
Efficacy of chemicals against Bacterial Blight of Clusterbean

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Three chemicals viz., streptomycin, plantomycin and copper oxychloride at different concentrations and their combinations were tested against the bacterial blight of clusterbean (guar) caused by *Xanthomonas axonopodis* pv. *cyamopsidis* *in vitro* and *in vivo*. In laboratory experiments by paper disc method maximum inhibition of growth of bacteria was induced by streptomycin @ 500 ppm. The seeds of clusterbean variety Pusa Navbahar inoculated with bacterial suspension and later on treated with streptomycin @ 500 ppm showed maximum percentage of seed germination. Under *in vivo* conditions seed treated with and plants treated with foliar sprays of streptomycin @ 500 ppm showed minimum per cent of disease incidence and maximum seed yield of clusterbean. Bacterial blight infection could be significantly also reduced by all three chemicals and its combinations at different concentrations as evidenced by the data of disease suppressing and increasing of yield.

Key words : *Xanthomonas axonopodis* pv. *cyamopsidis*, streptomycin, plantomycin, copper oxychloride, clusterbean

INTRODUCTION

The bacterial blight, caused by *Xanthomonas axonopodis* pv. *cyamopsidis*, is one of the major disease of clusterbean, commonly known as guar. Seedling mortality is the cause of primary damage when secondary spread of the disease causes infection on foliar plant parts. In case of heavy infection, it is reported to cause 58-68 per cent loss in grain yield (Srivastava and Rao, 1963; Gupta, 1978; Gandhi and Chand, 1985). Spraying of chemicals for controlling this disease is not common practice in Rajasthan. The present studies are, therefore, conducted to find out the effect of different chemicals on per cent seed germination, growth of bacterium *in vitro* and disease incidence of bacterial blight of clusterbean.

MATERIALS AND METHODS

One ml of bacterial suspension prepared by suspending 48 h old bacterial culture from yeast extract glucose chalk agar slants in 5 ml sterile water, was incorporated in 250 ml of autoclaved

bioassay medium, mixed thoroughly and 20 ml of which was poured in each sterilized Petri plates. Sterilized Whatman No. 1 filter paper discs of 10 mm diameter were soaked in different concentrations of test chemicals viz., streptomycin, plantomycin and copper oxychloride and were placed on the medium (3 disc/plate). The Petri plates were then incubated at 10°C for 2 h for allowing the chemical from disc to diffuse in the medium and later incubated at 28±2°C for 72 h and inhibition zone was recorded.

The effect of chemicals at different concentrations on per cent seed germination was studied under laboratory condition. Inoculated seed (with *Xanthomonas axonopodis* pv. *cyamopsidis*) of clusterbean variety Pusa Navbahar were used for the experiments. Treated seeds were plated on three layers of moistened blotter paper kept in sterilized Petri plates @ 10 seeds per Petri plates and incubated at 25±2°C and sterile distilled water was used to maintain the humidity. Untreated seeds were served as control. Observations were recorded on per cent germination after 7 days of incubation.

Under field conditions clusterbean seeds treated with bacterial suspension and different chemicals were sown in field in July 2001. The crop, after attaining an age of 30-35 days, was inoculated through foliar spray with bacterial suspension (conc. 10^8 cfu/ml) twice at an interval of 12 h. Moist conditions in the field was maintained for two days through irrigation water during day time. Chemicals were sprayed at the time of first appearance of the symptoms. Another two subsequent sprays of chemicals were given at 10 days interval. The experiments were conducted in Randomized block design with three replications. Disease intensity was recorded after 15-20 days of last spray. Clusterbean yield was also recorded for each treatment.

RESULTS AND DISCUSSION

Maximum inhibition of growth (25.5 mm) of *X. axonopodis* pv. *cyamopsidis* was induced by strepto-cycline (500 ppm), followed by streptomycin (250 ppm) + copper oxychloride (0.2%) and strepto-cycline 250 ppm concentration (Table 1). Vyas and

Table 1 : Efficacy of different chemicals against *Xanthomonas axonopodis* pv. *cyamopsidis* *in vitro* after 72 h of incubation at $28 \pm 2^\circ\text{C}$

Chemicals with concentration	Inhibition zone (mm)
Streptomycin 250 ppm	17.9
Streptomycin 500 ppm	25.5
Plantomycin 250 ppm	8.2
Plantomycin 500 ppm	12.7
Copper oxychloride 0.2%	7.9
Streptomycin 250 ppm + Copper oxychloride 0.2%	20.7
Plantomycin 250 ppm + Copper oxychloride 0.2%	12.5
Control	0.00
SEm±	0.054
C.D. 5%	0.1619
C.D. 1%	0.2231
C.V.	0.71

Patel (1993) also found similar results of streptomycin *in vitro* which gave widest zone of inhibition against *X. axonopodis* pv. *cyamopsidis*. All three chemicals gave higher per cent germination of seeds with their higher concentration in all three soaking periods. Among these chemicals

streptomycin @ 500 ppm resulted significantly highest per cent seed germination (Table 2).

Table 2 : Effect of different concentrations of chemical and soaking period on germination of inoculated clusterbean seeds at $25 \pm 2^\circ\text{C}$

Chemicals	Concentrations (ppm)	Per cent seed germination			
		Soaking period (minutes)			Mean
		15	30	60	
Streptomycin	100	48.33	52.00	57.67	52.67
	250	52.66	59.33	64.66	58.88
	400	57.33	66.00	78.00	67.11
	500	65.67	71.66	82.66	73.33
Mean		56.00	62.25	70.75	63.00
Plantomycin	100	28.66	35.66	43.00	35.77
	250	32.67	39.66	48.66	40.33
	400	36.00	43.00	51.66	43.55
	500	38.66	47.66	57.67	48.00
Mean		34.00	41.49	50.25	41.91
Copper Oxychloride	0.1%	25.66	29.66	32.33	29.22
	1.2%	28.00	32.66	38.00	32.89
	0.25%	30.66	35.33	40.33	35.44
	0.3%	33.66	38.66	43.66	38.66
Mean		29.49	34.08	38.58	34.05
Control					25.44
		Concen- Chemical	Soaking	Soaking	
		trations	period	period	
				× Conc.	
SEm±		0.1264	0.10947	0.10947	0.21894
C.D. 5%		0.3562	0.3085	0.3085	0.6169
C.V.		1.44			

Table 3 : Effect of chemicals on the management of blight disease of clusterbean under artificial inoculation with *Xanthomonas axonopodis* pv. *cyamopsidis* in the field conditions

Seed treatment & three sprays	Concentrations (ppm)	Per cent disease index (PDI)	Per cent disease control (PDC)	Yield in q/ha	Per cent increase in yield
Streptomycin	250	18.40	71.01	9.30	63.15
Streptomycin	500	9.00	85.83	9.90	73.68
Plantomycin	250	38.40	39.40	7.00	22.80
Plantomycin	500	27.30	57.02	7.70	35.08
Copper oxychloride	0.2%	41.40	34.83	6.20	8.77
Streptomycin + Copper oxychloride	250+ 0.2%	14.70	76.86	9.50	66.66
Plantomycin + Copper oxychloride	250+ 0.2%	30.1	52.59	7.10	24.56
Control		63.5	—	5.70	
SEm±		1.3759		0.01897	
C.D. 5%		4.17		0.05754	
C.D. 1%		5.79		0.07986	
C.V.		7.85		4.22	

One of the most common method of plant disease control is by seed treatment and foliar spraying of

chemicals. In present investigations it was found that antibiotics, streptocycline (500 ppm) as seed treatment as well as foliar spray was found best (85.83%) in controlling the disease and also supported higher yield (9.90 q/ha), followed by streptocycline (250 ppm) + copper oxychloride (0.2%). Gupta (1977) reported streptocycline and agrimycin 100 as best in controlling the disease and Lodha and Ram (1993) reported that spray of streptocycline was most effective for controlling bacterial blight of clusterbean.

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