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Research article

INVESTIGATION OF AQUEOUS EXTRACTS OF LEAVES OF *CALOTROPIS PROCERA* AS A NATURAL NEMATICIDE AGAINST ROOT KNOT NEMATODE INFECTION ON *ABELMOSCHUS ESCULENTUS L. MOENCH'S* YIELD

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ABSTRACT: In view of the recent increased interest in developing plant origin nematicides as a surrogate to chemical nematicides, this research was carried out to determine the effectiveness of Aqueous extract of Leaves of Sodom apple (Calotropis procure F. Aiton) in the control of root knot nematode infection on Okra Pods (Abelmoschus esculentus L. Moench). Aqueous extracts of Leaves of the C. procera F. Aiton were applied at 0%, 25%, 50%, 75% and 100% concentrations. The five treatments were replicated six times and were applied randomly to the infected Okra Plants with pods. The effects of the treatment on the yield of Okra were observed. The result showed that the different treatments resulted in improved yield of the treated plant.
Keywords: Nematode, Okra, Sodom apple, Okra Pods, C*alotropis procera*.

INTRODUCTION

Okra belongs to the family Malvaceae and is a native of tropical parts of Africa but it is now widely grown in the tropics. Okra is an erected, coarse, robust, annual crop. Dwarf varieties will grow to about three feet tall, while standard cultivars get up to eight feet Leaves are cordate in shape and lobed or divided. The fruit is a long pod, usually ribbed, spineless in cultivated kinds and harvested when three – four inches long. Pods are harvested while still tender and immature. The first pods are ready for harvest about two months after planting, but the plants will continue to bloom and produce pods if they are harvested continuously before they get too large [8]. Most pods are ready or harvesting from four to six days after the bloom opens. Okra is easily recognized by its attractive flowers, which resemble those of its Malvaceae family relative, ornamental hibiscus. Although Okra is usually grown for its pods, the leaves can be eaten. The pods have a very agreeable taste and are mucilaginous (kind of thick and gooey), therefore a good thickening agent for soups. The ripe seeds have been used as a substitute for coffee; the stems have been used to manufacture paper. Plant parasitic nematodes are important pathogens on most food, vegetable, horticultural and fiber crops and without adequate control will cause loss of yield and quality. Approximate yield losses due to plant parasitic nematodes have been estimated to be $ 100 billion worldwide each year [7]. Root-knot nematodes (*Meloidogyne* species) infect almost all types of plants and may cause considerable damage. During surveys, most vegetable crops including okra were found to be infected with *M. incognita* [5]. Root knot nematodes (Meloidogyne spp) are minute, worm-like animals which are very common in soils. They have a wide host range, causing problems in many annuals and perennial crops. They are major pathogens of vegetables in the world, impacting both quantity and quality of marketable yields. Nematode management is complicated and difficult and at present chemical control is employed in many crops to maintain their populations below economic threshold levels [2]. Recently, the control of plant parasitic nematodes by using conventional nematicides has declined internationally because of the inherent toxicity of many existing synthetic pesticides to non-target organisms and their persistence in the environment. There is increasing need to find more acceptable alternatives. The potential for nematicidal activity of indigenous plants and their products has been reported by earlier workers [4, 3, 6, 1]. Okra is infamous for its susceptibility to root knot Nematode infection normally commonly causes very irregular growth with production reduced and delayed. Hence this study is to determine the effectiveness of aqueous extract of *Calotropis procera* in the control of root knot nematodes infection on Okra.

MATERIALS AND METHODS

Pre-planting Operation

The experiment was carried out at the crop pavilion at the Faculty of Agriculture, University of Ilorin. Loamy soil got around the crop pavilion was steam sterilized to kill nematodes and some other micro organisms present in the soil. Thirty Plastic pots were used for the experiment each containing ten kilograms (10kg) of the sterilized soil. N.P.K, 20:10:10 fertilizer was applied as a basal treatment.

Planting Operation

Planting of Okra variety Clemson spineless was done at the rate of four seeds per pot. Two weeks after planting, the Okra seedlings were thinned to one most vigorous seedlings per pot.

Nematode Extraction

Gall *Celosia argentia* roots were collected from a village (Ile Apa) around the University. The galled roots were washed gently with water and were chopped into pieces. Ten percent (10%) parozone solution was added to the chopped galled roots in a container to digest gelatinous matrix surrounding the eggs. The 10% parazone was made by diluting 100ml of parazone with 900ml of water in a one litre flask. The content of the container (chopped Galled roots and parazone solution) was then shaken for four minutes.

After shaking, it was poured into four sieves arrayed horizontally according to their aperture sizes i.e 0.5mm at the top, followed by 0.2mm, 0.15mm and then 0.1mm sieve at the base. The 0.5mm retained the roots debris while nametode eggs were collected in the 0.2mm, 0.15mm, 0.1mm sieves. Water was poured in the sieves to wash off the parazone solution. The contents of the sieves retaining the nematode eggs were washed with water into a container. The egg suspension was later observed and standardized under a stereoscopic microscope such that one milliliter (1ml) of egg suspension contains approximately two hundred nematode eggs. Two weeks after planting of Okra, twenty millimeters (20ml) of eggs suspension containing approximately four thousand nematode eggs was used to inoculate the roots of each Okra plants.

Preparation of Aqueous Extract of C*alotropis procera F. Aiton*

The Plant C*alotropis procera* was collected within the University. Five kilograms (5kg) of Leaves were air dried (not sun-dried) and grinded to powder after well dried. It was soaked in water for twenty-four hours (24hrs). After the twenty-four hours, the soaked leaves were sieved. The filtrate was taken as 100% concentration solution of the leaf extract, serial dilutions was taken as 100% concentrated solution such that 25%, 50% and 75% concentrated solution were prepared,0% concentration served as the control. Three weeks after the planting, the treatments (different concentration of the aqueous extract) were applied randomly to the Okra plants. Each was replicated six times.

Data Collection

Data collection involves final nematode population, number and weight of pod per plants. Also at eight weeks of planting, the Okra plants were uprooted and number of galls per plant was noted. All data were subjected to analysis of variance and treatment means were separated using Duncans Multiple range test at 0.05 level of significance.

RESULT AND DISCUSSION

Table 1 shows the effect of treatment on the number of pod. Pod number was significantly higher in the plants treated with 50%, 75% and 100% concentrated extracted than in the planted treated with 25% extract and untreated control. The table also shows the effect of treatment on Pod weight, treatment level 25%, 50% and 75% were not significantly different in effect from control, treatment level 100% was not significantly different in effect from lower treatment levels but resulted in a significantly higher pod weight than control. Treatment levels 50%, 75% and 100% were not significantly different in effect but resulted in lower gall index than 25% treatment level However, all treated plants resulted in a significantly lower gall index than control as shown in Table 2.

The experiment shows that number and weight of pods were significantly higher in treated plants especially at 100% treatment level than the control (untreated plants). This experiment shows also that the treated plants were less galled than the control.

Table 1: **Effect of Aqueous Extract of *Calotropis procera* on Mean Number of Pod, and Pod weight Eight weeks after Planting.**

Treatment (Aqueous extract of *Calotropis procera)*	Pod Number	Pod weight
0%	0.50b	3.35b
25%	1.17b	6.52b
50%	1.33a	6.44ab
75%	1.50a	5.43ab
100%	1.83a	8.74a
Standard Error	0.231	1.092

Table 2: Effect of Aqueous Extract of *Calotropis procera* on Mean Number of Root weight and Gall Index Eight weeks after Planting.

Treatment (Aqueous extract of *Calotropis procera)*	Root weight	Gall Index
0%	3.75b	3.87c
25%	10.13a	2.93b
50%	9.85a	2.17a
75%	14.25a	2.10a
100%	11.47a	2.03a
Standard Error	1.403	0.203

CONCLUSION

From the result of this work, it can be concluded that leaf extract of Sodom Apple (*C. procera*) resulted in the increased yield of Okra pods and less gall index was reached. It can therefore serve as a natural nematicide for the control of root knot nematode infection in Okra.

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