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Characterization of Toxin Produced by *Alternaria macrospora* Zimm*

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Toxin was highly active upto 1 : 5 dilution. Steep fall of toxin activity was noticed at 90°. Toxin was stable at pH 8 and 9 and lost its activity at extreme acidic or alkaline pH levels. The stability of toxin after 30 days was lost to the extent of 77 per cent. Toxin produced by the pathogen inhibited seed germination of nine cotton varieties, and it ranged from 70 to 100 per cent. The toxin was found to be non-specific capable of affecting the seed germination of non-hosts.

The importance of toxins in the causation of plant disease is widely recognized. There are numerous reports available to demonstrate the *in vitro* production of substances that are toxic to plants by pathogenic fungi and bacteria. Sufficient evidence has accumulated to establish the role of toxin in the development of leafspot diseases (Brian *et al.*, 1949; Hiroe and Soya, 1954; and Chandrasekharan Nair, 1972). The properties of toxin produced by *Alternaria macrospora* are reported in this paper.

MATERIALS AND METHODS

The bacterial inhibition bioassay adopted by Kalyanasundaram (1954) was modified and followed to assay the toxin produced by *A. mecrospora*. Four replications were maintained. The results were expressed as the percentage mean area of inhibition-zone in transformed value.

RESULTS AND DISCUSSION

Sixteen day culture filtrate was serially diluted and results (Table I) showed a progressive decrease in toxin activity. Toxin activity gradually declined with increase in temperature from 30°C. There was a steep fall in the toxin activity at 90°C. Brian *et al.* (1951) indicated that culture filtrate of *Alternaria solani* was reduced to a marked extent at 90°C. The toxin was fairly stable at pH 4-9 but lost its activity at extreme acidic or alkaline pH levels like pH 2, 11 and 10. The stability of toxin after 15 days was lost to the extent of 48.94 per cent over the cul-

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TABLE I. Dilution end point of the toxin

Dilutions	Mean area of inhibition zone in sq. mm. (transformed value)
1:1	15.10
1:2	13.53
1:5	12.18
1:10	8.06
1:50	6.67
1:100	4.12
1:200	0.71
1:500	0.71
Control (uninoculated)	0.71
C.D.	0.92

ture filtrate which was assayed immediately.

The toxin inhibited seed germination of cotton varieties ranging from 71 to 100 per cent. In MCU 1, P 216.F, PRS 72, K7 and K8 the percentage inhibition ranges from 71 to 89 per cent. In Lakshmi, Bharathi, SB-1085-6 and Syodhar, 100 per cent inhibition of germination was noticed. The culture filtrate containing the toxin produced by the fungus was sprayed on one month old MCU.5 cotton seedling. The development of minute necrotic spots was observed on the toxin-sprayed plants after one week. Alternaric acid when introduced into cut shoots of tomato necrotic spots, a characteristic symptom associated with *Alternaria solani* developed on stem and leaves (Brian *et al.*, 1951, 1952).

Toxin inhibited seed germination of monocots like *Pennisetum typhoides*

TABLE II Properties of the toxin

Characters	Treatment	Mean area of inhibition zone in sq.mm. (transformed value)
Thermostability	30°C	17.62
	40°C	17.12
	50°C	15.87
	60°C	14.84
	70°C	15.10
	80°C	13.00
	90°C	6.99
	Autoclaved at 20 lb pressure for 20 min.	5.02
	Control (uninoculated)	0.71
	C.D.	7.76
Stability at various pH levels	pH 2	0.17
	3	8.06
	4	17.36
	5	16.38
	6	16.37
	7	16.13
	8	18.85
	9	19.82
	10	5.92
	11	0.71
	Control (uninoculated	0.71
	C.D.	1.86
Stability at different periods of storage	1 day	21.27
	7	15.62
	10	15.62
	15	11.37
	30	5.02
	C.D.	2.18

(Burmf. Stapf.&Hupp.), Zea *mays* linn. and *Setaria italica* (L.) Beauv. the percentage of inhibition ranged from 14.3

to 80.0, whereas cent per cent inhibition of seed germination was noticed in the case of *Ricinus communis* L., *Carthamus tinctorius* L., *Sesamum indicum* L., *Vigna sinensis* Endl., *Hibiscus esculentus* L., *Solanum melongena* L. and *Lycopersicon esculentum* Mill. This shows that the toxin produced by *Alternaria macrospora* was more inhibitory to dicots than monocots. Thus, the toxin was found to be nonspecific capable of affecting the germination of seeds of non-hosts,

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