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Research article

THE NEMATICIDAL EFFECT OF AQUEOUS EXTRACT OF LEAVES OF *CALOTROPIS PROCERA* AGAINST ROOT KNOT NEMATODE INFECTION ON VEGETATIVE GROWTH OF OKRA PLANTS (*ABELMOSCHUS ESCULENTUS L. MOENCH*).

[1]Oluwatoyin Eunice, B., [2]Bello Oluwasesan, M. and [3]Dada Adewumi, O.

[1]Science Department, Kiddies Secondary School, New Layout, Katsina
[2]Department of Applied Chemistry, Federal University, Dutsin-Ma, Katsina.
[3]Department of Industrial Chemistry, Landmark University, P.M.B 1001, Omu-Aran, Kwara State.
Corresponding author: sesanbello@yahoo.com, 2348062320327

ABSTRACT: This paper reports the nematicidial effect of aqueous extract of Leaves of Calotropis procera which was investigated in the control of root knot nematode infection on the vegetative growth of Okra Plant (Abelmoschus esculentus L. Moench).The aqueous extract of leaves of C. procera treated at 10%, 25%, 50%, 75% and 100% concentrations. The treatments were replicated six times and were applied randomly to Okra plants in thirty plastic pots. The effects of treatment on the vegetative growth of A. esculentus L. Moench was significant at 100%. The result of this experimental study reveals the nematicidal effects of aqueous extract of leaves of C. procera.

Keywords: Nematicidal, *Calotropis procera*, Aqueous, Vegetative.

INTRODUCTION

Calotropis procera is a spreading shrub or small tree up to four meters exuding copious milky sap when cut or broken. It has a native range from Indian to Iran and Africa. The leaves are opposite, grey, green and large, up to fifteen centimeters (15cm) long and ten centimeters (10cm) broad with a pointed tip. Flowers are waxy white; fruits are grey green and inflated eight to twelve centimeters (8-12cm) long. It contains numerous seeds with tuft of long silky hairs at one end [2]. It is propagated by seed spread by wind and water over large distance [7].

Active ingredients in *Calotropis procera* include: a yellow bitter resin, a black acid resin, a crystalline colourless substance Madarfluavil, a peculiar principle which gelatinizes on heating called Madarine and Calotropin (neutral), a very active poison of the digitalis type In Africa, *C. procera* is used in the local production of cheese. In India, it was experimented for paper making, the inner back yielding a fibre stronger than Russian hemp. *C. procera* root bark is largely used as a treatment for elephantiasis and leprosy and is efficacious in causes of chronic Eczema, Diarrhea and Dysentery.

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. In recent years, the nematicidial effects of certain plants extracts have been extensively investigated [3, 6]. They are easily degraded, are pollution free, leave no harmful residues, and are cheaper and non toxic to host plants and humans [1].

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 seedling 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.*

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 plant height, number of leaves and number of branches which were measured on weekly basis. The reading of plant height and counting of number of leaves started three weeks after planting. Also at eight weeks after planting leaf area was taken using the area meter. All data were subjected to analysis of variance and treatment means were separated using Duncan's multiple range test at 0.05 level of significance.

RESULT AND DISCUSSION

Table 1 shows the effect of treatment on number of leaves, there were no significant differences among treatment levels between the third and fourth weeks after planting. However, the treatment resulted in significant differences between the fifth and eighth weeks after planting. The highest treatment level (100% extract) resulted in a significantly more number of leaves per plant.

Table 2 shows effect of treatment of treatment on number of branches, between the fourth and sixth weeks after planting, there were no significant differences among treatment level. But there were significant differences among the treatment levels between the seventh and eighth weeks after planting. At seventh weeks after planting, treatment levels 100% was not significantly differently different in effect from lower treatment levels but it resulted in significantly higher number of branches than in the control. At eighth week after planting, treatment levels 25%, 50%, and 100% were not significantly different. Treatment levels 0%, 25%, 50% and 75% were not significantly different, but treatment level 100% resulted in significantly more number of branches and leaves than control.

Table 3 shows effect of treatment on leaf area, root and shoot weight, there were no significant differences among treatment levels but treatment resulted in significantly higher leaf area, root and shoot weights in all treated plants than control. Table 3 also shows the effect of treatment on Days to 50% plant flowering. There were no significant differences among treatment levels but treatment resulted in a significant difference between all treated plants and control. All treated plants flowered significantly earlier than control. This corroborates the earlier work of Muhammed, *et al*., (2011), that the leaves extract of *C. procera* significantly result in higher leaf area, root and shoot weights in Okra plants.

Nandal and Bhatti (1993), Trivedi *et al*. (1980) reported the role of Calotropis leaves in reducing nematode population. The reduction of nematode population may be attributed to the production of nematicidal substances like terthienyl, triterpenoid and other alkaloids by organic compounds. Rastogi and Mehrotra (1995) isolated two triterpene esters with biological activity from *Calotropis procera* leaves' extract.

Table 1: **Effect of Aqueous Extract of *Calotropis procera* on Mean Number of Leaves of Treated Okra.**

Treatment(Aqueous extract of *Calotropis procera)*	Third Week	Fourth week	Fifth week	Sixth week	Seventh Week	Eighth Week
0%	4.8	6.2	6.5b	7.8b	9.0b	9.5c
25%	5.3	6.8	7.5ab	8.8b	9.0b	10.2bc
50%	5.7	6.7	7.3b	8.8b	10.0ab	10.5bc
75%	5.5	6.8	7.7ab	8.5b	10.0ab	11.3ab
100%	6.0	7.5	8.8a	10.3a	11.8a	12.17a
Standard Error	0.469	0.411	0.451	0.442	0.657	0.542

Table 2: Effect of Aqueous Extract of *Calotropis procera* on Mean Number of Branches of Treated Okra.

Treatment(Aqueous extract of *Calotropis procera)*	Fourth Week	Fifth week	Sixth week	Seventh week	Eighth Week
0%	0	0.2	0.2	0.2b	0.2b
25%	0	0.5	0.7	1.2ab	1.2ab
50%	0	0.3	0.3	1.0ab	1.0ab
75%	0.2	0.3	0.3	0.8ab	0.8ab
100%	0.3	1.2	1.2	2.0a	2.0a
Standard Error	0.167	0.256	0.279	0.414	0.414

Table 3: Effect of Aqueous Extract of *Calotropis procera* on Mean Number of Leaf Area, Days to 50% Plant Flowering, Root and Shoot Weights at Eight Weeks after Planting.

Treatment (Aqueous extract of *Calotropis procera)*	Leaf Area	Days to 50% Plant Flowering	Root Weight	Shoot Weight
0% (Control)	139.50b	53.00b	3.75b	12.32b
25%	244.33a	49.17a	10.13a	27.62a
50%	250.83a	50.83a	9.85a	28.23a
75%	301.00a	50.50a	14.25a	29.57a
100%	296.83a	49.50a	11.47a	32.78a
Standard Error	25.319	0.715	1.403	3.065

CONCLUSION

From the result of this work, it can be concluded that leaf extract of Sodom apple (*C. procera*) resulted in the increased mean number of leaves, mean area of leaf, mean number of branches, root and shoot weight. It can therefore serve as a natural nematicide for the control of root knot nematode infection in Okra.

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