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Short Note

Bloefficacy of Avtar (zineb 68% + hexaconazole 4%) 72 WP against blister blight of tea

S.K. Sugha and B.R. Thakur
Department of Plant Pathology
CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur – 176 062, India.

Abstract

Avtar 72 WP, a co-ordinated product of zineb 68% + hexaconazole 4%, was tested for its bioefficacy against blister blight and its pathogen *Exobasidium vexans*. The test fungicide was found effective at and above 500 µg ml^{-1} test concentrations to give complete inhibition of basidiospore germination. The fungicide performed well in the field too to yield 50 per cent disease control at 0.30 % test concentration and was statistically at par with the result of hexaconazole 5 EC at 0.10 % concentration. Being a co-ordinate mixture of hexaconazole with a protectant zineb, it also helped in overcoming zinc deficiency, if any, with minimum chances of resistance development by the pathogen.

Key words: Avtar, bioefficacy, blister blight, tea.

Blister blight of tea (*Camellia sinensis* (L) O. Kuntze), caused by a biotrophic fungus *Exobasidium vexans* Massee is endemic in tea plantations of Kangra valley of Himachal Pradesh and causing substantial loss to the crop. Large number of fungicides, both systemics and nonsystemics are reported effective against the disease (Baby, 2002). Triazole fungicides, though very effective, find limited utility among the planters because of their high cost. Also, because of repeated use of these fungicides; these are at high risk of resistance development by the pathogen. In order to prolong the utility of these fungicides, majority of these are being developed as co-ordinated products with protectant fungicides. In this context, Avtar-72 WP, a co-ordinated product of zineb 68% + hexaconazole 4%, developed by Indofil Chemicals Company, Mumbai was evaluated *in vitro* and *in vivo* against the pathogen and disease, respectively.

Avatar 72 WP was evaluated at different test concentrations for per cent basidiospores inhibition of *E. vexans*. Basidiospores of the pathogen were harvested from the fully developed blisters in glass sterilized distilled water in the test tubes, washed twice in centrifuge at 3500 rpm and basidiospore pellet was resuspended in sterilized water for germination study. Different concentrations of the test fungicides were prepared from 1000 µg stock solutions. The fungicide suspension (0.02 ml) of each concentration was deposited on clean glass slides, allowed to dry at room temperature and 0.02 ml of spore suspension (more than 100 spores at 10X) of the pathogen was placed on each dried drop of fungicides. Hanging drop method was employed for germination of basidiospores of the pathogen and after 12 hours of incubation at 22± 1° C in Petri plates lined with double layered moist filter papers, the spores were fixed in cotton blue in lactophenol. Spore suspension in sterilized distilled water served as check. The experiment was repeated twice in three replications per treatment. Data on spore germination were recorded and per cent inhibition in spore germination in each concentration of test fungicide over check was determined as under:

$$\frac{C-T}{C} \times 100,$$

Where, C = % spore germination in check,
T = % spore germination in treatment.

Field trial on the bioefficacy of Avtar 72 WP at three concentrations (0.2, 0.25 & 0.3 %) was laid out at the University Tea Farm in Randomized Block Design. Each treatment consisted of 20 bushes and replicated thrice. Three fortnightly sprays of test fungicide along with the recommended one Blitox (copper oxychloride) 50 WP were given, starting with the appearance of disease. Data on the disease severity were recorded at each plucking round of 10 days. The disease was scored on one hundred shoots (two and a bud) per treatment per replication, taken randomly from the harvested lot to determine the comparative effectiveness of each treatment.

Results in the Table 1 revealed that basidiospores of *E. vexans* showed varied response in their germination at different concentrations of the test fungicide. With an increase in the concentration, corresponding decrease in per cent germination and an increase in inhibition per cent of basidiospores was noticed. Even at 10 µg ml^{-1}

concentration, the fungicide caused 22.1% inhibition in basidispore germination, which increased to 100 % at 500 µg ml^{-1} concentration. No germination of basidiospores were noticed at 750 and 1000 µg ml^{-1} test concentrations. All the test concentrations except 20 and 25 µg ml^{-1} differed significantly in their effect on germination of basidiospores whereas, 20 and 25 µg ml^{-1} concentrations were at par in their effect on the germination of basidiospores of the pathogen. At 500 µg ml^{-1} the fungicide was found highly effective as it caused cent per cent inhibition in germination of basidiospores.

Table 1. Effect of different concentrations of Avtar (zineb 68%+hexaconazole 4%) 72 WP on basidiospore germination of *Exobasidium vexans*

Concentration (µg/ml)	Per cent basidiospore germination*	Per cent Inhibition over check
10	77.9 (61.9)	22.1
20	58.4 (49.8)	41.6
25	57.5 (49.3)	42.5
50	46.6 (43.0)	53.4
100	41.6 (40.2)	58.4
200	27.3 (31.5)	72.7
250	9.9 (18.3)	90.1
500	0.0 (0.0)	100.0
750	0.0 (0.0)	100.0
1000	0.0 (0.0)	100.0
Check (sterilized water)	100.0 (90.0)	-
CD (P=0.05)	(4.2)	-

*Average of two tests of three replications each.
Arc sign transformed values are given in parentheses

In the field, all the fungicide treatments decreased the severity of disease over the unprotected plots (Table 2). Three fortnightly sprays of these fungicides except hexaconazole (0.10%) were statistically at par in checking the disease. Sprays of copper oxychloride and zineb were at par in their effect in checking the disease. Sprays of hexaconazole 5 EC at 0.05% and those of Avtar 72 WP at 0.25 % were comparable in checking the disease. Hexaconazole at 0.10 % and Avtar at 0.30 % were superior over rest of the fungicides in decreasing the disease as spray of these fungicides resulted in 60 and 50 per cent control of the disease. The results are comparable with the work done by various workers (Venkatraman, 1974; Gulati and Satyanarayana, 1989; Sugha and Singh, 1990; Sugha and Thakur, 1998; Thakur and Thakur, 2005). All the test concentrations of Avtar 72 WP were at par among themselves in controlling the disease. However, if sprayed at shorter intervals of 10 days, might provide still better protection to tea bushes against the disease.

Table 2. Comparative field performance of Avtar (zineb 68% + hexaconazole 4%) 72 WP against blister blight of tea

Fungicide	Conc. (%)	Disease severity * (%)	Disease control (%)
Zineb 75 WP	0.25	20.67 (27.03)	35.97
Hexaconazole 5EC	0.05	16.22 (23.55)	49.83
	0.10	12.89 (20.94)	60.13
Avtar (zineb 68% + hexaconazole 4%)72 WP	0.20	18.56 (25.47)	42.59
	0.25	17.56 (24.71)	45.69
	0.30	16.00 (23.38)	50.51
Blitox (copper oxychloride)50W P	0.30	21.56 (27.63)	33.31
Check	No spray	32.33 (34.63)	-
CD (P=0.05)	-	(5.15)	-

* Average of three replications on 100 shoots/ treatment/ replication/ plucking round of 10-days,
Arc sign transformed values are given in parentheses

Thus, spray of Avtar 72 WP not only provided protection to tea bushes against blister blight but also helped in overcoming zinc deficiency, if any, alongwith minimal chance of resistance development by the pathogen, as it being a co-ordinated mixture with a protectant fungicide zineb.

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