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Research Article

EFFICACY OF ANTIBIOTICS AGAINST *SCLEROTIUM ROLFSII* CAUSING FOOT-ROT OF BRINJAL

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ABSTRACT
Five antibiotics, viz., Ambistryn, Ampoxin, Benzyl penicillin, Bistrepen and Streptocycline were tried in different concentrations (i.e., 50, 100, 250, 500, 1000 and 2000 ppm) to study their effect on the growth of *Sclerotium rolfsii*. All the antibiotics have showed adverse effect and able to check the growth of *Sclerotium rolfsii*. Amongst the tested antibiotics, Streptocycline was found to be the most effective against the pathogen, followed by ambistryn, Benzyl penicillin, Bistrepen and Ampoxin. The lower concentration of Ampoxin (i.e., 50 and 100 ppm) and Bistrepen (i.e., 50 ppm) where found to be un-effective against the growth of Sclerotium rolfsii this may be due to fact that *Sclerotium rolfsii* might have developed resistance towards the lower concentration of Bistrepen and ampoxin.

Keywords*: Sclerotium rolfsii, Antibiotics, Foot-rot, Brinjal.*

INTRODUCTION
Foot-rot of brinjal (*Solonum melongena* Linn.) caused by *Sclerotium rolfsii* is a serious disease of the crop in Tikamgarh District of Madhya Pradesh from 20 to 30 percent of plants have been found to be affected every year in the brinjal growing fields. Hence, it was deemed essential to start some studies for this disease with the help of antibiotics. The Role of antibiotics in plant disease control is assuming greater importance in recent years particularly in India where a large bulk of fungicidal materials has to be continuously imported for this purpose. With the gradual curtailment of such imported fungicides from abroad because of the shortage of foreign exchange and paucity of local indigenous material, attempts are now being increasingly made to develop new antibiotics or screen those which are already available against plant pathogens. I.A.R.I., New Delhi have taken a step forward to screen out antibiotics against important plant diseases and some aspects of the investigations have already been published, (Dharam vir *et al.*, 1967, Dharma vir and Raychaudhuri, 1969). The antibiotics either inhibit the germination, growth and multiplication of pathogen and sometime out rightly killed the pathogen. A number of antibiotics have been found to be effective against many plant pathogens and these were described by thirumalachar (1968), Nene and Thapaliyal (1979) and Mishra (1980). Chaurasia (1976) have reported a good deal of efficacy of streptomycin against betelvine *Phytophthora* both in laboratory and in the field condition as well.
On the basis of above background in the present investigation efficacy of several antibiotics were studied in vitro against the growth of brinjal foot-rot pathogen *Sclerotium rolfsii.*

MATERIALS AND METHODS
The pathogen used in this investigation was *Sclerotium rolfsii* Sacc. Which was isolated from the infected foot region of *Solanum melongena* plant. The stock culture where maintained in potato dextrose agar slants under refrigeration at 4°C (Chaurasia, 2000; Chaurasia *et al.*, 2013).
For efficacy the following five antibiotics in different concentrations were tested against the growth of *Sclerotium rolfsii*.

1. *Ambistryn:*
Streptomycin sulphate I.P. equivalent to 1.0 g. of streptomycin sulphate base.

2. *Ampoxin:*
Ampicillin 250 mg. cloxacillin sodium i.p. equivalent to clopxacillin 250 mg.

3. *Benzyl penicillin:*
Benzyl penicillin i.p. 1.00.000 units, benzyl i.p. as Benzyl penicillin (Sodium salt potency 1600 units/mg).

4. *Bistrepen*:
Procaine penicillin G i.p. 3.00.000 penicillin G sodium i.p. 1,00,000 units streptomycin sulphate i.p. equivalent to 0.25 g. of streptomycin base.

5. *Streptocyclin*:
Streptomycin sulphate 90% w/w, teracycline hydrochloride 10% w/w.

The stock solution of each antibiotic was prepared by dissolving it in sterilized distilled water. Appropriate amount of antibiotic solution was added in the sterilized Potato dextrose agar medium before pouring to get the final concentration of 50, 100, 250, 500, 1000 and 2000 ppm. Controls without containing any antibiotics were also kept simultaneously. Approximately 20 ml of test medium was poured into each sterilized petridish and after solidification 8 mm diameter inoculum disc of 3 day old culture of *Sclerotium rolfsii* was placed at the center of each petridish. The inoculated petridishes were incubated at 30°C for 72 hours. Observations were recorded on the basis of radial growth of mycelial colony. The per cent inhibition of radial growth of *Sclerotium rolfsii* in each case was also calculated by the equation given by Vincent (1927).

$$I = \frac{(C - T)}{C} \times 100$$

Where, I = per cent inhibition;
C= Growth in control;
T= Growth in treatment

RESULTS AND DISCUSSION

Five antibiotics viz, Ambistryn, Ampoxin, Benzyl penicillin, Bistrepen and Streptocycline were tried in different concentrations to study their effect on the growth of *Sclerotium rolfsii*. Data regarding the radial growth is presented in Table 1 and graphically represented in Figure 1.

It is evident from the table 1 and Figure 1 that all the antibiotics showed adverse effect and check the radial growth of *Sclerotium rolfsii*. Amongst the tested antibiotics, streptocycline, Ambistryn and Benzyl penicilline were found to be effective against *Sclerotium rolfsii* both in lower as well as in higher concentrations, while Bistrepen and Ampoxin were found to be effective above 100 ppm concentration. In case of Ampoxin at 100 ppm concentration no growth has been recorded while Bistrepen added to medium at the rate of 100 ppm it was slightly effective in comparison to Ampoxin and showing 2.19 % inhibition. This may be due to fact that the pathogen *Sclerotium rolfsii* might have developed resistance towards the lower concentrations of Bistrepen and Ampoxin.

Growth inhibition observed in *Sclerotium rolfsii* may, however, be due to the toxic effects of these antibiotics on certain components of growth system of this soil borne fungal pathogen. The same explanation could hold good for the observation of Pande *et al.*, 1974, on the respiratory inhibition of *Sclerotium rolfsii* by antibiotics. Similar observations were made by Saksena *et al.*, 1975.

Streptocycline, produced by Hindustan Antibiotics Ltd. Pimpri, Poona is reported to be effective against a number of important plant pathogenic fungi (Chaurasia *et al.*, 1973; Pande *et al.*, 1974; Saksena *et al.*, 1975). In the present study also streptocycline was more effective against *Sclerotium rolfsii* as compared to other antibiotics tested. Streptomycin and Benzyl penicillin also inhibited growth. They are known to inhibit cell wall and membrane formation of several microorganisms (Umbreit *et al.*, 1964).

Table1: Effect of different concentrations of various antibiotics on the growth of *Sclerotium rolfsii.*

Antibiotic	Radial growth in mm*					
	Concentration in ppm					
	50	100	250	500	1000	2000
Ambistryn	78.5 (4.26)	75.2 (8.29)	70.1 (14.51)	67.00 (18.29)	62.3 (24.02)	55.5 (32.31)
Ampoxin	82.0 (0.00)	82.0 (0.00)	80.0 (2.43)	78.2 (4.63)	75.5 (7.92)	70.0 (14.63)
Benzyl penicillin	80.2 (2.19)	78.3 (4.51)	75.0 (8.53)	72.3 (11.82)	67.4 (17.80)	62.3 (24.20)
Bistrepen	82.0 (0.00)	80.2 (2.19)	78.3 (4.51)	75.4 (8.04)	70.5 (14.02)	65.1 (20.60)
Streptocycline	76.2 (7.07)	73.0 (10.97)	69.0 (15.85)	64.0 (21.95)	60.2 (26.58)	53.0 (35.36)
Control [No Antibiotic]	82.0 (0.00)					

**After deducting the inoculum disc of 8.0 mm diameter*
The data given in the brackets show per cent inhibition over control.

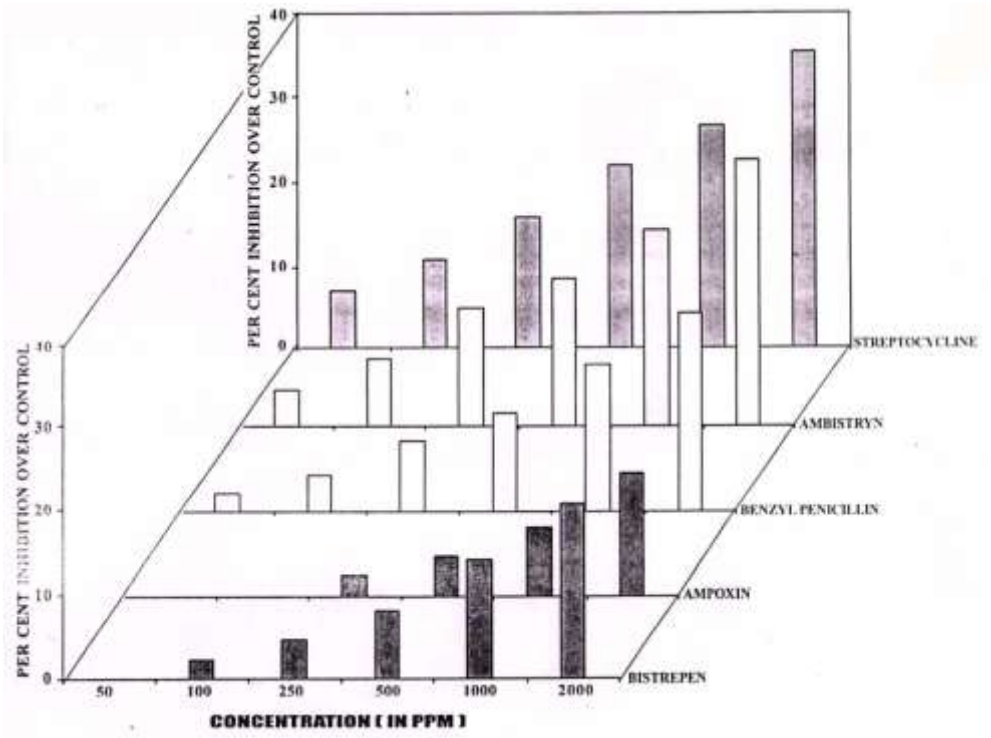

Figure 1: Effect of different concentrations of various antibiotics on the growth of *Sclerotium rolfsii*.

Streptomycin is a complex glycoside possessing a nitrogen containing disaccharide, streptobiosamine and a strong base called streptidine. Inhibition of growth by streptomycin may be due to condensation of oxaloacetate, pyruvate in kreb cycle (Rajak and Agarwal, 1986). It has also been reported in *Boryodiplodia theobromae* (Rajak and Agrawal, 1984) that streptomycin also inhibit the nucleic acid or

protein synthesis (Garg and Mehrotra, 1975).
On the whole, it is concluded that streptocycline was the most effective against the pathogen, followed by Ambistryn, Benzyl penicillin, Bistrepen and Ampoxin.

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