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Effect of Water Hyacinth (Eichhornia Crassipes (Mart) Solms Leaf Extract on the Juvenile Mortality of Meloidogyne Incognita

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Abstract: *The effect of extract of water hyacinth leaves extract was investigated on the juvenile mortality of Meloidogyne incognita in the laboratory. M. incognita juveniles (100 Juveniles in each Petri dish) were exposed to crude extract - 100 % concentration, crude extract + 10 ml of distilled water and crude extract + 20 ml distilled water, and distilled water only which served as control. Petri dishes were arranged in completely randomized design in the laboratory. Percentage mortality was calculated over 96 hours. Results indicated that the crude extracts gave 100 % juvenile mortality. The results also indicated that juvenile mortality increased with increase in time of exposure. It would be concluded that the extract was able to killed M. incognita juveniles in the laboratory, however, further screen house and field trials are recommended.*
Key Words: *Water hyacinth, extract, juvenile, mortality, concentration*

I. Introduction

Eichhornia crassipes (Mart) Solms commonly known as Water hyacinth is a warm water aquatic plant belonging to the family Pontideraceae. It is listed as one of the most productive plant on earth and is considered the world worst aquatic weed (Grodowitz, 1998). The 'beautiful blue devil', water hyacinth is recognised by its lavender flowers and shinning bright leaves which spread at an alarming rate. Its habitat ranges from tropical desert to subtropical or warm temperate rain forest zones, and tolerates a temperature range of 21.1 to 27.2^{0}C (Lata and Venapani, 2010). It can be used as compost, paper, fuel, and animal feed and water purification (Kristie, 2012). It is also an excellent source of biomass; and use to make furniture, hand bags and ropes in East Africa. Its flowers are used as a medication on skin of horses and a tonic (Wikipedia, 2012). It is also found to be effective in controlling microorganisms such as fungi and bacterial diseases in plants and humans because of its phytochemical compounds (Lata and Venapani, 2010) .

Meloidogyne incognita caused particularly severe yield losses, typically up to 50 % (Darekar andMhase, 1988) as a result of root deformation which diminishes function and predisposes plants to other pathogens (Natarajar et al., 2006). Meloidogyne spp are notoriously difficult to control because of their wide host range and high rates of reproduction with many generation times in a season (Ploeg, 2002).

Synthetic nematicides are expensive and highly toxic to humans, beneficial organisms and environment (Umar, 2009). Although, they have been found to increase crop yields (IITA, 2000), they are still a problem to the environment. There is, therefore, the need to develop alternatives to synthetic nematicides that are effective, ecologically safe and economical to peasant farmers (Yudelman. et al., 1998, Atungwu, et al., 2009).

The use of botanicals has been suggested as an alternative to chemical nematicides. These botanicals are effective, safe, cheap and available to farmers (Adegbite and Adesiyan, 2005, Javed, et al., 2007). This study was aimed at investigating different levels of leaves extract of water hyacinth on juvenile mortality of M.incognita in the laboratory.

II. Materials And Methods

Experimental site

The experiment was conducted in the laboratory of the Department of Crop Protection, Modibbo Adama University of Technology, Yola, Adamawa state, Nigeria, in July 2010. Yola is located within latitude 9^0 and 9^1 N and longitude 12^0 30$^{'}$ E, at an altitude of 185.9 m above sea level (Bashir, 2000).

Preparation of extract

Water hyacinth leaves were collected from water bodies around the university. The fresh leaves after collection were washed with water and shade dried for seven (7) days on polythene sheets. The dried material was then pounded into powder with pestle and mortar. Five hundred grams of powdered sample was poured into 100 ml conical flask, distilled water was added and the set up was allowed to stand for 24 hrs before it was centrifuged at 500 rpm and filtered through Whatman no. 42 filter paper (Rao et al., 1998). The filtrate so obtained was designated as crude extract (C), and this was diluted with 10 and 20 ml of distilled water to give concentrations C_1 and C_2 respectively. Distilled water was used as control.

Phytochemical analysis of the plant extract

Phytochemical analysis of the plant extract for tannins, saponins, alkaloid, flavonoid, phenol and quinones was carried out in the laboratory using the methods described by Sofowora (1993) and Trease and Evans (1989).

Extraction of M. incognita juveniles

M. incognita maintained on galled tomato roots were extracted for the experiment using the modified Bearmamn funnel method (Whitehead and Hemming, 1965).

Effect of extract on juvenile mortality

Ten (10) mls of the crude extract and the diluted forms were separately dispensed into petri dishes and 2 ml of suspensions containing 100 juveniles of M. incognita was introduced into each of the petri dishes with a syringe. Ten petri dishes were used for each treatment. Petri dishes for control contained only distilled water, (no extract). Each treatment was replicated three times. Petri dishes were arranged in completely randomised design in the laboratory. Mean percentage mortality was collected over a period of 96 hrs.

III. Results And Discussion

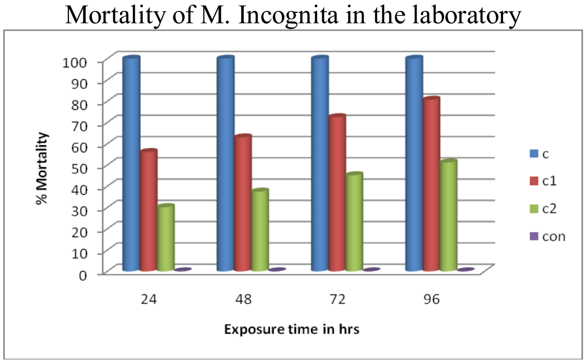
The result of the phytochemical analysis of the extract indicated the presence of alkaloid, tannins, flavonoid and phenolic compounds. The extract contained no saponin (Table 1). The results on juvenile mortality showed that the crude extract gave 100 % mortality of M. incognita larvae in all the exposure periods (Figure 1). The diluted extract (C_1) gave juvenile mortality of 56.1 % at 24 hrs exposure and increased up to 80.7% at 96 hrs exposure. The results further showed that the higher the concentration of the extract and exposure time, the higher the larval mortality. The presence of phytochemicals such as alkaloid and flavonoid in the extract could have been responsible for the mortality of juveniles. The results of this study

Table 1: Phytochemical analysis of the plant material

Phytochemical	
Tannin	+ +
Alkaloid	+ +
Flavonoid	+ +
Phenolic compounds	+ +
Saponins	- -

\+ presence of photochemical, - absence of photochemical

Figure 1: Means of different concentrations of Water hyacinth Extract on Juvenile Mortality of M. Incognita in the laboratory



C- Crude extract, C1- crude extract diluted with 10 ml of distilled water, C2- crude extract diluted with 20 ml of distilled water, CON- control (distilled water).

corroborated that of Lata and Venapani (2010) who reported that the presence of secondary metabolites in water hyacinth shoots and rhizomes such as terpenoid, flavonoid and quinones have curative activity against several pathogens. Anuja and Satyawati (2007) also reported that plant extracts that contained phenolic compounds, alkaloids, glucosides and flavonoid have been found to be effective against M. incognita. The control recorded 0 % juvenile mortality in all the exposure periods. The control been water is not toxic to nematodes and this resulted in zero mortality.

IV. Conclusion

The results obtained from the study indicated that water hyacinth have nematicidal property and hence can be used in the control of root knot nematode – M. incognita. The plant is available and cheap to obtain as it is a common weed growing over water bodies in Nigeria. It is suggested that further screen house and field trials be carried out before recommendations are made to farmers.

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