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SHORT COMMUNICATION

Nematicidal Activity of the Essential Oil of Allspice (*Pimenta dioica* L. Merr.)

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The nematicidal activity of the essential oil of allspice (*Pimenta dioica* L. Merr.) leaves and its major constituent eugenol was tested against the root-knot nematode *Meloidogyne incognita*. The essential oil and eugenol exhibited promising nematicidal activity at 660 µg/ml.

Keywords: Nematicidal activity, essential oil, allspice, *Pimenta dioica*.

Allspice (*Pimenta dioica* L. Merr.) is a spice-yielding evergreen tree, indigenous to West Indies and Tropical America. Its berries and leaves yield 0.5–2.0% essential oil which contains eugenol as major component (Purseglove *et al.*, 1981). The oil is used mainly in flavouring food items, perfumery, cosmetics and pharmaceutical preparations (*The Wealth of India*, 1969). Alternative uses of essential oils as antimicrobial and antifungal agents have been explored world wide (Chatterjee *et al.*, 1982; Kala *et al.*, 1984; Raghavaiah and Jayaramaiah, 1987; Leela *et al.*, 1992; Chandravadana and Nidiry, 1994; Aurore *et al.*, 1998). However, attempts have not been made so far to evaluate the nematicidal property of allspice. In the present study, the nematicidal activity of the essential oil of allspice leaves and its major constituent eugenol against the root-knot nematode *Meloidogyne incognita* (Kofoid and White) Chitwood is reported.

Freshly harvested leaves (100 g) of allspice were hydrodistilled for 3 h in a clevenger apparatus and the essential oil was collected. The oil was dried over anhydrous sodium sulphate and used. One ml of the oil was dissolved in 0.5 ml of ethyl alcohol and emulsified using few drops of 0.2% Tween-20, diluted with water to yield concentrations of 500, 1000, 2000, 4000 and 8000 µg/ml. 0.5 ml of each of these samples was added to 1 ml of the nematode suspension containing 200 second stage juveniles of the root-knot nematode *M. incognita* and kept at room temperature (27–32°C). The number of nematodes dead and alive were counted at 24 and 48 h directly by observation under a stereomicroscope. For further confirmation of mortality of the nematodes, the dead nematodes were disturbed with a nematode pick (a bamboo splinter) to see their mobility, if any. The dead nematodes assume a straight posture. 0.5 ml alcohol emulsified in 0.2% Tween-20 served as the control. Each treatment was replicated thrice. The nematicidal activity of eugenol procured from Signa Chemicals was also tested as indicated above. The results as shown in Table 1.

The major constituent of the oil was determined using a gas chromatograph HP 5706A equipped with FID and stainless steel column packed with 10% carbowax 20 M adsorbed on chromosorb W (80–100 mesh). The column conditions were set as follows: Column temp. 70–210°C @ 5°C/m, FID temp. 250°C, Injection port temp. 200°C. Nitrogen was used as the carrier gas. The analysis of the oil revealed 80% eugenol in leaves. The bioassay results showed that both the oil and the major constituent eugenol caused the same level of nematicidal activity at all the test concentrations. Significant nematicidal activity of the test nematodes was observed at 660 µg/ml and above both in the case of the volatile oil and eugenol. This indicated that the nematicidal property of the oil was essentially due to its major constituent eugenol. Earlier studies by Chatterjee *et al.* (1982) have brought out the nematicidal property of eugenol. This was confirmed in the present study also. This is the first report on the nematicidal activity of allspice.

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Table 1. Nematicidal activity of essential oil of allspice leaves.

Concentration (µg/ml)	% mortality over control at			
	24 h		48 h	
	Essential oil	Eugenol	Essential oil	Eugenol
165	5.22 (2.24)	9.49 (3.06)	16.03 (4.00)	14.08 (3.75)
330	8.91 (2.95)	14.88 (3.84)	22.94 (4.77)	30.68 (5.52)
660	70.61 (8.39)	73.62 (8.56)	99.19 (9.96)	100 (10.00)
1320	100 (10.00)	100 (10.00)	100 (10.00)	100 (10.00)
2640	100 (10.00)	100 (10.00)	100 (10.00)	100 (10.00)
P value	0.00	0.00	0.00	0.00
CD at 5%	0.85	0.90	0.50	0.54

Values in parentheses are square root transformed values.

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