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EFFICIENCY OF COLD AQUEOUS AND ALCOHOLIC EXTRACT OF NERIUM OLEANDER L. FLOWERS. IN THE CONTROL OF THE SUNN INSECT HEMIPTERA : SCUTELLERIDAE) EURYGASTER MAURA (GEOFFROY) ON THE WHEAT CROP IN BABYLON GOVERNORATE

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Abstract: The study aimed to know the effect of cold aqueous and alcoholic extract of oleander flowers. Nerium oleander L. on adults and nymphs of Sunnite. The results of the study showed the superiority of the alcoholic extract compared to the aqueous extract, where the alcoholic extract gave the highest death rate of 83.3% at a concentration of 30 mg/ml during a period of 5 days compared to the aqueous extract which gave a death rate of 80.0% at a concentration of 30 mg / ml during the same period for adults. The results also showed the effect of both alcoholic and aqueous extract on the second nymphal stage, as it gave the highest mortality rate of 100.0 at a concentration of 30 mg/ml during a period of 1 day. As for the effect of the extracts on the fourth nymphal phase, both alcoholic and aqueous extracts gave the highest mortality rate of 100.0% during the 7-day period for both extracts.

Keyword: sunn insect, wheat, oleander

1. Introduction

Wheat Triticum aestivum L is one of the main cereal crops that is of great importance in the world, whether in terms of the cultivated area or economic importance, as it represents the main component of human food throughout the ages, as it provides the adult person with more than 25% of his protein needs [1] and 50% of its need of carbohydrates . During the growing season, the wheat crop is exposed to great economic losses due to being infected with a number of pests that differ in their rates of damage that they cause. One of the most important of these economically important pests is the Eurygaster Maura (Linnaeus) sunn insect belonging to the family Scutelleridae of the Hemiptera order, and its damage is represented in feeding nymphs and adults on the leaves Stems and grains, and yield losses as a result of direct feeding range between 90-50% [2] . The severity of the infestation of the sunn insect affects the ratio of starches to proteins of the components of the bean, and thus the total components of the dough and the activity of the amylase enzyme, yeast activity and fermentation time in dough produced from wheat flour infected with sunn pest, which contain protease enzymes, are affected by a decrease in the production of primary metabolites (carbon dioxide and ethanol) as well as secondary metabolites (glycerol, acetic acid, and succinic acid)[3] . Sunn insect infestation affects the structure of the protein network surrounding the starch

granules, as this network is destroyed due to the activity of protease enzymes resulting from the insect infestation, and it gives a sticky dough with a weak and heterogeneous gluten network and thus poor technological specifications [4] mitigating the impact of sunn pest infestation on the technological and rheological properties and specific gravity of wheat grains was studied by mixing it with healthy grains [5]

. For this reason, attention has been drawn in recent research to find alternative methods for the use of chemical pesticides, and the most important method is biological control [6] . The fungi and plant extracts are good means of control in this field (.The use of plant-based pesticides represented by plant extracts as effective and successful natural control methods against insects because they have low toxicity to the plant and the lack of resistance so far [7] as it is characterized by many desirable characteristics such as rapid decomposition, being sensitive to light, heat and moisture, and turning it into non-toxic materials and not polluting the environment . Among those plants used in this field are Sisymbrium irio and Silybum marianum. The effectiveness of the aqueous extracts of the studied plants has been tested on different insects. [8] reported that the extracts of oleander stems, leaves and flowers have an inhibitory effect on feeding the larvae of the cotton nut Earias insulana.

Therefore, the research aims to study the effect of the alcoholic and aqueous extract of oleander flowers and its use as an alternative to pesticides in controlling the sunn pest.

2. Materials and Methods

Insect collection and breeding method

The whole winter sunnah was collected from the places of its dispersal inside the plant Imperata cylandrice, which is located on the shoulders of the waterways in the palm groves in the province of Babylon, where the sorrel plant is the secondary host for the wintering of the sunn bug in the middle Euphrates region. The insects were collected at different stages during the months of August and September and October 2021 and March 2022. The insects were then transferred to the laboratory, where they were raised on wheat by planting Barcelona-class wheat seeds on sandy soil inside plastic containers with dimensions of 35 x 25 x 18 cm, according to what [9] and continued The process of watering the seeds every three days using a hand sprinkler. When the plant reached a length of 3-10 cm, 30 insects were placed inside each plastic container, with 15 males and 15 females. The males were distinguished from the females by noting the last abdominal ring, where they are divided in the female and not divided in the male According to [10] . The open end of the containers was covered with two layers of boring with holes 2 mm in diameter and secured with a rubber band to prevent insects from escaping. Use a 100 watt electric lamp for the purpose of obtaining a light period of 16 hours. The insect was diagnosed by Assistant Professor Dr. Hana Hani Abdul-Hussein/Natural History Museum and Research Center/University of Baghdad.

Oleander samples collection and diagnosis.

The flowers of the oleander plant were collected from different places in Babylon Governorate during the month of October, 2021 and then diagnosed by Assistant Professor Dr. Khansa Rashid

Majid, Head of the Department of Botany and Environment at the Natural History Research Center and Museum/University of Baghdad, and they were placed on pieces of cloth in a dark room to prevent them from being exposed. After drying, it was ground using an electric mill for the purpose of using it in the work of extracts in subsequent experiments.

Preparation of plant extracts:

Preparation of aqueous extract of oleander flowers. Nerium oleander L

Prepare cold water extract of oleander flowers. N. oleander L according to the method [11] and modified from [12] 10 gm of oleander flower powder was taken and placed in a 500 ml glass beaker containing 200 ml cold distilled water. The plant material was mixed with a magnetic stirrer for a period of time. 15 minutes, then leave the solution for 24 hours (to obtain a better extraction) after covering it tightly to avoid the entry of impurities. The solution was filtered with a piece of tampon for several times and the filter was taken. After that, the foreign matter was deposited using a Centerifuge centrifuge at a speed of 3000 rpm for ten minutes. The filtrate was dried with an electric oven at a temperature of 45-40°C for the purpose of obtaining the dry dregs, which was kept in small, tightly closed glass bottles after recording their weight while they were empty and kept in the refrigerator until use.

For the purpose of estimating the biological activity of the cold water extract, (5) gm of dry residue was taken for each extract and dissolved in 100 ml of distilled water, so that the concentration of the basic solution (Stuck Solution) became 50 mg/ml, or equivalent to 5%, and concentrations of (10, 20, 30) mg/ml, and the control treatment was distilled water only.

Preparation of alcoholic extract of oleander flowers. N. oleander L

The method of (Harborn, 1984) was followed in preparing the alcoholic extract by taking a weight of 10 gm of dry matter powder of oleander flowers. N. oleander L was placed in the extraction device (Soxolate appratory) and 200 ml of ethyl alcohol was added to it and extracted for 24 hours at a temperature of 45 °C. The extracted sample and the container were focused on the raw extracted materials of plants, the process was repeated several times to obtain a sufficient amount. The material was dried in the electric oven at a temperature of 45-40 °C˚ Then the dry dregs were taken and placed in airtight glass containers with known weight and kept in the refrigerator until use. For the purpose of determining the biological activity of the crude alcoholic extract of oleander flowers, 4 gm of dry residue was taken for each extract separately. It was dissolved in 5 ml of ethyl alcohol and 3 ml of the diffuser, then the volume was completed to 100 ml with distilled water, and the concentration of the basic solution became 4%, or equivalent to 40 mg/ml and concentrations (10, 20, 30) mg/ml were prepared from it. The control treatment was 5 ml of ethyl alcohol and 3 ml of the diffuser, then the volume was completed to 100 ml of distilled water for the alcoholic extract and distilled water only for the aqueous extract.

Insect Roles Treatment

Effect of concentrations, type of extract and time periods of cold and alcoholic aqueous extract of oleander flowers. N. oleander L in the decimation of adults Sunnite in vitro.

A number of adult insects raised in the laboratory were taken for the purpose of conducting experiments on them and placed in Petri dishes. In each dish, five adults were used. Concentrations of 10, 20, 30 mg / ml of cold aqueous extract of oleander flowers were used, with three replicates for each treatment. The treatments were sprayed with a small hand sprayer. Capacity of 100 ml until complete wetness, in addition to the control treatment that was sprayed with distilled water for the aqueous extract, distilled water 95% and ethyl alcohol 5%. Then the treated insects were transferred to plastic containers with dimensions of 18 x 12 x 6 cm perforated with their lids and branches of wheat were placed for feeding purpose and they were changed Every three days to ensure continuous feeding of the insect, this experiment was conducted in laboratory conditions with a temperature of 5 ± 25 ° C and a relative humidity of 5 ± 75. The deaths were followed up after 1, 3, 5, 7 cumulative days of treatment.

Effect of concentrations, type of extract and time periods of cold and alcoholic aqueous extract of oleander flowers. N. oleander L in the decimation of second-stage nymphs of Sunn insect in the laboratory.

Five nymphs of the second instar were taken to a petri dish with a diameter of 9 cm for the purpose of treating them with the cold aqueous extract of oleander flowers. Three replicates were used for each concentration of 10, 20, 30 mg/ml. The lids of the dishes were punctured with a sterile needle (needle) for the purpose of ventilation and placed for feeding. Wheat branches were added to water to prevent drying, and the branches were changed every three days to ensure continued feeding of the insect The experiment was conducted in laboratory conditions at a temperature of 5 ± 25 ° C and humidity of 5 ± 75 The mortality rate of treated nymphs was calculated after 1, 3, 5, 7 days of treatment .

Effect of concentrations, type of extract and time periods of cold and alcoholic aqueous extract of oleander flowers. N. oleander L in the decimation of the fourth instar nymphs of the Sunn insect in the laboratory.

Five nymphs of the fourth instar were taken to a petri dish with a diameter of 9 cm for the purpose of treating them with the cold aqueous extract of oleander flowers. Three replicates were used for each concentration of 10, 20, 30 mg/ml. The lids of the dishes were perforated with a sterile needle for the purpose of ventilation and branches were placed for feeding them. Wheat was added to water to prevent drying, and the branches were changed every three days to ensure continued feeding of the insect. The experiment was conducted in laboratory conditions at a temperature of 5 ± 25 ° C and a humidity of 5 ± 75. The mortality rate for treated nymphs was calculated after 1, 3, 5, and 7 days of treatment.

Statistical analysis

The data experiments were analyzed according to the factorial experiment model and a completely randomized design (C.R.D) using the Leas torial t significant difference test (L.S.D) under the probability level (0.05) to indicate the significance of the existing differences. The percentage of mortality was corrected according to Abbott's equation (Abbott, 1925).

Corrected loss percentage =((comparison treatment in loss % - treatment in loss %))/((comparison in loss % - 100))x 100

The corrected values were converted to angular values that are not included in the statistical analysis (Al-Rawi and Khalaf Allah, 2000). The statistical program (SAS) Statistical Analysis System (2012) was used in the statistical analysis.

3. Results and Discussion

Effect of concentrations, type of extract and time periods of cold and alcoholic aqueous extract of oleander flowers. *N. oleander* L in the decimation of adults Sunnite in vitro.

It was found from the study and as shown in Table (1) that the aqueous and alcoholic extract of oleander flowers had a significant effect on the death rate of sunn bug adults, as the alcoholic extract in relation to the type of extract factor achieved the highest death rate of 44.6% compared to the cold water extract in which the percentage reached The mortality rate reached 39.9%. As for the effect of the concentrations, the studied results showed that the cold aqueous extract was superior to the alcoholic at the concentration of 30 mg / ml, which gave a death rate of 70.0%, while the alcoholic extract gave a death rate during the same concentration of 59.0%, and the results showed a difference Significant between the average effect of the concentration for both extracts, while the lowest mortality rate for both alcoholic and cold aqueous extracts was 42.9 and 50.0%, respectively, at a concentration of 10 mg/ml. Compared with the concentration of 0 mg / ml represented by the comparison treatment, the mortality rate in both alcoholic and cold aqueous extracts was 8.3 and 0.0%, respectively. As for the average effect of the time periods, the 7-day period gave the highest mortality rate of 53.1% and the lowest mortality rate was in the 1-day period, which amounted to 22.5%. The time period is 1 day. The present results show that the type and concentration of the extract and the time period have an effect on the mortality rate of adult insects. This is consistent with the study conducted by [10] the effect of the extract type factor had a significant effect on the mortality rates, as the boiled water extract showed the highest mortality rates of 50.33% compared to the mortality rates that were achieved in the cold water extract, which was 38.99%. While the factor of the concentrations used showed a significant effect on the mortality rate of sunn adults, as the concentration 5% showed the lowest mortality rate, which amounted to 37.79%, compared to the concentration 10%, which had a mortality rate of 51.53%. The interaction of the three factors, namely the type of extracted plant, the type of extract and concentration, had a significant effect on the mortality rates of adults, as the interaction treatment between boiled water extract and huwayra plant and concentration 10% showed the highest mortality rate, which reached 72.41% compared to the lowest percentage of death in the water extract. Cold and galangal plant and the concentration is 5%, reaching 26.66%. The results are in agreement with the study conducted by [11] The percentage of death increased with the increase in concentrations of the extracts, as well as the percentage of death increased with the increase in the time period. Of the treatment for ethyl alcohol, ethyl acetate and hexane compared with (0.00)%

in the control treatment to reach 41.15), 48.85 and 52.78%) respectively after (72) hours and for the same concentration (20) mg / ml and the treatments compared with (8.85) In the comparison treatment, it is also noted from the results that there are significant differences between the types of extracts with the superiority of hexane extract, followed by ethyl acetate and then ethyl alcohol. [14] indicated that an increase in the concentration of neem seed oil causes an increase in the rates of death of second-stage nymphs for two types of aphids: from the green peach

M. persicae **and a lettuce insect** ***Nasonovia ribisnigri*** **(Mosley).**

This effect may be more effective after treating the insect for somewhat spaced intervals, and this is consistent with what was found [15] as he confirmed that there are significant differences when comparing between the period of 24 and 48 hours, respectively. This is inconsistent with the study conducted by [16] where the ethyl alcohol extract of the Datura plant exceeded the rate of the death rate of the larval stages of the house fly *M.domestica* compared with the extract of ethyl acetate and hexane,

Table (1) Effect of concentrations, type of extract and time periods of cold and alcoholic aqueous extract of oleander flowers. ***N. oleander*** **L in the decimation of adults Sunnite in vitro.**

Extract type	Concentration mg/ml	Percentage of loss during the time period (day)				Concentration Effect Rate	Effect rate of extract type
		1	3	5	7		
Alcoholic extract	0	0.0	0.0	13.3	20.0	8.3	39.9
	10	13.3	46.7	53.3	58.3	42.9	
	20	26.7	53.5	50.0	66.7	49.2	
	30	20.0	66.7	83.3	66.7	59.2	
water extract	0	0.0	0.0	0.0	0.0	0.0	44.6
	10	33.3	46.7	60.0	60.0	50.0	
	20	33.3	53.3	73.3	73.3	58.3	
	30	53.3	66.7	80.0	80.0	70.0	
Impact rate of time periods		22.5	41.7	51.7	53.1		
L . S . D0.05	For extract type = 4.10, for concentrations = 5.80, for periods = 5.80, for overlap = 11.59						

Effect of concentrations and periods of cold and alcoholic aqueous extract of oleander flowers. ***N. oleander*** **L in the decimation of second-stage nymphs of Sunn insect in the laboratory.**

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The results in Table (2) show that there are significant differences between the rate of effect of the type of extract, where the results showed the superiority of the alcoholic extract over the cold aqueous extract, which gave a death rate of 78.5%, while the cold aqueous extract gave a death rate of 73.8%. As for the average effect of concentrations, the results showed that there was a significant difference between the concentrations of both extracts, where the concentration of 30 mg / ml gave the highest mortality rate of 100.0% in both alcoholic and cold water extracts, and it was significantly superior to all studied concentrations, while the concentration of 0 mg / ml gave the lowest comparison treatment. The mortality rate was 33.3% for the alcoholic extract and 6.7% for the cold aqueous extract. As for the average effect of the time periods, the current results showed that there were no significant differences between the studied periods, as the time period of 7 days gave the highest rate of death of 82.5%, while the time period of 1 day gave the lowest death rate of 63.3%, while periods of 3 and 5 days gave a death rate of 63.3%. 78.6 and 80.0%, respectively. As for the results of the interaction, the current results showed that both alcoholic and aqueous extracts gave a high mortality rate for the second nymphal phase, where the cold alcoholic and aqueous extract at a concentration of 30 mg / ml gave a death rate of 100.0% in the period of 1 day, while the other studied concentrations gave a death rate It varies according to what is shown in the table below, while the concentration 0 mg / ml represented by the comparison treatment gave the lowest mortality rate of 20.0% during the period 1 day for the alcoholic extract, while it was in the cold aqueous extract 0.0%. The current results show that the type of extract had an effect on the percentage of death . It agrees with the study conducted by [17] that the hexane extract of the jasmine plant *C. inerme* was superior in some aspects of the life performance of *Musca domestica* and significantly in its effectiveness compared to the extracts of ethyl acetate and ethyl alcohol. [18] also showed that the use of 11 types of plant extracts against the egg, nymph, and adult stages of the strawberry nipple was the weakest of the first nymph stages. The results of the study show that the cause of deaths in the nymph treated with plant extracts is the ability and membrane of the protenase channel of the extracted substances to inhibit the feeding of the insect through its effect on an enzyme as well as reducing the levels of sugar and total protein hemoly from the middle digestive Midgut

Table (2) Effect of concentrations and periods of cold and alcoholic aqueous extract of oleander flowers. *N. oleander* L in the decimation of second-stage nymphs of Sunn pest in the laboratory.

Extract type	Concentration mg/ml	Percentage of loss during the time period (day)				Concentration Effect Rate	Effect rate of extract type
		1	3	5	7		
Alcoholic extract	0	20.0	33.3	33.3	46.7	33.3	78.5
	10	66.7	100.0	100.0	100.0	91.7	
	20	66.7	88.9	100.0	100.0	88.9	
	30	100.0	100.0	100.0	100.0	100.0	

water extract	0	0.0	6.7	6.7	13.3	6.7	73.8
	10	73.3	100.0	100.0	100.0	93.3	
	20	80.0	100.0	100.0	100.0	95.0	
	30	100.0	100.0	100.0	100.0	100.0	
Impact rate of time periods		63.3	78.6	80.0	82.5		
L . S . D0.05	For extract type = 4.71, for concentrations = 6.66, for periods = 6.66, for overlap = 13.32						

Effect of concentrations and periods of cold and alcoholic aqueous extract of oleander flowers. *N. oleander* L in the decimation of the fourth instar nymphs of the Sunn insect in the laboratory.

Table (3) shows that there are significant differences between the rate of effect of the type of extract, where the results showed the superiority of the alcoholic extract over the cold aqueous extract, which gave a death rate of 61.0%, while the cold aqueous extract gave a death rate of 51.5%. As for the average effect of the concentrations, the current results showed that there were significant differences in the effect of the concentrations, as the concentration of 30 mg / ml of the alcoholic and cold water extract gave the highest death rate of 80.6 and 73.3%, respectively, and the lowest death rate was at concentration 0 mg / ml, which reached 21.7 and 11.7 While the concentrations of 10 and 20 mg/ml for the alcoholic extract gave a mortality rate of 68.9 and 73.1%, respectively, and 51.2 and 69.6%, respectively, for the cold aqueous extract. As for the average effect of time periods, the results show that there are significant differences, as the time period of 7 days gave the highest mortality rate of 74.5%, and it differed significantly with all time periods 1, 3 and 5 days, and the death rate was 41.7, 48.1 and 60.7%, respectively. As for the results of the interaction, there were significant differences in the percentages of mortality, where the concentration of 30 mg / ml during the time period of 7 days gave a death rate of 100.0% for both extracts, while the lowest percentage of death was at the concentration 0 mg / ml represented by the comparison treatment during a period of 1 day that amounted to 0.0 % for both extracts. The present results show that the percentage of mortality increases with the increase in concentration and time period, as well as the type of extract. The present results showed the superiority of the alcoholic extract over the cold aqueous extract of oleander flowers. It agrees with the study conducted by [20] the effect of the concentration of the extract type on the percentage of death of southern epidemic, as the concentration showed the lowest death rate in all extracts of 25.0% if the percentage of death in the alcoholic extract was 26.67, 23.33 and 21.67% compared to concentration 1% It was 80, 70 and 55 % for hot pepper extract. The superiority of the alcoholic and aqueous extract of oleander flowers in their effect on the treated roles under study is due to

the fact that they contain active substances such as steriods glycosides such as Nirin, Nirianthin and Oleandrin.

Active compounds similar to those found in chemical pesticides and these are toxic, repellent or anti-nutrition, which affect the absorption of food from the gastrointestinal tract leading to its destruction [20]

It is also due to the degree of polarity of the solvents and the quality of the chemicals it extracts. For example, ethyl alcohol extracts tannins, phenols and alkaloids, and hexane extract extracts fatty compounds and volatile oils, and ethyl acetate extracts alkaloid compounds and multiple phenols, as these substances are considered very effective [21]

Table (3) Effect of concentrations and periods of cold and alcoholic aqueous extract of oleander flowers. *N. oleander* L in the decimation of the fourth instar nymphs of the Sunn insect in the laboratory.

Extract type	Concentration mg/ml	Percentage of loss during the time period (day)				Concentration Effect Rate	Effect rate of extract type
		1	3	5	7		
Alcoholic extract	0	0.0	20.0	26.7	40.0	21.7	61.0
	10	53.3	58.3	75.0	88.9	68.9	
	20	53.3	66.7	83.3	88.9	73.1	
	30	66.7	66.7	88.9	100.0	80.6	
water extract	0	0.0	13.3	13.3	20.0	11.7	51.5
	10	46.7	41.7	50.0	66.7	51.2	
	20	53.3	60.0	73.3	91.7	69.6	
	30	60.0	58.3	75.0	100.0	73.3	
Impact rate of time periods		41.7	48.1	60.7	74.5		
L . S . D0.05	for extract type = 4.77, for concentration = 6.74, for periods = 6.74, for overlap = 13.49						

Conclusions:

1 - The results showed the effect of alcoholic and cold aqueous extracts of oleander flowers on the roles of the insect treated laboratory and gave a high death rate, and showed the superiority of the alcoholic extract over the cold water to a small degree.

2- The results showed that the lifespan of the nymph of the insect was affected and did not show a high resistance against the extracts, and the death rate was high when treated with the extracts. As for the adults, its resistance was higher than that of the nymphs towards the extracts.

3- The results showed that high concentrations had a high rate of death when treating adults, but when treating nymphs, all concentrations gave a good killing rate.

Recommendations:

1 - Through the current results, we recommend the use of extracts from the flowers of the oleander plant, depending on the results achieved in destroying the various roles of the insect.

2- We recommend the use of the cold aqueous extract as it gave good results in destroying the roles of the insect, as well as being less expensive when used and easy to use by farmers and in less time.

3- Reducing the use of pesticides, as they are harmful to the environment and beneficial insects, and their cumulative effect on humans when eating treated crops, as well as their direct impact when spraying them on plants.

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