

Antinemic Activity of Plant Extracts Against *Pratylenchus coffeae* Infecting Banana

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ABSTRACT : Fresh leaves of *Abutilon indicum*, *Azadirachta indica*, *Calotropis procera*, *Cassia auriculata*, *Crotalaria juncea*, *Datura stramonium*, *Prosopis juliflora*, *Tridax procumbens*, *Vitex negundo* and *Xanthium indicum* were dried and the prepared extracts were tested against the root-lesion nematode, *Pratylenchus coffeae* infesting banana. In the preliminary study almost all the plant species exhibited nematicidal activity ranging from 20.7 to 96.5 per cent mortality at 24 hr exposure period. The best 3 plant extracts viz. *A. indica*, *C. juncea* and *V. negundo* were further diluted at 20, 40, 60 and 80 per cent concentration and tested. *A. indica* exerted 73.4 per cent mortality of *P. coffeae* when exposed to 20 hr in the 80 per cent concentration of leaf extract followed by 76.4 and 64.8 per cent mortality with respect to *V. negundo* and *C. juncea*. No mortality was recorded in distilled water.

Key words: Nematicidal activity, plant species, plant extracts, *Pratylenchus coffeae*.

The root-lesion nematode, *Pratylenchus coffeae* (Zimm.) Goodey is an important root parasite on banana and is widely distributed through the infested corm in South India, Gujarat, Orissa, Bihar and Assam (Rajendran *et al.*, 1979; Sundararaju, 1996). The infestation results in 25.3 per cent loss in yield (Sundararaju *et al.*, 1999). Although considerable research work has been carried out on the management using different chemical nematicides, there is a very little work with reference to plant products having nematicidal/nematostatic properties as a possible measure for the management of the nematode problem. Since nematicides are expensive and cause serious environmental pollution, control strategies are now directed towards the use of natural products. Green and dry manuring of plant parts have been practiced as a method for the control of plant parasitic nematodes (Osman *et al.*, 1989). Leaf extracts of *Glyricidia maculata*, *Ricinus communis*, *Crotalaria juncea*, *Glycosmis pentaphylla*, *Azadirachta indica*, *Kalanchoe pinnata*, *Piper betel* and *Moringa oleifera* are reported to be lethal to *Radopholus similis* (Jasy & Koshy, 1992). Hence, an attempt was made to study the effect of certain plant extracts on *P. coffeae* under *in vitro* conditions.

MATERIALS AND METHODS

Fresh leaves of 10 plants, viz., *Abutilon indicum*, *Azadirachta indica*, *Calotropis procera*, *Cassia auriculata*, *Crotalaria juncea*, *Datura stramonium*, *Prosopis juliflora*, *Tridax procumbens*, *Vitex negundo* and *Xanthium indicum*, were collected and washed in sterile water. The water present on the surface area was allowed to dry by spreading in a clean air flow chamber and finally dried in oven at 60°C for 12 h. The dried leaves were then powdered and ground with pestle and mortar by adding methanol (1:1 w/v). The suspension was filtered through 4 ply muslin cloth and centrifuged for 5 minutes at 4000 rpm and filtered through Whatman No. 1 filter paper. The extract was designated as 100 per cent. From this standard extract, required concentrations (20, 40, 60 and 80) were prepared by adding distilled water. One hundred, freshly collected *P. coffeae* were introduced in 0.5 ml distilled water into 5 cm Petri dishes containing the residues of 10 ml of the plant extracts. Distilled water alone served as control. The Petri dishes were kept in BOD incubator at 26±1°C. Nematode mortality was counted at periodical intervals. Mortality was confirmed after transferring to distilled

water. The best performing 3 plant extracts were further reduced in concentration (20, 40, 60 and 80%) and tested against *P. coffeae* as described above. Per cent mortality was calculated and the data were subjected to arc sine transformation and analysed statistically.

RESULTS AND DISCUSSION

In the preliminary study, almost all the plant extracts showed nematicidal effect against *P. coffeae* ranging from 34.6 to 98.8 per cent mortality (Table 1). The efficacy of *A. indica* was well pronounced with 100 per cent mortality of *P. coffeae* when exposed to 48 hr followed by *V. negundo* and *C. juncea* with 100 per cent mortality at 72 hr. The lowest per cent mortality was recorded in *C. auriculata*.

The concentration of the best performed 3 plant extracts when further diluted and tested exhibited high nematicidal effect with more than 50 per cent mortality in all the 3 plant extracts at 40 per cent concentration after 60 h of incubation (Table 2). Cent per cent mortality was recorded in *A. indica* at 80 per cent of the extract after 60 h or incubation. *V. negundo* and *C. juncea* exhibited 99.6 and 94 per cent mortality respectively at the same exposure period and concentration of the extract. The mortality of *P. coffeae* was directly related to the exposure period of the plant extract. These results are in agreement with reports of Hutchinson *et al.* (1960) and Mountain & Elliott (1962).

It may be concluded, that plant extracts of *A. indica*, *V. negundo* and *C. juncea*, which are commonly available in banana fields, can be

Table 1. Antinemic activity of certain plant leaves against *Pratylenchus coffeae* under *in vitro* conditions.

Plants used	Per cent mortality after (h)			Mean
	24	48	72	
<i>Abutilon indicum</i>	50.2 (45.14)	75.2 (60.18)	90.5 (72.28)	72.0 (59.20)
<i>Azadirachta indica</i>	96.5 (79.44)	100.0 (89.72)	100.0 (89.72)	98.8 (86.29)
<i>Calotropis procera</i>	74.2 (59.52)	85.7 (67.94)	97.0 (81.72)	85.6 (69.72)
<i>Cassia auriculata</i>	20.7 (27.09)	29.0 (32.58)	54.2 (47.44)	34.6 (35.70)
<i>Crotalaria juncea</i>	84.5 (66.88)	92.5 (74.25)	100.0 (89.72)	92.3 (76.95)
<i>Datura stramonium</i>	64.2 (53.30)	71.5 (57.76)	90.7 (72.50)	75.5 (61.18)
<i>Prosopis juliflora</i>	79.5 (63.10)	87.2 (69.31)	97.0 (81.44)	87.9 (71.28)
<i>Tridax procumbans</i>	36.5 (37.16)	60.7 (51.22)	86.0 (68.12)	61.1 (52.17)
<i>Vitex negundo</i>	90.5 (72.13)	97.5 (82.17)	100.0 (89.72)	96.0 (81.34)
<i>Xanthium indicum</i>	64.5 (53.44)	78.0 (62.06)	91.2 (73.02)	77.9 (62.84)
Control	0.0 (0.29)	0.0 (0.29)	0.0 (0.29)	0.0 (0.29)
Mean	60.1 (50.68)	70.7 (58.86)	82.43 (69.63)	

Figures in the parenthesis are arc sin transformed values

	SEd	CD
t	(1.06)	(2.12)
h	(0.55)	(1.10)
txh	(1.85)	(3.67)

Table 2. Effect of selected plant extracts at reduced concentration against *Pratylenchus coffeae* under *in vitro* conditions.

Plants used	Per cent mortality after (h)												Mean
	20				40				60				
	20%	40%	60%	80%	20%	40%	60%	80%	20%	40%	60%	80%	
<i>A. indica</i>	16.0	38.4	51.0	73.4	19.0	50.8	76.2	96.8	42.8	65.2	85.2	100.0	59.5
	(23.52)	(38.29)	(45.57)	(58.96)	(25.83)	(45.46)	(60.81)	(80.90)	(40.86)	(53.85)	(67.41)	(89.72)	(52.60)
<i>C. juncea</i>	9.0	26.2	42.4	64.8	12.2	41.0	64.0	80.8	24.8	51.0	70.6	94.0	48.4
	(17.41)	(30.77)	(40.63)	(53.62)	(20.42)	(39.81)	(53.13)	(64.02)	(29.85)	(45.58)	(57.18)	(75.92)	(44.03)
<i>V. negundo</i>	10.0	29.4	44.8	67.4	16.4	45.6	71.2	87.4	39.4	61.0	81.6	99.6	54.4
	(18.39)	(32.83)	(42.01)	(55.19)	(23.88)	(42.48)	(57.57)	(69.29)	(38.87)	(51.37)	(64.64)	(88.15)	(48.72)
Control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)
Conc. Mean	8.7	23.5	34.5	51.4	11.9	34.3	52.8	66.2	26.7	44.3	59.3	73.4	
	14.90)	(25.54)	(32.13)	(42.01)	(17.60)	(32.00)	(42.95)	(53.62)	(27.47)	(37.77)	(47.38)	(63.52)	
Hour mean				29.55				41.34				50.95	
				(28.65)				(36.55)				(44.03)	

Figures in the parenthesis are arc sin transformed values

	SEd	CD
t	(0.26)	(0.53)
h	(0.23)	(0.46)
c	(0.27)	(0.53)
txhxc	(0.93)	(1.83)

effectively utilized as a sucker dip treatment for the control of *P. coffeae*.

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