



ORIGINAL ARTICLE

A STUDY OF THE ANNUAL PRESENCE, NUMERICAL DENSITY, AND SENSITIVITY OF DATE PALM CULTIVARS TO INFECTION WITH *JEBUSAEA HAMMERSCHMIDITI* (COLEOPTERA: CERAMBYCIDAE) IN SOUTHERN IRAQ.

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Abstract

The results of the study showed that the full insects of the long-horned palm stem borer appeared in Basra province during the month of May 2020, with numbers of 60 adults / 3 traps, when the average temperature was 30.41 °C and the average relative humidity was 33.88% While the first appearance of adult insects was recorded in Maysan province during the month of May 2020, with numbers of 33 adults / 3 traps, and the average temperature was 34.68 m° and the relative humidity was 24.06%, and that the peak activity of the insect in Basra province was in June 2020, and the number of insects that were caught was 186 Adult/3 trap The average temperature was 36.49 °C and the relative humidity was 19.96%. While the highest peak of adult insects in Maysan province reached 147 adults / 3 traps during the month of June, when the average temperature was 35.85 °C and the relative humidity was 13.80%, and regarding the sensitivity of different species to the insect infection. The results indicated that there was an effect of the cultivar in determining the incidence of infection among the different cultivars included in the study, with significant differences. Where the cultivar Osta Omran (Sayer) ranked first in terms of the number of holes, which numbered 145 holes / 10 palm trees, then the Al-khudarawi cultivar 122 holes / 10 palm trees, the Kantar cultivar 115 holes / 10 palm trees, and the Dairy cultivar 104 holes / 10 palm trees and Shukr cultivar 96 holes / 10 palm and Al-Zuhdi cultivar 64 holes / 10 palm trees and Abdul Hadi cultivar 55 holes / 10 palm trees and Al Maktoum cultivar 47 holes / 10 palm trees and Al-Barhi 20 holes / 10 palm trees and finally the cultivar Brim 10 holes / 10 palm trees.

Introduction

The date palm (*Phoenix dactylifera* L.) is the lady of the trees. It belongs to the palm tree Arecaceae family and it is one of the most important trees and has a great position among the trees. We find it mentioned in all the heavenly books. Countries in the cultivation and production of dates in the world

and the first documented appearance of date palms in the ancient world in the far south of Iraq in 4000 BC (Ibrahim 2008,). The *Jebusea hamerschmidtii* borer is considered one of the most important and dangerous diggers that infect palm trees in all its cultivation areas. Where it was found that the insect prefers to infect the old and neglected palms, and the insect prefers to infect the lower third of the trunk. The larvae are the harmful stage and dig tunnels in the bases of the fronds and then move towards the base of the tree, And repeated infections from one season to another lead to weak trees and low production, and trees are vulnerable to breakage, and the infection of this borer prepares palm trees to infect other insects, especially borers belonging to the genus *Oryctes*, which prefer to live on the droppings of the stem borer with Palm stem Borer *Jebusaea hamerschmidtii* (Kinawy, 2005; Khieralla et al. , 2015). The insect is one of the economically important insects that cause economic losses in palm trees, in addition to causing a gradual deterioration in palm trees and considering the insect one of the pests for which annual control must be conducted to reduce its damage and protect palm trees from the deterioration it causes (Al-Saadi, 2019). The increase in problems resulting from the infection of palm borers, especially the long-horned palm stem borer, in recent years is striking, and the damages and heavy losses and their destruction of large numbers of palm trees and their economic importance in Iraq and in the south, This study aimed to conduct a field survey and calculate the infection rate of the *Jebusaea hamerschmidtii* and calculate the annual presence, numerical density, and sensitivity of different date palm cultivars to the insect infestation in Basra and Maysan province in southern Iraq.

Materials and methods:

Annual presence and population density of the *Jebusaea hamerschmidtii* :

The annual presence and numerical density of the *Jebusaea hamerschmidtii* was studied in the province of Basra and Maysan by studying the average of numbers for the species of the genus for a full year from January 2020 until December 2021, using solar-powered light traps, in which the lighting process is automatic, starting with lighting at sunset and extinguishing with the appearance of the first light in the morning the next day in this study, three traps were used for each province, where the location in each province was chosen on the basis of the presence of light traps and the distance between one trap and another. The location was chosen in Basra province, in the Shatt Al-Arab district, which was planted with different types of date palms, and the location of Maysan province was located in the district of the Center, which was planted with different types of palms. The readings were taken every 30 days, and the adults that were caught were collected in plastic containers, and the complete data was recorded on them and transferred to the laboratory for the purpose of calculating the numbers and calculating the relative presence and sexual percentage.

Sensitivity of palm cultivars to the infection of the *Jebusaea hamerschmidtii* :

An orchard area of 60 dunams was chosen in the center of Maysan province, planted with different types of date palms. 10 palm trees of each cultivar were randomly selected and of similar ages, and tests were conducted for each tree from ground level to four meters high (Al-Saadi, 2019). The places of infection were identified, which are the regular circular holes that represent the exit holes of adults, in addition to the mucilaginous secretions on the affected palm stem (Kanawi, 2005; EL-shafie and Mohammed, 2016) and to calculate the number of holes in the circumference of the leg, this experiment was conducted during the month of June of the year 2020.

The relationship between the age of palm trees and the infection of borers of the genus *Oryctes* and *Jebusaea hammerschmidtii* :

A palm orchard with an area of (25) dunams was chosen, located in Maysan province, the center of Al-Amarah District, Al-Saniyah region, planted with different types of palm trees.

at different ages, in addition to the presence of a number of jujube trees and the area between the trees, they are planted with seasonal vegetable crops. The study included four categories of ages (Dhiab et al., 1975), which are:

- 1- Palm seedlings less than 5 years age.
- 2- Palm trees less than 10 years age.
- 3- Palm trees less than 20 years age.
- 4- Palm trees over 20 years age.

15 palm trees were chosen for each of the above categories, and based on the experience of the owner of the orchard, the ages of the different categories were determined and the experiment was conducted during June of 2021. Depending on the appearance of the infection of each type of borer, the infected trees were identified, and the number of infested palms was calculated to the total number of palms, the infection percentage was calculated.

Results and discussion :

Study of the annual presence and numerical density of *Jebusaea hammerschmidtii* in Basra and Maysan province:

The results of the study of the annual presence and numerical density of *Jebusaea hammerschmidtii* in the provinces of Basra and Maysan showed Table (1) Where the emergence of adults in Basra province during the month of May 2020, with numbers of 60 adults / 3 traps, when the average temperature was

30.41 m° and the average relative humidity 33.88%, while the first appearance of adult insects was recorded in Maysan province during the month of May 2020 with numbers of 33 adults / 3 trap had an average temperature of 34.68°C and a relative humidity of 24.06%. Then the number of adult insects began to increase until they reached their peak in Basra province in June 2020, and the number of insects caught was 186 adults / 3 traps, and the average temperature was 36.49 °C and the relative humidity was 19.96% While the highest peak of adult insects in Maysan province reached 147 adults / 3 traps during the month of June, when the average temperature was 35.85 °C and the relative humidity was 13.80%. After that, the number of adult insects began to decline Where 20 adults / 3 traps were recorded in Basra province in July 2020, when the average temperature was 37.65 °C and the relative humidity was 26.56% While the number of adults caught in Maysan province reached 7 adults / 3 traps in July, when the average temperature was 37.04 °C and the relative humidity was 43.95%, and this was the last appearance of adult insects in Maysan province. The last appearance of adult insects was recorded in Basra province in September 2020, and the number of adult insects was 3 adults / 3 traps, when the average temperature was 36.90 °C and the relative humidity was 20.35%. From the study, it is clear that the insect *Jebusaea hammershmiditi* has one generation per year and that there is a fluctuation in the insect population during the months in which the adult insects were present between the province of Basra and Maysan with significant differences between the months , Also, the presence of adult insects in Basra province continued until September 2020, and (Alousuf et.al,2020) indicated that the activity of the long-horned palm stem borer in Basra province is between May - September, While the adult insects were present in Maysan province until July 2020, this may be due to the influence of environmental factors, especially the monthly temperature factor, which has a significant impact in determining the dates of the emergence of adult insects, as the appearance escalates with the rise in temperature and with the rise in temperature, the emergence is faster. Determining the date of the emergence of adult insects is one of the basic things in determining the timing of insect control programs through conducting chemical control and setting up and operating light traps in order to target adults and prevent them from laying eggs and thus reduce the amount of damage they cause to palm trees. In light of the foregoing, it is noted that there are significant differences between the numbers of insects in the two governorates, and the results of Table (2) indicate that there is a difference in the number of adults caught in Basra province, higher than those caught in Maysan province, which amounted to 280 adults/season. While the number of insects amounting to 187 adults/season in Maysan province, as well as the table shows that there is a disparity and difference between the numbers of females and males, and this results in a difference in the sexual ratio of the insect in both provinces Where the sex ratio was female: 0.79 males and 1:0.68 males in Basra and Maysan, respectively. As for the relative presence of the species *Jebusaea hammershmiditi* , It is clear from Table (2) that the relative presence is equal in both province, where the relative presence was recorded at 99.99%, and that the

presence of the insect with these numbers in Basra and Maysan , It may be due to the fact that most of the palm groves in them are characterized by very long ages, in addition to the neglect these trees suffer from, the lack of continuous control operations, in addition to drought. These combined factors, in addition to the influence of other environmental factors, led to the weakness of palm trees and made them vulnerable to various pests. Qenawi, 2005 indicated that the insect prefers to infect the neglected date palm, and that the infection percentage increases with increasing humidity. As for the discrepancy in the number of adult insects between the governorates of Basra and Maysan, it may be due to the difference in the number of palm trees, where Basra province has more palms than Maysan province. As for the difference in the sexual percentage of the insect, it is due to the nature of mating and the occurrence of the fertilization process. Also, the difference in the date palm cultivars is one of the reasons that lead to the difference in the sexual percentage in addition to the influence of various environmental factors.

Table (1) Population density of adults of the long-horned palm stem borer in the province of Basra and Maysan adult / 3 trap:

average	month					province
	September	August	July	June	May	
280	3	11	20	186	60	Basra
187	0	0	7	147	33	Maysan

L.S.D for province (7.12), for months (11.26), and for interaction (15.92)

Table (2) Number of adults of *Jebusaea hammershmiditi* and the relative presence in Basra and Maysan province:

Relative Presence	Sexual percentage	Male	Female	total insects	province
% 99.99	1:0.79	156	124	280	Basra
% 99.99	1:0.68	111	76	187	Maysan

Sensitivity of different cultivars to the infection of *Jebusaea hammershmiditi*:

The results of the study that was conducted to determine the sensitivity of different cultivars of palm trees to borer infection in Table (3) indicates that there is an effect of the cultivar in determining the rate of infection among the different cultivars included in the study with significant differences. Where the cultivar Osta Omran (Sayer) ranked first in terms of the number of holes, which numbered 145 holes / 10 palm trees, then the khadarawi cultivar 122 holes / 10 palm trees, the Kantar cultivar 115 holes / 10 palm trees, and the Dairy cultivar 104 holes / 10 palm trees and Shukr cultivar 96 holes / 10 palm and

Al-Zuhdi cultivar 64 holes / 10 palm trees and Abdul Hadi cultivar 55 holes / 10 palm trees and Al Maktoum cultivar 47 holes / 10 palm trees and Al-Barhi 20 holes / 10 palm trees and finally the Brim cultivar 10 holes / 10 palm trees. This disparity between the different cultivars and the difference in the severity of the sensitivity of the cultivars to insect infection may be due to the composition of the trunk of the palm and the difference between the cultivars in terms of the strength and stiffness of the trunk and the fact that it contains fibers and materials that increase its hardness and make it more resistant than other cultivars or it may be due to what the cultivar contains substances that increase the food preference of the insect, such as the high content of sugary and cellulosic substances and other substances that are attractive to insects.

Table (3) Sensitivity of palm cultivars to the infection of the long-horned palm stem borer:

cultivars	Number of holes/10 palm	average
Osta Omran (Sayer)	145	14.50
Al-khudarawi	122	12.20
Kantar	115	11.50
Dairy	104	10.40
Shukr	96	9.60
Al-Zuhdi	64	6.40
Abdul Hadi	55	5.50
Al Maktoum	47	4.70
Al-Barhi	20	2.00
Brim	10	1.00

L.S.D(9.52)

The relationship between the age of palm trees and the infection of borers of the genus *Oryctes* and the long-horned palm stem borer:

The results in Table (4) indicate that the borers belonging to the genus *Oryctes* infect palm trees of different ages, and significant differences were noted between the rate of infection for trees less than 5 years age and trees less than 20 years age. Whereas no significant differences were observed between trees at the rest of the ages, and the highest infection percentage was in trees less than 5 years age and amounted to 0.733, As for the lowest infection percentage, it was for trees less than 20 years old, and it was 0.533, and the percentage was 0.667 and 0.600 for trees less than 10 years age and more than 20 years age, respectively and the results obtained indicate that the borers belonging to the genus *Oryctes* infect trees at young ages in a relatively greater manner than trees of large ages, as for the infection to *Jebusaea hammershmiditi*, The results in Table (4) indicate that the insect infects different ages and at different averages, where the highest infection percentage was in trees aged more than 20 years and less than 20 years, with significant differences from the rest of the ages, where the infection rate was 1.00 and 0.933, respectively. Where, no infection was recorded in trees less than 10 years old, and it reached

0.066 in trees less than 5 years old, and the low percentage of infection with this borer do not mean that there is no danger to the offshoots. Al-Saadi (2019) indicated that the presence of a single hole for the exit of the adult insects from the long-horned borer is sufficient to kill the vector vessels and facilitates the entry of pathogens into the inside of the seedlings, thus eliminating the offshoot, This increase in the incidence of stem borer in trees of old age and decrease in young trees ,While the high incidence of borers belonging to the genus *Oryctes* in young trees and its decrease in old trees may be due to competition between borers Whereas, the long-horned palm stem borer is the most dominant of the borers belonging to the genus *Oryctes* in older palm trees and EL-shafie, 2015 indicated that the long-horned palm stem borer prefers neglected, weak and old palms.While EL-sayed and Albrahim, 2015 mentioned that the borer belonging to the genus *oryctes* are considered one of the biggest problems in newly established palm orchards, and that one of the reasons that help in the high percentage of infection in the long-horned palm stem borer in older trees is that the more palm trees With age, its legs are weak due to the influence of environmental factors and neglect and the lack of service operations due to high altitudes and therefore easy to injure, while trees of young ages have strong stems and service operations are continuous and thus their resistance to infection is more.As for the relationship between the presence of the two types of borer at the same ages, it is noted that the infection percentage was greater in the old ages in both types, and the largest percentage of infection was in the long-horned palm stem borer, especially in the ages of more than 20 years , Where the percentage of infection was 1.000, while the percentage of borer belonging to the genus *Oryctes* was 0.600 with significant differences. However, the discrepancy confirms what Kenawy (2005) mentioned that infection with the long-horned palm stem borer facilitates infection with the borers of the genus *oryctes*, which live on the droppings of the larvae of the palm stem borer. Long-horned.

Table (4) The average infection of different borers and its relationship to the age of palm trees:

mean			tree age
average	Long-horned palm stem borer infection	Infection by borers of the genus <i>Oryctes</i>	
0.400	0.066	0.733	Less than 5 years age
0.333	0.000	0.667	Less than 10 years age
0.733	0.933	0.533	Less than 20 years age
0.800	1.000	0.600	More than 20 years
	0.500	0.633	average

L.S.D for insect type (0.13), palm age (0.19) and interaction(0.27..(

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