LABORATORY ASSESSMENT OF THE MOLLUSCICIDAL AGAINST THE SNAIL AND FISH AT BARAKAT AREA (IRRIGATED CANAL) WAD MEDANI, GEZIRA STATE- SUDAN (2013)

Original Research Article

ISSN : 2456-1045 (Online)
(ICV-MDS/Impact Value): 3.08
(GIF) Impact Factor: 2.174

Journal Code: ARJMD/MDS/V-17.0/I-1/C-3/SEP-2017
Category : MEDICAL SCIENCE
Volume : 17.0 / Chapter- III / Issue -1 (SEPTEMBER)
Website: www.journalresearchijf.com
Received: 21.09.2017
Accepted: 01.10.2017
Date of Publication: 12-10-2017
Page: 12- 15

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Citation of the Article

Abdelrhman AA; Elbashir H; Samira A & Bakri N. (2017). Laboratory Assessment of the molluscicidal Against the Snail and Fish at Barakat Area (Irrigated Canal) Wad Medani, Gezira State- Sudan (2013).; Advance Research Journal of Multidisciplinary Discoveries.17.0,C-3(2017):12-15 ; available at : http://www.journalresearchijf.com

ABSTRACT

Objective: The aim of this Study was to assess the molluscicidal against Snail *Bulinus truncatus* and Fish *Gambusia affinis*.

Methods: Extracts of Bayluscide 83.1% WP were activities against adult *Bulinus truncatus and Gambusia affinis*. The suspected dead snails were examined under a dissecting microscope at 30x magnification ,then a fish was considered dead when motionless, bloating and/ or its colour change under a dissecting microscope at 30x magnification, and the LC_{50} value for the molluscicidal tested were computed.

Result: for the molluscicidal activities of Bayluscide 83.1% WP, the LC_{50} value against *Bulinus truncatus* and *Gambusia affinis* was (230,640 ppm) respectively.

The aqueous extract of Bayluscide 83.1% WP is exhibited reasonable molluscicidal activity against the target population. however, comprehensive laboratory evaluation is recommended prior to field tests of the molluscicidal since their impact on other aquatic biota is not known.

Keywords:

Schistosomiasis,
Bulinus truncatus,
Gambusia affinis,
molluscicidal.

I. INTRODUCTION

Schistosomiasis refers to human disease resulting from infection by any of the parasitic blood flukes of Schistosoma spp. Worldwide, it is estimated that over 239 million people are acutely or chronically infected with one or more of these species [(1)]. The disease is ranking second after malaria in terms of socio-economic and public health importance, especially in rural areas of developing countries, then 239 million people with active Schistosoma infections in 2009, 85% lived in sub-Saharan Africa, where approximately 112 million and 54 million were infected with urinary and intestinal Schistosomiasis, respectively, and the number of person at risk of infection is greater than 600 million [(2)]. Globally, schistosomiasis ranks second among parasitic disease of socio-economic and public health importance and is found in 48 countries of Africa [(3)]. The transmission of this tropical disease is determined by the existence and geographic distribution of the intermediate host snail [(4)]. Infection usually takes place after direct contact with infested freshwater [(5)] and [(6)]. Owing in part to poor sanitation or hygiene and the wide dispersion of suitable freshwater snail hosts [(6)]; [(7)]; [(8)]. Is acquired when free-swimming parasite larvae (cercariae) penetrate the skin of people exposed to infest freshwater [(9)].

Mosquito fish Gambusia affinis have been used as a biological control agent for mosquitoes more than 100 years and, then used under appropriate conditions, remain one of the best candidates for biological control programs against mosquitoes [(10)].

II. MATERIAL AND METHODS

A cross sectional study was conducted in Irrigated Canal at Barakat Area Wad Medani, Gezira State- Sudan during the period (March to October 2013).

2.1 Aquatic Macrofaunal Collection:

Five field- surveys were conducted for collection of aquatic snail from the study area. In each site snails were collected by scooping method using flat wire- mesh. The scope composed of a metal frame (30*30cm) supporting a mesh of 1.5 micro-size attached to an iron handle of 1.5 meter long as described by [(11)] .The sampling technique was conducted by taking many dips, perpendicular to the edge of the canal down to the bottom for a distance of about 0.5-1 meter towards the core of the canal. In each field survey, the collected snails were pooled in a plastic container 10 liter, filled to 1/3 with water and topped with perforated cover. The containers were transported to the laboratory of Blue Nile National Institute for Communicable Diseases, University of Gezira. However all collected snails were cleaned, sorted out and identified [(12)] . Then each species was put in a labeled plastic container. After 24 hours the snails *Bulinus truncatus* was screened for the natural trematode infection through putting 5 snails in a vial (30 ml) and expose it to a bulb lamb (60 w) for 3 hrs from 9h:00 – 12h:00, and those found liberating any type of cercaria were recorded [(12)] .

2.2 Bayluscide test against Snail Bulinus truncatus:

Snails were cleaned and placed in container (10 litres) filled to half with dechlorinated tap-water for 24 hrs at the Insectary which was set at 25 degree centigrade and 75% Rh. They were put into plastic cups (140 ml) filled to 1/5 with water to keep them fresh. Each cup supported 20 snails. From each cup water was discarded and snails were unloaded separately into Bayluscide 83.1% WP concentrations of 0.00, 154, 175, 180, 192, 200, 240, 250 ppm. Concentrations were kept in plastic containers (1.0 litres) at a volume of 500 ml. Snails were left in these concentrations for 24 hrs before being removed and put in similar plastic containers filled to the half with dechlorinated tap-water for another 24 hrs. Data were showing the dead snails 48 hrs after treatment. The suspected dead snails were examined under a dissecting microscope at 30x magnification. The snail considered dead when out the shell or non- responsive to teasing with blunt needle.

2.3 Collection and Bayluscide test against Fish Gambusia affinis:

Five field- trips were executed for collection of Fish Gambusia affinis from small drain for broken pipes of domestic water at workshops area, Wad- Medani, Sudan. It has been collected by scooping method as stated in 3.6 above. The collected fish were transported to the Insectary set at 25 degree centigrade and 75% Rh in the Blue Nile National Institute for Communicable Diseases, University of Gezira. For homogeneity in term of fitness, fish were separated from other aquatic funa and flora and placed in container (10 litres) filled to half with dechlorinated tap-water for 24 hrs, They were put into plastic cups (140 ml) covered with muslin which fixed in position using a rubber band to avoid jumping of the fish out of the cup. The cups filled to 1/5 with water to keep them fresh. Each cup supported 20 fish. From each cup water was discarded and fish were unloaded separately into Bayluscide 83.1% WP concentrations of 0.00, 330, 480, 630, 720, 780, 930, 1080 ppm. Concentrations were kept in plastic containers as stated in 3.7.1 above. They were covered with muslin which fixed in position using a rubber band again to avoid fish jumping. Fish were left in these concentrations for 24 hrs. Then a fish was considered dead when motionless, bloating and/ or its colour change.

2.4 Data Analysis:

Probit analysis programme was used; the Lc50 of the population was recorded in twenty four hour.

III. RESULT

Table (1) The sensitivity of Snail against Molluscicide (Bayluscide 83.1% WP) in the study area. n= (20-40).

dose/ppm	1	2	3	4	5	6	7
	250	240	200	192	180	175	154
Log10 Dose	2.398	2.38	2.30	2.28	2.26	2.24	2.19
Mortality Rate %	73	88	80	73	48	15	34
Probit	5.58	6.18	5.84	5.58	4.95	3.96	4.59

Table (2) The sensitivity of Fish Population against Molluscicide (Bayluscide 83.1% WP) in the study area. n= (40-80).

dose/ppm	1	2	3	4	5	6	7
	330	480	630	720	780	930	1080
Log_{10} Dose	2.52	2.68	2.78	2.86	2.89	2.97	3.03
Mortality Rate %	13	20	45	50	62	74	95
Probit	3.87	4.16	4.87	5	5.31	5.64	6.64

Fig (1) The response of the snail Bulinus trancatus and the fish Gambusia affinis population to Bayluscide 83.1% WP in the study areas.

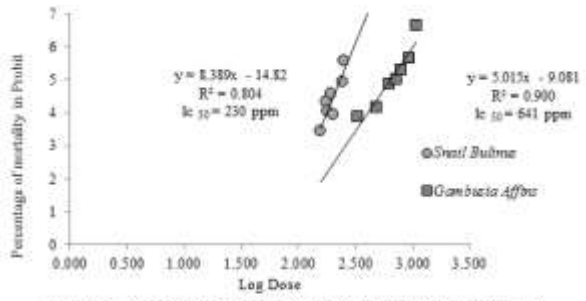

Fig (1) The response of *Bulinus trauncatus population and Gambusia affinis population* to Molluscicide (Bayluscide WP 83.1 %) after 24 hrs exposure, n= (20 - 80).

Fig (1) showed that the regression line of the snail *Bulinus trauncatus* as for as response to various log dose of the Molluscicide (Bayluscide 83.1 % WP) was more steeper (8.4) than regression line reported on fish *Gambusia affinis* (5.0). However, the snail was more sensitive (Lc_{50} = 230 ppm) to the used pesticide compared to the fish (Lc_{50} = 641 ppm).

IV. DISCUSSION

Plant substances are environmentally safe. But being of low resistance and high dose devaluate their practical use for control [13]. However, some plant substances were used as Molluscicidal to control snails vectors of schistosomiasis [14], [15], [16], [17], [18]. It was found that, some plant substances were so toxic to snails such as the n-Butanol extract of root of *solanum elaeagnifolium*; it was shown to have Molluscicidal activity with Lc_{50} of (12 ppm) for *Bulinus truncatus* [16]. This result was so competitive with the Molluscicidal product Bayluscide 83.1% WP that reflected Lc_{50} (230 ppm) in this study. However, some plant substances were as good as molluscicide used in this study for the control of the *Bulinus truncatus* such as volatile oil of *Cymbopogo nervants* which reflected Lc_{50} (237 ppm) [17]. On the other hand a high Lc_{50} such as *Calotropis procera; Nicotiana tabacum* and *Trigonella foenum* [14]. Lc_{50s} for these plants were 3-9 folds that of the molluscicides, Bayluscide 83.1% WP used in this study.

However, pesticides are useful tools for pest control, but they are toxic to aquatic species, particularly fish [19]. It was known that fish such as *Gambusia affinis*, predator of mosquitoes larvae, was encouraged to be established in Irrigated Schemes to control Malaria [20], which is the most important socioeconomically devastating parasitic diseases [14]. Hence, control of schistosomiasis through pesticides use should consider the Malaria control environment including the fish *Gambusia affinis*. But unfortunately *Gambusia affinis* was so sensitive to insecticides used to control adult mosquitoes such as Deltamethrin. It was reported that Lc_{50} for Deltamethrin against *Gambusia* was (0.076 ppm) [21]. In Sudan Malaria is a serious disease and the Sugarcane plantation environment furnish a suitable presence for it. At the same time pests in Sugarcane, Insects and weeds, were controlled with Chlorpyriphos and Glyphosate, respectively [22], [23], [24]. Again *Gambusia* fish was sensitive to Chlorpyriphos (Lc_{50} 85 ppm) and when used with Glyphosate the sensitivity increased (Lc_{50} 11 ppm) (Osten et al., 2005). Having said that the use of Molluscicide, Bayluscide 83.1% wp was so mild on Gambusia fish where the Lc_{50} (640 ppm).This result indicate that no interference, will take place, with Malaria control when the molluscicide was used to control the snail *Bulinus truncatus.*

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