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Studying of the effect of some plant extracts on the Bioefficacy of green bottle insect *Lucilia sericata* (Diptera: Calliphoridae)

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Abstract

This research aims to study the effect of ethyl alcohol extracts on the leaves of the *Camaldulensis dehnh* and seeds of *Cuminum cyminum* and leaves of *Eruca sativa,* Nerium *oleander* of some aspects of the Bioefficacy on the first and third larvae instar of Green bottle fly *Lucilia sericata* (Diptera: Calliphoridae). Breeding was conducted in the laboratory at a temperature 30 ± 5 °C, a relative humidity of 60 ± 5 of light a period of 12 hours /day. The ethyl alcoholic extracts of the leaves of the *C.dehnh* and seeds of *C. cyminum* and leaves of *E. sativa, N. oleander* show different results according to the concentration and duration of treatment. The ethyl alcoholic extracts of the leaves of the *C.dehnh* gave the highest mortality percentage 95.7% at the concentration of 500 ppm after 24 hours of treatment for the first larvae instar While the results show that the ethyl alcoholic extracts of the leaves of the *N. oleander* gave the lowest mortality percentage was 23.5.% at 10 ppm after 72 hours of treatment for the first larvae instar as well as the ethyl alcoholic extracts of the leaves of the *C.dennh* show highest mortality percentage 87.5% at the concentration of 500 ppm after 24 hours of treatment while the lowest mortality percentage was 22.2.% at 10 ppm after 72 hours of treatment for the third larvae instar. The results show that there were significant differences for ethyl alcohol extracts of seeds and leaves of plants used in the effect on the first and third larval instars of *Lucilia sericata* (Diptera: Calliphoridae)

Introduction:

The medicinal insects form a major threat to humans and animals [1]. This problem prompting researchers to find alternatives that are non-toxic to humans and animals [2]. 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 [3]. Myiasis is an important medical and veterinary problem larvae of *L.sericata* are obligatory

ectoparasites, *L.sericata* is commonly referred to as sheep blowfly since sheep are its primary host in places [4] . The fly bottle green lays eggs in the sheep wool, the larvae feed on the skin surface causing massive cutaneous lesions and secondary bacterial infections, this causes a huge economic impact, not only does it cost money to treat infected wounds, L. *sericata* causes myiasis was studied in1826 [5]. Plant extracts can be used in the biological control of insects without harm to the environment [6]. Most infections occurs where people live in villages, without cleaning dwelling, larvae of the Blue bottle fly, *L.sericata* (Meigen) (Diptera:Calliphoridae) is live on wounds, as a result infection occurs, *L.sericata* is found in the mouth, eyes [7]. Primary infection leading to oviposition on the skin surface [8]. Adults and larvae of *L.sericata* act as passive vectors of *Mycobacterium avium* and *Mycobacterium hominissuis* [9].

This research aims to study the effect of ethyl alcoholic extracts of the leaves of the *C. dehnh* and seeds of *C.cyminum* and leaves of *E. sativa* , *N.oleander* of some aspects of the Bioefficacy on the first and third larvae instar Green bottle fly : *Lucilia sericata* (Meigen) (Insecta: Diptera: Calliphoridae).

Materials and methods

Collection of plant samples

The Green bottle fly: *Lucilia sericata* (Meigen) (Insecta: Diptera: Calliphoridaewas collected using baits traps, then they were transported to the laboratory in cages made of wood measuring 50 x 50 x 70 cm, then they were wrapped with a transparent cloth and one of its sides made it a hose for dealing with the insect. The adults were placed in the box with minced meat, liquid blood, and water to feed them. When the larvae came out they were fed the same food and when the larvae reached the third stage, they were transferred to another box and fed with corn then they were transferred to a container at 30 ± 5 °C and relative humidity of 60 ± 5% to obtain on the pupa, then the temperature is lowered to 27 C to obtain the adultI nsects are classified according to their external characteristicst, the study was conducted from the beginning of the ninth month to the end of the eleventh month of the year 2020. The required plant parts were collected from the market local in the Balad region. This plant was washed and cleaned of dust and dirt and place in a well-ventilated, dry place for 14 days in the laboratory at 25°C [10]. The dried plant was kept in bags until the extraction process began.

Prepare ethyl alcoholic extract

The require concentrations were obtained by taking 1 g of the leaves or seeds extract of the plant, each part was placed in 100 ml of ethyl alcohol 95% followed by heating for 20 hours at 30 C in the water bath, the extracts were dried by a rotary evaporator at a temperature of 40 ° C, [11], then the dried in an electric oven between 30-35°C, a concentrated solution of 1% or 10,000 ppm was attained according to dilution formula of C1V1 = C2V2, the other required concentrations of 500, 100, 50, 10 ppm were prepared. The control treatment used only distilled water.

Studying the effect of plant extracts on the destruction of the first instar of *L.sericata*.

Took 20 larvae from the first instar larvae for each repeater and by 4 replicates for each concentration with use distilled water to control after that transferred to plastic containers containing 100 ml of the extract and added 0.2 g of larval food to each repeater. The percentage of loss in the first larval instar was recorded after 24, 72 hours of treatment. The same process was repeated to the third larval stage, and the mortality percentage has been corrected.

Results and discussion

The plant extracts efficacy of the first larval instar after 24 hours of treatment.

The results show the effect of alcoholic extracts in mortality larvae as shown in Table (1) that the ethyl alcoholic of the extracts of *C. dehnh*, caused the highest mortality percentage 95.7% at the higher user concentration of 500 ppm while the lowest mortality percentage was 35.8% at user concentration 10 ppm also the results o show that plant leaves extracts of *C.cyminum* it caused mortality percentage 81% at the concentration of 500 ppm and caused mortality percentage 31.3 % at 10 ppm, also the results o show that the plant leaves extracts of *E.sativa* it caused mortality percentage 64.9% at the concentration of 500 ppm and it caused mortality percentage 29% at 10 ppm. While the results show that the ethyl alcoholic of the extracts of *N.oleander* caused mortality percentage of 57% at the concentration of 500 ppm and caused 26.4.% at concentration 10 ppm. All alcoholic extracts of the plants used showed significant differences after 24 ,72 hours of treatment figure 1.

Table1. The plant extracts efficacy of the first larval instar after 24 h of treatment.

Plant	concentration / ppm				Average mortality of each plant
	10	50	100	500	
C. dehnh.	35.8	60	80.7	95.7	68.05 A
C.cyminum	31.3	56	69.6	81	59.74 B
E.sativa	29	39.5	55.2	64.9	47.15 C
N.oleander	26.4	32.8	54.2	57	40.35 D
Average mortality of each concentration	30.6 D	47.07 C	62.67 B	74.65 A	

*Similar capital letters in one line horizontally mean no significant differences.

**Similar capital letters in one column vertically mean no significant differences

The plant extracts efficacy of the first larval instar after 72 hours of treatment.

The results show the effect of alcoholic extracts in mortality larvae as shown in Table (2) that the ethyl alcoholic of the extracts of *C. dehnh*, caused the highest mortality percentage 84.6% at the higher user concentration of 500 ppm while the lowest caused mortality percentage 30% at user concentration10 ppm against first larval instar of *L.sericata* also the results show that plant leaves extracts of *C.cyminum* it caused mortality percentage 76% at the concentration of 500 ppm and it caused mortality percentage 39.9 % at 10 ppm, also the results show that the plant leaves extracts of *E.sativa* it caused mortality percentage 50.2% at the concentration of 500 ppm and it caused mortality percentage 28% at 10 ppm. While the results show that the ethyl alcoholic of the extracts of *N.oleander* caused mortality percentage of 39.3% at the concentration of 500 ppm and it caused 23.5 % at concentration 10 ppm. All alcoholic extracts of the plants used showed significant differences after 24 ,72 hours of treatment figure 1.

Table2. The plant extracts efficacy of the first larval instar after 72 h of treatment.

Plant	concentration /ppm				Average mortality of each plant
	10	50	100	500	
C. Dehnh.	30	50	75	84.6	59.94 A
C.cyminum	39.9	54	60.8	76	57.73 A
E.sativa	28	53.7	45.7	50.2	44.41 B
N.oleander	23.5I	35.2	30.7	39.3	32.17 C
Average mortality of each concentration	30.35 D	48.23 B	53.05 A	53.52 A	

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**Similar capital letters in one column vertically mean no significant differences

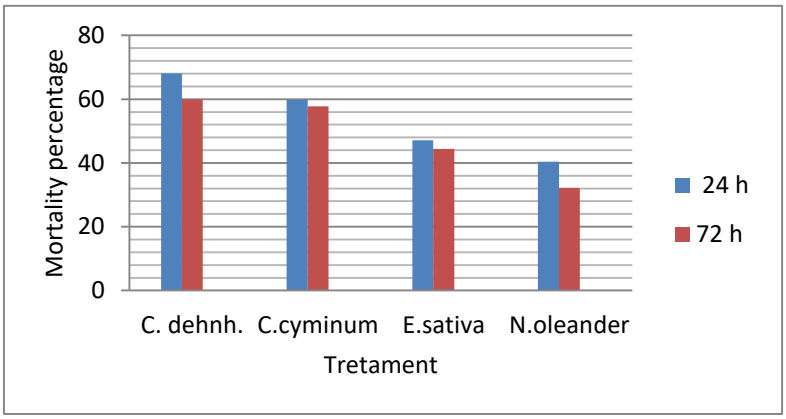

Fig 1. The rate mortality percentage of plant extracts

The plant extracts efficacy of the third larval instar after 24 hours of treatment.

The results show the effect of alcoholic extracts in killing larvae as shown in Table (3) that the ethyl alcoholic of the extracts of *C. dehnh*, it caused the highest mortality percentage 87.5% at the highest user concentration of 500 ppm while the lowest mortality percentage 44% at user concentration10 ppm against first larval instar of *L.sericata* also the results o show that plant leaves extracts of *C.cyminum* it caused mortality percentage 79% at the concentration of 500 ppm and it caused mortality percentage 41.5 % at 10 ppm, also the results o show that the plant leaves extracts of *E.sativa* it caused mortality percentage 69% at the concentration of 500 ppm and it caused mortality percentage 37% at 10 ppm. While the results show that the ethyl alcoholic of the extracts of *N.oleander* caused mortality percentage of 63.7 % at the concentration of 500 ppm and it caused 33 % at concentration 10 ppm.

Table3. The plant extracts efficacy of the third larval instar after 24 hours of treatment.

Plant	concentration /ppm				Average mortality of each plant
	10	50	100	500	
C.dehnh.	44	56	76	87.5	65.75 A
C.cyminum	41.5	53	70	79	60.87 B
E.sativa	37	47.2	60	69	53.3 C
N.oleander	33	40.8	54.3	63.7	47.9 D
Average mortality of each concentration	38.8 D	49.2 C	65.7 B	74.8 A	

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The plant extracts efficacy of the third larval instar after 72 hours of treatment.

The results show the effect of aqueous extracts in killing mosquito larvae as shown in Table (4) that the ethyl alcoholic of the extracts of *C. dehnh*, caused the highest k mortality percentage 70.8% at the higher user concentration of 500 ppm while the lowest mortality percentage was 32.5% at lowest user concentration10 ppm against first larval instar of *L.sericata* also the results o show that plant leaves extracts of *C.cyminum* it caused mortality percentage 68.8% at the concentration of 500 ppm and it caused mortality percentage 29.3 % at 10 pp , also the results o show that the plant leaves extracts of *E.sativa* it caused mortality percentage 56 % at the concentration of 500 ppm and it caused mortality percentage 27% at 10 ppm. While the results show that the ethyl alcoholic of the extracts of *N.oleander* caused mortality percentage of 53 % at the concentration of 500 ppm and it caused mortality percentage 22.2% at concentration 10 ppm. All alcoholic extracts of the plants used showed significant differences after 24 ,72 hours of treatment figure 2.

Table 4. The plant extracts efficacy of the third larval instar after 72 h of treatment.

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Plant	Mortality percentages of concentration in ppm				Average mortality of each plant
	10	50	100	500	
C.dehnh.	32.5	45.3	65.7	70.8.	53.57 A
C.cyminum	29.3	40	61.5	68.8	49.85 B
E.sativa	27	37.5	40	56	42.6 C
N.oleander	22.2	31.5	48.9	53	38.9 D
Average mortality of each concentration	27.7 D	38.3 C	54.02 B	62.65 A	

*Similar capital letters in one line horizontally mean no significant differences.

**Similar capital letters in one column vertically mean no significant differences

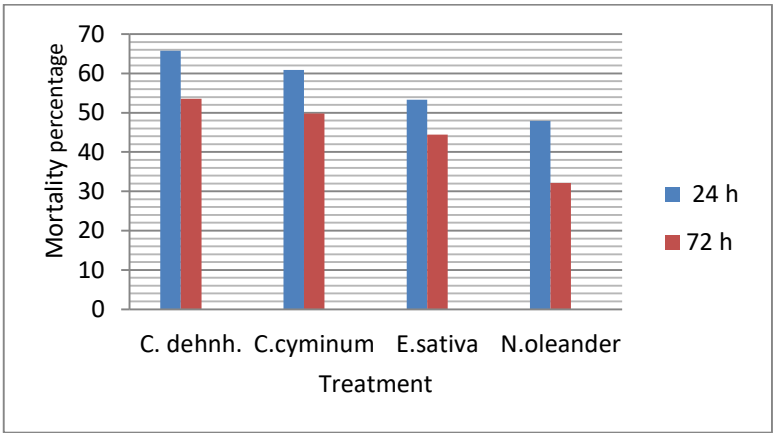

Fig 2. The rate mortality percentage of plant extracts

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 [12] 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 [13] 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 [14] which show the plant extracts *Brassica corrpestris* show mortality percentage after 72 hours of treatment against the larval instar of *L.sericata* . This study similar with [15] 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 [16] agree with our study their results suggested that four plants safe possible insecticides for the control of blowflies. This study agree with [17] was mentioning that the feeding activity of *L. coprina* larvae may lead rapidly to further oviposition by other flies, also this study agree with [18] which prove *Chenopodium ambrosiodes* and *Thymus vulgaris*the, *Anethum graveolens*, extracts effect against *L. sericata* larvae.

A study [19] approached the current study by the effect of plant extracts on the development of the Bluefly. This study is in agreement with [20] which it was proved that the extracts affected the blue bottle flies at different bioactivity concentrations. This study is in agreement with [21] which it was proved that two medicinal plants *Commiphora molmol and Balanites aegyptiaca* gave positive results in effect on larvae instars of *Lucilia sericata*.

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دراسة تأثير بعض المستخلصات النباتية على الفعالية الحيوية لحشرة الذبابة الخضراء *Lucilia sericata* (Diptera: Calliphoridae)

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الكلمات المفتاحية:

Lucilia sericata، *المستخلصات الكحولية، فعالية حيوية*

معلومات المؤلف

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الخلاصة:

يهدف هذا البحث إلى دراسة تأثير مستخلصات الكحول الإثيلي لأوراق نبات *Camaldulensis dehnh* وبذور *Cuminum cyminum* وأوراق Eruca , *Nerium* sativa *oleander* لبعض جوانب الفعالية الحيوية على يرقات الطور الأول والثالث للذبابة الزرقاء *Lucilia sericata* (Diptera: Calliphoridae). أجريت التربية تحت ظروف مختبرية، درجة حرارة 30 ± 5 درجة مئوية، ورطوبة نسبية 60 ± 5 وفترة اضاءة 12 ساعة / يوم. أظهرت المستخلصات الكحولية الإثيلية لأوراق نبات *C.dehnh* وبذور *C. cyminum* وأوراق *E. sativa*، *N. oleander*واعطت نتائج مختلفة حسب تركيز ومدة المعاملة. أعطت المستخلصات الكحولية الإثيلية لأوراق *C.dehnh* أعلى نسبة قتل 95.7٪ بتركيز 500 جزء في المليون بعد 24 ساعة من المعاملة للعمر اليرقي الأول و أعطت اوراق نبات *N. oleander* أقل نسبة بلغت 23.5٪ عند 10 جزء في المليون بعد 72ساعة من المعاملة للعمر اليرقي الأول وكذلك المستخلصات الكحولية الإيثيلية لأوراق نبات *C.dehnh* أظهرت أعلى نسبة وفيات 87.5٪ بتركيز 500 جزء في المليون للعمر اليرقي الثالث بينما أعطت اوراق نبات *N. oleander* كانت أقل نسبة قتل22.2٪ عند 10 جزء في المليون للعمر اليرقي الثالث بعد 72 ساعة من المعاملة ، اظهرت النتائج وجود اختلافات معنوية لمستخلصات الكحول الاثيلي لبذور وأوراق النباتات المستخدمة في التاثير على يرقات العمر اليرقي الأول والثالث للذبابة الزرقاء *Lucilia sericata* (Diptera: Calliphoridae