

# EFFECT OF SOME PLANT EXTRACTS ON THE POPULATION DENSITY OF *Eurytoma amygdali* AND THEIR IMPACT ON ALMOND PRODUCTION IN SULAIMANI PROVINCE

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## ABSTRACT

This study was performed in the College of Agricultural Sciences, University of Sulaimani to study the effect of some plant extracts as safe alternatives for chemical pesticides. Different concentrations of natural plant extracts of rosemary, garlic lobes and cayenne pepper were prepared and sprayed to almond orchards infected by almond fruit wasp *Eurytoma amygdali* in Iraqi Kurdistan region during 2017. Evaluation results showed the effectiveness of some plant extracts in the control of this pest in almond orchards under the conditions of this experiment, since there were significant effects of these plant extracts on the lowering of population densities existed on infected almond fruits with 1.43, 1.44 and 1.67 infected fruit due to 5% aqueous extracts of garlic, cayenne pepper and rosemary, respectively compared to control 3.35 infected fruit. These extracts also had significant effects in the decreasing of fruit infection percentages 28.726, 41.789 and 41.985% and average fruit weight losses 18.124, 25.007 and 32.517% due to using plant extracts compared to control treatments 78.849% for fruit infection percentages and 73.182% for fruit weight losses. The obvious effectiveness of garlic extract 5% was also noticed in the lowering of infection percentage, population density and fruit weight loss percentage compared to control.

**Key words:** *Eurytoma amygdali* , Plant Extracts, Population density, Weight loss and extracts activity.

**تأثير بعض المستخلصات النباتية على الكثافة العددية لدبور ثمار اللوز *Eurytoma amygdali* End. (Hymenoptera: Eurytomidae) و إنتاج ثمار اللوز في محافظة السليمانية**

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## الخلاصة

اجريت هذه الدراسة في كلية العلوم الزراعية /جامعة السليمانية وهدفت الى اختيار تأثير بعض المستخلصات النباتية كبديل امن للمبيدات الكيميائية . فقد تم تحضير تراكيز / للمستخلصات النباتية الطبيعية وهي اكليل جبل، فصوص الثوم وفلفل الحار و تم رشها في البساتين المصابة بدبور ثمار اللوز في منطقة كوردستان/ العراق تحديدا خلال عام 2017. وبينت نتائج التقييم فاعلية بعض مستخلصات النباتية لمقاومة دبور الثمار اللوز (*Eurytoma. amygdali*) على اشجار اللوز تحت ظروف التجربة الحقلية الى تأثير معنوي للمستخلصات النباتية في خفض الكثافة الحشرية على ثمار اللوز المصابة وبلغت 1.43، 1.44 و 1.67 ثمرة/مصابة باستخدام المستخلصات المائية للثوم و الفلفل الحار و اكليل جبل عند تركيز 5% على التوالي مقارنة بمعاملة السيطرة و البالغ معدلها 3.35 ثمرة/مصابة. كما ظهرت تأثيرا معنويا في خفض معدل النسبة المئوية للإصابة بالحشرة وبلغت 28.726 و 41.789 و 41.985% وكذلك معدل نسبة فقدان وزن الثمار وبلغت 18.124 و 25.007 و 32.517% عند استخدام المستخلصات المائية ، مقارنة بمعاملة السيطرة و البالغة 78,849 لنسبة الأصابة بينما بلغ مقدار نسبة فقدان الوزن 73.182%. وقد لوحظ ان تأثير مستخلص الثوم عند تركيز 5% كان واضحا في خفض نسبة الاصابة والكثافة العددية للإصابة ونسبة فقدان الوزن للثمار مقارنة بمعاملة السيطرة .

**الكلمات المفتاحية:** *Eurytoma amygdali* ، المستخلصات النباتية ، الكثافة العددية ، فقدان الوزن و فاعلية المستخلصات

## Introduction

Almond (*Amygdalus communis* L.) is economic important orchard trees, fruits contain value nutritious such as fat and proteins (1). Where in many areas, almonds are grown under dry land, this fruit is used in two stages of fresh fruit and dried nuts in the Kurdistan region. Concerning in Iraq it is cultivation is limited in the Kurdistan- region only (1, 2). According to (3) almond trees Infested by many insect pests , one of the most important pest is almond fruit wasp *Eurytoma amygdali* Enderlein (Hymenoptera: Eurytomidae). normally the pest effected on production both in quantity and quantity. The damages caused by this insect usually about 60- 95%, in unsprayed orchards the larvae bore in the kernel of the fruits (4, 5 and 6). The almond fruit wasp has a single host plant which is almond tree( 7). (8) observed that the first emergence of adult wasps was in late March and April, which is produced a tiny circular exit hole in the mummies. These holes are the best evidence of the presence of this pest. The adults mate and the female lay eggs in the young, developing, green fruit. Normally females lay a single egg inside developing fruit near the seeds (9). The larva feeds on the embryo, and upon completing its growth, sometime in mid-summer(10 , 11 ,12,13). Botanical insecticides are kind of insecticides used in control of the pests, rapidly led to the replacement of chemical compounds (14). While (15) reported that using of extracts and pure compounds derived from different plants could control insect pests effectively without effects on the human and animal health or on the environment. Many botanical insecticides have been used for hundreds of years but recently they have been displaced by synthetic insecticides. Some plant compounds such as piretrins from (*Tanacetum cinerariifolium*), nicotine from (*Nicotiana tabacum*), and rotenone from (*Derris* and *Lonchocarpus*) were used long ago to pests control (14).

(16) investigated that the activity of aqueous extract garlic were sprayed on almond plant leaves against whiteflies to check their

insecticidal activity. The aqueous extract was treated individually as well as in different combination against whiteflies and wasps, as the dose increases, the repellent effect also increased. The use of this plant extract can control the population of serious pests like aphids and mealybugs in an environmental friendly way.

(17) indicate that the rosemary record gave a clear impact on the aphids. Where it decreased the average number of total insects, the results show that the effective influence of the prepared pesticide, it can be used with in programs to control operations to eliminate aphids.

(18 , 19) reported that the previous studies also revealed that the powders and extracts of *Capsicum* species seeds were significantly toxic to inhibited adult emergence of *Callosobruchus maculatus* and *Sitophilus zeamais* . which is the plant extracts on insect pest are being manifested in several ways, these includes altering the behavior of the insect, growth retardation, toxicity, oviposition deterrence, feeding inhibition and reduction of fecundity and fertility (20 , 21). For these reasons, alternative chemicals (biocide) for pest control are being sourced from plants (22). The objective of this study is therefore,

The objective of research is to develop alternative methods to control by repelling or killing of wasp fruit almonds , *E. amygdali* End, using plant extracts that being environmentally friendly and able to eliminate the effect of the insect.

## Material and method

The experiments were conducted on almond orchard of 1.5 hectare located in the farm Hassan Tapa of sulaimani at an altitude of 725 meter ascension sea level, and 40 kilometer from the center of the Sulaimani from April to August in 2017. Plant material (rosemary, Garlic lobe and hot pepper ) used in this study was collected at the lab Horticulture Department, in the summer of 2016, from the fields were identified by Assistant Pro. Dr. Ropak Tawfiq in the College of Agricultural Sciences / University of Sulaymaniyah

.Weighed 100 grams using an electronic balance from powdered the leaves of the rosemary (*Rosmarinus officinalis*), garlic lobe(*Allium sativum*) and fruit of hot pepper (*Capsicum annuum*). We will prepare the extracts using different techniques. The first will be dried at 40 °C in the oven before grinding them with milling machine (powder). The amount of powder mixed with the 100ml of water were calculated on weight by volume, weight of powder/volume of water( 2, 2.5 and 5)g of each grinded plant materials were soaked in 100ml of water to obtain crude extracts of three concentration levels of 2, 2.5 and 5% (w/v). Each mixture was filtered with cheese cloth after 24 hours (23 , 24) .

The adults mate and lay eggs in the young, developing, green fruit. Larvae of this wasp remain in that fruit and are therefore protected from applying contact extracts sprays. Spray applied at the beginning of the adult emergence (25). The water extracts were sprayed employment (carried) out observed after departure adults from the mummy field placed in a wooden cage (26). The knapsack

$$\% \text{ Infestation} = \frac{\text{No. of infestation fruits}}{\text{Total no. of fruits}} \times 100 \quad \dots\dots (29, 30).$$

To determine the effect of plant extracts on insect injury and weight loss percentage of dried almond fruits (infested and non-infested) at the end of the season. The percent loss in weight due to insect damage was calculated by using the following formula of

$$\% \text{ Weight loss} = \frac{\text{Average total infestation weight fruit}}{\text{Average total weight fruit}} \times 100 \quad \dots (31).$$

$$\% \text{ insecticide activity} = \left( \frac{\text{Control infestation ratio} - \text{Treatment infestation ratio}}{\text{Control infestation ratio}} \right) \times 100 \quad \dots\dots (29, 30).$$

Data analysis, the experiment was designed according to Complete Randomized Block Design ( C. R. B. D) in orchards. Three replicates were replicated and each was repeated in four experimental pieces, three extracts and three concentrate, as well as the treatment of the spray control with water only, separated from each other and each with a row of trees to avoid confusion and spread of pesticides In the course of spraying from experimental piece to adjacent experimental piece or between replicates. All data obtained were subjected to analysis of variance (ANOVA) and the mean differences were

sprayer with a capacity of 20 liters on 1/4/2017. The spray was repeated two weeks after the first spray. Beginning with the start of flowering and fruit component until the end of the season. Fruits were sampled obtain from on April 4 to August 22. On each sampling data 10 fruits were collected at random from each treatment of 20 randomly selected trees. The (fruits) samples will be kept in polyethylene bags and labeling then taken to the laboratory for testing the fruit almonds were dissected in the laboratory under binocular microscope Olympus SZ30 Stereo Microscope On LED Stand and the infested almonds were sorted on eggs, larvae, pupae of either *E. amygdali* . The morphological characteristic of the adult used to identify the *E. amygdali* Enderlein by (27) . However (28) showed that the species is recognizable both by morphological characteristics and by host: *E. amygdali* attacks only almonds. Almonds with exit holes were eliminated from the sample, then used About equation for calculated the percentage of infestation and the percentage of the extract activity (29, 30).

compared by a Duncan test using XLSTAT v.2010 software (32). Differences at  $P < 0.05$  were considered significant.

## Results

The results in Table (1) cleared that the population density of the weekly data of wasp almond fruit was fluctuated during the seasons. The population density of weekly data of almond fruit was fluctuating during the season. It was observed after the spraying process with the plant extract and with a different concentration that the infestation began to appear on the fruits affected in the

field in the first week of April to the end of the season in the last week of August, showed that the three plant water extracts used in this study showed a significant effect on the egg, larvae, pupa and adult roles. While the less water extract was rosemary at 2% concentration, each gave wasp almond fruit 2.43 fruits/infested mean of fruits and control treatment was 3.39 fruits/infested wasp almond fruit and award the concentration 5% water extract was high significant in reducing of the mean population density of infested fruits for each water extract of garlic obo, rosemary and cayenne pepper to mean of

1.43, 1.44 and 1.67 fruits/ infested respectively, while the lowest concentration effect is the concentration of extract at 2% The fruits are infested with 2.24, 2.25 and 2.43 fruits/infested for peppers, garlic and rosemary. The mean effect on the average population density of fruit infestation was 2.5%, count 1.81 and 1.89 fruits/infested for garlic and pepper extract, respectively. that comparative population was highly significant (  $P < 0.05$ ). The test for overall mean population showed that there was a highly significant difference between them.

**Table (1). Estimation of the water extracts of *Rosmarinus officinalis*, *Allium sativum* and *Capsicum annuum* on population density of the different stages of wasp almond fruit *E. amygdali* during (April - August 2017).**

| Time          | Mean numbers of the defriend stages wasp almond fruit |                    |                    |                |                    |                     |                    |                |                |              |
|---------------|---|--------------------|--------------------|----------------|--------------------|---------------------|--------------------|----------------|----------------|--------------|
|               | Water extracts  |                    |                    |                |                    |                     |                    |                |                |              |
|               | Rosemary  |                    |                    | Garlic lobe    |                    |                     | Cayenne Pepper     |                |                | Control      |
|               | 2%  | 2.5%               | 5%                 | 2%             | 2.5%               | 5%                  | 2%                 | 2.5%           | 5%             | 0 %          |
| <b>4-Apr</b>  | 2.67<br>abcd  | 3.00<br>abc        | 0.67<br>efg        | 1.00<br>defg   | 1.33<br>cdefg      | 1.00<br>defg        | 0.33<br>fg         | 0.33<br>fg     | 0.00<br>g      | 3.33<br>ab*  |
| <b>11-Apr</b> | 3.00<br>abc   | 3.00<br>abc        | 1.67<br>bcde<br>fg | 2.67<br>abcd   | 2.00<br>abcde<br>f | 1.33<br>cdefg       | 3.00<br>abc        | 3.00<br>abc    | 2.33<br>abcde  | 3.67<br>a    |
| <b>18-Apr</b> | 2.33<br>abcd<br>e                                     | 2.33<br>abcde      | 2.33<br>abcd<br>e  | 2.67<br>abcd   | 2.33<br>abcde      | 1.67<br>bcdef<br>g  | 2.33<br>abcde      | 1.67<br>bcdefg | 2.33<br>abcde  | 3.33<br>ab   |
| <b>25-Apr</b> | 2.00<br>abcd<br>ef                                    | 2.00<br>abcde<br>f | 1.33<br>cdef<br>g  | 2.33ab<br>cde  | 1.67b<br>cdefg     | 1.67b<br>cdefg      | 3.00<br>abc        | 2.33<br>abcde  | 1.33<br>cdefg  | 3.67<br>a    |
| <b>2-May</b>  | 2.33<br>abcd<br>e                                     | 2.33<br>abcde      | 1.33<br>cdef<br>g  | 2.33<br>abcde  | 1.67<br>bcdef<br>g | 1.33<br>cdefg       | 1.67<br>bcdef<br>g | 1.00<br>defg   | 2.00<br>abcdef | 3.67<br>a    |
| <b>9-May</b>  | 2.67<br>abcd  | 2.00<br>abcde<br>f | 1.67<br>bcde<br>f  | 2.67<br>abcd   | 2.33<br>abcde      | 2.00<br>abcde<br>fg | 2.67<br>abcd       | 2.00<br>abcdef | 1.67<br>bcdefg | 3.67<br>a    |
| <b>16-May</b> | 2.00<br>abcd<br>ef                                    | 2.33<br>abcde      | 1.33<br>cdef<br>g  | 2.00<br>abcdef | 1.33<br>cdefg      | 1.00<br>defg        | 2.33<br>abcde      | 2.33<br>abcde  | 1.67<br>bcdefg | 3.33<br>ab   |
| <b>23-May</b> | 3.00<br>abc   | 2.33<br>abcde      | 1.33<br>cdef<br>g  | 2.67<br>abcd   | 2.67<br>abcd       | 1.33<br>cdefg       | 1.67<br>bcdef<br>g | 2.33<br>abcde  | 2.33<br>abcde  | 3.00<br>abc  |
| <b>30-May</b> | 2.67<br>abcd  | 2.00<br>abcde<br>g | 1.33<br>cdef<br>g  | 2.67<br>abcd   | 3.00<br>abc        | 1.67<br>bcdef<br>g  | 2.67<br>abcd       | 2.00<br>abcdef | 1.67<br>bcdefg | 2.67<br>abcd |
| <b>6-Jun</b>  | 2.67  | 2.00               | 1.00               | 2.67           | 1.00               | 1.67                | 2.33               | 1.33           | 0.33           | 3.33         |

|               | abcd               | abcde<br>f         | defg               | abcd                | defg               | bcdef<br>g         | abcde              | cdefg          | fg                | ab               |
|---------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|----------------|-------------------|------------------|
| <b>13-Jun</b> | 2.33<br>abcd<br>e  | 0.67<br>efg        | 0.67<br>efg        | 2.00<br>abcdef<br>g | 1.67<br>bcdef<br>g | 2.33<br>abcde      | 3.33<br>ab         | 3.00<br>abc    | 2.33<br>abcde     | 3.67<br>a        |
| <b>20-Jun</b> | 2.33<br>abcd<br>e  | 2.67<br>abcd       | 0.33<br>fg         | 1.33<br>cdefg       | 2.00<br>abcde<br>f | 0.33<br>fg         | 2.00<br>abcde<br>f | 0.67<br>efg    | 2.00<br>abcdef    | 3.00<br>abc      |
| <b>27-Jun</b> | 1.67<br>bcde<br>fg | 2.33<br>abcde      | 1.67<br>bcde<br>fg | 2.00<br>abcdef      | 2.00<br>abcde<br>f | 1.00<br>defg       | 2.67<br>abcd       | 1.67<br>bcdefg | 1.00<br>defg      | 3.33<br>ab       |
| <b>4-Jul</b>  | 2.33<br>abcd<br>e  | 2.33<br>abcde      | 2.00<br>abcd<br>ef | 1.67<br>bcdefg      | 1.00<br>defg       | 1.00<br>defg       | 1.00<br>defg       | 1.33<br>cdefg  | 2.33<br>abcde     | 3.00<br>abc      |
| <b>11-Jul</b> | 2.00<br>abcd<br>ef | 2.00<br>abcde<br>f | 1.33<br>cdef<br>g  | 2.00<br>abcdef<br>g | 1.00<br>defg       | 1.00<br>defg       | 2.67<br>abcd       | 1.33<br>cdefg  | 1.33<br>cdefg     | 3.33<br>ab       |
| <b>18-Jul</b> | 2.00<br>abcd<br>ef | 2.33<br>abcde      | 2.33<br>abcd<br>e  | 1.00<br>defg        | 1.67<br>bcdef<br>g | 1.33<br>cdefg      | 2.33<br>abcde      | 1.33<br>cdefg  | 1.00<br>defg      | 3.00<br>abc      |
| <b>25-Jul</b> | 1.67<br>bcde<br>fg | 3.00<br>abc        | 1.33<br>cdef       | 3.00<br>abc         | 1.33<br>cdefg      | 2.00<br>abcde<br>f | 2.00<br>abcde<br>f | 2.33<br>abcde  | 1.33<br>cdef      | 3.67<br>a        |
| <b>1-Aug</b>  | 2.67<br>abcd       | 2.00<br>abcde<br>f | 1.67<br>bcde<br>fg | 2.33<br>abcde       | 2.00<br>abcde<br>f | 1.33<br>cdefg      | 2.00<br>abcde<br>f | 2.33<br>abcde  | 1.33<br>cdefg     | 3.33<br>ab       |
| <b>8-Aug</b>  | 3.00<br>abc        | 2.67<br>abcd       | 1.67<br>bcde<br>fg | 2.67<br>abcd        | 2.67<br>abcd       | 1.67<br>bcdef<br>g | 2.33<br>abcde      | 2.00<br>abcdef | 2.67<br>abcd      | 3.67<br>a        |
| <b>15-Aug</b> | 2.67<br>abcd       | 2.33<br>abcde      | 2.00<br>abcd<br>ef | 2.67<br>abcd        | 1.67<br>bcdef<br>g | 1.67<br>bcdef<br>g | 2.67<br>abcd       | 2.67<br>abcd   | 2.00<br>abcdef    | 3.33<br>ab       |
| <b>22-Aug</b> | 3.00<br>abc        | 2.00<br>abcde<br>f | 1.33<br>cdef<br>g  | 3.00<br>abc         | 1.67<br>bcdef<br>g | 1.67<br>bcdef<br>g | 2.00<br>abcde<br>f | 2.67<br>abcd   | 2.00<br>abcdef    | 3.33<br>ab       |
| <b>Mean</b>   | <b>2.43</b><br>c   | <b>2.27</b><br>c   | <b>1.44</b><br>a   | <b>2.25</b><br>c    | <b>1.81</b><br>b   | <b>1.43</b><br>a   | <b>2.24</b><br>c   | <b>1.89</b> b  | <b>1.67</b><br>ab | <b>3.35</b><br>d |

\*Number with the same letters within each column or row are not different significantly by Duncan Multiple Range Test ( $P \leq 0.05$ ).

Table (2) Show that the best effect in reducing the percentage of weight loss and a percentage of the infestation of the almond fruit infested by wasp almond fruit after processing spray treatment of water extraction plant on the almond trees of end season produce . as a excellence extract with a 5% garlic extract, was the percentage of infestation 28.726%, the weight loss was reduced to % 18.124 Generally, there were significant differences ( $P \leq 0.05$ ) among sapling

dates in which highly mean of infestation percentage, while treatment control was a percentage of infestation was 78.849% and the percentage loss was 73.182% but it was the least influential extract the other parameter rosemary a percentage infestation was 58.651% concentration a 2%, impact not significant to the treatment of control was 78.849% by reducing the weight loss was 42.687% Statistical analysis confirmed form the availability of the differences significant

between the effect of interaction between the each.  
water extracts and concentrations are used for

**Table 2. Effect of (water) aquatic extract of some plants of means percentage infestation fruits and the percentage of weight loss on the different stages of wasp almond fruit *E. amygdali* in the almond fruits treatment on the orchard during (April - August 2017).**

| Treatments            | Concentration % | Mean weight-Total /g | Mean weight - non-infest/g | Mean weight-Infest./ g | Percentage of infestation | Percentage of weight loss |
|-----------------------|-----------------|----------------------|----------------------------|------------------------|---------------------------|---------------------------|
| <b>Cayenne Pepper</b> | 2               | 7.511 c              | 1.480 bc                   | 3.740 abc              | 51.568 bc                 | 49.585 ab*                |
|                       | 2.5             | 10.630 b             | 2.147 ab                   | 3.502 abc              | 46.151 bc                 | 34.679 bc                 |
|                       | 5               | 13.559 a             | 2.308 ab                   | 3.261 bc               | 41.789 bc                 | 25.007 bc                 |
| <b>Lob Garlic</b>     | 2               | 14.519 a             | 1.974 ab                   | 5.684 a                | 50.123 bc                 | 39.017 bc                 |
|                       | 2.5             | 12.820 ab            | 2.268 ab                   | 3.374 abc              | 42.425 bc                 | 28.843 bc                 |
|                       | 5               | 13.513 a             | 2.879 a                    | 2.252 c                | 28.726 c                  | 18.124 c                  |
| <b>Rosemary</b>       | 2               | 7.268 c              | 1.647 bc                   | 3.033 bc               | 58.651 ab                 | 42.687 bc                 |
|                       | 2.5             | 10.274 b             | 1.879 ab                   | 3.755 abc              | 53.726 abc                | 39.400 bc                 |
|                       | 5               | 10.475 b             | 2.314 ab                   | 3.049 bc               | 41.985 bc                 | 32.517 bc                 |
| <b>Control</b>        | 0               | 6.285 c              | 0.853 c                    | 4.709 ab               | 78.849 a                  | 73.182 a                  |

\*Number with the same letters within each column are not different significantly by Duncan Multiple Range Test ( $P \leq 0.05$ ).

The results indicated in Table (3) indicate that the general mean of percentage of infestation activity and treatment a decreased in the season during 2017 percentage of infestation of the wasp almond fruit from 28.726, 41.789 and 41.985% as a result of treatment with plant extract , Concentration of 5% for each treatment Garlic, Pepper and Rose Marie had a

percentage of activity of extracts 63.568, 47.001 and 46.753 %, Respectively, compared to the concentration treatment of 2% Rose Marie, Pepper and Garlic decreased the efficacy of the extract to 25.616, 34.599 and 36.432% and the proportion of infestation increased 58.651, 51.568 and 50.123%, respectively(table3 )

**Table (3) Average of infestation percentage and percentage of plant extracts activity in the control of wasp fruit almond during (April- August 2017).**

| Characters    | Water extracts |        |        |             |        |        |                |        |        |
|---------------|----------------|--------|--------|-------------|--------|--------|----------------|--------|--------|
|               | Rosemary       |        |        | Garlic lobe |        |        | Cayenne pepper |        |        |
|               | 5%             | 2.5%   | 2%     | 5%          | 2.5%   | 2%     | 5%             | 2.5%   | 2%     |
| Infestation % | 41.985         | 53.726 | 58.651 | 28.726      | 42.425 | 50.123 | 41.789         | 46.151 | 51.568 |
| Control %     | 78.849         | 78.849 | 78.849 | 78.849      | 78.849 | 78.849 | 78.849         | 78.849 | 78.849 |
| Activity %    | 46.753         | 31.862 | 25.616 | 63.568      | 46.195 | 36.432 | 47.001         | 41.469 | 34.599 |

## DISCUSSION

Protecting the fruits of green almonds in field and markets away from chemical pesticides and no infestation of fruits . Fruits of almonds, we thought using a healthy plant extract. Field

experiments with almond fruit showed that the plant extracts of Rosemary, Garlic lobe and Cayenne Pepper, alone or in combination, have insecticidal properties to maintain lower population densities , Percentage of infestation and Percentage of weight loss of wasp almond

fruit. composite drimonepolygodial water extract pepper from more component inhibitor antifeedant which tested successfully in the field , (33). The effect may be due to extracts contain Toxicant or Antifeedant and Repellent Thus causing insects to starve for not feeding on treating fruits(34). The “hotness” in some species of the plant genus Capsicum. American Environmental Protection Agency registered capsaicin is currently for use as an insect repellent and toxicant (35). (36) revealed that aqueous garlic bulb extracts on cowpea compared with the untreated control, significantly reduced the populations of the *Maruca vitrata* and *Clavigralla tomentosicollis*. (37) reported the garlic oil as the most effective deterrent against *Callosobruchus maculatus* on cowpea with 100% oviposition deterrent index. Similar results were obtained with (16 and 38) who found that the garlic bulb extract in combination with other extracts effectively reduced aphids and whiteflies infesting several crops. maintain (39) that they were concentration plant extracts increased agent caused the repellent or insecticidal activity also increased in proportion with time increase.

## CONCLUSIONS

Different extracts levels of the Our data show that there is protection against almond orchards against *E. amygdali* with organic remedy. They are using plant extracts of rosemary, garlic lobe and Cayenne Pepper against possible insecticide. However, it is important to note that the first adult appearance of cages including, mummy fruit field in order to apply the treatment at optimal time, to protect the use of fresh and green fruits and prevent infested. From statistical analysis, It is deduced from the current study the possibility of using plant extracts (due to its cheapen and availability) without the boiling point of the studied plants in abundance at the Kurdistan Region and the introduction of these extracts within the botanical extracts control programs of this insect to be an easy way to manage the pest and protect the green almonds fruits or reduce

the damage caused by infestation. Further studies are required to test their insecticidal activity on other orchards damaging insects.

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