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EFFECT OF TRICYCLAZOLE AND MANCOZEB ON RICE PATHOGENS

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ABSTRACT

Tricyclazole and mancozeb effectively inhibited four vital functions viz., spore germination, germ tube elongation, mycelial growth and sporulation of four rice pathogens tested at different concentrations of the fungicides. Tricyclazole at 500 ppm was highly effective against *Pyricularia oryzae* and *Thanatephorus cucumeris* whereas a concentration of 1000 to 1500 ppm was required to inhibit *Helminthosporium oryzae* and *Sarocladium oryzae*. Mancozeb around 500 ppm was highly inhibitory to *P. oryzae*, at 1000 to 1500 ppm to *H. oryzae* and at 1000 to 2000 ppm to *T. cucumeris*, whereas even at 200 ppm it was inhibitory to mycelial growth of *S. oryzae*.

Field evaluation of fungicides has to be preceded by *in vitro* evaluation of their efficacy. Hence the present study was taken up to assess the effect of fungicides tricyclazole and mancozeb on spore germination, germ tube elongation, mycelial growth and sporulation in four important rice pathogens, viz., *P. oryzae*, *H. oryzae*, *S. oryzae* and *T. cucumeris* and the results are presented in this communication.

MATERIALS AND METHODS

Effect of fungicides on spore germination and germ tube elongation was studied by slide germination technique (Anon., 1947) using concentrations of 100, 200, 500, 1000, 1500 and 2000 ppm of mancozeb and tricyclazole. The germ tube length in 20 germinated conidia from each microscopic field was determined 12 hours after incubation. The per cent inhibition of germ tube elongation by fungicide was calculated.

The efficacy of the fungicides on the mycelial growth of four rice pathogens was tested using Czapek's broth as basal medium (Carpenter, 1942). The flasks containing fungicides at 200, 500, 1000, 1500 and 2000 ppm were inoculated with fungal discs of 8 mm diameter taken from one week old culture and incubated at room temperature ($28 \pm 2^\circ\text{C}$) for 10 days. Three replications were maintained for each treatment. The mycelial mat was dried in hot air oven till constant weight and weighed. Finally per cent inhibition of mycelial growth was worked out.

For determining sporulation in *H. oryzae* and *S. oryzae*, sclerotial formation in *T. cucumeris* potato-

dextrose agar medium was used while a special medium (containing soluble starch 10 g, Yeast extract 1.0 g and agar 20 g/litre) was used in the case of *P. oryzae*. The solid media were incorporated with fungicides at 200, 500, 1000, 1500 and 2000 ppm concentrations and inoculated with the respective fungus. After 12 days, four mycelial discs were taken and placed in 20 ml of sterile water kept in 100 ml flasks, for 15 minutes and the number of spores per ml of water was determined using a haemocytometer. The per cent inhibition of sporulation by the fungicide over control was worked out.

RESULTS AND DISCUSSION

Tricyclazole at 500 ppm completely inhibited all the four processes viz., spore germination, germ tube elongation, mycelial growth and sporulation in *P. oryzae*. However, spore germination and germ tube elongation were inhibited even at 200 ppm. But Froyd et al. (1976) reported that only at 300 ppm tricyclazole inhibited germ tube elongation. Agnihothrudu (1984) observed similar effect of tricyclazole on mycelial growth at 500 ppm. Mancozeb at 500 ppm completely inhibited spore germination, germ tube elongation and sporulation in *P. oryzae* but mycelial growth was arrested only at 1000 ppm concentration (Table 1). Ganesan (1987) also reported that mancozeb at 1000 ppm completely inhibited mycelial growth in *P. oryzae*. However, Awoderu and Esuruoso (1975) found mancozeb to completely inhibit spore germination only at 2000 ppm.

Tricyclazole at 1000 ppm entirely inhibited mycelial growth and sporulation of *H. oryzae*; at 1500 ppm it completely inhibited spore germination and germ

TABLE 1 : Effect of Tricyclazole and Mancozeb on Rice Pathogens.

| Fungicide | Concentration (ppm) | Per cent inhibition* of | | | |
|--------------------------------|---------------------|-------------------------|----------------------|-----------------|-------------|
| | | Spore germination | Germ tube elongation | Mycelial growth | Sporulation |
| (1) | (2) | (3) | (4) | (5) | (6) |
| <i>Pyricularia oryzae</i> | | | | | |
| Tricyclazole | 100 | 78.17 | 76.19 | NT | NT |
| | 200 | 94.90 | 90.47 | 55.18 | 67.29 |
| | 500 | 100.00 | 100.00 | 100.00 | 100.00 |
| Mancozeb | 100 | 80.48 | 63.49 | NT | NT |
| | 200 | 89.28 | 76.18 | 37.52 | 71.96 |
| | 500 | 100.00 | 100.00 | 68.21 | 100.00 |
| | 1000 | 100.00 | 100.00 | 100.00 | 100.00 |
| <i>Helminthosporium oryzae</i> | | | | | |
| Tricyclazole | 100 | 74.83 | 87.18 | NT | NT |
| | 200 | 83.53 | 95.00 | 53.60 | 42.44 |
| | 500 | 93.29 | 96.52 | 91.23 | 91.02 |
| | 1000 | 96.77 | 98.25 | 100.00 | 100.00 |
| | 1500 | 100.00 | 100.00 | 100.00 | 100.00 |
| Mancozeb | 100 | 78.37 | 87.89 | NT | NT |
| | 200 | 92.29 | 94.79 | 64.34 | 28.97 |
| | 500 | 97.94 | 97.82 | 77.58 | 73.06 |
| | 1000 | 99.05 | 98.12 | 93.28 | 100.00 |
| | 1500 | 100.00 | 100.00 | 100.00 | 100.00 |
| <i>Sarocladium oryzae</i> | | | | | |
| Tricyclazole | 100 | 38.69 | 62.71 | NT | NT |
| | 200 | 60.62 | 85.22 | 34.99 | 88.82 |
| | 500 | 93.79 | 96.36 | 80.14 | 94.78 |
| | 1000 | 100.00 | 100.00 | 98.02 | 100.00 |
| | 1500 | 100.00 | 100.00 | 100.00 | 100.00 |
| <i>Sarocladium oryzae</i> | | | | | |
| Mancozeb | 100 | 39.15 | 53.43 | NT | NT |
| | 200 | 90.41 | 86.94 | 100.00 | 100.00 |
| | 500 | 96.25 | 95.53 | 100.00 | 100.00 |
| | 1000 | 100.00 | 100.00 | 100.00 | 100.00 |
| <i>Thanetophorus cucumeris</i> | | | | | |
| Tricyclazole | 100 | 40.26 | 68.90 | NT | NT |
| | 200 | 79.10 | 96.75 | 61.13 | 97.45 |
| | 500 | 100.00 | 100.00 | 84.72 | 100.00 |
| | 1000 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE 1 : Contd...

| (1) | (2) | (3) | (4) | (5) | (6) |
|----------|------|--------|--------|--------|--------|
| Mancozeb | 100 | 20.89 | 35.28 | NT | NT |
| | 200 | 58.21 | 55.45 | 18.31 | 81.14 |
| | 500 | 77.71 | 78.83 | 43.89 | 96.46 |
| | 1000 | 95.52 | 94.96 | 62.99 | 100.00 |
| | 1500 | 100.00 | 100.00 | 80.35 | 100.00 |
| | 2000 | 100.00 | 100.00 | 100.00 | 100.00 |

Means of 3 replications; NT : Not tested.

*Both the chemical were tested 0 to 2000 ppm on all pathogens.

tube elongation. Mancozeb at 1000 ppm inhibited sporulation completely and at 1500 ppm it restricted other functions completely. Kumar et al. (1975) observed complete inhibition of mycelial growth by mancozeb at 2000 ppm.

In *S. oryzae*, all the functions except mycelial growth were inhibited completely by tricyclazole 1000 ppm. It completely inhibited mycelial growth at 1500 ppm. Mancozeb at 200 ppm itself entirely inhibited mycelial growth and sporulation. However, complete inhibition of spore germination and germ tube elongation could be seen at 1000 ppm indicating that mancozeb was more effective than tricyclazole in inhibiting vital functions of this pathogen. Reddy et al. (1985) observed complete inhibition of mycelial growth of the pathogen at 800 ppm concentration of mancozeb.

Tricyclazole at 500 ppm itself affected all the vital functions in *T. cucumeris* except mycelial growth. At 1000 ppm, it inhibited mycelial growth completely. Mancozeb at 1000 ppm inhibited sclerotial formation; at 1500 ppm it inhibited sclerotial germination and germ tube elongation and at 2000 ppm, it inhibited mycelial growth entirely. This indicates that tricyclazole was more inhibitory to *T. cucumeris* than mancozeb.

The results indicate that Tricyclazole at 500 ppm was highly inhibitory to *P. oryzae* and *T. cucumeris* whereas a concentration of 1000 to 1500 ppm was required to inhibit *H. oryzae* and *S. oryzae*. Mancozeb around 500 ppm was highly inhibitory to *P. oryzae*, at 1000 to 1500 ppm to *H. oryzae* and at 1000 to 2000 ppm to *T. cucumeris* whereas even at 200 ppm it was inhibitory to mycelial growth of *S. oryzae*.

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LIGHT INTERCEPTION AND PRODUCTIVITY IN RICE

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ABSTRACT

A study was carried out to determine the relationship between light interception and productivity in rice. Cultivar difference could be observed in leaf area index, leaf angle, light extinction co-efficient (k), dry matter production grain yield. The study suggests that the rice cultivar with optimum leaf area index, upright leaves (low leaf angle) and lower light extinction co-efficient should be screened for higher production potential. Grain yield had negative and significant correlation with leaf angle ($r = -0.3710^*$) and light interception ($r = -0.3889^*$), the dry matter production was found to have positive and significant ($r = 0.3214^*$) association with grain yield.

Crop growth and productivity is mainly decided by the efficiency in utilisation of solar radiation by the green leaf area. Crop photosynthesis is a

measure of light utilisation by leaf area. Photosynthesis in the field is primarily dependent upon the incident solar radiation, leaf angle or leaf orientation, and

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