P-ISSN: 2305-6622; E-ISSN: 2306-3599
International Journal of Agriculture and Biosciences
www.ijagbio.com; editor@ijagbio.com

Research Article

Efficacy of Extract of Pig Nut (*Hyptis suaveolens)* Extract in Controlling Root-knot Nematode (*Meloidogyne javanica*) Treub Chitwood juveniles

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Article History: Received: April 12, 2020 Revised: July 23, 2020 Accepted: August 28, 2020

ABSTRACT

Water extracts of pignut, *Hyptis suaveolens* was assayed for its nematicidal properties in June 2019 in Yola, Nigeria. Water extract of the dried plant was produced and serially diluted with distilled water to give 5 ml, 10 ml and 15 ml dilutions designated as T_2, T_3 and T_4 respectively. The undiluted extract (crude extract) was designated T_1 while the control (T_0) contained only distilled water. These were dispensed into 15 petri dishes each containing 1000 juveniles of *M. javanica* and counting of dead nematodes was done every 24 hours for 72 hours. The result show that the crude extract (T_1) recorded by far the highest juvenile mortality of 100%. The 5 ml dilution (T_2) recorded only 56% mortality. This is an indication that the plant *H. suaveolens* has a good nematicidal potential.

Key words: Crude extract, *Hyptis suaveolens*, Juvenile mortality

INTRODUCTION

Plant-parasitic nematodes are recognized as major agricultural pathogens and are known to attack plants and cause crop losses throughout the world (Zakaria *et al.*, 2013). Williamson and Gleason (2003) reported that nematodes cause an annual crop loss of approximately US$ 100 billion worldwide. Root-knot nematodes (*Meloidogyne* species) are the most abundant and destructive nematodes around tropical areas of the world (Latif *et al.*, 2014) and are the most damaging plant-parasitic nematode (Barker, 1985). Symptoms of root-knot nematode damage in cowpea include stunted growth, galling and leaf chlorosis, severe damage may lead to reduced number of leaves and buds, reduced yield and sometimes, total crop failure (Umar, 2009). Different methods of control have been tried by many workers with varying degrees of success. These include the use of organic soil amendments (Mashela, 2002; Bailey and Glazarovits, 2003; Chindo and Khan, 2008; Min-Jeong *et al.*, 2016), a combination of organic amendments and bioagents (Zakaria *et al.*, 2013; Hammam *et al*, 2016; Singh *et al.*, 2016; Muthulakshmi *et al.*, 2017). Synthetic nematicides known to be environmentally unfriendly and the use of some of these chemicals have been outlawed in many countries. The use of plant extracts is also an effective control measure as described by many workers (Taye *et al.*, 2012; Latif *et al.*, 2014; Ahmad *et al.*, 2016). This work was designed to evaluate the control of the root-knot nematode *M. javanica* juveniles using extracts of the plant *Hyptis suaveolens*.

MATERIALS AND METHODS

The experiment was carried out in 2019 in the laboratory of the Department of Crop Protection, Modibbo Adama University of Technology, Yola, Nigeria. Second stage juveniles (J2) of *M. javanica* were extracted from pure culture of infested tomato roots. The extraction of juveniles was done using the modified Baermann method (Whitehead and Hemming, 1965). The extraction set up was shallow trays with sieve lined with tissue paper and macerated roots of tomato placed on it. Water was poured in from the side of the tray to a level just submerging the materials on the sieve. This set up was left to stand for 24 hours and the nematode juveniles were collected by decanting into a beaker. Aliquots of 10 ml in syringes were taken and counted under a stereoscopic microscope using a grid counting dish and 1000 juveniles were used for this juvenile mortality test.

The plant, *Hyptis suaveolens* was picked around the university campus in Yola. The leaves were removed, washed and shade-dried. Extract was prepared using the

Cite This Article as: Aji MB, I Umar and A Mamman, 2019. Efficacy of extract of pig nut (*Hyptis suaveolens)* extract in controlling root-knot nematode (*Meloidogyne javanica*) treub chitwood juveniles. Int J Agri Biosci, 9(4): 163-165. www.ijagbio.com

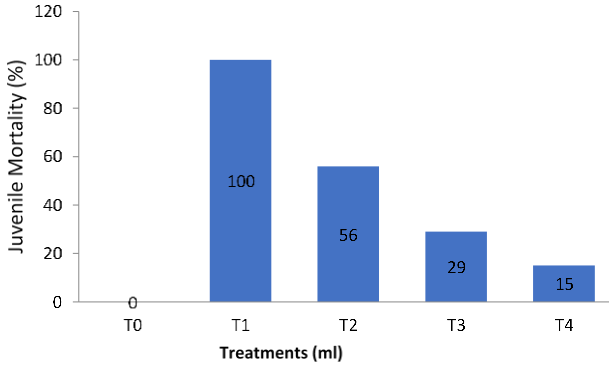

Fig. 1: Effect of concentrations of plant extracts on juvenile mortality of *root-knot nematode, M. javanica*

Table 1: Phytochemical Composition of Pig Nut (*H. Suaveolens*) Powder

Components	Qualitative
Tanins	+
Saponins	+
Terpenoids	+
Flavonoids	+
Alkaloids	+
Glycosides	-
Steroids	+
Phenols	+

Key: - = Undetected; + = Detected

method described by Umar and Mohammed (2013). *H. suaveolens* was ground to powder using clean, dried mortar and pestle. Fifty (50 g) grams of the powder was soaked in 250 ml distilled water contained in a 1000 ml conical flask and left for 24 hours. This was then filtered separately through Whatman No. 1 filter paper. The filtrate obtained was the crude extract and designated T_1 representing 100% concentration. Dilution of the crude extract was carried out with 5 ml, 10 ml and 15 ml distilled water to form T_2, T_3 and T_4 respectively. The control contained only distilled water (T_0).

A total of 15 petri dishes were used for this experiment. One thousand juveniles of *M. javanica* contained in 5 ml distilled water were put into each petri dish. The serial dilutions prepared above were dispensed into the 15 petri dishes containing the juveniles. Counting of dead nematodes was done every 24 hours for three days. Dead nematodes were identified by touching them with a needle to see if they move or not. Experimental design was complete randomized design (CRD) with five treatments replicated three times.

RESULTS AND DISCUSSION

The result (Figure 1) shows that the highest juvenile mortality was recorded in the crude extract with 100% mortality. This was followed by the 5 ml dilution which recorded 56%. The 10 ml dilution recorded 29% juvenile mortality while the 15 ml dilution had 15% mortality. The control (distilled water) was the least with no juvenile mortality recorded (0%).

This experiment shows that the crude extract of *H. suaveolens* has the most significant effect on the juveniles of *M. javanica* with a mortality of 100%. The 5 ml dilution is a distant second with 56% mortality. The effect of the crude extract was due to its high concentration and may also be attributed to the presence of phytochemicals in the plant materials (Table 1) and cause mortality of juveniles of *M. javanica* (Umar, 2007). This study agrees with the result of Anum *et al.* (2018) who reported that aqueous extracts from seeds of *Brassica junceam Piper nigrum, Nigella sativa, Sinapis alba, Papaver* somniferum and *Trigonella feonum-graceaum* suppressed egg hatching and increased larval mortality of *M. javanica*. Yasmin *et al.* (2003) who found that extracts of neem to be effective in controlling root-knot nematode (*M. javanica*) on sweet gourd. They reported that extracts of neem seed, bark and leaves were significantly toxic to juveniles, reduced the number of galls and egg masses per plant and also reduced the number of all growth stages of the nematode.

Phytochemical test was carried out to test for tanins, saponins, terpenoids, Flavonoids, alkaloids Steroids and Phenols using the methods described by Sofowora (1993) and Trease and Evans (1989).

Conclusion

In conclusion, this study showed that pignut (*H. suaveolens*) aqueous extract were effective in controlling nematode as it caused juvenile mortality in the laboratory. Therefore, this plant material has nematicidal potential and it is recommended that field trials should be tried to ascertain its effectiveness

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