ISSN NO: 2771-8840
Date of Publication: 21-08-2022

The infestation percentage and the population density of the lesser date moth Batrachedra *amydraula* Meyrick (Cosmopterygidae: Lepidoptera) on cultivars Date Palm trees in Basrah governorate

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Abstract: The date palm *Phoenix dactylifera* L. is a very important economic crop in Iraq and some Arab countries. Date palm trees are infected with a large number of insect pests in all its parts, which leads to a decrease in the productivity of dates in terms of quality and quantity, including the lesser date moth *Batrachedra amydraula* Meyrick (Cosmopterygidae: Lepidoptera). This study was conducted to find out determine the incidence and population density of the lesser date moth *B. amydraula* on date palm cultivars sensitive to infection in Basra governorate (south of Iraq) on palm trees cultivars (Barhi, Sayer and Halawi), in Shatt Al-Arab area, Basra Governorate, during the 2018 season. The results showed that the highest infection rate for Barhi cultivar was in the first week of June, reaching 58.07%, while the highest infection rate was during the last week of May for Sayer cultivar and amounted to 63.21% which amounted to 67.23%. The results also showed that the highest population density of Lesser date moth *B. amydraula* larvae of Barhi cultivar reached 57.06 larvae/bunch during the month of June, while it reached for Sayer and Halawi cultivars (52.01 and 47.24 larvae/ bunch) respectively during the end of May.

Keywords: *Batrachedra amydraula* ،Date Palm trees ، The infestation percentage, population density.

1-Introduction

The date palm (*Phoenix dactylifera* L.) is a very important economic crop in different countries, It is one of the important trees in human life due to its importance in meeting the food and commercial needs and the rest of the other requirements of life, as it has economic importance and great nutritional value (Abbas and Mazel, 2019, Khalaf, 2013). The total production of dates reached 1132 million metric tons globally in 2019/2020 (Statista, 2021). In Iraq, the production of dates from palm trees has reached about 735,353 tons with an average production of 66.7 kg / palm in 2020 (Central Statistical Organization, 2021). Palm trees are attacked by a large number of insect pests in all their parts, causing them sometimes serious and great damage, represented in the weakness of the palm, which leads to a decrease in its productivity of dates in terms of quality and quantity, and these damages also lead to the death of the palm. At the top of the date palm, the pollen and fruits of the date palm are exposed to many pests and insects that attack the flowering spurs before and after they open. They also attack the fruits in their different stages, including the lesser date moth *Batrachedra amydraula* Meyricke (Cosmopterygidae: Lepidoptera), which leads to wilting and breaking of the fruits, then its fall (Al-Jubouri, 2007). The lesser date moth *B. amydraula* is a dangerous date palm pest in Iraq (Downson and Aten, 1962; Levi Zada *et al.* 2011; Haldhar *et al.* 2017). The larvae of the pest feed inside the fruit and spin webs around flowers before infesting the fruit and damaging three or four fruits during its lifetime. The loss may reach 90% in some farms, as the importance of the pest lies in the emergence of its different generations with all periods of fruit growth from the emergence of pollen to the harvest of the crop (Al-Jubouri, 2010). Palm varieties differ in their sensitivity and resistance to pests, including severe, medium and low sensitivity to infection, the real reasons for the sensitivity or resistance of palm varieties to pests are not precisely known until now. The difference in the proportions of the components of the vegetative, fruiting, physiological and anatomical parts may be related to resistance and sensitivity, as there is a difference in the components of each of the jamri, khalal, wet and dates between the varieties (Abdul Hussein, 1985). The symptoms of infection also differ in the degree of their appearance among palm varieties, where the limp appears twisted with blackened edges of the sprouts, as well as the

ISSN NO: 2771-8840
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drying of the scallops and their loss of green color, and the discoloration of the fruits in black in the habbuk phase with a small expenditure on the base of the arjoun. Due to the widespread spread of these two insects in the palm orchards in Basra governorate, and due to the economic importance of date palms, especially the Barhi, Al-Sayer and Al-Halawi varieties, which are among the most abundant varieties. In addition to the lack of studies and research on the lesser date moth *B. amydraula* in Basra governorate, otherwise, this study was conducted to determine the incidence and population density of the lesser date moth *B. amydraula* on date palm cultivars sensitive to infection in Basra governorate (south of Iraq).

2-Materials and Methods

The research was conducted in one of Basra's orchards, Abu Al-Khasib district, south of Basra Governorate (south of Iraq), for the agricultural season 2019, where three varieties of date palms were selected: Sayer, Halawi and Barhi. These cultivars were also inoculated with the male pollen (Ghanami al-Khader) and three replicates (palm trees) were selected for each type of pollen appearance. The emergence of lesser date moth *B. amydraula* insect was monitored.

2-1- Symptoms of infection and damage caused by lesser date moth *B. amydraula*:

The symptoms of infection caused by lesser date moth *B. amydraula* insect were followed up from the beginning of the appearance of the pollen by hand pollination of palm trees until the wet stage through the weekly follow-up of the symptoms, random samples were taken from ten trees. In each visit, the female pollen of all studied species was examined from the beginning of its appearance until its formation as a stump, and any symptoms of infection with lesser date moth *B. amydraula* were observed, four spadex from 4 bunch were examined in different directions on each tree ،fifty fruits were collected randomly from the ground and placed in small plastic bags, labeled and kept in plastic bags for transport to the laboratory. Larvae numbers were counted in the laboratory after examination.

2-2- Percentage of infestation with lesser date moth *B. amydraula*:

The percentage of infestation was calculated by calculating the number of infected tastes that showed symptoms for both studied insects after the pollen grains were opened (out of the total number of tastes while continuing to follow the symptoms of infection every 15 days after knowing the affected tastes) and the percentage was calculated through the following law:

$$\text{Infection rate \%} = \frac{\text{The number of infected bunch}}{\text{Total number of bunch}} \times 100$$

2-3- The number of larvae of lesser date moth *B. amydraula*:

The population density was calculated in the field by counting the number of larvae of different ages presents on the spadex for every three bunches that were marked for each palm and according to the symptoms of infection.

2-4- Statistical analysis:

All trials were analyzed using the R.C.B.D. randomized block design. At a probability level of 0.05, the averages were compared according to the least significant difference method, the average L.S.D. based on (Al-Rawi and Khalaf Allah, 1980).

3-Results and Discussion

3-1- Symptoms of infection and damage caused by lesser date moth *B. amydraula*:

Symptoms of infection begin with the larvae of lesser date moth *B. amydraula* attacking the young fruits during mid-April for the Sayer and Halawi cultivars and the beginning of May for the Barhi cultivar. They gnaw through the cover inside the fruits to feed on the contents, leaving an empty outer wall. During the next generation, the peak infestation is at the beginning of June for Barhi cultivar and the end of May for Sayer and Halawi cultivars. Infected fruits wilt and turn red. Small dried fruits can be seen tied or hung with silk threads produced by the larvae of fallen fruits with insect penetration holes and silky residues close to the fruit cover. These are characteristics or signs of the infestation of the small date bed, as the infection decreases during the end of July.

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The high infestation may be due to the appropriate weather conditions such as temperature and humidity for the intergenerational reproduction of lesser date moth *B. amydraula* on palm trees (Muhammad, 2011; Aslan et al., 2018). Otherwise, the date of the onset of the generation and the injury the intensity varies by region and often coincides with the growth stages of fruits that usually ripen earlier in the southern region of the northern sides of palm cultivation area according to the surrounding areas environmental factors (Al-Fahdawi, 1988; Aziz, 2005; Muhammad, 2011).

3-2- Percentage of infestation with lesser date moth *B. amydraula*:

The results in Figure (1) showed that there were significant differences in the percentage of infestation with the lesser date moth *B. amydraula* in Barhi cultivar during the different stages of maturity, as no infestation was recorded during the beginning of the first and second weeks of April. Al-Habbouk passed and reached 2.76%, then the infection rate reached the highest rate during the first week of June in the Jamri stage, reaching 58.07%, and the rate of infection decreased until it reached the lowest of July, with an average rate of 6.92 % during the month.

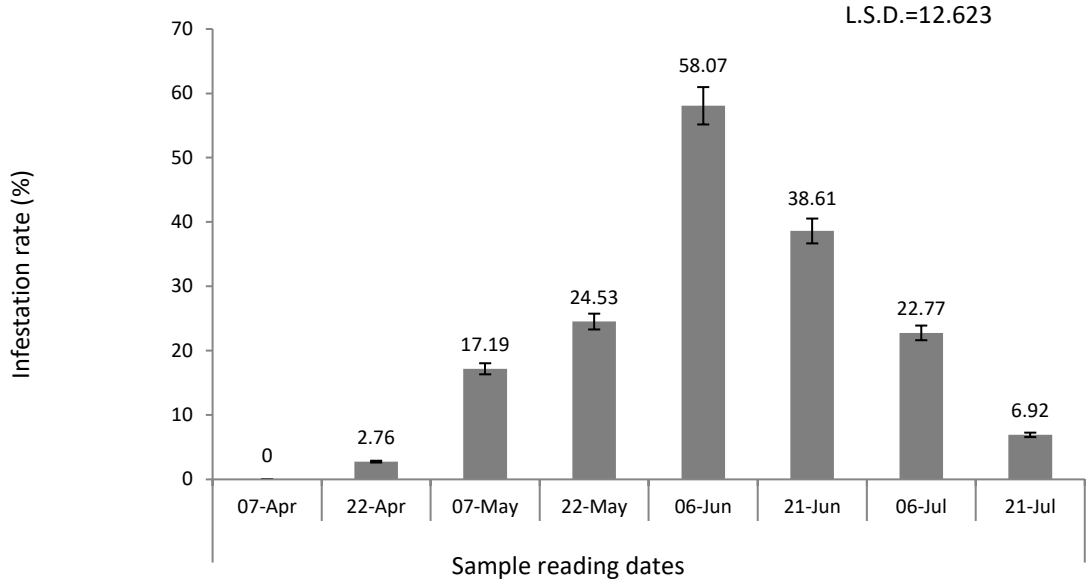

Figure 1: Percentage of infestation with lesser date moth *B. amydraula* on Barhi cultivar.

As for the Sayer cultivar, the results in Figure (2) showed that there were statistically significant differences in the rate of infection with lesser date moth *B. amydraula* during the different stages of maturity, as no infection was recorded during the beginning of the first and second weeks, and the infection was recorded during the third week of April in the stage of Hababuk and reached 4.78%, then the infection rate reached the highest rate during the last week of the month of May in the Jamri stage, reaching 63.21%, and the infection rate decreased until it reached its lowest level in July during the first week, with an average rate of 9.11%, and no infection was observed during the second week From July in the Khalal stage, the infection rate was 0%.

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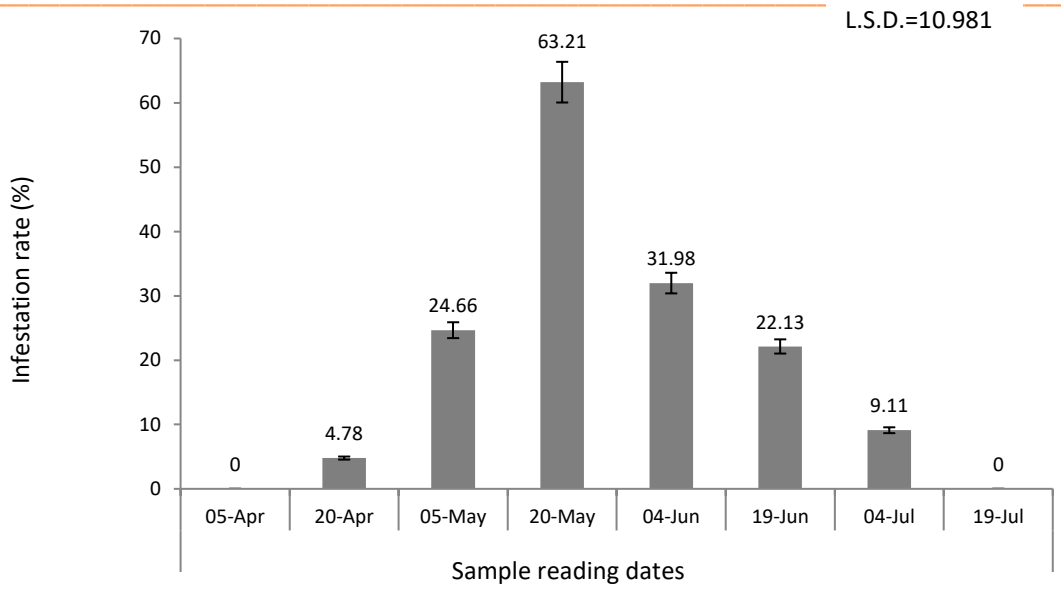

Figure 2: Percentage of infestation with lesser date moth *B. amydraula* on Sayer cultivar.

Otherwise, the results in Figure (3) showed that there were statistically significant differences in the rate of infection with lesser date moth *B. amydraula* for Halawi cultivar during the different stages of maturity, as no infection was recorded during the beginning of the first, second and third weeks, and the infection was recorded during the last week of April In the Hababuk stage, it reached 1.63%, then the infection rate reached the highest rate during the first week of June in the Jamri stage, reaching 67.23%, and the infection rate decreased until it reached its lowest level in July during the first week, with an average rate of 14.12%, and no injuries were observed during The second week of July in the Khalal stage, as the infection rate was 0%.

The reason for the emergence of the infestation and its climax during the period between mid-May and June may be due to the multiplicity of generations of the insect, which may reach three generations overlapping with each other, as the first generation begins with the spawning of the first two females and the first two hatches of the insect appear on the first two branches. In the first week, the eggs hatch and the larvae begin to feed on the fruits in the habbok stage, and a small hole occurs near the funnel of the fruit and feed on its contents. From the month of July (Abdul-Hussein, 1974).

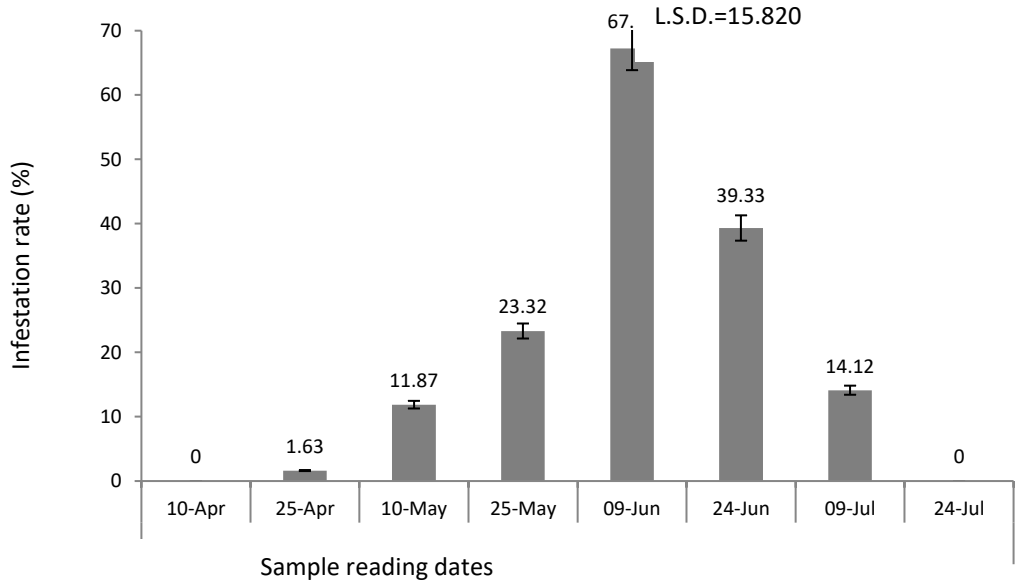

Figure 3: Percentage of infestation with lesser date moth *B. amydraula* on Halawi cultivar.

The results agreed with what was reached Khalaf, (2012), Khalaf et al. (2009) and Al-Yousef and Mazal (2008) In the announcement of a wilderness proportion of the rumor, it was in the Al -Jamri phase compared to the other stages, on this basis, the second generation is the most dangerous generation on the trees of the palm trees, and that is due to the dispersal of the content of the fruits of the fruits, and the

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difference of the fruits of the fruits, and the vocals (An inverse relationship between egg productivity and the percentage of tannins, which act as insect repellents or attractants (Aziz, 1990; Bustamante 2006).

3-3- The average number of larvae of lesser date moth *B. amydraula*:

The results shown in Table (1) showed that the average population density of lesser date moth *B. amydraula* larvae on Barhi cultivar started during the fourth week of April and amounted to 0.40 larvae / bunch, and the larvae continued to appear and increase until they reached their peak during the first week of June, when it reached 57.06 larvae / bunch, and the average population density began to decline from the second week of June, which amounted to 39.36 larvae / bunch until the average population density of the insect decreased and reached 0 larvae / bunch during the third and fourth week of July. While the average population density of lesser date moth *B. amydraula* larvae on Sayer cultivar, as shown in Table (1), started during the third week of April and amounted to 0.19 larvae / bunch, and the larvae continued to appear and increase until they reached their peak during the fourth week of May, reaching 52.01 larvae\ bunch ,the average population density rate began to decline from the first and second week of June, which amounted to (35.20 and 33.27 larvae / bunch) respectively, and the average

Table 1: Effect of variety and period on population density larva *B. amydraula* on cultivars.

Average larval density during the study period		Cultivars			Average of weeks	Average of months
		Barhi	Sayer	Halawi		
April	Week1	0	0	0	0	0.18
	Week2	0	0	0	0	
	Week3	0	0.19	0.03	0.07	
	Week4	0.40	1.54	0.07	0.67	
May	Week1	1.21	4.63	1.04	2.29	19.57
	Week2	4.56	18.13	17.77	13.48	
	Week3	8.18	30.07	22.86	20.37	
	Week4	27.22	52.01	47.24	42.15	
June	Week1	57.06	35.20	33.49	41.91	26.46
	Week2	39.36	33.27	20.13	30.92	
	Week3	18.73	26.04	16.24	20.33	
	Week4	9.87	18.13	10.05	12.68	
July	Week1	2.41	8.77	4.63	5.27	1.43
	Week2	1.39	0	0	0.46	
	Week3	0	0	0	0	
	Week4	0	0	0	0	
Average of cultivars		10.64	14.24	10.84		

L.S.D. for Barhi = 16.630 L.S.D. Average of weeks =10.225
L.S.D.for Sayer =14.191 L.S.D. for Halawi = 13.609

population density rate of the insect decreased and reached 0 larvae / bunch during the second, third and fourth week of July.

As for the Halawi cultivar, the average density of population density rate of the insect decreased and reached 0 larvae / bunch during the second, third and fourth week of July. lesser date moth *B. amydraula* larvae began to appear during the third week of April and amounted to 0.03 larvae / bunch, and the larvae continued to appear and increase until they reached their peak during the fourth week of May, when it reached 47.24 larvae / bunch, and the average population density began to decline from the first week of June, which amounted to 33.49 larvae / bunch, and the average population density of the insect decreased and reached 0 larvae / bunch during the second, third and fourth week of July (Table 1).

From the above results, it is clear that the highest density of larvae was during the end of May and the beginning of June, and this may be due to the appropriate environmental conditions for the activity of the insect larvae during this period. Khalaf (2012) found that the average density of lesser date moth *B. amydraula* on the Barhi cultivar reached its peak During the first week of June, it reached 402.5 larvae / 6

ISSN NO: 2771-8840
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bunch, as indicated by Al-Yousef and Mazal, (2008) that the difference in environmental conditions or growth conditions played a major role in increasing the infestation of lesser date moth *B. amydraula* and that the highest number of larvae density of Sayer variety was during the second week of the month In June, it reached 199.5 larvae / 5.5 bunch, as for the Halawi variety, it was recorded during the second week of June, and it reached 111.75 larvae / 5.5 bunch, as indicated by Aziz (1990). This is according to the closeness of those species to their chemical content in addition to the environmental conditions that have a role in preserving or increasing the population density of the insect.

Conclusion

Lesser date moth *B. amydraula* has become a major and important pest in palm fields in some palm-growing areas in recent years. The results obtained in this study indicated that the peak of the infestation occurred during the months of May and June, as a result of the interaction of the generations of the insect among themselves. Therefore, the control should be used before these two months to reduce the insect density and economic loss. More research is needed on these thousands of people to better understand the biological and ecological characteristics of generations, the method of observation, and so on. All of the above represents the important foundations and pillars upon which the integrated management of this scourge is based. Educating farmers and intensifying organized extension campaigns would contribute effectively to the development and implementation of control programs that reduce the risk of this insect.

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