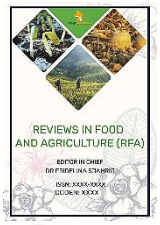
ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2735-0312 (Online)
CODEN: RFAEAW

Reviews In Food And Agriculture (RFNA)

DOI: http://doi.org/10.26480/rfna.02.2022.44.47



CrossMark

RESEARCH ARTICLE

EFFICACY OF SOME BOTANICAL EXTRACTS AGAINST INFESTATION OF INSECT PESTS OF OKRA (*Abelmoschus esculentus* L.)

Idowu G. A.[a], Oyewale R. O.[b*], Bolajoko M. H.[b], Ibrahim R. O.[b], Isah C.[b], Adejumo A. A.[b]

[a]Department of Seed Certification, quality control, Crop Registration and Release, National Agricultural seeds council, Abuja-Nigeria
[b]Department of Crop Production, Federal University of Technology, Minna, Niger State, Nigeria
**Corresponding Author Email: r.oyewale@futminna.edu.ng*

ARTICLE DETAILS

Article History:

Received 03 March 2022
Accepted 04 April 2022
Available online 12 April 2022

ABSTRACT

The experiment was conducted to determine the efficacy of some botanical extracts using Neem leaf extracts, *Azadiracta indica,* Moringa leaf extract *Moringa oleifera, Jatropha* leaf extract *Jatropha gossypifolia* and systemic insecticides (Cypermethrin) as treatments. The treatments were arranged in Completely Randomized Design (CRD), replicated three times. Data were collected on parameters such as, number of leaf, plant height, days to 50% flowering, fresh fruit weight and yield weight were subjected to Analysis of Variance (ANOVA). Results showed that *Moringa* leaf extracts had the least insect pests' damage (0.33), tallest plant height (44.00 cm), highest leaf number (8.00), heaviest fruits weight (46.94 g) and highest fruit yield among the botanicals used. Hence, the leaf of Moringa (*Moringa oleifera)* can be recommended to be used for managing insect pests of okra.

KEYWORDS

Okra, insect pests, botanical extracts, insecticide, mixture

1. INTRODUCTION

Okra, which is scientifically known as *Abelmoschus esculentus* (L.) Moench) is one of the important vegetables containing good dietary value with medicinal and industrial importance. It is called a lady's finger, a flowering plant in the mallow family. Although, the species is still poorly studied but cultivated in tropical and warm temperate region around the world (Maganha et al., 2010). It is one of the most widely known and utilized species of the family Malvaceae (Naveed et al., 2009) and also an economically important vegetable crop grown in tropical and sub-tropical parts of the world (Saifullah et al., 2009). Okra originated in Ethiopia (Sathish et al., 2013) and was then propagated in North Africa, in the Mediterranean, in Arabia and India by the 12th century BC (Nzikou et al., 2006). Okra is a short annual crop which is grown in the lowland tropics and has several cultivars with different maturity period, shape of fruit, stem length, colour of leaves and other characteristics. It is mainly propagated by seeds and has duration of 90-100 days. The leaves are 10 - 20 cm long with 5 -7 lobes, characterized by small erect stems that are bristly or hairless with heart shaped leaves. Okra possesses petals which ranging from 4 - 8 cm in diameter, and flowers with five white to yellow. The seed pods are capsule, up to 25 cm long and containing numerous seeds (Kumar et al., 2010). It is very rich in carbohydrate, protein, minerals, fat, fiber and phenols (Huang et al., 2008). The crop is widely cultivated in Turkish, West Africa, India, Burma, Japan, Afghanistan, Yugoslavia, Bangladesh, Pakistan, Malaysia, Brazil, Ghana, Ethiopia, Cyprus and the Southern United States (Tripathi et al., 2011) and is among the most frequently and popularly consumed traditional vegetables. Okra has considerable area under cultivation in Africa and Asia with huge socio-economic potential. In West and Central Africa (WCA), it is called 'Gan' (Bambara), 'Kandia' (Manding), 'Nkruma' (Akan), 'Fetri' (Ewe), 'Gombo' (French). In Nigeria, okra is called 'Ila' (yoruba), 'Kubewa' (Hausa), 'Layre' (Fulfude), 'Epehu' (Egbira), 'Pomi' (Nupe).

Heavy infestations caused by insect pests has been the major constraints associated with okra production that exert both quantitative and qualitative loss on the crop. Insect pest of okra includes Aphids, *Aphis gossypii*; Whitefly, *Bemisia tabaci*; Armyworm, *Spodoptera exempta*; Corn earworm, *Helicoverpa zea;* Loopers, *Trichopulsi ani*; Flea beetle, *Podagrica uniforma*; Brown flea beetle, *Nisotra dilecta* causing several damages; varying from necrotic leaves, stunted shoots, singular or closely grouped holes in foliage, shallow dry wounds on fruits, damaged leaves, reduced plant stand and many others. Infestations by sucking insect pests do not only affect the crop but also hamper the crop health by transmitting pathogenic diseases. The incidence and dynamics of insect pests on okra are essential to develop sustainable management strategies. Extensive use of insecticides has resulted to the problems of pest resistance, resurgence, pesticides residues, destruction of beneficial fauna and environmental pollution (Adilakshmi et al., 2008). However, asides chemical control of insect pest, the parts of some plants (seed, root, bark, leaf) as botanical extracts have been discovered to be effective in pest management considering their environmental safety. However, the parts of some plants (seed, root, bark, leaf) as botanical extracts have been discovered to be effective in pest management considering their environmental safety. Botanicals are group of safe bios-insecticides with a broad spectrum of anti-pest activity, relatively to specific mode of action, low mammalian toxicity and more tendency to disintegrate, in nature or metabolic in a biological system (Mohammed, 2009).

This research work, therefore, aimed at controlling the attack of insect pests of okra using botanical extracts of some selected herbs which are readily available and cheaper. The results from the Research work brought out the efficiency of different botanical extracts deployed for the management of insect pests of okra and the best performed extracts will be recommended to okra growing farmers.

Quick Response Code	Access this article online	
	Website: www.rfna.com.my	**DOI:** 10.26480/rfna.02.2022.44.47

Cite The Article: Idowu, G. A.,Oyewale, R. O., Bolajoko, M. H., Ibrahim, R. O., Isah, C., Adejumo, A. A. (2022). Efficacy of Some Botanical Extracts Against Infestation of Insect Pests of Okra (*Abelmoschus esculentus* L.). *Reviews In Food And Agriculture, 3(2): 44-47.*

2. Materials and Methods

2.1 Study Location

The study was carried out at Horticulture and Nursery Garden of the Department of Crop production, Federal University of Technology Minna (9^0 51 ^{1}N, 6^0 ^{1}44 E and 212 m above sea level), Nigeria. Minna falls under the Southern Guinea Savanna ecological zone of Nigeria with average annual rainfall of about 1200mm. The rainfall is distributed between April and early October with peak around September. Temperature ranges from 35 ^{0}C to 37.5 ^{0}C while the relative humidity is between 40 and 80 %.

2.2 Source of Okra Seeds

Clemson spineless, used was sourced from an Agro chemical store in Minna.

2.3 Experimental Layout

The treatments; three botanical extracts and a synthetic insecticide were arranged in Completely Randomized Design (CRD) and replicated three times.

2.4 Source of Botanicals

The leaf of Moringa, M*oringa oleifera;* Neem, *Azadiracta indica;* Red Jatropha, *Jatropha gossipifolia* were obtained from Landscaping unit of The Federal University of Technology, Gidan kwano Campus Minna, with the aids of cutlass and knife .

2.5 Preparation of leaf extracts

The leaves were carefully removed from the branches and 1 kg of the weighed leaves were crushed into paste. Each paste was put into different container and 100 ml of distilled water was added to each paste in the plastic container. The mixture was then stirred using a clean glass rod, covered with aluminum foil to prevent evaporation and left for 24 hours. After 24 hours, the paste was blended in an electric blender and another 100 ml of distilled water was added, stirred with the magnetic stirring rod and covered with aluminum foil, then the blended mixtures were filtered and the liquid content separated. Some drops of streptomycin sulphate were added to prevent bacterial growth in the concentrations.

2.6 Treatments

Neem: *Azadiracta indica* leaf extract

Moringa: *Moringa oleifera* leaf extract

Red *Jatropha: Jatropha gossypifolia* leaf extracts

Cypermethrin (as check)

2.7 Agronomic Practices

2.7.1 Seed Sowing

Okra seeds were sown at 2 seeds per pot. Application of water was done on daily basis and weeding was done by hand pulling.

2.7.2 Thinning

At 2 week after sowing (WAS) okra seedlings were thinned to one stand per polythene pot.

2.7.3 Fertilizer Application

NPK (15:15:15) fertilizer was applied by side placement and 5 cm away from the plants and covered at 2 weeks after sowing (WAS).

2.7.4 Application of botanical extracts and systemic insecticides

The extracts were applied at 4, 5, 6 and 7 weeks after sowing (WAS).

2.8 Data Collection

2.8.1 Plant Height

Okra plants were measured from the base of the plants to the tip of the longest leaves using meter rule at 4,5,6,7 WAS.

2.8.2 Leaf's Number

The number of leaves of each okra stand were counted at 4,5,6,7 WAS.

2.8.3 Number of holes

Holes created by insects on okra leaves were counted at 4, 5, 6 and 7 WAS.

2.8.4 Days to First Flower Opening

The number of days from sowing to the first flower opening was counted

2.8.5 Days to 50% Flowering

This was obtained by counting the number of days from sowing to when 50% of the plant population flowered

2.8.6 Fresh Weight

After harvest, fresh weight of the fruits was taken.

2.8.7 Data Analysis

The data collected from all parameters were subjected to analysis of variance (ANOVA) using statistical Analysis system procedure. The treatment means were separated using Duncan multiple range test (DMRT) at $p \leq 0.05$.

3. Result

3.1 Effects of Botanical Extracts on Infestation of Insect Pests of Okra Plant

The effect of botanical extracts on okra leaves at 4 WAS showed that there was no significant difference between control and botanical extract treatments (Table 1). Neem extract had the highest (5.33) number of holes; followed by control (3.00), *Jatropha* extract (1.67), systemic insecticide (Cypermetrin) (0.67) and *Moringa* extract (0.33) had the fewer number of holes. No significant difference among the treatments was recorded at 5 WAS, Neem extract had the highest number of holes (5.33), control (4.00), *and Jatropha* extract (3.00) while systemic insecticide (cypermetrin) (1.33) and *Moringa* extract had the least number of holes (0.33). So also, there was no significant difference ($P<0.05$) between the treatments in 6 WAS, it was observed that neem extract had the highest number of holes (5.33), control (4.00), *Jatropha* extract (3.00), systemic (1.33) and moringa extract (0.33). Lastly in 7 WAS, there was no significant difference between the treatment groups. Control and neem extract had the same highest number of holes (5.33), Jatropha extract (3.00), Cypermethrin (1.33) and moringa extract with the lowest number of holes at (0.33).

3.2 Effect of Botanical Extracts on Number of Leaves Per Plant

The effect of botanical extracts on number of leaves of okra at 4 – 7 weeks after sowing (WAS) (Table 4.2). There was no significant difference recorded among the various treatments, although Neem leaf extracts had the highest number of leaves at all the weeks followed by Cypermethrin.

3.3 Effect of Botanical Extracts on Plant Height Per Stand

This shows the effect of botanical extracts on plant height per stand at 4 – 7 weeks after sowing (WAS). At 4 WAS, there was no significant difference among the botanical extracts, Cypermethrin and Control. At 5WAS, Moringa extract recorded the tallest significant different ($p \leq 0.05$) plant. But no significant difference among all treatments used for the research at 6 and 7WAS.

3.4 Effect of Botanical Extracts on Day To Flowering of Okra.

Effect of the botanicals on this trait was significant ($P \leq 0.05$) with *Jatropha gossipifolia* extract and Cypermethrin recorded the earliest day to flowering (41 days), followed by Moringa *Moringa oleifera* (42 days) to flowering with control and Neem *Azadiracta indica* having 48 days and 49 days respectively .There was significant difference ($P \leq 0.05$) between Neem extract and all others botanical extracts.

3.5 Effect of Some Botanical Extracts on The Fruit Yield of Okra Plant.

Moringa (*Moringa oleifera)* extracts was recorded to have the highest fruit yield (46.94 g), followed by Cypermethrin (34.7 g) with *Jatropha gossipiofilia* extract and Neem *Azadiracta indica* extracts recorded 6.95 g and 24.37 g respectively. Control had lowest yield which was 21.36 g.

Table 1: Effect of botanical extracts on Infestation of insect pests of okra

	Number of holes			
Treatment	4 WAS	5 WAS	6 WAS	7 WAS
Control	3.00a	4.00a	4.00a	5.33a
Neem Extract	5a	5a	5a	5a
Jatropha Extract	2a	3a	3a	3a
Systemic	1a	1a	1a	1a
Moringa Extract	0.33a	0.33a	0.33a	0.33a
LSD±	5.43	6.51	6.51	6.27

Means followed by similar alphabet(s) in the same column are not significantly different at ($P \leq 0.05$) by Duncan Multiple Range Test (DMRT)

Table 2: Effect of botanical extracts on number of leaves of okra				
Number of Leaves				
Treatment	4 WAS	5 WAS	6 WAS	7 WAS
Moringa leaf Extract	5	6	7	8
Neem leaf Extract	5	5	8	8
Jatropha leaf Extract	5	5	7	7
Cypermethrin	5	6	8	8
Control	4	5	7	7
LSD±	0.95	1.09	2.53	2.16

Means followed by similar alphabet(s) in the same column are not significantly different at ($P \leq 0.05$) by Duncan Multiple Range Test (DMRT)

WAS: Week after Sowing

Effect of botanical extracts on plant height of Okra at 4 – 7 weeks after sowing (WAS)

Plant Height (cm)				
Treatment	4 WAS	5 WAS	6 WAS	7 WAS
Moringa leaf Extract	17.33a	24.00a	32.67a	44.00a
Neem leaf Extract	16.67a	21.33b	27.67a	36.00a
Jatropha leaf Extract	16.67a	22.67ab	28.67a	35.33a
Cypermethrin	16.33a	23.67a	28.33a	37.00a
Control	16.67a	23.33a	29.33a	40.33a
LSD±	1.52	1.28	4.41	8.50

Means followed by similar alphabet(s) in the same column are not significantly different at ($P \leq 0.05$) by Duncan Multiple Range Test (DMRT)

WAS: Weeks after Sowing

Effects of Botanical extracts on days to flowering of okra plant

	Days to Flowering
Treatment	
Moringa leaf Extract	42[a]
Neem leaf Extract	49[a]
Jatropha leaf Extract	41[a]
Cypermethrin	41[a]
Control	42[a]
LSD±	2.02

Means followed by similar alphabet(s) in the same column are not significantly different at ($P \leq 0.05$) by Duncan Multiple Range Test (DMRT)

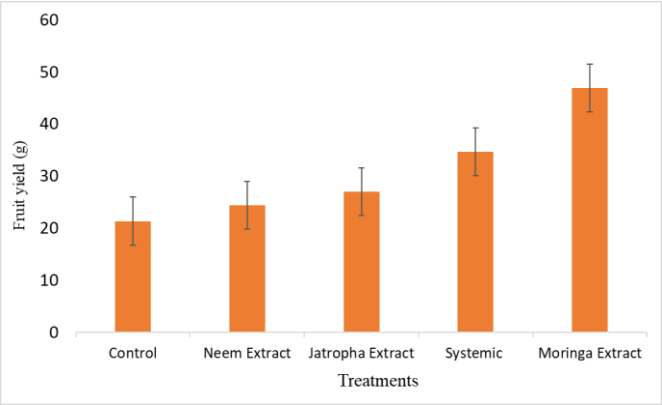


Figure 1: Effects of some botanical extracts on the fruit yield of okra.

4. Discussion

The Moringa *Moringa oleifera* had tallest okra plant and less infestation of insect pest, and highest number of leaves, as well as highest yield of okra fruits. *Moringa oleifera* has been reported by Fugile, 2010 to accelerate growth of young plants, strengthen plant, improve resistance to pests and diseases, increases leaf area duration, increase number of roots, produce more and larger fruits and generally increase yield by 20 to 35%. High amount of Zeatin has also been reported in fresh *Moringa oleifera* leaves which is a hormone that increases the growth of plant (Nagar et al., 2006). In some household of Nigeria, the use of Moringa has been reported to have increased seed germination, growth and yield of crops (Muhamman et al., 2010; Phiri and Mbewe., 2010).

Jatropha gossipifolia produced high yield followed Moringa, as it has been popularly reported that pests and diseases do not pose a significant threat to Jatropha, due to the insecticidal and toxic characteristics of all part of the plants. All the treatments performed better than Control and competed with high effects with the standard (Cypermethrin).

5. Conclusion

From the study, the application of *Moringa oleifera* leaf extract enhanced growth, fruit production and suppressed insect pest attack on the okra assessed. *Moringa oleifera* leaf extract may be a good source of effective insecticide for the control of okra insect pest in this study area with no adverse effect to the environment, human, aquatic resources and natural enemies of the insect pests.

Recommendations

Moringa leaf extract is recommended as botanical pesticide to substitute synthetic pesticides for the control of insect pests of okra in Minna. This will help the farmers to obtain the potential optimum growth and fruit production of okra with less adverse effects on human and environment. Further studies should be conducted to find out the active ingredients in the Moringa plants that functions as insecticidal material(s).

References

Adilakshmi, A., Korat, D. M. & Vaishnav, P. R. 2008. Bio-efficacy of some botanical insecticides against pests of okra. Karnataka Journal of Agricultural Sciences, 21(2): 290-292.

Fuglie, L. J. 2000. New uses of Moringa studied in Nicaragua: ECHO's Technical Network site networking global hunger solution. ECHO, Nicaragua.

Huang, Z., Wang, B., Eaves, D. H., Shikany, J. M., & Pace, R. D. 2008. Phenolic compound profile of selected vegetables frequently consumed by African Americans in the Southeast United States. Food Chemistry 103, 13951402.

Kumar, S., Dagnoko, S., Haougui, A., Ratnadass, A., Pasternak, D. & Kouame, C. 2010. Okra (Abelmoschus spp.) in West and Central Africa: potential and progress on its improvement. African Journal for Agriculture Resources. 5: 3590-3598.

Maganha, E. G., Halmenschlager, R. C., Rosa, R. M., Henriques, J. A. P., Ramos, A. L. P., & Saffi, J. 2010. Pharmacological evidence for the extracts and secondary metabolites from plants of the genus Hibiscus, Food Chemistry; 118(1): 1-10.

Muhamman, M. A., Auwalu, B. M., Manga, A. A. & Jibrin, J. M., 2009. Effects of (Moringa oleifera Lam) extract on the growth of Tomato (Lycopersicon esculentum (L.) Kert) in Kano, Sudan Savanna Ecological Zone of Nigeria. Proceedings for the 27th Annual Conference of Horticultural Society of Nigeria, Kano state. Nigeria. 71-75.

Muhammed, A. 2009. Antixenotic and antibiotic impact of botanicals for organic stored wheat insect pests, PhD Thesis. University of Agriculture, Faisalabad, Pakistan.

Naveed, A., Khan A. A., & Khan, I. A. 2009. Generation mean analysis of water stress tolerance in okra (Abelmoschus esculentus L.). Pak J Bot, 41: 195-205.

Nzikou, J., Mvoula-Tsieri, M. & Matouba, E. 2006. A study on gumbo seed grown in Congo Brazzaville for its food and industrial applications. African Journal of Biotechnology, 5 (24); 2469-2475.

Phiri, C., Mbewe, D. N. 2010. Influence of Moringa Oleifera leaf extracts on germination and seedling survival of three common legumes. International Journal of Agriculture and Biology, 12: 315-317.

Saifullah, M. & Rabbani, M. G. 2009. Evaluation and characterization of okra (Abelmoschus esculentus L. Moench.) genotypes. SAARC Journal of Agric. 7: 92-99.

Sathish, D., & Eswar, A. 2013. A Review on: Abelmoschus esculentus (Okra). International Resource Journal of Pharmaceutical Application Science. 3: 129-132.

Tripathi, K. K Govila, O. P., Warrier , R. & Ahuja, V. 2011. Biology of Abelmoschus esculentus L. (Okra). Series of Crop Specific Biology Documents, Department of Biotechnology, Ministry of Science & Technology & Ministry of Environment and Forest, Government of India. 35.