The toxicity of alkaline compounds of some plants in some aspects of the life of the house fly *Musca domestica*(Diptera:Musacidae)

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Abstract

Current research included evaluating the efficacy of extracts of Citrus alkaloid raw materials *Citrullus colocynthis* L., *Rubus sanctus* Shreb and *Lycium barbarum* in the cumulative mortality of the *Musca domestica*. The alkaloids extract of the raspberry plant *R.sanctus* recorded a clear superiority over the bitter melon *C. colocynthis* and *L. barbarum*, as the mortality rates for eggs ranged between 80.78 -43.34% for the *R.sanctus* plant in concentrations 20 -2.5 mg / ml, while it reached 66.93-32.50% for the *C.colocynthis* plant. In comparison with the control treatment of 16.60%, the botanum *L.barbarum* followed with a loss rate ranging between 63.68-31.12% for the same extract and the aforementioned concentrations. There is a direct relationship between the percentages of loss and the concentrations used.

As for the effect of extract of raw alkaline compounds of plants on the destruction of the three larval phases of the housefly, the effect was evident as the highest rates of killing were achieved for the larval phases of all plants and at the highest concentration of 20 mg / ml, with the exception of what the third phase of the bitter melon plant showed in terms of resistance, as the mortality of the
The M. domestica L. is an insect of medicinal and veterinary importance as it has a wide spread all over the world, affecting human and animal health through its mechanical transmission of many pathogens in humans and animals such as typhoid and paratuberculosis of all kinds, eye diseases, cholera, tuberculosis and Pulmonary tuberculosis, anthrax and summer diarrhea in children, and some of these germs enter the cavity of the fly with a swallow of contaminated material. When the fly stands on human food or drink, it sheds part of its load from the microbes by throwing them on saliva or stools, in addition to the conditions that this causes From spawning and annoyance (1).

Insecticides remain part of the integrated vector management strategy, so there is an urgent need to develop alternative insecticides to control the vector of nurses, and the new development must include safe and more effective alternatives to pesticides used, especially since resistance to pesticides remains a difficult challenge despite the existence of theoretical research on resistance Insecticides and their prevention strategies, but they are often not applied or kept in the laboratory (2). Because plants have many byproducts of metabolism that are a source of protection against insects and other organisms such as bacteria and fungi (3) It has made it the focus of attention of many researchers, as it is less harmful to non-target neighborhoods, the speed of its degradation and the difficulty of mechanical resistance to natural products compared to the pesticides manufactured because the latter works on the basis of one active compound. As for plant derivatives, it is a large group of chemical compounds, so the ability of pests to develop Resistance to such
substances is few (4) The Iraqi environment contains various plants rich in compounds of known medical importance, just as some of them are known to contain toxic compounds (5). It is one of the Iraqi plants widely spread in Iraq. *C. colocynthis* is an important medicinal plant because it contains many active compounds, including Alkaloides, represented by Citrullin, which is attributed to the bitter taste of the plant, as well as other active substances such as resins, gum, cyclosides, soaps, and cucurbitin B, C, D, I (6). (7) also confirmed the existence of two types of sterols (C29H48O and C29H50O) in the petroleum ether extract of the bitter melon plant fruits collected from Basra region in Iraq that the alcohol extract of the *R.sanctus* blackberry plant contains a wide variety of anti-virus and anti-bacterial substances specific to TB bacteria as well. Has effectiveness against cancer (8, 9) As for *L. barbarum* L. It is known in the traditional Chinese herbal medicine and has been widely used as food, reducing glucose and fats in the blood, fighting aging, fatigue, anti-cancer, facilitating male fertility and immune regulation (10) Given the medical importance of this insect, the current research has been interested in evaluating Efficiency of extracts of organic solvents and secondary compounds of the aforementioned plants in some aspects of the daily performance of the housefly insect and the possibility of adopting them as possible alternatives to chemical pesticides.

2- Materials and methods of work

2-1 Collecting and diagnosing plant samples

Samples of leaves were collected for carrots, raspberry and bitter melon seeds during October 2012 from public parks in Al-Diwaniyah Governorate, with the exception of bitter melon seeds, which were purchased from a local market in the city itself. Plant samples were dried in laboratory conditions separately, and ground to obtain accurate vegetable powder, kept in a tightly sealed bottle, and placed in the refrigerator until use. All plants are classified according to the Iraqi Flora of Iraq By Prof. Dr. Sohaila Hussein / College of Education / University of Al-Qadisiyah as the blackberry Schreb *Rubus sanctus* of the Rosaceae family: and the *Lycium barbarum* of the Solanaceae family: the *Citrullus colocynthis* of the family family: Cucurbitaceae
2-2 Collection, diagnosis and breeding of the insect

*M. domestica* was collected from a residential area in Al-Diwaniya Governorate by means of a network made of tulle cloth and the camels were placed in parallel cages with rectangles of dimensions (90 x 90 x 90) cm and a base of wood, the sides of the cages were covered with tulle cloth. Petri dishes were placed in the cage container on milk and a little sugar to feed the whole. The insect was raised and fed according to the method (11) with a temperature of 30 ± 1 and a relative humidity of 5 ± 65%. Plastic cups were placed inside the cage on an industrial food medium to feed the larvae and the component of wheat bran 655 g + powdered milk powder 50 g + yeast 38 g + 600 ml distilled water, mixed the ingredients together to form a fragile dough and moistened with distilled water for the purpose of attracting adults and laying eggs, transferred the eggs to the incubator at a temperature of 30 ± 1 and relative humidity 5 ± 65 % Up to the virgin stage (12). The resulting virgins were collected and placed in the previously described breeding cages until the camels were removed and mated. The larvae and males were distinguished from the females according to (13, 14, 15). The insect diagnosis was confirmed in the Natural History Museum / University of Baghdad. The plant was purified for two generations before being tested.

2-3 Prepare plant extracts

2-3-1 Extraction of raw alkaloids

I followed the method mentioned in (16), took (20) grams of powder for each vegetable sample and put it in the paper extraction container and each separately, then put it in the extracting device with (200) ml of 95% ethyl alcohol and the substance was extracted for 24 hours at a temperature 40 m. Then the extract was dried with a rotary evaporator, the resulting substance was taken and dissolved in 5 ml of ethyl alcohol. Then add 30 ml of sulfuric acid 2%. The alcohol can be disposed of by using the rotary evaporator a second time to keep the solution acidic, then add an amount of ammonium hydroxide solution 10% to it pH = 9 after that The solution was extracted by separating funnel and using 10 ml of chloroform, shaken several times and the mixture was separated into two layers. The lower layer containing the chlorinated soluble alkaloids was taken, the last step was repeated three times and the lower layer was taken each time so that the combined
solution became approximately (40) ml. For the purpose of estimating the biological efficacy of the extract of raw alkaline compounds for the plants used, the weight of 2 g of dry matter was dissolved in 5 ml ethyl alcohol 95% and completed the volume to 100 ml with distilled water so the pure solution became 2% or the equivalent of 20 mg / ml and from the latter I attended the concentrations of 2.5, 5 and 10 mg / ml Control was 5% of ethyl alcohol.

2-4 - The effect of extracts of alkaline compounds raw of the tested plants on the immature life roles of the home fly M. domestica (cumulative mortality)

2-4-1 Effect of extracts of alkaline compounds of plants tested on the destruction of M. domestica eggs.

I took (20) eggs / repeater within the age of 24 hours and placed in a petri dish containing a filter paper and at the rate of (3) replicates for each concentration. The eggs were treated with different concentrations for each extract and for each plant and separately sprayed the extract by hand spray) and by (3) ml for each repeater, As for the control parameters, it was by using distilled water with the solvent used in the extraction, then each of these plates was covered with a perforated dish cover, then the eggs were transferred to the incubator at a temperature of 30 ± 1 °C and a relative humidity (5 ± 65%). An hour of treatment, and the death rates were adjusted according to Abbott's formula (17).

2-4-2 Effect of raw alkaline compounds extracts of plants tested on larvae of M. domestica

(20) larvae / repetitions were taken from the first phase larvae within the age of 24 hours and at the rate of (3) repeats for each concentration. It was transferred to plastic tubes containing food media treated with the concentrations of the extract for each plant and each separately, where (6) ml of all the concentrations of extracts and for each plant and separately were added to (3) g of the food medium. As for the control parameters, distilled water was used with the used solvent. In extraction, the plastic tubes were transferred to the incubator and in the same previous conditions, the percentages of loss were recorded in the first larval stage after (24) hours of treatment and the rates of loss were adjusted according to Abbott's formula (17).
The same process was repeated for the second and third larval stages with the same number of replicates for each plant and for solvent extracts Membership and secondary compounds separately.

2-5 Designing experiments and statistical analysis

The results of the experiments of the effect of organic solvent extracts and the extracts of the secondary compounds of the plants on the loss of eggs were analyzed according to the Completely randomized design, while the results of the experiments of the extracts on the loss of different larval phases were analyzed according to the model of global experiments using the use of a fully-randomized Factorial experiments with completely randomizd design A Least Significant Difference (L.S.D.) test was used under the 0.05 probability level for the significance test.

The percentages of death were corrected for killing according to the Abbott formula (17) and modified and known as Schneider and Orell Formulla (18). The corrected percentage of death was calculated according to the following:

\[
\text{Corrected percentage of death} = \frac{\% \text{ of depreciation in the transaction} - \% \text{ of depreciation in comparison}}{100\% \text{ for depreciation in comparison}}
\]

Corrected percentages of decomposition were converted into angle values for inclusion in statistical analysis (19).

-3- Results and discussion

3–1 Effect of extracts of Alkaline compounds of the tested plants on the percentage of mortality of eggs M. domestica

Table (1) shows the rates of egg decay in the extracts of the secondary raw compounds (alkaloids) for the tested plants. The results of the statistical analysis confirmed the superiority of the blackberry plant R. sanctus in giving the highest percentage of eggs loss through the effect of plants, followed by bitter melon, then gonads, which did not differ significantly in the percentage of decay of the aforementioned role.

Statistical analysis also showed that the bilateral interaction between plants and the concentrations of their secondary extracts showed that the alkaline extract of the blackberry plant in concentrations (5, 10 and 20)
mg/ml scored the highest percentage of mortality for house fly eggs (49.78, 56.23 and 80.87)%, respectively. When comparing the plants to the same extract, we find that the alkali extract of the blackberry plant was better in the percentage of perishing than the extract itself for the *C. colocynthis* plant, which in turn was better than the peridot plant, and that there is a direct relationship between the rates of perishing and the concentrations used, as with increasing the concentration, the perishing rates increase for the role used. (20) The *Datura innoxia* alkali extract exceeded the alkaloid extract of the citrus fruit plant *C. colocynthis* in the events of the highest percentages of corn stalk insect eggs *Sesamia cretica* reached 100%, 95.29%, respectively in concentration 1.5%, while the phenolic compounds gave a death rate of 70.72 54%, respectively, and for the same focus. (21) also indicated that the alkali extract of ficus *Albizia lebbeck* scored the highest percentage of mortality of eggs *M. domestica* at a concentration of 10 mg/ml as it reached 90.0%, followed by the alkali extract of leaves 83.6% and then seeds 62.3%. Whereas (22) the phenolic compounds of the tobacco plant *Nicotiana tabacum* were superior to the Destruction of *Bemisia tabaci* whitish eggs, as the rate of decomposition reached 44.67% over the alkaloids compounds. (23) indicated the presence of compounds similar to the hormone compounds of the boy's hormone and other substances that interfere with fetal development when treating eggs early in the postpartum period, and reported that they affect the movement of the fetus inside the egg, blastokinesis. Or, the cause of the loss may be due to the harmful effect of the extract on the embryos inside the egg and led to the hatching of weak larvae that die as they emerge from the egg (22) The reason for the difference in the percentage of loss may be due to the difference in the different active substances in plants and the accumulation of these substances in the gut, in this regard (24) indicated that the epithelial cells of the central digestive tract of insects contain a group of enzymes Microsomal oxidase enzyme and their function is to remove the toxic effect of natural compounds in plants and that Any compound that affects these enzymes leads to their death, that the effect of phenolic compounds may be due to its containment of tannins, as they are water-soluble flavonoid polymers produced in the gaps of the plant cell and are toxic to insects, where they are associated with saliva and digestive enzymes, including trypsin and chymotrypsin, and then inhibit them and thus Insects begin to lose weight and then die (25).
Table (1) The effect of raw alkaline extract of the tested plants on the percentage leading to the loss of *M.domestica* eggs.

| Plants              | Percentage of Mortality (%) | Plant impact rate |
|---------------------|-----------------------------|-------------------|
|                     | 0.0 | 2.5 | 5   | 10  | 50  |             |
| *C. colocynthis*    |     |     |     |     |     |             |
|                     | 16.60 | 32.50 | 42.41 | 47.66 | 66.93 | 41.22 |
| *R. sanctus*        |     |     |     |     |     |             |
|                     | 16.60 | 43.34 | 49.78 | 56.23 | 80.87 | 49.36 |
| *L. barbarum*       |     |     |     |     |     |             |
|                     | 14.76 | 31.12 | 41.81 | 47.05 | 63.68 | 39.68 |
| Concentration rate  |     |     |     |     |     |             |
| Alkalin extract For |     |     |     |     |     |             |
| plants              | 15.98 | 35.65 | 44.66 | 50.31 | 70.49 |       |

LSD 0.05 The average effect of alkaline extract concentration on plants = 2.07

For Bilateral interference = 3.59
3-2 The effect of Crude alkalin extract of the tested plants on the percentage of mortality of the larval phases of the *M. domestica*

Table (2) shows the effect of extracts of raw alkaline compounds on the annihilation of the three larval phases of the housefly. *R. sanctus* the best among plants was to give the highest mortality for the three larval stages and for all concentrations used in the experiment, as it reached 90.00%. Also, the alkaline extract of *R. sanctus* and *L. barbarum* plants at a concentration of 20 mg / ml scored a 90.00% mortality rate for all larval stages. Compared to the bitter melon, which recorded a mortality rate of 85.56%, 90.00%, and 90.00% for the three phases, respectively, and with the same concentration, compared to the control that reached 8.61%, 14.76%, 18.44%. This is confirmed by the results of the statistical analysis through the effect of plants, that the highest percentage of mortality of the larval phases of the *M. domestica* was from the share of *R. sanctus*, which was superior to that of *C. colocynthis* and *L. barbarum*, respectively. Statistical analysis also confirmed through the rate of the larval phasing effect that the percentage of loss for the first phase was significantly higher than the rate of loss for the second phase, which in turn outperformed the percentage of death for the third phase. The results of the statistical analysis also showed the bilateral interaction between the factors of the experiment, that the alkali extract of the *R. sanctus* plant was better than that of the *C. colocynthis* and the giants in increasing the percentage of perennial annihilation of the fly larvae. In general, we note that the alkaloids extracts of the tested plants were the highest in the percentage of perishing of the larval stages, and this explains that the plant extracts may contain compounds that have the ability to spread and penetrate through living tissues (26) or the plant extract may affect through contact with the surface of the body so that it penetrates the chemical compounds of Kotkal The insect through the elastic areas causing paralysis and then death (18). The chemical compounds found in plant extracts are phenols, alkaloids, tannins, turbines and volatile oils and they have a negative impact on the physiological processes in insect bodies, especially in the larval phases.
The difference of plants in causing different rates of perishing may be due to the variation in their chemical components, which may be effective inhibitors or feeding stimuli, and sometimes the insect is attracted to an undesirable substance because the substances affecting within the food components may not be perceived by the insect because the concentration of its vapor may not be sufficient and effective. On the olfactory response of the insect among (30), the phenolic extract of bitter melon fruit *C. colocynthis* was superior to the alkaline extract in the events of the highest mortality ratios of larvae of the fly insect *Sarcophaga haemorrhoidalis*. By combining it with fats, which are the main material for the release of energy with small amounts of carbohydrates, or it may be due to the effect of toxic substances on the hardening of kytolalk by its effect on the Tyrosinase enzyme or the deposition of these toxic substances on the wall of the body and thus affecting the respiratory openings in the wall, which prevents Gas exchange (31), or the reason for these decay may be that plant extracts work to inhibit the enzymes responsible for the representation of toxic substances and thus increase the ability of these toxins in their effect to reach the goal.
Table (2) The effect of Crude alkalin extract on the larval phases of the Miscanthus in different concentrations (Mg/ML) of the plants

| Plants         | Consenatrion Mg/ML | The rate of larval phasing effect (B) |
|----------------|--------------------|--------------------------------------|
|                | 0.0                | 2.5                                  | 5          | 10         | 20         |                 |
| C. colocynthis | 18.44              | 20.99                                | 25.09      | 45.06      | 90.00      | 38.56         | 43.07         |
|                | 14.76              | 20.62                                | 23.57      | 31.15      | 90.00      |                 |               |
|                | 8.61               | 18.75                                | 21.46      | 29.29      | 85.56      |                 |               |
| R. sanctus     | 19.89              | 24.05                                | 26.75      | 48.79      | 90.00      | 40.68         | 38.06         |
|                | 18.44              | 22.51                                | 25.40      | 33.96      | 90.00      |                 |               |
|                | 14.76              | 19.09                                | 22.10      | 32.13      | 90.00      |                 |               |
| L. barbarum    | 18.44              | 22.51                                | 25.40      | 47.32      | 90.00      | 38.16         | 36.27         |
|                | 16.60              | 20.80                                | 23.64      | 32.23      | 90.00      |                 |               |
|                | 12.92              | 18.91                                | 21.86      | 30.76      | 90.00      |                 |               |
| Concentration rate Alkalin extract For plants | 15.87 | 20.91 | 23.91 | 36.74 | 89.50 | C = 2.77 |                 |
| LSD 0.05       |                    |                                     |            |           |           | A= 1.24       | B = 1.26      |
|                |                    |                                     |            |           |           | ABC = 8.33    |               |

The rate of larval phasing effect (B)
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