EFFECT OF NEEM (*AZARADICHTA INDICA*) LEAF EXTRACT ON INSECT PEST OF BENNISEED

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Background of the Study

Benniseed (*Sesamum indicum*) is of African origin and was taken into cultivation in Africa at an early date. It occurs wild in West Africa and central Africa and is cultivated there in a small scale. It does not occur in east and southern Africa (except northern Angola), but is sometimes cultivated and found naturalized in tropical Asia (Konan, et al., 2011). *Benniseed (Sesamum radiatum)* is a species of flowering plant in the Pedaliaceae. It is in the same genus as sesame. It is known by the English common names benniseed, black benniseed, black sesame, and vegetable sesame. It is native to west and central Africa, it has been cultivated since ancient times in Africa, and is sometimes also used in tropical Asia. Here it has become naturalized to a small extent.

It is used in Africa as a leafy vegetable; the leaves are eaten fresh and cooked. The leaves are slimy in texture when cooked. The shoots are used in soups and porridge.

The seeds are eaten whole or as a paste. The leaves are also used medicinally as a lexative, an antidote to scorpion venom and to treat sprains and ease childbirth.

This plant is an annual herb growing up to 1.2 to 1.5 meters tall. The leaves are opposite, or toward the top of the plant, alternately arranged. The leaves are lance-shaped to oval and up to 12 centimeters long. They may be smooth-edged or serrated. Flowers occur singly in the leaf axils. They are pink to purple in color, sometimes white, and somewhat bell-shaped. They measure up to 5 centimeters long. The fruit is a capsule up to 3.5 centimeters long which contains seeds roughly 3 millimeters long.

This plant grows wild in savannah and other habitat types. It is also a weed of fields and homesteads. It can grow on poor, rocky soils and it flowers even through drought conditions. When cultivated, the plant yields 5 to 6 tons of leaves per hectare (Ray, 2008).

Sesame seed is considered to be the oldest oilseed crop known to humanity. The genus has many species, and most are wild. Most wild species of the genus *Sesamum* are native to sub-Saharan Africa. *S. indicum,* the cultivated type, originated in India (Babatunde and Auwalu, 2007).

According to Food and Agricultural Organization Statistics (FAOSTAT, 2016), sesame is an annual plant growing 50 to 100 cm (1.6 to 3.3 ft) tall, with opposite leaves 4 to 14 cm (1.6 to 5.5 in) long with an entire margin; they are broad lance late, to 5 cm (2 in) broad, at the base of the plant, narrowing to just 1 cm (0.4 in) broad on the flowering stem. The flowers are yellow, tubular, 3 to 5 cm (1.2 to 2.0 in) long, with a four-lobed mouth. The flowers may vary in colour, with some being white, blue, or purple. Sesame seed is a high-value cash crop. Prices have ranged between $800 and $1700 per metric ton between 2008 and 2010 (Ray, 2011).

Neem is a member of the mahogany family, Meliaceae. It is today known by the botanic name *Azadirachta indica*. According to Samara (2012), Neem often grows rapidly. It can be cut for timber after just 5-7years. Maximum yields reported from northern Nigeria amounted to 169 m^3 of fuel wood per hectare after a rotation of 8 years. Yields in Ghana were recorded between 108 and 137m^3 per hectare in the same time.

Neem products work by intervening at several stages of an insect's life. The bodies of these insects absorb the neem compounds as if they were the real hormones, but this blocks their endocrine systems resulting to deep-seated behavioral and physiological aberrations leaving the insects so confused in brain and body that they cannot reproduce and their population slummed (NRC, 2016).

Increasingly, approaches of this kind are seen as desirable methods of pest control: pests do not have to be killed instantly if their populations can be incapacitated in ways that are harmless to people and the planet as a whole. In the 1990s, this is particularly important: many synthetic pesticides are being withdrawn, few replacements are being registered, and rising numbers of insects are developing resistance to the shrinking number of remaining chemical controls.

Statement of the Problem

The most common problem affecting the production of benniseed is that of insect pest which causes the following problems:

They eat benniseed leaves, shoots and the flowers, which decrease yield, additionally, they destroy crop and increase cost of production leading to low production of benniseed and multiplication of the insects themselves.

1.3 **Purpose of the Study**

The main purposes of the study are:

i. To assess the effect of Neem (azaradichta indica) leaf extract on insect pest of benniseed.
ii. To determine the effect of concentration levels of Neem leaf extract on pest of benniseed.

Research Questions

There are many questions to answer on this research, but, here are some that are more important:

1. What is the effect of Neem (azaradichta indica) leaf extract on insect pest of benniseed?
2. What is the effect of concentration levels of Neem leaf extract on insect pest of benniseed plant?

Materials and Method

The experiment was carried out at Department of Agricultural Education, Federal College of Education (Technical) Gombe, Gombe State. The land was cleared with hoe and cutlass where the soil was ploughed to a depth of 15 – 30cm, 5 ridges of 11 x 11 metres were made at the experimental plot using hoe. The seed varieties were collected from ministry of Agriculture, Department of Agricultural Development Programme (ADP), Gombe State. The bennised (*sesame indicum*) was mixed with soil before planting in order to avoid over planting of seeds. Six (6) holes were dug at the 10 – 15cm depth and 40cm between holes. The neem leaf extracts (*azadirachta indica*) were collected at the Federal College Education (Technical), Gombe. The neem leaf was pounded into smaller pieces using mortar. The pounded leaf samples were weighted five (5) kg and mixed with two (2), three (3), four (4) and five (5) litres of distilled water respectively. Then the solutions were kept overnight. It was filtered through the cheese cloth whattman No. 1 filter paper; the filtered solution was kept under normal room temperature. Knapsack sprayer was used to spray the solution on the beeniseed (sesame) plant.

The experiment was laid in a Randomized Complete Block Design (RCBD) with five treatment and five replicates. The neem leaf extracts were applied once a week and began three (3) weeks after sowing (WAS). Hence the treatments are:

T_0 = Control (No treatment)

T_1 = 2 litres of Neem Extract suspension

T_2 = 3 litres of Neem Extract suspension

T_3 = 4 litres of Neem Extract suspension

T_4 = 5 litres of Neem Extract suspension

Data Collection

The observation was by visual count and recording, it commenced three (3) weeks after sowing in the morning between 7 – 9am. There were three (3) sampled plant per plot. Parameters taken were: defoliated leaves and insects mortality at 3, 6 and 9 weeks after sowing (WAS) was taken.

Data Analysis

Data collected was analysed on defoliated leaves, and insects mortality to assess the influence of the treatment using analysis of variance (ANOVA). Significant means differences were separated using F – LSD at 5% level of probability.

Results

Table 1: Average effect of Neem leaf extract on the insect pest of benniseed.

TREATMENT	3 WAS	6 WAS	9 WAS
T_0	10.65	12.50	11.0
T_1	11.95	13.25	25.25
T_2	11.65	13.25	19.25
T_3	11.65	12.75	13.0
T_4	11.82	12.50	13.0
LSD (5%)	-	-	8.22
CV (%)	16.22	8.25	92.25

The result on effect of neem leaf extract on insect pest of benniseed shows that, the plot that received neem leaf extract significantly reduced the population and number of whitefly, leaf roller and leaf spot disease. Table 1 shows that, the effect of neem leaf extract on insect pest of benniseed was found to be significant at 3WAS with T_1 having the highest number of plants not affected by whitefly and leaf roller (11.95). Followed by T_3 (11.82), the control treatment T_0 gave the least value (10.63). While at 9WAS, effect of neem leaf extract shows significant difference with T_1 which gives the highest value (25.25) followed by T_2 (19.25) at 9WAS, and the control treatment T_0 which gave the least value (11.0).

Table 2: Average effect of Neem leaf extract on the number of leaves of benniseed.

TREATMENT	3 WAS	6 WAS	9 WAS
T_0	8.52	10.00	9.00
T_1	9.56	10.60	20.20
T_2	9.32	10.60	15.40
T_3	9.32	10.20	10.40
T_4	9.46	10.00	10.40
LSD (5%)	-	-	6.58
CV (%)	12.98	6.60	73.80

The result from table 2 shows that, the number of leaves was not significant at 3WAS and 9WAS although T_1 produced the highest number of leaves (9.56) with the control T_0 as the least value (8.52) at 3WAS while at 6WAS, T_2 and T_1 were better in number of leaves (10.60) as compared to the control T_0 and T_4 (10.0) (Table 2). At 9WAS number of leaves was significant ($P \leq 0.05$) T_1 produced the highest number of leaves (20.2) followed by T_2 and T_3 produced equal number of leaves (15.40), (10.40) while control T_0 produced the least (9.00) (Table 2). The findings are in line with the report of Basedow et al. (2002) who reported that the treatment containing neem extract increased growth of okro plant significantly. Also leaf defoliation was drastically reduced compared to the plot that did not receive neem extract ($p \leq 0.05$. Even during observation at 3WAS, 6WAS and 9WAS of T_0 control treatment, leaf defoliation and leaf disease were manifested physically which hinder the growth development of the plant. The result is in line with the findings of Lowery et al. (2009) on effect on neem extract on aphids of okro.

Table 3: Effect of different concentration levels of neem leaf extract on benniseed

TREATMENT	INSECT MORTALITYAT 9WAS	DEFOLIATED LEAVES AT 9WAS
T_0	4.50	15.40
T_1	10.10	5.20
T_2	13.20	4.80
T_3	17.40	3.29
T_4	24.0	2.07
LSD (5%)	7.43	6.58
CV (%)	17.1	73.80

The result from table 3 shows that, the effect of different concentration levels of neem extract on benniseed at 9WAS has been observed at the physiological maturity of the plant at 9 weeks after sowing (WAS). T_0 insect mortality (4.50) and defoliation of leaves (15.40) T_1 gave (10.10) on insect mortality and defoliation of leaves (5.20), T_2 on insect mortality (13.20), and defoliation of leaves (4.80) T_3 on insect mortality (17.40), (3.29) and T_4 gave the highest value on insect mortality (24.0), and defoliation of leaves (2.07) which gave the least values. Therefore, the effect of different concentration levels of neem extract at T_4 on insect mortality and defoliation of leaves shows significant difference between all parameters taken. The findings stated are in position with Mudathir and Basedow (2004) which stated that neem extract reduced the activities of whitefly, leaf spot disease and leaf roller on okro, tomatoes and onions and also increased yield. From the observation, the plant treated with neem leaf extract produced the highest yield. The results were in agreement with the findings of Gundugi (2013).

All the parameters taken were positively influenced by the application of the neem leaf extract. The plant leaves of sesame increased due to treatment with the appropriate combination of neem leaf extract levels (Ogunlana, 1995). This may be due to the presence of possible growth hormone of the plant. There was significant difference between the control

and the treated plot in the number of leaves damaged. This could be attributed to efficiency of the combined treatment due to complementary action of the pesticides applied. The pest population was highest in the control plot. Several studies have mentioned that pesticides spraying enhanced yield increased of sesame (Thul et al., 2009).

Neem extract gave good result in controlling whitefly population and reducing leaf defoliation and disease incidence compared with the control treatment. The promising effect of neem extract against whitefly and other sesame pest enhanced the yield in the present study compared to the work of Mudathir and Basedow (2004). Similarly, the finding also tells in line with that of Pun et al. (2005) who reported that treatment containing *Azadirachtin* significantly reduced the attack of sesame pest and increased yield.

Conclusion

The potentials of the neem leaf extract to benniseed (sesame) in controlling insect pest and diseases on the field, like whitefly, leaf roller and leaf spot diseases is effective. Neem leaf extract is not only effective in controlling insect pest but increases yields of benniseed, because the azadirachta retards the activities of insect pest, bacteria, fungi which results in causing diseases to the plant thereby reducing yield. Also, the use of neem leaf extract should be considered as means of reducing high cost of production. The use of neam extract is a way of improving organic farming and an attempt to sustainable agriculture with less threat on the environment and human health. Therefore, the use of neam extract should be considered as a useful insecticide (*Azadirachtin*) in the control of whitefly. Further research study on the use of neam seed compared with the leaf extract and rate of application is highly recommended.

Recommendation

Based on the findings in this study, the following recommendations were made:

1. The use of azadirachta is a way of improving of organic farming and an attempt to sustainable agriculture with less threat on the environment and human health.
2. The use of azadirachta should be employed as a useful insecticide (azadirachtin) in the control of insect pests.
3. Farmers should consider use of azadirachta in place of inorganic pesticide in order to reduce cost of production and residual effect on the soil.
4. Government should also encourage farmers to use azadirachta as pesticide due to its effect on insect pest and diseases control.

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