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A STUDY ON THE TOXICITY OF THE ETHANOL EXTRACT OF *Moringa oleifera* SEED OIL ON *Simulium* LARVAE

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ABSTRACT

Different control measures have been targeted against vectors of diseases, and attempts relied heavily on the use of such synthetic pesticides. Unfortunately, the repeated use of synthetic insecticides has disrupted natural biological control system. The development of resistance and human health concerns has led to a search for alternative control measures. To test the toxicity of the ethanol extract of *Moringa oleifera* seed oil on *Simulium* larvae, larvae of *Simulium* were used for larvicidal bioassay. 120 larvae were released in plastic containers. 20 for every set of experiment, with two replicates for each concentration of *Moringa oleifera* seed oil. 200ml of water was used, after which the oil extract was introduced. A total of 100% mortality was recorded in 0.1ml and 0.2ml treatment levels, showing an excellent toxicity on the larvae sampled. The result of this study suggests that the plant extract can act as larvicide against *Simulium* larvae in breeding sites.

Keywords: Toxicity, *Moringa oleifera, Simulium larvae*

INTRODUCTION

The blackflies are a serious threat to public health. They are central to the transmission of the parasitic nematode, *Onchocerca volvulus* (roundworm) which causes "Onchocerciasis" or River blindness". It serves as the larval host for the nematode and acts as the vector by which the disease is spread. The parasite lives

in human skin and is transmitted to the blackfly during feeding (Service, 2008; WHO, 2010).

Onchocerciasis is the second in the world only to trachoma as an infectious cause of blindness (WHO, 2010).It is not the nematode, but its endosymbiont, *Wolbachia pipientis* (a genus of bacteria which infects arthropod species, as well as some nematodes), that causes the severe inflammatory response that leaves many blind (Willey *et. al.*, 2009). The larval nematodes spread throughout the body. When the worms die, their *Wolbachia* symbionts are released, triggering a host immune system response that can cause severe itching and can destroy optical tissue in the eye. The increasing incidence of insecticide resistance and a growing concern on the outbreak of diseases caused by blackflies (*Simulium*) brought about interest in alternative control strategies in preventing the proliferation of diseases to improve public health.However, the plant kingdom is by far the most efficient "factory" of chemical compound, synthesizing many products used in the defense against many pests and vectors (Shown *et al.*, 1998).

Moringa oleifera is one such plant which invites the attention of all researchers worldwide. It has been naturalized in many tropic and sub-tropic regions, referred to a number of names such as, Horseradish tree, Drumstick tree, Ben oil tree, Miracle tree and "Mothers best friend" (Julia, 2008). It is a small medium sized tree, about 5 to 10m in height, found in the Sub-himalayan tract (Trapti *et al.*, 2009).

JUSTIFICATION

The repeated use of synthetic insecticides for insect control has disrupted natural biological control systems and led to resurgences in insect populations. It has also resulted in the development of resistance, undesirable effects on non-target organisms and fostered environment and human health concerns. This has led to interest in alternative control strategies. Natural products of plant origin with insecticidal properties have been assayed in the recent past for the control of a variety of insect pests and vectors. The potential utility in adapting *Moringa oleifera* as a larvicide cannot be over emphasized. It is not only cheap but environment friendly.

MATERIALS AND METHODS

This work was carried out in National Horticultural Research Institute, Mbato Sub-station, Okigwe, Imo State. *Moringa oleifera* seeds were gotten from Springfield Integrated Farms, Owerri, Imo State. It was identified by Prof. Ogbonnaya, C.I of the Department of Plant Science and Biotechnology (PSB), Abia State University, Uturu. The seeds were taken to the Microbiology Laboratory, National Arbovirus and Vectors Research Centre (NARVC), 33 Park Avenue, G.R.A, Enugu, where they were dehulled manually and dried at room temperature of 25°C in order to retain its active ingredients. After drying, the kernels were ground into fine powder. The larvae were got from a fast flowing river (*Ibii* River) in National Horticultural Research Institute, Mbato Sub-station, Okigwe, Imo State. They were identified by Dr. (Mrs.) Ibeh, O.O of the Department of Animal and Environmental Biology (AEB), Abia State University, Uturu.

The soxhlet extraction technique as adopted by Cowan, (1999) was used for this study. This was done using ethanol, distilled water and the powered seed as the solvents and solute respectively. *Simulium* larvae were used for laboratory bioassay under laboratory conditions of 27^0C and 75% RH according to the method advocated by WHO (2005). Twenty (20) larvae were collected and carefully suspended with its suspending substrate in each plastic container for every set of experiment. Aeration was maintained artificially throughout the study. Two replicates were kept for each concentrations of the oil. Poultry feed was added to the containers, in order to save them from starvation. 200mls of water was added to each of the containers, after which the oil extract was introduced at various concentrations. Mortality was recorded after 3hours, 6hours and 9hours of treatment.

RESULT.

The toxic effect of the ethanol extract of *Moringa oleifera* seed and its percentage mortality were assayed. The effects were observed in different concentrations of 0.1ml and 0.2ml at different time intervals, 3hours, 6hours, and 9hours.

At 3hours, mean mortality of 15% and 25% were recorded at 0.1ml and 0.2ml treatment levels respectively. At 6hours mean mortality of 50% and 60% were recorded at 0.1ml and 0.2ml treatment levels respectively.

At 9hours, mean mortality of 35% and 15% were recorded at o.1ml and 0.2ml treatment levels respectively.

A total of 100% mortality was recorded in the 0.1ml and 0.2 ml treatment levels, showing an excellent toxicity on the larvae sampled. See Table 1.

Table 1: Percentage Mortality of Different Concentrations of the Ethanol Extract of *Moringa oleifera* Seed Oil on *Simulium* Larvae After 9 Hours.

Culture Container	No of Larvae	% Conc.	No/% Mortality			Total % Mortality
			3 hours	6 hours	9 hours	
B1a	20	0	(0%)	(0%)	(0%)	0%
B1b	0	0	0%	0%	0%	0%
$B1\bar{x}$	20	0	0%	0%	0%	0%
B2a	20	0.1	3(15%)	10(50%)	7(35%)	20(100%)
B2b	0	0	3(15%)	10(50%)	7(35%)	20(100%)
$B2\bar{x}$	20	0.1	15%	50%	35%	100%
B3a	20	0.2	5(25%)	12(60%)	3(15%)	20(100%)
B3b	0	0	5(25%)	12(60%)	3(15%)	20(100%)
$B3\bar{x}$	20	0.2	25%	60%	15%	100%

DISCUSSION

In recent times, the use of environmentally friendly biodegradable insecticides from plant to control insect vectors of diseases is gaining importance (Nour, *et al.,* 2009), because these botanicals have been found to be effective, user-friendly and inexpensive (Nathan, *et al.*, 2004) In this study, efforts were made to evaluate the toxic effects of *Moringa olefera* seed oil extract on *Simulium* larvae. Previous works have reported the toxic effect of *Moringa oleifera* on mosquitoes like the *Aedes aegypti, Culex quinquefasciatus* and other insects (Sharma *et al.*, 1998; Sukamar *et al.,* 1991). However, there is paucity of information on the toxic effect of *Moringa oleifera* or any other plant as a potential larvicide for the larvae of *Simulium*, as we did not come across any.

Thus, the same principle that caused *Moringa oleifera* seed oil to be toxic on mosquitoes larvae are likely; to make it toxic on *Simulium* larvae. It is with this

understanding that this study was carried out as it may be suggesting the presence of phytochemical compounds in the plant that can act as potential larvicide.

The result of this study was highly toxic to the larvae as it recorded a 100% mortality even at low concentration. This observation is interesting as it may be suggesting the presence of phytochemical compounds in *Moringa oelifera* that can act as potential lavicide for *Sumilium.* The fact that, the phytochemical compounds in the plant are active, resulting to the larvae death. The 100% mortality recorded in the study is similar to the observation made by Kamalakannan *et al.,* (2009). Kamalakannan *et al.,* (2009) recorded 95% mortality rate with the ethanol extract of *Pedilanthus tithymaloides* leaves against the larvae of *Culex quinquefasciatus.*

This work therefore recommends for more extensive laboratory and field trials on the level of toxicity exhibited by ethanol extract of *Moringa oleifera* seed oil on *Simulium* larvae.

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