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ANTIBACTERIAL ACTIVITY OF VARIOUS TOXICANTS AGAINST *XANTHOMONAS CAMPESTRIS PV. MALVACEARUM* FOR THE CONTROL OF BACTERIAL BLIGHT OF COTTON

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Streptomycine sulphate, Agrimycin-l00 and Vitavax, in that order, were the most effective while Nemispore Pencozeb, Sandofan-M, Cuperosan and Beam were relatively less effective in inhibiting the culture of Xanthomonascampestris pv. malvacearum. Vitavax, Nemispore, Pencozeb, Sandofan M and Cuperosan at 0.01 percent concentration exhibited no activity against the bacterium while Beam displayed no effectiveness even at 0.2 per cent concentration. Foliar application of Streptomycine sulphate only reduced 29.64 per cent disease severity over the non sprayed inoculated control.

INTRODUCTION

Angular leaf spot caused by Xanthomonas campestris pv. malvacearum is one of the important diseases of cotton. The pathogen is local as well as systemic in nature and can reduce the yield of cotton crop up to 50 percent under favourable conditions of disease development (Hussain and AB, 1975). Since prevalent commerial cotton varieties are susceptible, the only hope to combat with the disease lies in the chemotherapeutic control. Some chemicals have revealed possibility of the control of this disease (Verma et al., 1976; Jalali and Grover, 1974; Jeyachandran and Shanmugam, 1979). Therefore, a few of the available toxicants were evaluated for their effect on the growth of Xanthomonas campestris pv. malvacearum and the cotton bacterial blight disease.

MATERIALS AND METHODS

1) Effect of toxicants on the inhibition of bacterial culture

7 Sterilized petri plates containing one ml suspension (having 10 cells/ml) of X. campestris pv. malvacearum were poured with luke warm nutrient agar. The agar and the bacterial suspensions were mixed gently and then the petri plates were allowed to solidify. Ten mm diameter autoclaved filter paper discs were dipped in each of the four aquous concentrations (0.01, 0.1, 0.2 and 1.0 percent) of Streptomycin sulphate, Agrimycin-100, Vitavax, Nemispore, Pencozeb, Sandofan-M, Cuperosan and Beam. The soaked discs were placed, after touching with a dry sterilized filter paper surface, on the bacteria mixed agar plates which were then put in a refrigerator for 24 hours. The plates were then incubated at 30 ± 2°C for 72 hours. The zones of inhibition around the discs were recorded (Cruickshank et al., 1975). For each of the toxicants at its four concentrations, there were four replications (petriplates) for each treatment. The petri-plates in the control treatment had filter paper discs dipped only in sterilized water. The data on the zone of inhibition of the bacterium for each treatment were recorded.

2) Effect of toxicants on bacterial blight disease of cotton

Seedlings of cotton cultivars B-557 were raised in green house in earthen pots (25 cm dia.). At about 15 cm plant height, the plants were thinned to two plants per pot. The potted plants were then sprayed with 0.2 percent solution of each of Streptomycin sulphate, Agrimycin-lOO, Vitavax, Nemispore, Pencozeb, Sandofan-M and Cuperosan. There were 12 pots for each treatment (four pots/replication). After 24 hours of toxicant spray, the plants were spray inoculated, till the leav~ were' water soaked, with a water suspension <Containing 10 cells/ml) of X. campestris pv. malvacearum. The plants sprayed with distilled water served as control. The second spray of toxicants was given 15 days after inoculation. Disease severity was recorded after 28 days of inoculation.

RESULTS AND DISCUSSION

The toxicants varied greatly for their effect on the inhibi-

Table 1. *Diameter of the zone of inhibition* (mm) at *four concentrations of various toxicatits*

Toxicants	Concentrations (Percent solution)			
	0.01	0.1	0.2	1.0
Streptomycin sulphate	13^{gh} *	$1g^{e}$	29^{be}	37^{e}
Agrimycin-100	8^{ij}	17^{ef}	22^{d}	31^{b}
Vitavax	0.0^{1}	18^{e}	$1g^{e}$	30^{b}
Nemispore	0.0^{1}	13^{gh}	12^{h}	16^{fg}
Pencozeb	0.0^{1}	9^{i}	12^{h}	17^{ef}
Sandofan-M	0.0^{1}	5^{k}	7^{j}	15^{fg}
Cuperosam	0.0^{1}	1hi	11hi	llj.g
Beam	0.0^{1}	0.0	0.0^{1}	13^{gh}
Control	0.0^{1}	0.0^{1}	0.0^{1}	0.0^{1}

Mean values sharing similar letters do not differ significantly at 1% level of significance (DMR- Test).

tion of culture of ~. campestris pv. malvacearum and there was an increase in the zone of inhibition with an increase in the concentration of toxicants solutions into which discs were dipped (Table-I). Streptomycin sulphate, Agrimycin-100 and Vitavax, in that order, were found to be the most effective toxicants in inhibiting the growth of the bacterial culture. Nemispore, Pencozeb, Sandofan-M, Cuperosan and Beam were

Table 2. *Effect of various toxicants* on *the* severi ty *of bacterial blight* disease *of greenhouse grown cotton plants*

Toxicants	Disease severi ty after 28 days	Percent disease over control
Control	5.33[a] *	
Pencozeb	4.56[a]	14.44
Nemispore	5.16[a]	3.19
Sreptomycin sulphate	3.75[b]	29.64
Cuperosan	5.13[a]	3.75
Vitavax	5.30[a]	0.18
Agrimycin-lOO	5.23[a]	1.87

* Any two mean values sharing similar letter do not differ significantly at 1% level of significance (DMR- Test).

relati vely less effecti ve, in the order given, in the inhibition of the bacterial culture. However, Vitavax, Nemispore, Pencozeb, Sandofan-M and Cuperosan at 0.01 per cent concentration exhibited no activity against the bacterium while Beam showed no activity even at 0.2 percent concentration. Funglcides are generaHy poor bactericides, but Vitavax proved to be almost as effective as the antibiotic Agrimycin-lOO in inhibiting the growth of the bacterium. The effectiveness of Streptomycin and Carboxln (Vltavax) in inhibiting the growth of 2S... campestris pv; malvacearum has already been reported (Verma et al., 1976).

With regards to the effect of spray of toxicants on the severity of bacteri.; blight disease, *all* toxicants except Streptomycin sulphate, did not control the disease. Only foliar application of Streptomycin sulphate reduced disease severi ty by 29.6 per cent compared with the non sprayed inoculated control (Table-Z). However, it was noted that in *all* fungicidal treatments there was comparatively less stem splitting on account of infection as compared to non sprayed control where bacter Ial infection resulted into severe stem splitting. Agrimycin-100 and Vitavax have been reported to be systemic in cotton seedlings and reported to persist in plant tissue for 4 weeks (Nayak and Verma, 1975). These chemicals have been reported to reduce bacterial blight on field grown cotton (Jeyachandran and Shanmugam, 1979; Nayak et al., 1976). In our studies these two toxicants have been found to be ineffective in reducing the disease on green-house plants. This may be due to difference in the succulence and other environmental conditions of the greenhouse and field grown cotton plants.

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