

CONTROL OF BACTERIAL LEAF SPOT OF BETEL VINE*

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Bacterial leaf spot incited by *Xanthomonas campestris* pv. *betlicola* (Patel, Kulkarni and Dhande) Dye, is a serious disease of betel vine in Kerala causing considerable economic losses. In recent years, the incidence of the disease is so alarming that farmers are abandoning the cultivation of betel vine. In a preliminary study, it was found that none of the popular and common cultivars is resistant to the disease. So a study was taken up to test the efficacy of some antibiotics for the control of the disease,

Materials and Methods

The *in vitro* sensitivity of the bacterium *Xanthomonas campestris* pv. *betlicola* to six different antibiotics was tested. Three concentrations viz., 100 ppm, 250 ppm and 500 ppm of Agrimycin-100, Ampicillin, Streptocycline, Terramycin, Streptomycin and chloramphenicol were tested by the standard filter paper disc method. Solutions of the above antibiotics were prepared in sterile distilled water. Sterile filter paper discs of 10 mm diameter were dipped in the solutions and placed on potato sucrose peptone agar medium seeded with 24-48 h old culture of the bacterium in petridishes. The test was conducted with three replications and observations on the zone of inhibition were recorded.

For the *in vivo* screening of antibiotics, an experiment was laid out in completely randomised design with four replications. Three antibiotics namely chloramphenicol, Terramycin and Agrimycin-100 at concentrations of 250 ppm and 500 ppm were sprayed on naturally infected plants.

Two sprayings were given at an interval of one week. Observations on the disease intensity, survival of diseased leaves and rate of defoliation were recorded on the day of each spraying and seven days after the second spraying (Koshy Abraham, 1980).

Results and Discussion

The results are presented in Table 1 and 2. Of the six antibiotics tested *in vitro*, chloramphenicol was found to be significantly superior to all other antibiotics which was closely followed by Terramycin. Agrimycin-100, Streptomycin and Streptocycline were on par and significantly inferior to chloramphenicol and Terramycin. Ampicillin was not at all effective against the bacterium at the concentrations tested.

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Chloramphenicol at 500 ppm was significantly more inhibitory than its lower concentrations and all other antibiotics. Terramycin at 500 ppm was found to be on par with Streptomycin 500 ppm and chloramphenicol 250 ppm but was significantly superior to its lower concentrations and other antibiotics except chloramphenicol 500 ppm. The higher concentrations of Streptocycline, Streptomycin and Agrimycin-100 were found to be significantly superior to their lower concentrations. Thirumulachar *et al.* (1956) reported the inhibitory effect of Terramycin, Chloromycetin (chloramphenicol) and Streptomycin to *X. betlicola* on *Piper betle*. James Mathew *et al.* (1979 a, b) noticed that chloramphenicol at 500 ppm exerted maximum inhibition against the growth of *X. betlicola*

Table 1

In vitro sensitivity of antibiotics against *Xanthomonas campestris* pv. *betlicola* (inhibition zone in mm)

Antibiotics	100 ppm	250 ppm	500 ppm	Mean
Agrimycin-100	19.33	25.33	29.00	24.55
Ampicillin	0.00	0.00	0.00	0.00
Chloramphenicol	28.00	30.33	36.33	31.55
Streptomycin	18.66	22.33	30.33	23.77
Streptocycline	19.33	24.33	27.66	23.77
Terramycin	29.33	28.66	33.00	29.33
C.D. (0.05) for comparison between antibiotics				1.573
C.D. (0.05) for comparison between concentrations				3.125

from *Piper nigrum*. Thus the study reveals that chloramphenicol, Terramycin, Streptocycline, Streptomycin and Agrimycin-100 have got inhibitory effect to *X. campestris* pv. *betlicola* and Ampicillin was not effective. Among these, chloramphenicol at 500 ppm has got maximum inhibitory effect.

None of the antibiotics in the field trial gave absolute control of the disease. But there was significant decrease in disease intensity and significant difference in the percentage of survival of diseased leaves in the treated plants. There was no significant difference in the percentage of defoliation between treated plants and control, one week after first and second sprayings.

The percentage index of disease status one week after first spraying showed that plants receiving the Terramycin 500 ppm spray showed less disease intensity and control plants had maximum intensity. But one week after second spraying the percentage index of disease status was less on all antibiotics treated plants. The percentage of survival of diseased leaves was maximum on plants receiving Terramycin 500 ppm spray and minimum on control.

Table 2
In vivo screening of antibiotics against the disease

Treatments	Percentage of defoliation		Percentage index of disease status		Percentage of survival of diseased leaves over two weeks
	one week after 1st spraying	one week after 2nd spraying	one week after 1st spraying	one week after 2nd spraying	
Chloramphenicol 500 ppm	12.5 (20.69)	6.2 (14.41)	19.37	21.87	33.0 (35.08)
Chloramphenicol 250 ppm	10.5 (18.95)	18.4 (25.26)	25.43	48.17	50.6 (45.32)
Terramycin 500 ppm	0.72 (4.86)	10.4 (18.85)	15.81	32.68	85.2 (67.37)
Terramycin 250 ppm	7.1 (15.36)	21.3 (27.47)	18.52	28.35	43.6 (41.35)
Agrimycin-100 500 ppm	10.8 (19.18)	14.6 (22.45)	39.64	46.77	70.7 (57.23)
Agrimycin-100 250 ppm	16.5 (24.00)	25.1 (30.08)	28.14	38.95	38.4 (38.31)
Control	17.0 (24.36)	34.0 (35.65)	59.27	97.44	24.4 (29.59)
C.D. (0.05)	—	—	20.93	27.41	21.80

Figures in parenthesis are values after angular transformation

Control or bacterial leaf spot of betel vine on a field scale has not been attempted by earlier workers. In the present study, even though chloramphenicol at 500 ppm was having maximum *in vitro* sensitivity, the field performance was not as good as that of Terramycin 500 ppm. Terramycin 500 ppm exerted better *in vivo* control of the disease as in the percentage index of disease one and two weeks after spraying was minimum and also the percentage of survival of diseased leaves was maximum in plants receiving this treatment. In the absence of resistant cultivars of betel vine, Terramycin at 500 ppm could be used in reducing the severity of the bacterial leaf spot in betel vine garden. Further detailed studies are necessary before this can be recommended in the field control of the disease.

Summary

In the *in vitro* screening of antibiotics, chloramphenicol, Terramycin, Streptomycin, Streptocycline and Agrimycin-100 have showed inhibitory effect to *X. campestris* pv. *betif/cota*. Among these, chloramphenicol at 500 ppm exerted maximum

inhibitory effect. None of the antibiotics tested in *in vivo* gave absolute control of the disease. But minimum percentage index of disease status and maximum percentage survival of diseased leaves were observed in plants receiving Terramycin 500 ppm spray.

സംഗ്രഹം

വെറിലച്ചെടിയുടെ ഇലപ്പുള്ളിരോഗ ഹേതുവായ സാന്തമോണാസ് ക്യാമ്പസ്റ്റ്രിസ് *pv. ചൈറോലിക്കോള* (*Xanthomonas campestris pv. betlicola*) എന്ന ബാക്ടീരിയത്തിനെതിരെ ആന്റിബയോട്ടിക്സുകൾ ഉപയോഗിച്ച് ലബോറട്ടറിയിൽ നടത്തിയ പരീക്ഷണങ്ങളിൽ, ക്ലോറാഫിനിക്കോൾ, ടെറാമൈസിൻ, സ്ട്രെപ്റ്റോമൈസിൻ, സ്ട്രെപ്റ്റോസൈക്ലിൻ, അഗ്രിമൈസിൻ എന്നിവയ്ക്ക് ഈ ബാക്ടീരിയത്തെ നശിപ്പിക്കുവാനുള്ള ശക്തിയുള്ളതായി തെളിഞ്ഞു. ഇവയിൽ 500 ppm വീര്യമുള്ള ക്ലോറാഫിനിക്കോളിന് ഏറ്റവും കൂടുതൽ ശക്തിയുള്ളതായി കണ്ടു. എന്നാൽ രോഗം ബാധിച്ച വെറിലച്ചെടികളിൽ അഗ്രിമൈസിൻ ക്ലോറാഫിനിക്കോൾ, ടെറാമൈസിൻ എന്നിവ 500 ppm വീര്യമുള്ള ടെറാമൈസിനാണ് ഈ രോഗം കുറയ്ക്കുന്നതിന് ഏറ്റവും ഫലപ്രദമായി കണ്ടത്.

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