

The effect of plant extracts of *Vitex agnus-castus* L. on the blowfly *Lucilia sericata* (Diptera : Calliphoridae)

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Abstract

This research aims to study the effect of plant extracts of *Vitex agnus-castus* L. on Green bottle fly *Lucilia sericata* (Diptera: Calliphoridae). Breeding and the experiment were conducted in the laboratory at a temperature 25 °C, a relative humidity of 55 of light a period of 12 hours/day. The results showed that the effect of extracts of phenolic compounds of *Vitex agnus-castus* in the destruction of the insect *Lucilia sericata* , reached the highest when using concentrations 20% which was 71%. As for the alkaloid compounds the destruction of the insect *Lucilia sericata* were 89% when using concentrations of 20%. It has reached the lowest at 5% for both compounds reaching 46.7% for phenolic compounds and 57% for alkaloid compounds.

1. Introduction

Myiasis is an infestation of vertebrate animals and live humans with dipterous larvae, which feed on the host's tissues (dead or living) or liquid substances (1). Various species of flies are able to be agents of myiasis and caused other forms of parasitism (2,3). Entomologically myiasis is classified in several types: obligatory, facultative and accidental. Clinically it can be categorized as a result of body involvement area such as cutaneous, nasopharyngeal, ophthalmic, and urogenital (4). In nasopharyngeal myiasis larva causes ocular and aural involvement and larva

targets at the head cavities including nose, sinuses, ears and eyes. The first report of myiasis caused by *Lucilia sericata* was in 1826 by Magen who extracted maggots from eyes, mouth and paranasal sinuses of a hospital patient (5) *Lucilia* fly belongs to Calliphoridae family which is ectoparasites both in humans and animals. *Lucilia* fly is metallic green or copper green, 8-10 mm and feed on carrion, excrement and garbage (2). The female lays eggs on meat, corps, carcasses and wound of human and animals. Service 1986 has reported that the requisite time for developmental stage of *Lucilia* is about 10-23 days. Between 8-12 h, the eggs change into a conical larva, and complete

peritreme of posterior respiratory spiracles. After 4–8 days, larvae develop and drop on soil and after 6-14 days change in to adult flies (3). The family Calliphoridae of blow flies is among the families most studied in the world. This family has synanthropic habitats that impact directly in forensic entomology, medical, veterinary and economic subjects (6,7). In particular, blow flies are among the first colonizers of cadavers that might serve as a biological clock to measure the time of death(8).

The medicinal insects form a major threat to humans and animals (9). This problem prompting researchers to find alternatives that are non-toxic to humans and animals (10). Many plants extracts have been used as alternatives to chemical insecticides in the mortality and control of insects where humans used plant containing toxic substances in their leaves directly through the use of powder or after extraction with organic solvents (11). Plant extracts can be used in the biological control of insects without harm to the environment (12).

This research aims to study the effect of phenolic and alkaloids compounds that extracted from the leaves of *Vitex agnus-castus* L. on the blowfly *Lucilia sericata* (Diptera : Calliphoridae)

2. Materials and methods:

Flies were collected by net from different regions in Basrah Governorate (Basrah University and the massacre of Basrah Governorate). They were returned to the lab for morphological identification (based on (13)) . Insect adults were kept in special cages at laboratory temperature and fed on fresh chicken and sheep livers, which

are a source of food and suitable places for laying eggs as well. The cages also contain a mixture of sugar and water solution, taking into account the daily replacement of liver pieces. Botanical samples (the leaves of the plant *Vitex agnus-castus*) were collected from the University of Basrah, College of Agriculture, and diagnosed in the herbarium of the College of Science - Department of Life Sciences - University of Basrah. Fresh plant leaves were wiped off from dust and dried at laboratory temperature. Then it was ground using a Philips electric mill to obtain powdery plant sample.

Extraction of phenolic compounds:

Phenolic compounds were extracted according to the method Ribereau - Gayon (1972) , where 100 gm of vegetable powder was taken in a glass flask with a capacity of 1000 ml and 40 ml of acetic acid 2% was added to it. After the completion of the extraction process, the solution was left to cool, then filtered using a filter paper of type 1. Wattman No. An equal volume of N-Propanol and an amount of NaCl and sodium chloride were added to the filtrate until saturation was reached. Two layers were formed. The upper layer containing phenolic compounds was isolated using a separation funnel and It was dried with a rotary evaporator at a temperature of 50°C and kept at a temperature of 20°C until use.

Extraction of alkaloids:

The extraction was carried out according to Harborn (1984) by taking 50 gm of vegetable powder and mixing it with 300 ml of 10% ethanolic acetic acid solution in a glass container with a capacity of 100 ml

with continuous stirring at room temperature for a period of 4 hours. The components were filtered using a Buechner funnel and type filter papers. 1.wattman No. The filtrate was concentrated and treated with concentrated ammonia until the pH became equal to $\text{pH} = 9$. The solution was placed in a separating funnel and 20 ml of chloroform was added to it three times. The mixture was shaken each time. The chloroform layer was isolated, then left to dry at room temperature and the extract collected. And save at $20\text{ }^{\circ}\text{C}$ until use.

The method of Al-Mansour (1995) was followed in the process of preparing different concentrations of plant extracts, as follows:

Mix 5 gm of the plant extract with two drops of Tween 20 and complete the volume to 25 ml of distilled water containing 1% liquid paraffin to obtain a concentration of 20%. Concentrations of 15%, 10% and 5% were prepared from it. As for the insoluble extracts in water, the previous method was used, but by adding 5 ml of alcohol and completing the volume to 25 ml of distilled water containing 1% paraffin, with the addition of two drops of Tween 20. As for the comparison treatment, it included 5 ml of the solvent used and 20 ml of Distilled water containing 1% paraffin to which two drops of Tween 20 have been added.

2 ml of the extracts of the plant was added to 10 g of minced meat, which was placed in petri dishes with a diameter of 19 cm and placed in insect breeding cages $40 \times 30 \times 30$ cm. 10 insects were entered by 3 replicates for each concentration. These boxes were placed under laboratory conditions and results recorded after 24 hours. As for the comparison treatment, it included the same amount of minced meat that was treated with distilled water to which two drops of Tween 20 were added.

3. Results

The results showed that the effect of extracts of phenolic compounds of *Vitex agnus-castus* in the destruction of the insect *Lucilia sericata* , reached 46.7%, 60%, 65.5%, and 71% when using concentrations of 5%, 10%, 15%, and 20% . As for the alkaloid extracts the destruction of the insect *Lucilia sericata* were 57%, 76%, 85.2% and 89% when using concentrations of 5%, 10%, 15%, and 20% . The statistical results showed that there were significant differences ($p < 0.05$) between the extracts, with a superiority of the alkaloid extracts with an average of 76.8% in the highest concentrations.It also indicated that there were significant differences between the concentrations. (tap.1)

Table1. The plant extracts efficacy on the blowfly *Lucilia sericata* .

Average of Extract	Concentrations				Plant extract
	%20	%15	%10	%5	
60.8	71	65.5	60	46.7	Phenolic compounds
76.8	89	85.2	76	57	Alkaloid compounds

80	75.4	68	51.9	Average of concentration
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4. Discussion:

The results of the statistical analysis show that there are significant differences in the toxicity of plant extracts based on the type of plant extract used in the study, where the percentage mortality increase with a direct increase of concentration and that there is a difference between the plants, this is due to the difference in the quality and quantity of active compounds contained in the plants that affect the nervous system of the insect, that paralyzes its movement, leading to death or affect the mechanism of action of the necessary enzymes responsible for important biological processes, causing the cessation of metabolism and death. This is corresponding with (14) which prove the effect of certain plant compounds in the mortality of the epithelial cells of the central digestive tract of the *L. sericata* fed to these compounds. This is corresponding with (15) which prove plant compounds have high toxicity effecting in the nerve tissue of the larvae and cause paralysis and death. These results are agreed with the results (16) which show the plant extracts *Brassica corpestris* show mortality percentage after 72 hours of treatment against the larval instar of *L.sericata* . This study similar with (17) which prove extracts of *Hyoscyamus niger* have effect on *L.sericata* . Activities of the plant leaves extracts

Apium graveolens, *Brassica compestris*, *Raphanus sativus* and *Trigonella foenum-graecum*, study (18) agree with our study their results suggested that four plants safe possible insecticides for the control of blowflies. . This study is in agreement with (19) which it was proved that the extracts affected the blue bottle flies at different bioactivity concentrations.

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