck blast calculated and statistically analyzed and are presented in Table 1. Leaf blast was not observed during 1998, whereas during 1999, all treatments had significantly reduced the leaf blast incidence compared to untreated control. Among the biocontrol agents and botanicals, nimbicidine was most effective in reducing leaf blast which was no par with *P. fluorescens* and neem gold. Gnanamanickam *et al.*, (1989) reported that spraying with fluorescent pseudomonad bacterial cell suspension (108 cfu/ml) reduced leaf and neck blast infections. However the chemical control was significantly superior in managing leaf blast. Similarly, Gnanamanickam *et al.*, (1994) reported that pyroquilon was most effective for blast suppression compared to all biocontrol agents.