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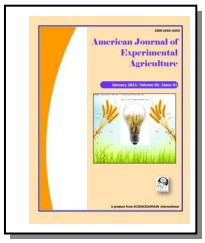

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Effects of Some Indigenous Plant Extracts as Inhibitors of Egg Hatch in Root-Knot Nematode (*Meloidogyne incognita* race 2)

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Research Article

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ABSTRACT

Studies on the effectiveness of some indigenous plant extracts as inhibitors of egg-hatch in root-knot nematode (*Meloidogyne incognita* race 2) were carried out in the Plant Protection Laboratory of Institute of Agricultural Research & Training, Obafemi Awolowo University, Moor Plantation, Ibadan. *Azadirachta indica* (Neem); *Chromolaena odorata* (Siam weed); *Nicotiana tabacum* (Tobacco); *Carica papaya* (Pawpaw); *Cannabis sativa* (Hemp); *Cassia alata* (Asunwon) and *Vernonia amygdalina* (Bitter leaf) were effective inhibitors of egg-hatch of root-knot nematode *Meloidogyne incognita* race 2 at concentration of 2.5% w/v (250g/10litres of water) while the rest were good inhibitors of egg-hatch of *M. incognita* race 2.

Keywords: Egg-hatch, inhibitor, plant extracts, root-knot nematode;

1. INTRODUCTION

Root knot nematodes, *Meloidogyne spp.*, cause conspicuous root galls and serious reductions in yield of several host plants. They are of major economic significance throughout the tropics and warmer regions of the world. Infected plants suffer vascular damages which disturb water and mineral uptake. Although, chemical nematicides hold major promise in nematode control (Adegbite and Adesiyan, 2001; Akinlade and Adesiyan, 1982; Oyedunmade *et al*., 1992), the high cost, their non-availability at the time of need and the hazards they pose as environmental pollutants discourage most potential users in Nigeria. This necessitates the search for pollution free and cheaper alternative control measures which are appropriate for resource-poor farmers in

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Nigeria. There have been some efforts towards the search for cheaper and safer alternatives to the chemical nematicides in Nigeria (Adegbite, 2003; Onalo, 1999; Egunjobi and Onayemi, 1981; Egunjobi and Afolami, 1976). Hoan and Davide (1979) have also suggested the use of plant extracts for nematode control.

Plant extracts have been found effective for the control of plant parasitic nematodes (Chatterjee and Sukni, 1980). Leaf extracts of certain plants are known to have nematicidal or nematostatic properties against several plant-parasitic nematodes (Hussain *et. al*., 1996; Khana, 1991; Saxena *et. al*., 1990; Siddiqui and Alam, 1989). Plant extracts have the advantages of cheapness, and ready availability over the conventional nematicides. Their environmental safety (Adegbite, 2003; Zurren and Khan, 1984; Egunjobi and Onayemi, 1981; Egunjobi, 1974) in an environmentally conscious world also holds promise for their acceptability and use by resource-poor African farmers. The present report is the result of in-vitro investigations of the efficacy of some selected indigenous medicinal plant extract in inhibiting egg-hatch of *Meloidogyne incognita* race 2.

2. MATERIALS AND METHODS

Thirteen selected indigenous plants were collected from various ecological zones of south-western Nigeria. These were *Azadirachta indica* (Neem); *Cannabis sativa* (Hemp/Akotaba); *Calotropis procera* (Bomubomu); *Carica papaya* (Pawpaw/Ibepe); *Cassia alata* (Asunwon); *Chromolaena odorata* (Siam weed/Akintola); *Jatropha gossypiifolia* (Lapalapa); *Ficus exasperate* (Ipin); *Mitracarpum verticillatum* (Irawo ile); *Nicotiana tabacum* (Taba); *Ocimum gratissimum* (Efinrin); *Parkia biglobosa* (Irugba-oso) and *Vernonia amygdalina* (Bitter leaf/Ewuro).

The fresh mature healthy leaves were plucked from their branches and spread on polythene sheets on benches in the laboratory for two weeks to air dry. The dried leaves were committed to fine particles using Mammonlex Blender. 250 gramme fine particles of each selected indigenous plants were dissolved in 10 litres of water and allowed to soak in water overnight; the extracts were strained through a sieve and collected in a plastic container for use. The eggs used in this investigation were collected from *Celosia argentea* planted on soil naturally infested with *Meloidogyne incognita*; when required the *Celosia argentea* plants were carefully dug and *Meloidogyne* infested roots were washed with tap water. The washed roots were then cut into small pieces from which eggs were extracted following the method of Hussey and Bakes (1973). The identity of *M. incognita* was confirmed using potential patterns as described by Eisenback *et al*. (1981).

The supernatant fluid was then filtered through a series of sieves having 240, 300 and 350 meshes. The nematode eggs retained on the sieves were then collected by rinsing each sieve with distilled water and poured into a one-litre beaker. The resulting solution was then diluted with water to the one litre mark. The populations of the eggs in the suspension was estimated to be 1000±5 by counting ten samples of one-millilitre using Doncaster's (1962) dish. This was done by putting 1000 eggs of *M. incognita* in a plastic counting Petri dish and adding 10ml each of selected plant extract to each plastic counting Petri dish. The control was also set up using 10ml of distilled water. Each treatment was replicated five times arranged randomly on incubator of 28°C. The eggs were allowed to hatch for a period of ten days, after which the number of eggs that hatched were determined.

Percent inhibition was determined using the formula suggested by Clarke and Shepherd (1964).

% inhibition = 100 – (100 – Hs/Hw)

where Hs is the number of egg-hatch in the hatching substance and Hw is the number that hatched in water.

3. RESULTS AND DISCUSSION

The results of the study are presented in Table 1. Inhibition of egg-hatch of *Meloidogyne incognita* varied with the treatments. The extract of *Azadirachta indica* (Neem) was the most effective, followed by *Chromolaena odorata* (Siam weed), *Nicotiana tabacum* (Tobacco), *Carica papaya* (Pawpaw), *Cannabis sativa* (Hemp), *Cassia alata* and *Vernonia amygdalina* (Bitter leaf or Ewuro). All of these were effective inhibitors of egg-hatch of *M. incognita* race 2 at concentration of 2.5% w/v (250g/10 litres of water) while *Mitracarpum verticillatum* (Irawo ile), *Parkia biglobosa* (Irugba-oso), *Jatropha gossypiifolia, Calotropis procera*, *Ficus exasperate* can be classified as very good inhibitors of egg hatch of *M. incognita* while the least percent inhibition was obtained from distilled water.

Table 1: Percentage inhibition of egg-hatch of *Meloidogyne incognita* by leaf extracts of selected plant

Plant Species	Common name	Hatching concentration	% Inhibition
Azadirachta indica	Neem	2.5% w/v (250g/10 litres)	93.30
Cannabis sativa	Hemp	Same	88.25
Calotropis procera	Apple of Sodom	Same	67.13
Carica papaya	Pawpaw	Same	89.90
Cassia alata	Candle bush	Same	85.50
Chromolaena odorata	Siam weed	Same	91.50
Jatropha gossypiifolia	Jatropha	Same	68.50
Ficus exasperate	Sandpaper Fig	Same	60.50
Mitracarpum verticillatum	Tropical girdle pod	Same	77.85
Nicotiana tabacum	Tobacco	Same	90.50
Ocimum gratissimum	African Basil	Same	75.83
Parkia biglobosa	African Locust bean	Same	70.25
Vernonia amygdalina	Bitter leaf	Same	82.50
Distilled water		Same	55.80

Although the active ingredients in the plant extracts were not studied, several of the plants used in this investigation are known to contain toxic polyphenolic compounds, alkaloids and saponins (Dalziel, 1973; Brain & Margaret 1979).

Neem extracts inhibited *M. incognita* egg-hatch. Neem leaf extract was found to have nematicidal properties (Egunjobi and Afolami, 1976; Siddiqui and Alan, 1989; Fatoki and Fawole, 2000).

Chromolaena odorata extracts inhibited *M. incognita* egg-hatch. *C. odorata* extract was found to also have nematicidal properties (Fatoki and Fawole, 2000; Adegbite, 2003). The active principles in *Chromolaena odorata* are Alkaloids and Flavonoid.

It appears that the egg shells of *M. incognita* are permeable to the toxic materials contained in the plant extracts used in this investigation, consequently, killing the developing juveniles.

This method of controlling the root-knot nematode is promising. Further investigation is necessary particularly in the area of isolation of biological active principles of the plants.

4. CONCLUSION

This finding is important from the view of controlling plant parasitic nematodes without the use of nematicides in view of the environmental pollution likely to cause. However, studies are to be continued to find out the active principal involved in them and also to find out the effects of these leaves in controlling nematodes when they are incorporated into the soil as green manure, at the same time the limitation of availability in large quantities to use them as green manure will be there.

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