Asian Journal of Research in Botany

Volume 6, Issue 2, Page 134-139, 2023; Article no.AJRIB.98978

Comparative Effect of Mixture of Bio-pesticide Made of (Blue Green Algae and Neem) and Synthetic Pesticide (Aldrin Dust) in Control of Pest of *Telfairia occidentalis*

Ezenwata I. Sussan [a*], Anyanele, W. Chibuzo [b], Idigo, M. Amara [c] and Eze, C. Catherine [d]

[a] Department of Biological Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State, Nigeria.
[b] Ecology and Conservation of Natural Resources-Botany Department, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.
[c] Department of Biological Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State, Nigeria.
[d] Public Health Microbiology and Environmental Management- Department of Microbiology, School of Biological Sciences, Federal University of Technology Owerri, Imo State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/98978

Original Research Article

Received: 17/02/2023
Accepted: 19/04/2023
Published: 01/05/2023

**Corresponding author: E-mail: evangcwa@gmail.com, IS.ezenwata@coou.edu.ng;*

ABSTRACT

Pesticides are highly toxic substances. Their toxicity may not completely eliminate the target organisms but may adversely affect some of the life processes of the non-target host plants. This research work was carried out in order to check its effect and to compare the effect of a biopesticide made of mixture of Neem leaf and agal extract with that of a synthetic pesticide (Adrin dust) in the control of pests of fluted pumpkin. This experiment was laid in a randomized complete block design. The effect of these treatment on insect control were evaluated, in terms of number of days of germination, leaf length, leaf width, number of leaf and petiole length, all at two weeks after germination. Results showed that the Neem leaf and blue green algal extract, were effective in controlling the pest attacking the fluted pumpkin in the field, and also improved the morphological growth of the plant with increase in concentration when compared with the chemical insecticide and the control. The number of days of germination was faster when compared with control, leaf length, also showed a significant growth at 60% concentration. This was not so with the synthetic pesticide as the increase in concentration of the insecticide, affected growth. The knowledge of effectiveness of bio-pesticides can therefore be exploited for crop improvement and breeding purposes.

Keywords: Vermicomposting; biopesticide and synthetic.

1. INTRODUCTION

Over the years, extensive use of commercially available synthetic pesticides against pests has led to their bioaccumulation in the environment causing increased resistance of plants to pest, and reduction in soil biodiversity [1]. Therefore, growing attention has been given toward the development of alternate environmentally friendly pesticides/insecticides that would aid in efficient pest management system and also prevent chronic exposures leading to diseases [2]. One such strategy is, the use of neem plant's (*Azadirachta indica*) active ingredients which exhibit agro-medicinal properties conferring insecticidal properties [3]. The most prominent constituent of Neem leaf, is azadirachtin, which has been established as a pivotal insecticidal ingredient [1, 4]. It acts as an antifeedant, repellent, and repugnant agent and induces sterility in insects by preventing oviposition and interrupting sperm production in males [5,6].

Fluted pumpkin Hook (F) is one of the most important vegetables grown in Southern Nigeria [7]. It is generally regarded as a leaf and seed vegetable. The leaves and young shoot are edible. The leaf has a high nutritional, medicinal and industrial values being rich in protein (29%), fat (18%) and minerals and vitamins (20%). *Telfairia occidentalis* Hook. F., commonly called fluted pumpkin, belongs to the family Cucurbitaceae and is said to have originated from Tropical West Africa [8]. The crop is grown both for its leaves and for the oily seeds contained in its large ribbed fruits, is mainly cultivated in West Africa [9]. In Nigeria, it is majorly cultivated in the South Eastern States where it is planted as a backyard crop mainly by the Igbo tribe [10]. The crop is primarily grown as a leaf vegetable and is used for human consumption and animal fodder [9]. In spite of its nutritional value and importance, there is a dearth of information on the status of their protection against pests in Nigeria.

1.1 Objective of the Study

The objective of this study is to compare the effect of mixture of Neem leaf and agal extract and Adrin dust pesticide in the possibility of controlling pests of fluted pumpkin in Uli.

- To compare the effect of mixture of bio-pesticide made of (Blue green Algae and Neem) and synthetic pesticide (Aldrin dust) in control of pest of *Telfairia occidentalis*.
- To determine the level of concentration at which control will be achieved.

2. MATERIALS AND METHODS

The study was carried out in Biological sciences botanical garden in Chukwuemeka Odumegwu Ojukwu University Uli, Anambra State. The study was done during the 2022 rainy season. Mean annual total rainfall is about 1600 mm with the mean annual evapo-transpiration often exceeding this value in recent years. Temperature is uniformly high all-year-round, with mean minimum and maximum annual values of 21°C and 31°C. Rarely does the relative humidity fall outside the range 55–80% throughout the year.

2.1 Land Preparation

The land was cleared with cutlass and ridges were constructed with hoe, after that the application of organic manure (livestock dung/waste) was done in order to supply the soil with mineral nutrients necessary for plant growth.

2.2 Seed Sourcing and Preparation

The fluted pumpkin seeds were purchased from the market. The seeds were scooped from the pods, sun drying was done in one day. It is good to allow for adequate sun-drying before planting. The procedure helps to reduce moisture content and promote germination.

2.3 Preparation of Extract and Seed Treatment

The Neem leaves and the agal were dried, blended. 100g of each of the dry powdered plant were soaked in distilled water for 3days after which it was sieved and the extract obtained. The extract was dried and different grams which ranges from 20g to 60g were used for treatment of the seeds as biopesticides, and planted along with the fluted pumpkin seeds to prevent insect pest damages to the seeds.

2.4 Seed Treatment with Synthetic Pesticide

Treatment application was done by immersion of fluted pumpkin seed in Aldrin dust and plant extract of different concentration from 20g to 60g before planting.

2.5 Planting and Development

The seeds were buried in the soil one foot apart. It was vertically placed with the pointed edge inserted into the soil before planting. And the plant's depth is between 10cm deep, which is ideal for the seeds.

2.6 Experimental Design

The experiment was laid in a randomized complete block design.

Data collection: Data collection commenced at germination and ended two weeks after germination. The following morphological data were used to evaluate the effect of the chemical pesticide and the bio pesticide on the growth of fluted pumpkin. These parameters are no of days of germination, leaf length, leaf width, petiole length etc.

2.7 Statistical Analysis

The statistical analysis used for this work is graph.

3. RESULTS

The result on the experiment on comparative studies of a bio-pesticide (combination of Neem and blue green algal extract) and a synthetic pesticide (Aldrin dust) in the control of field pest of fluted pumpkin (*Telfaria occidentalis*) is presented in the Table 1. The biopesticide, proved to be the most effective compare to the chemical pesticide. The higher the concentration in gram, the higher the number of leaves, leaf length, leaf width, and petiole length it produces. In Table 1 the Telfaria plant have better growth performance, due to the capacity of the biopesticide to resist the insect pests attack on the plant. In Table 2, the morphological performance was too low compared to the one treated with bio-pesticide due to the effect, the synthetic pesticide delayed the germination of the seed plant. The graphical analysis of Tables 1 and 2 is presented in Figs. 1 and 2.

Table 1. Showing mean value of morphological data of fluted pumpkin treated with bio-pesticide

Concentration in gram	No of leaf	Leaf length	Leaf width	Petiole length	No of days of germination
20g	3	3	3.4	3.4	7
30g	5	3.1	3.4	3.4	7
40g	5	4	3.6	3.4	7
50g	5	5.1	3.6	3.5	7
60g	7	6	3.7	3.5	7
Control	3	3.2	3.1	3.2	9

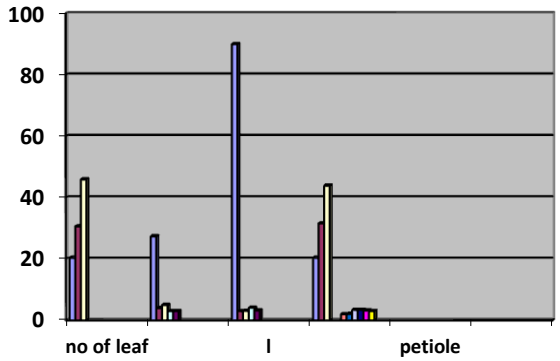

Fig. 1. Graph showing the mean value of morphological data of fluted pumpkin treated with chemical

Table 2. Showing the mean value of morphological data of fluted pumpkin treated with chemical pesticide

Concentration in gram	No of leaf	Leaf length	Leaf width	Petiole	No of days of germination
20g	3s	3.0	2	2.7	9
30g	4	3.1	2.1	2.7	9
40g	5	4.1	3.4	3.0	10
50g	3	3.2	3.4	2.5	13
60g	3	3.0	3.4	2.5	13
Control	3	3.2	3.0	2.7	9

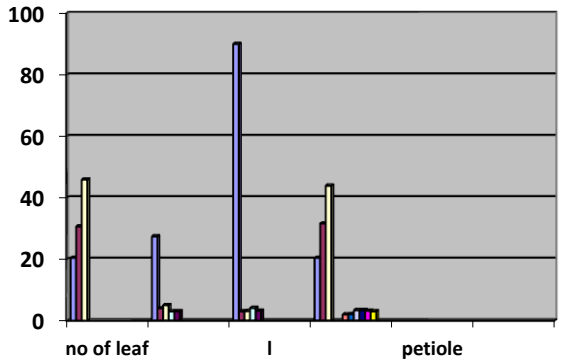

Fig. 2. Graph showing the mean value of morphological data of fluted pumpkin treated with chemical

4. DISCUSSION

The environmental risks associated with the continuous use of synthetic pesticides have prompted the use of plant based insecticidal components that provide selective toxicity to insects with minimum off target effects. The use of botanical pesticides offers eco-friendly

pest control strategy to aid the agricultural practices.

This experiment was conducted to evaluate the effect of bio pesticide comprising of neem leaf and blue green algal extract in comparison to synthetic pesticide and a control, in control of insect pest of *Telfairia occidentalis.*

The effect of these treatment on insect control were evaluated, in terms of number of days of germination, leaf length, leaf width, number of leaf and petiole length, all at two weeks after germination. From Table 1, it could be depicted that that the neem and blue green algal extract, were effective in controlling the insect and pest attacking the fluted pumpkin in the field, and also improved the morphological growth of the plant with increase in concentration when compared with the synthetic pesticide and the control. The number of days of germination was faster when compared with control. The leaf length showed a significant growth at 60% concentration. This was not so with the synthetic pesticide as represented in Table 2. In Table 2 there were little increase in morphological growth, the only increase was visible at 40% concentration, as the concentration increased to 60%, there was a decline in growth showing that high concentration of the chemical insecticide produced toxic effect on the fluted pumpkin. This work is in agreement with Gajalakshmi and Abbasi, [11], who reported that 'Adding neem leaves while vermicomposting with earthworms facilitates faster growth of plants. It could be depicted that seed treatment with the chemical pesticide, delayed germination, when compared with the control.

5. CONCLUSION

The study gives a baseline information on the use of Neem and blue green algal extract and synthetic pesticide (Adrin dust) in the control of insect pest of *Telfairia occidentalis*. Among the various herbs, neem plant-based insecticides have been the most accepted bio-pesticides, due to the presence of multiple limonoids in neem plant extracts. Thus, it is crystal clear from this research work that neem and blue green algae has wide role in agricultural activity which helps to control insect pest of *Telfairia occidentalis* and can help to reduce the use of chemical -based pesticide and improve Agricultural productivity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Chaudhary S, Kanwar RK, Dental A, Cahill DM, Barrow JC, Sehgal R, Kanwar JR. Progress in *Azadiractta indica* based biopesticide in replacing synthetic toxic pesticides. Front Plant Sci. 2017;8(1):610.
   DOI: 10.3389/fpls.2017.00610.
2. Mivittaly MK, Kosivi RK, Tulashie SK, Addi MN, Tawiah JY. The need for alternative pest Management Methods to Mitigate risks among cocoa farmers in the Volta region, Ghana. Heliyon. 2022;8(12):12591.
   DOI: 10.1016/j.heliyon.2022.e12591.
3. Sarkar S, Singh PR, Bhattachanya G. Exploring the role of *Azardirachta indica* (neem) and It's active compounds in the regulation of biological pathways: an update on Molecular approach. 3 Biotech. 2021;11(14):178.
   DOI: 10.1007/513205-021-02745-4.
4. Morgan. Azadirachtin, a scientific gold mine. Bio org: Med. Chem. 2009;17:4096-4105.
   DOI:10.1016/j.bmc.2008.11.081, 10.1016/j.biortech.2003.09.012
5. Ravva SV. Effect of been (*Azadiracthta indica*) on the survival of *Eschericha coli* 0157:H7 in Diary Manure. Directory of open Access Journal; 2015.
6. Du HY, Li jL, Ja RY, Yin ZO, Li XT, Lv C, Zhang L, Yes G, Zhang YO. Acaricidal activity of four fractions and Octadecanoic acid-tetrahydro furan-3,4-diylester isolated from chloroform extracts of been(*Azardirachta indica*) oil against Sarcoptes scabiei Bar. Cuniculi Larvae in Vitro Veterinary Parasitology. 2009;163(1-2):175-178.
7. Odiaka NI, Akoroda MO, Odiaka EC. Diversity and production methods of fluted pumpkin (*Telfiaria occidentalis* Hook (F); experience with vegetable farmers in Makurdi, Nigeria. African Journal of Biotechnology. 2008;7(8):944-954.
   DOI: 10.5897AJB07-338.

8. Oboh G. Effect of blanching on the antioxidant property of some tropical green leafy vegetable. Food Sci Technol. 2005;38:513 -517.
9. Okoli BE, Mgbeogu CM. Fluted pumpkin *Telfairia occidentalis*. West African vegetable crop. Economic Botany. 1983; 37(2):145 -149.
10. Akoroda MO. Ethnobotany of *Telfaria occidentalis* (Curcubitacea) among Igbos of Nigeria. Economic Botany. 1990;44:29 – 39
11. Gajalakshmi S, Abbasi S. Neem leaves as a source of fertilizer-cum-pesticide vermicompost. Bioresour. Technol. 2004; 92:291–296.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/98978