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Short Communication

Studies on the larvicidal efficacy of aqueous extracts of *Striga hermonthica* (Delile) Benth and *Mitracarpus scaber* (Zucc) on *Culex quinquefasciatus* (culicidae) mosquito larvae

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The effects of the aqueous extracts of whole plants of *Striga hermonthica* and *Mitracarpus scaber* against the larvae of *Culex quinquefasciatus* mosquito were investigated and the level of significance and effective concentration was also investigated. The extracts of the two plants were effective as mosquito larvicidal, with *M. scaber* being more effective than that of *S. hermonthica.* The larvicidal effectiveness of the extracts was directly proportional to their dilution given in percentage (%) concentration, 0.1, 0.2, 0.5, 1.0 and 2.0%, the higher the concentration of the extracts, the more effective. It is therefore concluded that *S. hermonthica* and *M. scaber* contain larvicidal properties that could be developed and used as natural insecticides for mosquito control.

Key words: *Striga hermonthica, Mitracarpus scaber, Culex quinquefasciatus,* mosquito larvae, aqueous extracts.

INTRODUCTION

Mosquitoes are responsible for transmitting some of the most dreaded communicable diseases on human (Miyagi, 1994) and have perhaps attained the greatest public notoriety than any other arthropod (Lane and Crosskey, 1993). Mosquitoes cause more human suffering than any other organism, over two million people die from mosquito-borne diseases every year. Mosquito vectored diseases include protozoan diseases, such as malaria, filarial diseases and viruses such as dengue, encephalitis and yellow fever. In addition, mosquito bites can cause severe skin irritation through an allergic reaction to the mosquito's saliva causing the bump and itching. (Abdullahi et al., 2003).

Most of the widely used vector control methods are the application synthetics chemical insecticides, which affect, not only target population but the non-target species. Secondly there is also constant increased possibility of development of resistance by the vector to these insecticides (Chapagain and Weisman, 2005). Efforts are been made to isolate and develop phytochemical possessing pesticidal /insecticidal activities (Vatandoost and Vaziri, 2004) that would suitable alternatives to these synthetic chemicals (Anyaele et al., 2002). This study was conducted to find out the larvicidal effectiveness of the aqueous extracts of *Striga hermonthica* (Delile) Benth and *Mitracarpus scaber* (Zucc) against the larvae of *Culex quinquefasciatus* using simple procedure which easily be repeated.

S. hermonthica (Delile), Benth Serophulariaceae) Figure 1, is a semi-parasitic plant growing of millet and sorghum fields and widespread in West and East Africa. The plant had been used in the treatment of eczema and skin rashes in some communities in Nigeria and had been studied to have a weak anti-malaria activity (Okpako and Ajaiyeoba, 2004).

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Figure 1. *Striga hermonthica* Del Benth.

Figure 2. *Mitracarpus Scaber* Zucc.

M. scaber Zucc (Rubiaceae) Figure 2 is a common weed of cultivated of fallowed lands with a wide distribution throughout West Africa.

It is employed in the treatment of score throat and leprosy (Jegede et al., 2005) and is topically applied on the skin for treatment of eczema, scabies and dermatitis (Bisignano et al., 1999).

MATERIALS AND METHODS

Fresh samples of the plants, Figures 1 and 2 were collected from Dundaye village, a few kilometers from the permanent site campus of Usmanu Danfodiyo University, Sokoto. Extraction was conducted using a simple procedure, thinking that it could be repeated in any remote area of the world where the plants grow naturally the method of extraction was the same for both plants. The collected samples were washed and sun-dried, after which, the sample was ground to powder. 20 g of the ground material was placed into 500 ml beakers, 100 ml of distilled water was added and mixed vigorously. The mixture was kept for 24 h. The mixture was filtered using a fine muslin cloth and the final volume adjusted to 100 ml. A series of dilution was carried out to make 0.1, 0.2, 0.5, 1.0 and 2.0% of the extract concentrations using distilled water. Eggs of *C. quinquefasciatus* species were collected in a plastic bucket from a pool of stagnant water near the student's hostel blocks at the main campus, Usmanu Danfodiyo University, Sokoto, Nigeria, and were allowed to hatch. The larvae were identified by an Entomologist and further confirmed by a specialist from Bayero University, Kano, Nigeria. The buckets containing the larvae were kept in netted enclosure in the laboratory and fed on whole bran wheat biscuits.

Two hundred and fifty milliliter (250 ml) disposable plastic cups, 24 No. batches were arranged on a clean sterilized laboratory bench and labeled "a, b, c, d, and e" with three replications and 'f' serving as the control. The cups of "a, b. c. d, and e" contained 50 ml of the extracts at 0.1, 0.2, 0.5, 1.0 and 2.0% concentrations respectively. Ten larvae of third instars were placed into each cup containing 50 ml of the treatment solutions and the effects of the extracts on the larvae were monitored by counting the number of larvae twelve hourly, each day for three days.

The data obtained were statistically analyzed using analysis of variance (ANOVA) for mean, standard error (SE) and least significant difference (LSD) at 5%.

RESULTS

The larvae *C. quinquefasciatus* that were killed in the experimentation descended to the bottom of plastic cups and were subsequently removed. By the third day, 100% mortality was observed at 1% of concentration S. *hermonthica* and 0.5% of *M. scaber,* respectively. The effects of the various aqueous extracts of these plants on the mortality of mosquito larvae are presented in Tables 1 and 2 respectively. The results indicated that mortality of the mosquito larvae being directly related to increase in the concentration of aqueous extract. This demonstrates relative potency of aqueous extracts of *S. hermonthica* and *M. scaber* as a mosquito larvicide. Extract of *M. scaber* showed more potency as a mosquito larvicide than the extract of *S. hermonthica* as 100% mortality was observed at 1% concentration on day 2 compared to day 3 of the latter and the differences in potency was statistically not significant ($p > 0.05\%$).

DISCUSSION

The aqueous products of S. *hermonthica* and *M. scaber*

Table 1. Mortality of *Culex quinquefasciatus* larvae from different concentrations of aqueous extract of *Striga hermonthica.*

Extract concentration (%)		Mortality (%)		
		Day 1	Day 2	Day 3
a	0.1	3 ± 2	18 ± 3	29 ± 2
b	0.2	11 ± 2	23 ± 2	41 ± 2
c	0.5	34 ± 2	56 ± 2	69 ± 2
d	1.0	83 ± 2	92 ± 2	100 ± 0
e	2.0	97 ± 2	100± 0	100 ± 0
f	0 (Control)	0 ± 0	0 ± 0	0 ± 0

Values are the mean of 3 (n = 3 ± SE).

Table 2. Mortality of *Culex quinquefasciatus* larvae from different concentrations of aqueous extract of *Mitracarpus scaber.*

Extract concentration (%)		Mortality (%)		
		Day 1	Day 2	Day 3
a	0.1	22 ± 2	49 ± 2	55 ± 2
b	0.2	51 ± 2	63 ± 2	79 ± 2
c	0.5	84 ± 2	98 ± 2	100 ± 0
d	1.0	99 ± 2	100 ± 0	100 ± 0
e	2.0	100 ± 0	100 ± 0	100 ± 0
f	0 (Control)	0 ± 0	0 ± 0	0 ± 0

Values are the mean of 3 (n = 3 ± SE).

have shown some larvicidal activity against the third intar larvae of *C. quinquefasciatus*, with 100% mortality attained at day 3, at 1.0 and 0.5% concentrations respectively. This research has demonstrated the larvicidal potency of the aqueous extracts of S. *hermonthica* and *M. scaber.* The differences in potency between the extracts of the two plant species was not significant ($p > 0.05$). Earlier phytochemical studies on these plants have shown that of *S. hermonthica* plants contained high amount of flavanoids (Kiendrebeogo et al., 2005) and saponins (Okpako and Ajaiyeoba, 2004) and extracts of *M. scaber* contained gallic and trimethorybenzoic acids (Bisignano et al., 1999). The result of this study, compared to other similar studies on other plant products (Mohan and Ramaswamy, 2007; Sukumar et al., 1991), indicated that S. *hermonthica* and *M. scaber* can be used as a mosquito larvicide. But further larvicidal study on specific potency of these phytochemical (and others) need to be undertaken to ascertain which of these chemical could responsible for the larvicidal potency. The larvae of *Anopheles* could also be included as it is the major vector of human *Plasmodia.* The extracts of these plants could be used as environmentally friendly and sustainable insecticides for mosquito control.

REFERENCES

Abdullahi K, Muhammad S, Manga SB, Tunau IM (2003). Chloroquine resistance *Plasmodium falciparum* in Sokoto North-West Nigeria. Afr. J. Biotechnol., 2(8): 244-245.

Anyaele OO, Amusan AA, Okorie TG, Oke AO (2002). Toxicity of hexanolic extract of *Piper guineense* Schum and Thun (Piperaceae) on *Aedes aegypta*. Nig. J. Entomol., 19: 15-17.

Bisignano G, Sanago R, Marino A (1999). Anti-microbial effect of *Mitracarpus scaber* extract and isolated constituents. Letter in: Appl. Microbiol., 30: 105-108.

Chapagain B, Weisman Z (2005). Larvicidal effects of aqueous extracts of *Balanites aegyptiaca* (desert date) against the larvae of *culex pipiens* mosquitoes. Afr. J. Biotechnol., 4(11): 1351-1354.

Miyagi BK (1994). Alternative control strategies for mosquitoes vectors of human disease in India. Perspectives in Entomol. Sci. Res. Pub. Jodhur, pp. 359-368.

Jegede AI, Kunle FO, Ibrahim AJ (2005). Pharmacognostic investigation of leaves of *Mitracarpus vilosus* (S.W) D.C. Afr. J. Biotechnol., 4(9): 957-959.

Kiendrebeogo M, Dijoux-Franca MG, Lamien CE, Meda A, Wouessiejewe D, Nacoulma OG (2005). Acute toxicity and antioxydant property of *Striga hermonthica* (Del) Benth (Scrophulariaceae). Afr. J. Biotechnol., 4(9): 919-922.

Mohan DR, Ramaswamy M (2007). Evaluation of larvicidal activity of leaf extract of a weed plant, *Ageratina adenophora* against two important species of mosquitoes, *Aedes aegyti* and *Culex quiquefasciatus.* Afr. J. Biotechnol., 6(5): 631-638.

Okpako LC, Ajaiyeoba EO (2004). *In vivo* and *in vitro* antimalarial studies of *Striga hermonthica* and *Tapinanthus sessilifolius*. Afr. J. Med. Med. Sci., 33(1): 73-75.

Lane RP, Crosskey RW (1993). Medical insects ad arachnids: Chapman and Hall London, pp. 120-214.

Sukumar K, Perich MJ, Boobar LR (1991). Botanical derivatives in mosquito control – a review. J. Am. Mos. Contr. Assoc., 7: 210-237.

Vatandoost H, Vaziri VM (2004). Larvicidial activity of neem tree extract against mosquito in the Islamic republic of Iran. East. Mediter. Health J., 10(4/5): 573-581.