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RESEARCH NOTE

An *in vitro* evaluations of chemicals on the growth of *Erwinia caratovora* subsp. *carotovora* causing tip-over disease of banana

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ABSTRACT

An *in vitro* evaluation was carried out on commercially available antibacterial chemicals to find out their effectiveness against the growth of *Erwinia carotovora* subsp. *carotovora*. Among the different chemicals tested *in vitro*, streptocycline at 500 ppm has shown highest inhibition zone followed by copper oxychloride and copper hydroxide each at 3000 ppm Among the different antibacterial chemicals in combination with copper chemicals evaluated results revealed that copper oxychloride and copper hydroxide both (3000 ppm) each in combination with streptocycline (500 ppm) exhibited superior inhibition zone followed by streptocycline and copper hydroxide than with copper sulphate.

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Banana is the one of the oldest and best known fruits of the world. Banana and plantain constitute a major staple food crop for millions of people in tropical populations. Several factors are attributed to the constraints for high production of banana and the major being the occurrence of diseases. Among the bacterial diseases, tip-over or bacterial rhizome rot of banana caused by *Erwinia carotovora* subsp. *carotovora* is gaining importance in recent years in Karnataka though earlier the disease was considered as of minor importance.

The bacterium was multiplied by inoculating the culture into 20 ml of nutrient broth taken in "Erleynemayers" flask. The inoculated flasks were incubated at 30°C for 48 hours. The bacterial suspension was then seeded to the lukewarm Nutrient agar medium (1000 ml). The seeded medium was poured into the sterilized Petriplates and plates were allowed to solidify.

The bactericides were prepared at different concentrations. The filter paper discs (Whatman no-44) measuring 5mm in diameter were soaked in the respective chemical concentrations for 5 min and transferred onto the surface of seeded medium in the Petriplates. The inoculated plates were kept in refrigerator at 5^0C for 4 hours to allow for the diffusion of chemicals into the medium. The plates were then incubated at 30^0C for 72 hours. The observations were taken for the production of inhibition zone around the filter paper discs. The results obtained were analyzed statistically.

Chemicals (each at four concentrations) were evaluated for their efficacy against the growth of *Erwinia carotovora* subsp. *carotovora* by inhibition zone method. The details of chemicals used and their cobinations with antibiotics and results obtained are given in Table 1 and 2.

Present investigation was carried out to evaluate commercially available antibacterial chemicals to find out their effectiveness against the growth of *Erwinia carotovora* subsp. *carotovora* under *in vitro* conditions.

Results of Table 1 indicated that streptocycline was found significantly superior over other treatments with highest inhibition (2.38) at 500 ppm followed by copper oxychloride at (1.72) and copper hydroxide (1.59) both at 3000 ppm. Next was copper sulphate which showed inhibition of (1.01 cm) at 3000 ppm. Bromopol and plantamycin were at par with each other,

Table 1 : *In vitro* evaluations of chemicals on the growth of *Erwinia carotovora* subsp. *carotovora*

Sr. No.	Name of the chemical	Concentration (ppm)	Mean diameter of the inhibition zone (cm)
1.	Streptocycline	100	1.35 (1.53)
		250	1.51 (1.58)
		350	1.83 (1.69)
		500	2.38 (1.84)
2.	Plantamycin	100	0.00 (1.00)
		250	0.00 (1.00)
		350	0.63 (1.27)
		500	0.76 (1.33)
3.	Bromopol	100	0.00 (1.00)
		250	0.00 (1.00)
		350	0.80 (1.34)
		500	0.96 (1.40)
4.	Bleaching powder	1000	0.00 (1.00)
		2000	0.00 (1.00)
		3000	0.00 (1.00)
		4000	0.75 (1.32)
5.	Copper	1500	1.35 (1.53)
	oxychloride	2000	1.44 (1.56)
		2500	1.60 (1.61)
		3000	1.72 (1.65)
6.	Copper hydroxide	1500	1.21 (1.49)
		2000	1.33 (1.53)
		2500	1.49 (1.58)
		3000	1.59 (1.61)
7.	Copper sulphate	1500	0.74 (1.32)
		2000	0.85 (1.35)
		2500	0.92 (1.39)
		3000	1.01 (1.43)
Control			0.00
Factor		S.Em±	C.D. (P=0.01)
Chemicals		0.0029	0.0103
Concentration		0.0022	0.0082
Interaction		0.0058	0.0216

Figures in the parenthesis are $\sqrt{x+1}$ transformed values

at 500 ppm concentrations and they showed 0.96 cm and 0.76 cm, respectively, where both the chemicals showed no effect at 100 and 250 ppm concentration Bleaching powder was least effective only at higher concentration at 4000 ppm. However, all other chemicals *viz.*, copper oxychloride and copper hydroxide were at par with each other. Same results have been reported by Thammaiah *et al.* (2006) under field condition. Kannan *et al.* (2006) reported that soil drenching of sodium hypochorite (0.5%) and streptomycine sulphate (500 ppm) performed well and reduced the rhizome rot disease incidence. Nagaraj *et al.* (2002) evaluated various bactericides and

Table 2 : *In vitro* evaluation of combination of chemicals/antibiotics on the growth of *Erwinia carotovora* subsp. *Carotovora*

Sr. No.	Name of the chemical	Concentration (ppm)	Mean diameter of inhibition zone (cm)
1.	Streptocycline+Copper oxychloride	500 + 3000	2.83 (1.95)
2.	Streptocycline + Copper hydroxide	500 + 3000	2.56 (1.88)
3.	Streptocycline + Copper sulphate	500 + 3000	2.13 (1.76)
4.	Plantamycin + Copper oxychloride	500 + 3000	1.73 (1.65)
5.	Plantamycin + Copper hydroxide	500 + 3000	1.63 (1.62)
6.	Plantamycin + Copper sulphate	500 + 3000	1.06 (1.43)
7.	Bromopol + Copper oxychloride	500 + 3000	2.03 (1.74)
8.	Bromopol + Copper hydroxide	500 + 3000	1.93 (1.65)
9.	Bromopol + Copper sulphate	500 + 3000	1.26 (1.50)
		S.E±	0.33
		C.D. (P=0.01)	1.36

Figures in the parenthesis are $\sqrt{x+1}$ transformed values.

antibiotics under *in vitro* Methoxy ethyl mercuric chloride 2000 ppm, copper sulphate @ 4000 ppm, steptocycline @ 750 ppm and norfloxin @ 750 ppm were found effective in inhibiting the growth of *Erwinia carotovora* subsp. *carotovora.*

The results of Thammaiah *et al.* (2005) revealed that the combination of streptocycline 1000 ppm + copper oxychloride 2000 ppm recorded the maximum inhibition of *Erwinia chrysanthemi* (24.00 mm) followed by copper oxychloride 4000 ppm (23.33). The combination of Streptocycline (500 ppm) and copper oxychloride (3000 ppm) oxhibited mean diameter of inhibition zone (2.83 cm) followed by streptocycline (500 ppm) and copper hydroxide (3000 ppm) (Table 2).

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