



Study of the effect of the ethyl alcohol extract of leaves *Carissa macrocarpa* in the control of the green peach *Myzus persicae* in vitro

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Received: Aug. 3, 2022	Abstract The current study evaluated the efficacy of ethyl alcohol extract in the plant leaves of <i>Carissa macrocarpa</i> in the control of green peach aphid <i>Myzus persicae</i> in vitro. The results showed the effect of using different concentrations of the ethyl alcohol extract of the plant leaves of <i>C. macrocarpa</i> on the mortality average rate of nymphs and adults of green peach aphid <i>M. persicae</i> in the laboratory, as the highest mortality rate on the nymphs and adults reached 64.11% and 53.56% at the concentration of 100 mg/ml, respectively, while the lowest mortality level was 54.11% and 32.78% at the concentration of 50 mg/ml, respectively. There were significant differences in the mortality rate.
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Introduction

Cucumis sativus L. is one of the most important summer vegetable crops in Iraq and widespread in the world. It belongs to the Cucurbitaceae family. Cucumbers are cultivated in Iraq in open fields in two (spring and autumn) plots. Likewise, they are grown in the protected environment under tunnels and greenhouses, and glass houses, the statistics of the device indicated. The Central Bureau of Statistics indicated that the area planted with cucumbers for the year 2014 amounted to 82,218 dunums and a yield of 56,334 tons. The cucumber crop is affected by many pests, including the green peach aphid *Myzus persicae* of the order Hemiptera that infects this crop due to its direct feeding on it through its piercing and absorbent mouth parts by sucking the vegetable juices from leaves, buds, and flowers, causing leaves to curl or twist and stop their growth, and to the secretion of aphids. Honeysuckle covers the surfaces of infected plants, on which black mold fungi grow [1]. Botanical insecticides are one of the available alternatives methods that have shown effectiveness in controlling insect pests due to their properties such as their high toxicity to pests because they contain compounds similar to those found in manufactured pesticides, as well as their rapid decomposition and not leaving residuals in the environment [2]. Because the *C. macrocarpa* plant contains effective compounds, it was chosen to study the ethyl alcohol extract on the green peach aphid *Myzus persicae* *Aphis fabae* [3].



Materials and Methods

Collection, diagnosis, and breeding of the insect

An insect of green peach aphid, *Myzus persicae*, was collected from the cucumber crop in Babylon Governorate, Al-Musayyab project area on 15/11/2021. Leaves infected with green peach were taken in nylon bags and diagnosed by the Museum of Natural History, after which it was bred and multiplied on plates prepared for this purpose. They were also cultured in the laboratory according to the Jabri method (1985) in an incubator with a temperature of 25 ± 1 °C to obtain the colony and use it in subsequent laboratory experiments.

Plant sample collection

The leaves of the *C. macrocarpa* plant were collected from the gardens of the Musayyib Technical College, as well as from some home gardens. These leaves were washed with running water to remove the dust, and then the leaves were dried in a place away from sunlight to preserve the substances contained in this plant from volatilization. After drying, these leaves were ground to obtain a fine powder; the powder was preserved in special boxes and placed in the refrigerator for use in subsequent experiments. The plant was diagnosed in the Natural History Museum.

Lab experiments

Preparation of the ethyl alcohol extract of the plant leaves of *Carissa macrocarpa*

The extract of ethyl alcohol was prepared from the leaves of the *Charisia* plants. 10 gm of leaf powder was taken and placed in a Saxolith extractor, then 200 ml of ethyl alcohol was poured, and the extraction continued for the plant sample for 24 hours. Then the filtrate was taken and concentrated in a rotary evaporator at a temperature of (40-45) C, then dried. The sample was heated in an electric oven at a temperature of (40-45) °C [4]. The effect of alcoholic *Charisia* extract was tested according to the method of Al-Rubaie [5]., where 2 grams of dry matter extracted with ethyl alcohol were taken and dissolved in 3 ml of ethyl alcohol, and the volume was completed to 100 ml of distilled water so that the stock solution became 2% or equivalent to 20 mg/ml and from the base solution. Then the following concentrations were prepared (30, 20, and 10) mg/ml, while the control treatment was 3 ml of ethyl alcohol, and the volume was filled with 100 of distilled water. Efficiency test of the alcoholic extract of the plant leaves of *C. Macrocarpa* in vitro performance of adults and nymphs of green peach aphid *M. persicae*.

Plastic bottles were used, in each of which a sterile filter paper was placed on top of the filter paper. The leaves of the cucumber plant were wrapped with sterile cotton pieces to keep the cucumber leaf moist to feed the aphid. 10 adults and nymphs were placed in each repeater, with 3 replicates for each concentration (30, 20, 10) %.



Replicates with extract concentrations were sprayed as a comparison treatment with distilled water at the rate of 1 ml refined, then the bottle mouth was covered and surrounded by a rubber band to prevent the exit of the treated aphids and transferred to the incubator at a temperature of $(25\pm 2^\circ)$ C and relative humidity of $65\pm 5\%$ [6]. The mortality rate for adults was recorded after 24, 48, and 72 hours.

Statistical analysis

The results of the study were analyzed according to the factorial experiment model and with a completely randomized design factorial for laboratory experiments. The Least significant difference (L. S. D.) test was used under the probability level of 0.05 to test the significance of the results. The percentage of fatalities was corrected according to the Abbott Formula [7].

Results and Discussion

The effect of using concentrations of ethyl alcohol extract of *C. macrocarpa* leaves on the rate mortality of green peach nymphs, *M. persicae*

The results of Table (1) showed the effect of using different concentrations of the ethyl alcohol extract of the plant leaves of *C. macrocarpa* on the mortality average rate of green peach nymphs, *M. persicae* in the laboratory. Where the highest mortality rate reached 64.11% at the concentration of 100 mg/ml, while it was the lowest mortality rate was 54.11% at the concentration of 50 mg/ml and with clear significant differences. The results showed that the highest mortality rate for the interaction reached 71.67% at the concentration of 100 mg/ml after 120 hours, while the lowest mortality rate was 49% at the concentration of 50 mg/ml after 24 hours table (1) a direct relationship between the concentration and the percentage of loss, as well as the case for the periods. The reason for the increase in the death rate is because the extract of the leaves of the charisia plant contains effective compounds such as (glucoside, terpenoids, and phenols) [8].

This study agrees with what was stated by Redman [9]. that nymphs are more sensitive than adults because they are in the stage of development, which facilitates the penetration of the pesticide or extract into the insect's skin. This study agrees with Hatem [10]. who found that the organic extracts (ethyl alcohol, ethyl acetate, and hexane) of the leaves of the *C. macrocarpa* plant showed significant differences between the concentrations of the extracts and the comparison treatment.

Table (1): the effect of different concentrations of ethyl alcohol extract of the *C. macrocarpa* plant leaves on the mortality rate of green peach nymphs, *M. persicae*

Concentrations mg/ml	Periods/hour			Concentration rate
	24	72	120	
50	49.00	55.00	58.33	54.11
75	56.67	63.33	67.67	62.56
100	57.67	63.00	71.67	64.11
Comparison	0.33	2.33	4.33	2.33
average days	40.92	45.92	50.50	
L.S.D	2.12	1.06	time periods 1.22	concentrations interfere

The results of Hamza's study [11]. showed that the superiority of ethyl alcohol extract of *Lantana camera* to *Cinnamomum zeylanicum* extract with a concentration of 1.5% on nymphs of *Aphis fabae*, which gave a mortality rate of 40.0% in the fourth nymph after 24 hours, while the comparison treatment was which amounted to 3.3% for the same time.

The laboratory study was conducted by Alhatab [12]. also showed that the use of ethyl alcohol extract of the leaves of the night alum plant *L. Mirabilis jalapa* on a corn aphid *Rhopalosiphum maidis* showed the effectiveness of the extract on nymphs and adults, where the mortality rate was 54.8% and 46.9% at a concentration of 20 mg/ ml compared with 6.1 and 12.3% in the control treatment after 48 hours, respectively of treatment. Effect of using alcoholic extract concentrations of the plant leaves of *Carissa macrocarpa* on the rate of laboratory mortality of green peach adults, *Myzus persicae*. The results of Table (2) showed the effect of using different concentrations of the ethyl alcohol extract of the plant leaves of *C. macrocarpa* on the mortality average rate of adults of green peach aphid *M. persicae* in the laboratory, where the highest mortality rate reached 53.56% at the concentration of 100 mg/ml, while it was the lowest mortality rate was 32.78% at the concentration of 50 mg/ml with clear significant differences. The results showed that the highest mortality rate for the interaction reached 60.00% at the concentration of 100 mg/ml after 120 hours, while the lowest mortality was 30.00% at the concentration of 50 mg. / ml after 24 hours. The reason may be attributed to the increase in the mortality rate of green peach insects for extracts of ethyl alcohol because they contain effec-

tive compounds similar to those found in pesticides, which affect the absorption of food from the gut, leading to the insect's death [13].

Table (2): the effect of different concentrations of ethyl alcohol extract of the *C. macrocarpa* plant leaves on the rate of laboratory fatality of green peach adults, *M. persicae*

Concentration s mg/ml	Periods/hour			Concentrati on rate
	24	48	72	
50	30.33	31.67	36.33	32.78
75	40.00	43.67	48.33	44.00
100	47.33	53.33	60.00	53.56
Comparison	1.00	3.33	2.33	2.22
average days	29.67	33.00	36.75	
L.S. D	to 2.38	1.37 r periods	1.19 concentrations	interfere

This study agrees with what was stated by Hatem [14]. that the effective effect of the ethyl alcohol extract on the leaves of the plant *C. macrocarpa*. It was also clear by the increase in the concentrations and the effective period of those extracts in the death of adult green peach insects in vitro, reaching 26.07% after 24 hours of treatment at the highest concentration of 20 mg/ml compared with 0.00% in the control treatment, and then increased to 35.22% for the same extract and after 72 hours of treatment compared to 6.15% in the control treatment.

In this study, the alcoholic extract of *C. leaves* showed its effect on the different stages of the green peach aphid *M. persicae*. Moreover, the effectiveness of the alcoholic extract of the *C. macrocarpa* plant, effective on the green peach aphid, by increasing the concentrations used and the period of exposure.

References

- 1) Abbott, (1925). A method of computing the effectiveness of an insecticide. J. Econ. Entomol. 18: 65-67.
- 2) Al-azzawi, abdullah falih. (1980). General applied entomology, department of plant protection/college of agriculture/university of baghdad, mosul university press, p.191.



- 3) Alhatab, a.s. (2019).test of the extract of leaves plant mirabilis jalapa l. To use as a natural insecticide against rhopalosiphum maidis(fitch). International conference for sustainable agricultural development. Vol.33 no. 1(b).
- 4) Al-hattab, ahmed saeed (2008). A comparative study on the effect of some pest control methods used in integrated control management on some aspects of the life performance of the green peach aphid myzus persicae (sulzer) (homoptera: aphididae) master's thesis / college of agriculture / university of kufa. 65 pages.
- 5) Al-rubaie, hadi mazal (1999). The effect of extracts of daturainnoxat plant on some aspects of the life performance of the house fly muscadomestica l. Ph.d. Thesis university of babylon / college of science 126 pages.
- 6) Central statistical organization (2014). Statistical group issued by the central statistical organization annually. The republic of iraq.
- 7) Hamza, abbas ghanem. (2017). Efficacy of some alcoholic extracts, boiled and cold water of cinnamomum zeylanicum and lantana camera l. Cinnamon aphis fabae in resistance to the black bean insect. Kufa journal of agricultural sciences, 9 (1): 123-134.
- 8) Hatem, riam bassem (2020). Evaluation of the efficacy of the plant extract of charissa and the fungal filtrate trichoderma harzianum in controlling green peach insect master thesis, al-furat al-awsat university / al-musayyib technical college, 64 p.
- 9) Jabri, naseer mikhail. (1985). Biological and ecological study of the green peach myzus persicae (sulzer) in iraq. Master's thesis / college of agriculture / university of baghdad, 75 pages.
- 10) Ladd, j. L.; jacobson, m. And buriff, c. R. (1978). Japanese beetles extract from neem tree seeds as feeding deterrents. J. Econ. Entomol. (71): 810-813.
- 11) Metspalu l.; hiiesaar k.; joudu, j .and kuusik, a.(2001b). The effects of certain toxic plant extracts on the larvae of colorado potato beetle leptinotarsadecemline-ala (say. Institute of plant protection, estonian agriculture university.93-100.
- 12) Mohmed a s. (2019). Evaluation of the crude phenolic and terpenoid extracts of carissa macrocarpa against aphis fabae scopoli (hemiptera: aphididae) in-vitro. Journal of biopesticides, 12(1):72–75.
- 13) Rahman, s; biswas, s. K.; barman, n. C. And ferdous, t. (2016). Plant extract as selective pesticide for integrated pest management. Biotec.res. j.2(1):6-10.
- 14) Redoan, a. C.; carvalho, g.a.; cruz, i.; figueiredo, m.l. And silva, r.b. (2010). Effect of insecticides used in maize (zea mays l.) On nymphs and adults of doru luteipes (scudder) (dermaptera: forficulidae) in semi-field condition. Revista brasileira de milho e sorgo, 9(3):223-235.