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Effect of Oleander Leaf extract on adult aphids Mortality under laboratory conditions

Author : Osama ghazi abbas ,Department of life science ,collage of pure science , Almutana university

E.mail: Asama.khazi@mu.edu.iq

Abstract

This study aimed to evaluate the efficiency of the oleander *Nerium oleander* leaf extract on adult aphids in laboratory conditions as an alternative to chemical pesticides. The insects were collected from various plants from the city of Al-khaddar Al -Muthanna governorate-Iraq ,they reared and raised inside in laboratory prior to the experiment, the plant extract was prepared from oleander leaves, three concentrations (20%,25%and30%) by using (one, two and three sprays and we used a distiller water was used as a witness in this experiment the mortality rate was recorded after exposure to the sprays between 24 and 48 hours . the results showed , a significant increasing in adult aphids mortality rates was observed with increasing number of sprays . while time had more significant impact than concentration .A significant difference were observed after 48 hours compared to 24 hours , particularly at a25% concentration. In contrast , the control treatment showed limited mortality rates during both exposure periods. There results indicate that oleander leaf extract is effective against adult aphids ,and the exposure duration and spray frequency are crucial factor in enhancing its effectiveness . Thus supporting its inclusion in integrated

Keywords : aphids , oleander ,bio control , plant extract .

Introduction

Aphids one of most Important insect on agricultural economics , because of its feeding on the military substance in the plants and consequently on the product and her potential on transmit viruses and fungus that make her ability foe product weak

(BLACKMAN&EASTOP,2000VAN,Edman &Harrington.2017). chemical control have good results from a different perspective quickly death , speed work , the development of insect resistance to the pesticides .killing other living organisms out of target in the soil , and the health risks to the human (Desenex .,2007) . In this challenges ,human society tried to find different solutions that avoid using toxic pesticides(Benel,g.,pavela.,2016) The best one of these was extracts of plants for her potential and her directly effect on the insect by through expulsion , discouragement and killing . with reduced negative effects on plant ,human and soil (Isman,2006;regnault roger et al.,2012) The Ornamental plants which is considered one of the sources that gave positive results . Although of these plants have chemical compounds have many useful effect on multiple pests of microbiology and insects still remained of limited use in insect control ,that Couse low chemical concentration of active compounds , legislative and regulatory challenges eta. (Wink,2015) .Oleander is one of the plants with high activity of glycoside and phenolic compounds that showed toxic effects on the many of organisms including

insects.

(Cheeke,1998;Longford&boor.1996).Many researches pointed that plant extract have differences in their effect on organism .this due to preparation method , extract constriction ,insect type and insect stage. (Pavela&Benelli.,2016).In a context under taken by HENEIDY by using plant extract comprising with pesticide on aphids and whiteflies , the results showed that plant extract can be useful chemical command in control these insect (EL-HENEIDY ET AL.,2019) in the same context by using *N.tabacum* and *A.indica* to control *Callosobruchus maculatus* and the experiment gave positive effectiveness as alternative to chemical pesticides (Rasheed et al., 2024)in a study in which castor oil was used on number of eggs and emerging from the seeds the results gave us important information about using this extract on the grain beetle (Taimur &Abduljabar.,2023)In Iraq there is a study about using extracts from aquatic plant to control flour beetle and sedges, the extract yielded good mortality rates for these beetles .(Osman &alhaj.,2019) Aljuouri conducted research prove at using wheat husks ,it can reduce grain beetle .(Aljubouri et al.,2012) the same happy researcher “Khaled” did a study on using extract plants can be so useful by increasing the concentrations used to get rid of bean pests .(Khaled.,2020) At the university of Aleppo prove that the extracts of aquatic plants have a high toxicity capabilities on the death of insects (HUDA Hallak .,2013) And on the

mosquitoes, some of researchers have used extracts at specific concentrations on the different stages of mosquito life and the experiment showed a variation in concentration levels depending on the type of concentration.(Fatehia .,2019) However in a comparative study on the effectiveness of the extract with pesticide against whiteflies the practical experience proved beneficial a high control and less damage comparative with pesticide in control this insect (Hanaa et al.,2025).

The objective of this study was to evaluate the effect of oleander (Nerium oleander) Leaf extract on the mortality of adult aphids under laboratory conditions, with particular emphasis on the influence of different spray cycle frequencies on insect response. The study aimed to assess the potential of the extract as a botanical control agent within an integrated pest management approach.

Materials and methods

The samples were collected from an area in the city of AL-KHDER in the samawa plain with barley , these insects were placed in a petri dishes inside the laboratory and placed a number of green leaves so that they can be fed and live inside the dishes , the insects were preserved under standard laboratory conditions :temperature 25 degrees and while maintaining exposure to light for extended periods (Mpchiah et al.,2011)

source of leaf plant

The samples (Nerium oleander leaves)collected from the garden of the college of pure science which were uncontaminated and unaffected by insect infestation or other pollutants . leaves were washed and cleaned and dry it from the water ,leaves was cut by using clean scissors and placed inside its casing , add a proportion of water with 1:10 methanol to the chopped leaves at room temperature with periodic shaking for 24 hours . The mixture is filtered by using filter paper to remove the residue and leave it at low temperature to obtain a crude extract . IT was stored inside glass bottles at 5 Celsius (AL-MAZRA AWE,2019).

designing the experiment and application

The design used randomized complete blocks with three replicates per transaction , the experimental unit was a petri dish containing a host plant and the insects ,on each Petridis placed 9 insects . The concentrations of (20-25-30) % of the plant extract were used , with (one –two and three) sprays . sprays it by using a sterile hand sprayer . the transactions included witnessing with distilled water(Dader,2016)

Data analysis : the data were recorded after 24 hours number of dead and live insects . the adjusted mortality rate was calculated using Abbott (1925) the data were subjected to statistical analysis using spss software and the differences were analyzed using analysis of variance

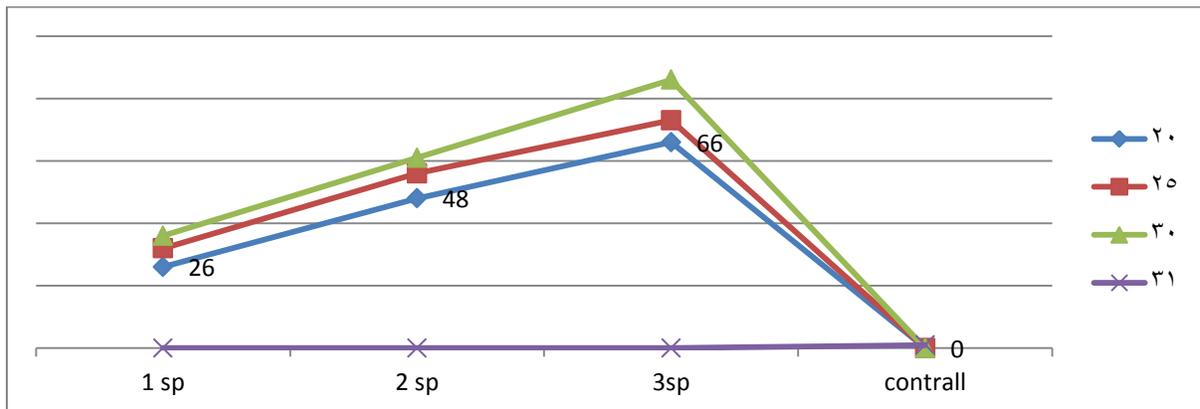
. The studied pest is characterized by its small size, rapid reproduction, and high ability to absorb plant sap, leading to weakening of infected plants, distortion of their growth, transmission of some pathogens, and causing significant agricultural losses in crops.

The results showed the effect of using oleander leaf extract is evident in causing varying rates of mortality in adult aphids ,during the 24 hours exposure period .the recorded data exhibited that the effectiveness of the plant extract increased with the increased in the number of sprayers ,while the different concentrations(20,25and30%) did not show greater differences in mortality rates compared to the effect of the number of sprays .

Result

table 1:the percentage of Mortality rates of adult aphids after 24 hours from spraying operation .

number of sprays	25%	20%	30
1 spray	30	26	34
2 spray	56	53	59
3spray	84	80	87
Control	0	0	11



Shape : The effect of concentration level and time on mortality rate in 24 hours

The second results table it indicate significant differences emerged based on the amount of time that has passed over

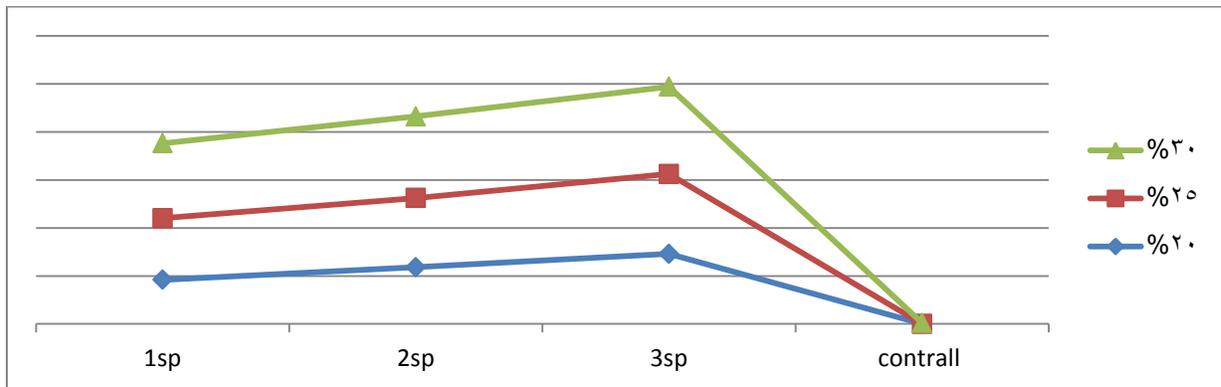
the insects within 48 hours ,with the same concentrations(20,25and30%) and

number of sprays (1,2 and 3) remaining

constant .this is what the results show .

Table 2 : the percentage of Mortality rates of adult aphids after 48 hours from spraying operation .

number of sprays	30%	25%	20%
1 spray	78	62	48
2 spray	85	73	61
3spray	95	81	73
Control	11	0	0



Shape : The effect of concentration level and time on mortality rate in 48 hours

Discussion

The results of this study showed that extract of oleander leaf exhibited significant effectiveness against adult aphids , death rate increased with the number sprays and the duration of exposure , while the effect of

concentration was less pronounced compared to the effect of time factor .results from 24 hours showed moderate death rate while results from 48 hours revealed significant difference confirming that time is crucial factor in

determining the efficacy of the plant extract .

It was observed that repeated spraying directly contributed to increased mortality proportion , with the three spray treatment obtaining the highest values in both exposure time spans . this is attributed to the cumulative effect of the active secondary compounds found in oleander leaves .like alkaloids, cardiac glycosides and flavonoids, which require time and repeated exposure to disrupt the insects physiological processes (isman 2006)noted that the efficacy of plant extract is often cumulative and depends more on the duration and frequency of exposure than solely on increasing concentration .

Results also pointed that concentration in 25% exhibited significant difference after 48 hours compared to 24 hours making it a high effective and important concentration may be more efficient than moderate concentration in some cases , due to the balance between the amount of active ingredient and its rate of absorption within the insect's body .this find aligns with pavela's (2011) assertion that moderate concentration of plant extract may produce a better insecticidal effect than high concentration.

Regarding the time factor , the results after 48 hours showed a significant increase in mortality rates compared to 24 hours in all treatment , indicating that the plant extract requires sufficient time to exert its full effect (koul et al.,2008) demonstrated that many plant extract do

not cause immediately insect death but rather act gradually by disrupting nutrition or causing malfunction in the nervous or respiratory system which explain the apparent increases in mortality over time .

In contrast , the control treatment showed very low mortality rates during both exposure periods, which can be attributed to natural factors such as stress or laboratory handling . this confirms that the deaths recorded in the other treatment resulted from the effect of the plant extract and not from the experimental conditions .(Abbott.1925) emphasized the necessity of control to correct the results and rule out natural mortality when evaluating the efficacy of insecticides .

The results of this study are consistent with those of (Ahmed et al .,2019) regarding the use of plant extract against aphids . they indicated that increasing the exposure time was the most significant factor in raising mortality rates ,while the difference between concentration were less pronounced .(Salam et al.,2015) also noted that plant extract represent promising alternative to traditional chemical pesticides due to their acceptable efficacy .cumulative effect ,and reduced environmental impact .

Based on the above , it can be concluded that oleander leaf extract has high applicability in integrated aphid control programs . especially when relying on an appropriate number of applications and a longer exposure time, rather than

focusing solely on increasing concentration these results .

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