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SEED TREATMENT WITH BAVISTIN AND VITAVAX ON THE INCIDENCE OF TURCICUM LEAF BLIGHT OF MAIZE AT PRETASSEL STAGE

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Dry seed treatment with two systemic fungicides Bavistin 50 WP and Vitavax 75 WP significantly reduced incidence of Turcicum leaf blight caused by *Exserohilum turcicum* (=*Helminthosporium turcicum*) in prematured maize plants under artificial epiphytotic condition. Vitavax was more effective in this regard than Bavistin. Laboratory tests showed that both fungicides completely inhibited mycelial growth and conidial germination of the pathogen.

Key words : Bavistin, Vitavax, *Exserohilum turcicum*, *zea mays*, inoculation, epiphytotic.

INTRODUCTION

Turcicum leaf blight or Northern leaf blight of maize (*Zea mays* Linn.) caused by *Exserohilum turcicum* (Pass.) Leonard & Suggs. (synonym *Helminthosporium turcicum* Pass.) acts as a major constraint on maize production in Indian agriculture as it is widely prevalent over this country and it may cause significant loss in grain yield as well as in crop value under favourable conditions (Payak and Sharma, 1978 ; 1985). Management of this disease with chemicals has been mainly recommended by the use of protectants of thiocarbamate group such as Maneb (Dithan M-45) or Zineb (Dithane Z-78) by Payak and Sharma (1985). Use of systemic fungicides as seed treatment in the control of some major foliar diseases and stalk rots of maize has received great attention during the recent years. Thus dry seed treatment with Benlate 50 WP, Bavistin 50 WP and Plantvax 75 WP has been most effective against brown spot (*Physoderma maydis*) disease (Thakore, 1974), late wilt (*Cephalosporium maydis*) and charcoal (*Macrophomina phaseolina*) rot (Raj, 1987). But information is so far lacking in this regard in respect of Turcicum leaf blight.

MATERIALS AND METHODS

The study was undertaken at Maize Research Station of Bidhan Chandra Krishi Viswavidyalaya, Kalyani, during *rabi* months (December to February) of 1986-'87.

From ecological point of view, the existing weather conditions at Kalyani during this period may be considered to be conducive for the development of *E. turcicum*.

A virulent isolate of *E. turcicum* was included in the present study. The two systemic fungicides used against this pathogen were Bavistin 50 WP (methyl -2-benzimidazole carbamate 50) and Vitavax 75 WP (5, 6-dihydro-2-methyl-1, 4 oxathiin-3-carboxanilide 75%). A susceptible maize inbred line CM 202 was included in the experiment. Dry seed treatment was done with these fungicides @ 2 g per kg of seed. The fungicide treated seed was then planted in 6 rows plot with 3 replications following the split-plot technique. Each row was 5 meters in length and contained 20 plants. Adequate control was kept by keeping untreated plots. Normal agronomic practices were followed and no other plant protection measure was undertaken during the entire crop season.

The standard whorl inoculation method by using suspension of *E. turcicum* grown in potato dextrose agar (PDA) medium was followed to inoculate the standing plants of about 35 days old (Sharma, 1982). Inoculation was repeated twice at weekly interval and the data on the disease incidence were recorded visually on individual plant basis prior to flowering following 1 to 5 scale (Payak and Sharma, 1982). Finally the average disease index per plant in a plot was calculated.

For studying the effect of the test fungicides on the linear growth of mycelium, 100 ml of PDA was put in each of the 250 ml Erlenmeyer flasks and sterilized. 10 mg, 20 mg, 30 mg, 40 mg and 50 mg of the test fungicides were then added to the partially cooled medium (about 40°C) to give the required strength of 100 ppm, 200 ppm, 300 ppm, 400 ppm and 500 ppm respectively. The flasks were shaken thoroughly and the contents poured in 10 cm Petri dishes (20 ml in each Petri dish). The Petri dishes replicated six times were then inoculated with 6 mm diameter discs of inoculum from 7 day-old culture of *E. turcicum* and were incubated at 26±1°C for 10 days after which mycelial growth was recorded.

For studying the effect of the test fungicides on conidial germination, a drop of conidial supension in sterile tap water was placed in each of the double grooved cavity slides to which one drop of the fungicidal suspension was added. The slides were then incubated for 20 h at 26 ± 1°C after which percentage of conidial germination was recorded under the low power of microscope.

RESULTS AND DISCUSSION

Both fungicides were able to significantly reduce incidence of *E. turcicum* over control (Table 1). However, Vitavax was significantly more effective than Bavistin in reducing the disease. Laboratory tests (Table 2) showed that linear growth and conidial germination of the pathogen were progressively decreased with the increase doses of the fungicides upto 400 ppm. However, complete inhibition of growth and conidial germination by the two fungicides were recorded at 500 ppm.

Table 1. In vivo *effect of two fungicides on the incidence of* Exserohilum turcicum *infecting maize*

Test fungicide (2 g per kg of seed)	Intensity of infection	Average disease index (1 to 5 scale)*
Bavistin 50 WP	*Moderate infection,* abundant lesions on lower leaves, few on upper leaves	3.0 b
Vitavax 75 WP	*Mostly light infection,* moderate number of lesions on lower leaves	2.3 c
Uusupplemented (contro)	*Heavy to very heavy infection,* lesions abundant on almost all leaves, premature drying or death of few plants	4.8 a

*Data not sharing the common letters are significantly different (P=0.05) as determined by Duncan's multiple range test.

Table 2. In vitro *effect of two fungicides on the linear growth and conidial germination of* Exserohilum turcicum

Test fungicide	Concentration (ppm)	Linear growth (mm)	Conidial germination (%)
Bavistin 50 WP	50	62.5	59.6
	100	53.5	48.4
	200	27.6	21.2
	300	23.4	16.5
	400	20 5	12.5
	500	No growth	No germination
Vitavax 75 WP	50	56 2	47.6
	100	41.3	36,8
	200	21 6	15.5
	300	17.8	11.4
	400	11.5	8.7
	500	No growth	No germination
Uusupplemented (control)	—	98 5	96.5

The present study has highlightened the importance of seed treatment with two systemic fungicides Bavistin 50 WP and Vitavax 75 WP in reducing incidence of *E. turcicum* in maize at pretassel stage. Laboratory tests with these two fungicides also showed complete inhibition of growth and germination of conidia of this pathogen. As already indicated that seed treatment with Benlate 50 WP, Bavistin 50 WP and Plantvax 75 WP was also effective in the control of some other maize diseases like brown spot (Thakore, 1974) and late wilt and charcoal rot (Raj, 1987). Experimental evidence in this regard a'so indicated the usefulness of some

systemic fungicides against some other diseases incited by *Helminthosporium* spp. Thus seed treatment with Carboxin (Oxathiin group) @ 1.25 g per kg gave good result in the control of leaf stripe caused by *Drechslera gramineam*(=*H. gramineam*) of barley (Kingsland, 1970). However, in the present study Vitavax was found superior in its action over Bavistin. On the other hand, superior action of Benomyl-HCl (Benzimidazole group) as compared to Carbendazim-HCl (Oxathiin group) has been also recorded on conidial germination of *Bipolaris oryzae* (=*H. oryzae*) on rice host (Krishnamurthy and Kumari, 1981).

Both Benzimidazoles and Oxathiins have been reported to be systemic with prophylactic or curative action against various plant diseases. Uptake and apoplastic translocation of Oxathiin compounds have been reported in several crop plants including maize (Pocklington and Linn, 1970 . Bioassay of the extract of leaf tissue of soybean seedlings from Carboxin treated seed showed the presence of fungitoxic activity for several days (Thapliyal, 1970; Thapliyal and Sinclair, 1970; 1971). In pearl millet seedlings, both Carboxin and Oxycarboxin were found to be absorbed by the roots and translocated to the stem and leaves at high concentrations and speed (Bhaktavatsalam and Tripathi, 1974). Reduction in the intensity of infection due to *E. turcicum* on maize leaves in the present case might be also due to similar reasons.

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