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Damages caused by *Citrullus Colocynthis* extracts on larvae of *Anopheles arabiensis* and *Culex quinquefasciatus* mosquitoes

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Abstract
Mosquitoes are the primary vectors accountable for the organic transmission of lethal sicknesses such as, dengue, malaria, filaria, chikungunia, Japanese encephalitis etc. The aim of current study was to evaluate the damages caused by *Citrullus colocynthis* extracts on the larvae of *Anopheles arabiensis* and *Culex quinquefasciatus* mosquitoes on the morphological bases. Larvae of *A. arabiensis* and *Cx. quinquefasciatus* were collected from Tayba village, Gezira State, Sudan, whereas *Citrullus colocynthis* fruit pulps (FP) and seeds (CS) were collected from within Wad Medani City, Gezira State. *C. colocynthis* FP and CS were shade dried at room temperature and submitted to ethanol and acetone extracts. The susceptibility of *A. arabiensis* and *Cx quinquefasciatus* to FP and CS extracts followed the WHO instruction. The mortality of FP-ethanol extract at concentrations of 17.39-87.13 ppm were 30-90% on *Cx. quinquefasciatus*, while it was 45-90% on *A. arabiensis.* CS-ethanol extract of at concentrations of 17.39-87.13 ppm resulted in 45-90% mortality on *Cx. quinquefasciatus* and 35-85% on *A. arabiensis.* CS-acetone extract at concentrations of 37.26-74.52 ppm resulted in 42-90% mortality on *Cx. quinquefasciatus* and 47-87% on *A. arabiensis*, while FP-acetone extract at concentrations of 76-152 ppm resulted in 37-92% mortality on *Cx. quinquefasciatus* and 25-90% on *A. arabiensis.* Some damage effects (morphological changes) were monitored on the dead larvae that subjected to the ethanol and acetone extracts, and it includes change in the larval color (to brighter color) in about 80% of dead larvae, disconnected heads in 25% of dead larvae, siphon lost in 30% of dead larvae. There were few number of swelled dead larvae (10%). The study recommends following the survived larvae till they became adults to evaluate their reproductive efficiency.

Keywords: *C. colocynthis*, *A. arabiensis*, *Cx. quinquefasciatus*, morphological damage, plant extracts

Introduction
The control of mosquitoes and any form of manage ought to contain cautious attention to the biology of the mosquitoes and be primarily based totally on medical surveillance. A reaction to manipulate nuisance mosquitoes may also appearance very specific from a reaction to govern disease-vectoring mosquitoes [1]. It is simple to kill the mosquito larvae whilst they may be nevertheless constrained to the water, in a finite, easily-controlled area [2].

Bitter apple, *C. Colocynthis*, additionally called bitter cucumber belongs to the family Cucurbitaceae and has a global distribution, being usually observed within side the sandy lands of India, Arabia, West Asia, and Tropical Africa and within side the Mediterranean region. Interestingly enough, *citrullus* has been used medicinally for remedy of leishmania and its extract is anti-diabetic and antioxidant. This plant is understood to have various compounds, which display insecticidal, antibacterial, larvicidal, deterrent, anti-feedant, growth-regulating and anti-fertility effects [3].

Insecticidal impact of Cucurbitacin E Glycoside remotes from *Citrullus colocynthis* turned into examined in opposition to *Aphis craccivora*. Different extracts of *Citrullus colocynthis* fruits (methylene chloride, n-hexane, ethanol, and chloroform) in opposition to *A. craccivora* had been studied on this experiment.

The maximum insecticidal impact (LC_{50} 11003 ppm) turned into received from the ethanol extract [4]. *Citrullus lanatus* are liable to a massive quantity of pests and illnesses which includes whiteflies (Hemiptera: Aleyrodidae) [5]. Whiteflies harm several crops, which includes watermelon, via each direct and oblique feeding [5].

Direct feed may also bring about deformation of leaf tissue, defoliation, and dehydration due to sap loss. Digestion of plant sap through whiteflies effects in excretion of fluid called honeydew, which may also growth the prevalence of fungal contamination in addition to sticky fruit surfaces. In addition to feeding harm, whiteflies are critical vectors of several plant viruses [6].

The objective of current study was to evaluate the morphological changes (damages) caused by *Citrullus colocynthis* ethanol and acetone extracts on the larvae of *Anopheles arabiensis* and *Culex quinquefasciatus* mosquitoes**.**

3. Materials and Methods
3.1 The Study Area
Wad Medani City is located in the central parts of the Gezira State, Sudan. Tayba village was selected for sampling mosquitoes' larvae (North Wad Medani City), whereas, *C. colocynthis* were collected from within Wad Medani City.

3.2 Methodology

Larvae of *A. arabiensis* and Cx. *quinquefasciatus* were collected with sufficient amounts of breeding water. Rearing, maintenance and testing of mosquito larvae followed WHO (1996) [7]. The collected *C. colocynthis* fruit pulps and seeds were shade dried at room temperature. The dried plant parts were grounded, using mortar and pestle and were then used to prepare ethanol and acetone extracts.

Susceptibility tests followed WHO (1996) [7]. Instruction. 20 larvae of *A. arabiensis* and Cx. *quinquefasciatus* of the third or early fourth instar were placed on 300 ml cups which were adjusted to 250-300 ml tap water. From the stock concentrations, about 1, 1.5, 2, 2.5, and 3 ml extract were added to these cups, but not to control batch. Each test was based on three replications. These experiments were run in the Laboratories of Faculty of Engineering and Technology, at the room temperature (26± 3ºC). After 24 hours, in each test cup, the dead larvae were counted, put in glass slices to be photographed for monitoring the morphological changes (especially changes in color, status of digestive tract and the separation of some body parts). A digital microscope provided with camera was used for documentation of these observed changes.

3.3 Data Analysis

Damage observed in the dead larvae of *Anopheles* and *Culex* were photographed, and since that, the aim of this study was to evaluate the damages caused by *C. colocynthis* extracts on *Anopheles* and *Culex* larvae, so no statistical analysis was needed.

4. Results and Discussion

4.1. Mortality of *C. colocynthis* extracts on *Anopheles* and *Culex* larvae

After 24 hours, the ethanol extract of *C. Colocynthis* fruit pulp at doses ranged between 17.39-87.13 ppm, showed mortality ranged between 30-90% on *Cx. quinquefasciatus* and 45-90 on *A. arabiensis* larvae, while the ethanol extract of the seeds at 17.39-87.13 ppm resulted in mortality ranged between 45-90% on *Cx. quinquefasciatus* and 35-85% on *A. arabiensis* larvae. Concerning acetone extracts of *C. colocynthis* seed at doses ranged between 37.26-74.52 ppm, the resulted mortality ranged between 42-90% on *Cx. quinquefasciatus* and 47-87% on *A. arabiensis* larvae, at the same time, the acetone extract of the fruit pulp at doses ranged between 76-152 ppm, resulted in mortality ranged between 37-92% on *Cx. quinquefasciatus* and 25-90% on *A. arabiensis* larvae (Table 1 - 4).

The mortality and damage of larvae ought to be attributed to compounds that consisted in the plant under study. The crude extract of *C. Colocynthis* leaves showed the presence of ten compounds corresponding to insecticidal activities [8]. Flavonoids and different compounds that can have effective impact in controlling aphid pests [9]. Mollashahi *et al*., proved the toxicity of *C. colocynthis* fruit extract on *C. Trachypterus* grasshopper in Iran [10].

4.2. Damage caused by *C. colocynthis* extracts on *Anopheles* and *Culex* larvae

Some morphological changes have been monitored at *Anopheles* and *Culex* larvae submitted to ethanol (Plate, 1 and 2) and acetone extracts (Plate, 3 and 4). The change in the color (to brighter color) was noticed in approximately 80% of the dead larvae for all extracts. Larva with disconnected head was recorded in 25% of the dead larvae for all extracts. Siphon lost have been observed in about 30% of the dead larvae subjected to the ethanol and acetone extracts. There have been few of the swelled dead larvae (about 10%).

This results have been consistency with the result obtained by Kehail *et al.* whom studied the damages caused by castor seed oil and its ethanol extracts on *Anopheles arabiensis* larvae, Gezira State, Sudan [11].

Table 1: Mortality % of ethanol extract of *C. colocynthis* fruit pulp on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hours

Conc. (ppm)	*Cx. quinquefasciatus*	*A. arabiensis*
87.13	90	90
69.74	70	80
52.26	55	75
34.87	40	65
17.39	30	45

Table 2: Mortality % of ethanol extract of *C. colocynthis* seeds on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hours

Conc. (ppm)	*Cx. quinquefasciatus*	*A. arabiensis*
87.13	90	85
69.74	80	75
52.26	65	60
34.87	60	45
17.39	45	35

Table 3: Mortality% of acetone extract of *C. colocynthis* seeds on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hours

Conc. (ppm)	*Cx. quinquefasciatus*	*A. arabiensis*
74.52	90	87
65.21	72	80
55.89	65	72
46.58	60	67
37.26	42	47

Table 4: Mortality% of acetone extract of *C. colocynthis* fruit pulp on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hour

Conc. (ppm)	*Cx. quinquefasciatus*	*A. arabiensis*
152.0	92	90
121.6	80	75
106.4	72	62
91.2	62	35
76.0	37	25

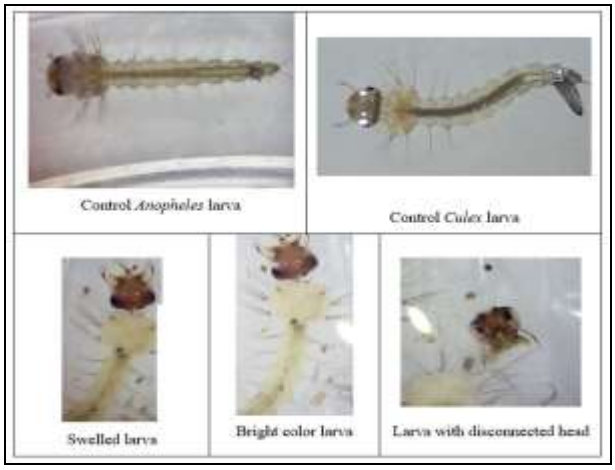

Plate 1: Damages caused by the ethanol extract of *C. colocynthis* fruit pulp on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hour

Plate 2: Damages caused by the ethanol extract of *C. colocynthis* seeds on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hour

Plate 3: Damages caused by the acetone extract of *C. colocynthis* seeds on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hour

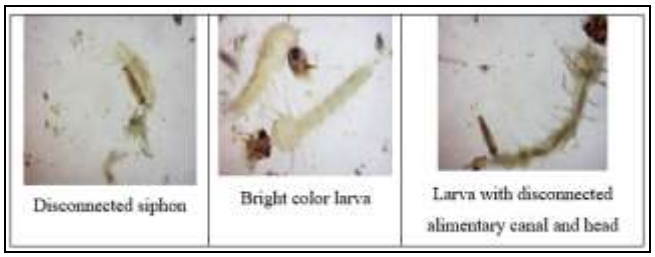

Plate 4: Damages caused by the acetone extract of *C. colocynthis* fruit pulp on *A. arabiensis* and *Cx. quinquefasciatus* larvae after 24 hour

Conclusions

The current study concluded that all extracts either ethanol or acetone have a considerable lethal effects (25 – 92% mortality) on *Anopheles* and *Culex* larval population. Some morphological changes (damages) were monitored on the tested larvae. The change in the larval color (to brighter or pale color) in about 80%, larva with disconnected heads in about 25%, disconnected siphons were noticed in about (30%) of the tested larvae that subjected to ethanol or acetone extract. There were also few swelled larva (10%).

Recommendation of this study survived larvae should be reared and followed till they became adults to evaluate their reproductive efficiency, also the selectivity of each extract should be evaluated.

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