



Determining the Infestation Rate and Severity of Lesser Date Moth, *Batrachedra amydraula* (Lepidoptera: Cosmopterygidae), on Certain Date Palm Cultivars in Al-Muthanna Governorate

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Abstract

Field investigations on the lesser date moth were conducted during the 2026 growing season across a private orchard in Al-Muthanna Governorate, targeting three distinct date palm cultivars during the Hababouk stage. The field data revealed that the (Osta Imran) cultivar exhibited the highest susceptibility to infestation. This cultivar recorded a peak infestation rate of 46% in fallen injured fruits, coupled with a mean infestation severity of 58.3%. Conversely, the (Shwkar) cultivar displayed the lowest susceptibility, with a fallen fruit infestation rate of 30.6% and a strand infestation severity of 52.7%. Meanwhile, the (Balka) cultivar occupied an intermediate position, demonstrating a 35.6% infestation rate in fallen fruits and a 55.5% infestation severity on the strands.

Keywords: *Batrachedra amydraula*, Date palm, Infestation rate, Al-Samawa.

1. Introduction

The lesser date moth *Batrachedra amydraula* is widely recognized as one of the most economically devastating pests threatening date palm cultivars, particularly due to its extensive geographical distribution across most global production areas, especially in Asia and Africa (Al-Jaboori, 2025). This insect gains significant economic importance from the severe damage it inflicts on date yields, both within orchards and throughout the post-harvest storage phase. The primary damage is caused by the larvae, which spin characteristic silken webs around the fruits, securing them to the strands or to each other (Basheer & Metwally, 2014; Al-Hamadani *et al.*, 2019). Larval attacks initiate during the early stages of fruit development right at the onset of fruit set. As larvae feed extensively on the internal contents of the young fruit, it leads to desiccation, premature fruit drop, and a distinctive reddish discoloration (Al-Dulaimi, 2004).

The severity of infestation fluctuates depending on date palm cultivars, prevailing environmental conditions, and across different insect generations. In scenarios of severe infestation, affected bunches can lose a massive portion of their fruit load due to early dropping, which dramatically reduces

overall yield, halts cluster development, and ultimately causes complete drying of the bunch; consequently, no single cultivar has been found entirely immune to this pest (Yadav *et al.*, 2025; Al-Amery *et al.*, 2021). Furthermore, the life cycle of *B. amydraula* varies based on geographical regions and host cultivars. In this context, Howard *et al.* (2001) noted that the lesser date moth produces two generations annually in tropical and subtropical regions. However, Shayegan *et al.* (1998) reported that the pest continues its development within date storage facilities in Iran, yielding multiple generations as long as temperatures remain above 20°C. Such conditions trigger a sharp increase in infestation rates, escalating crop losses to somewhere between 60% and 100% when ambient environmental factors favor rapid multiplication (Al-Musafir *et al.*, 2021). The critical importance of investigating this pest stems from its pervasive nature and destructive feeding habits within palm groves, where it can be encountered ubiquitously (Ali & Mohammad, 2014; Hussainawy *et al.*, 2022).

Owing to the scarcity of entomological research focusing on insects affecting date palms in Al-Muthanna Governorate, the objective of the

current study was to determine the infestation rate and severity of *B. amydracula* on three specific date palm cultivars (Osta Imran, Balka, and Shwkar) within the orchards of Al-Muthanna Governorate.

2. Materials and Methods

2.1. Study Site

The field experiment was conducted during the 2026 growing season within a private date palm orchard located in Al-Samawa District, Al-Muthanna Governorate. The orchard encompasses an area of 5 dunams, cultivating a total of 300 date palm trees of various cultivars. The study site is characterized by an arid climate, featuring hot summers accompanied by dust-laden winds and cold winters. For this investigation, three distinct and uniform cultivars were selected: Osta Imran, Balka, and Shwkar. Three trees were selected as biological replicates for each cultivar. The chosen experimental trees were standardized in terms of age and agricultural practices, and crucially, they had not been subjected to any chemical control programs. Its historical record of persistent lesser date moth infestations over the preceding years dictated the selection of this specific orchard.

2. 2. Assessment of the Infestation Rate of the *B. amydracula* on Selected Palm Cultivars "

the infestation rate and the corresponding insect developmental stages were determined across the three date palm cultivars (Osta Imran, Balka, and Shwkar) based on the phenological stages of fruit development. Sampling initiated at the onset of the (Hababouk) stage, where 100 fruits per cultivar were randomly collected and placed into labeled plastic bags noting the cultivar name and collection date .The collected samples were then transported to the Postgraduate Studies Laboratory in the Department of Plant Protection, College of Agriculture, University of Muthanna. Under a stereomicroscope and hand lenses, the samples were thoroughly examined to record the infestation percentage and identify the active insect stage at the time of collection. All data were documented in a dedicated repository. The infestation percentage was calculated using the following:

Infestation Percentage (%) = (Number of injured fallen fruits / Total number of fallen fruits) × 100.

2.3. Assessment of *B. amydracula* Infestation Severity.

To evaluate infestation severity across the studied date palm cultivars (Osta Imran, Balka, and Shwkar), three uniform trees were randomly selected per cultivar at the study site. From

each selected tree, three fruit bunches (clusters) were randomly sampled from each of the four cardinal directions (North, South, East, and West), yielding a total of 12 bunches per tree. Samples were transferred into plastic bags to determine the total number of fruits along with the number of infested fruits per bunch from the initial onset of larval attack. The bunches were continuously monitored, and the number of infested clusters per cultivar was recorded based on diagnostic symptoms, such as the presence of larval entry holes near the perianth (calyx) of fallen fruits or the direct observation of larvae inside them. The tree-level infestation rate was determined by quantifying the number of infested palm trees for each cultivar. Meanwhile, the infestation severity percentage on fruit bunches was calculated post-fruit set using the following formula:

$$\text{Bunch Infestation Severity \%} = \frac{\text{Number of infested bunches}}{\text{Total number of examined bunches}} \times 100.$$

The infestation severity of the lesser date moth, *Batrachedra amydraula*, was estimated by calculating the percentage of infested fruits relative to the total number of examined fruits for each date palm cultivar, according to the following equation:

$$\text{Infestation Severity (\%)} = \frac{\text{Number of infested fruits}}{\text{Total number of examined fruits}} \times 100$$

Where the number of infested fruits represents the total fruits showing symptoms of infestation by the insect, while the total number of examined fruits represents all fruits inspected within the studied sample. Infestation severity is considered an indicator of the extent of damage caused by the pest (Agrios, 2005).

All obtained data were subjected to statistical analysis using GenStat software.

Treatment means were compared and statistically evaluated using the Least Significant Difference (LSD) test at a significance level of $P= 0.05$.

3. Results and Discussion

Figure (1) illustrates the infestation rates of *B. amydraula* across the studied date palm cultivars during the Hababouk stage. The Osta Imran cultivar recorded the highest infestation at 46 fruit whereas the Shwkar cultivar displayed the lowest at 31 fruit. Meanwhile, the Balka cultivar exhibited an intermediate infestation at 35.7 fruit.

The findings revealed a distinct variation in infestation rates among the evaluated cultivars throughout the different fruit development stages. The highest infestation rates were

systematically recorded during the Hababouk stage, followed by a gradual decline as fruit maturation progressed. This variation is primarily attributed to differences in the nutritional and chemical profiles of the fruits among cultivars, alongside variations in tissue

texture and its suitability for larval feeding. Additionally, favorable environmental factors—particularly elevated temperatures and relative humidity—directly enhance insect activity and population density during the early stages of fruit growth.

Figure 1. Infestation Rates of the Lesser Date Moth *Batrachedra amydraula* on Selected Date Palm Cultivars in Al-Muthanna Governorate.

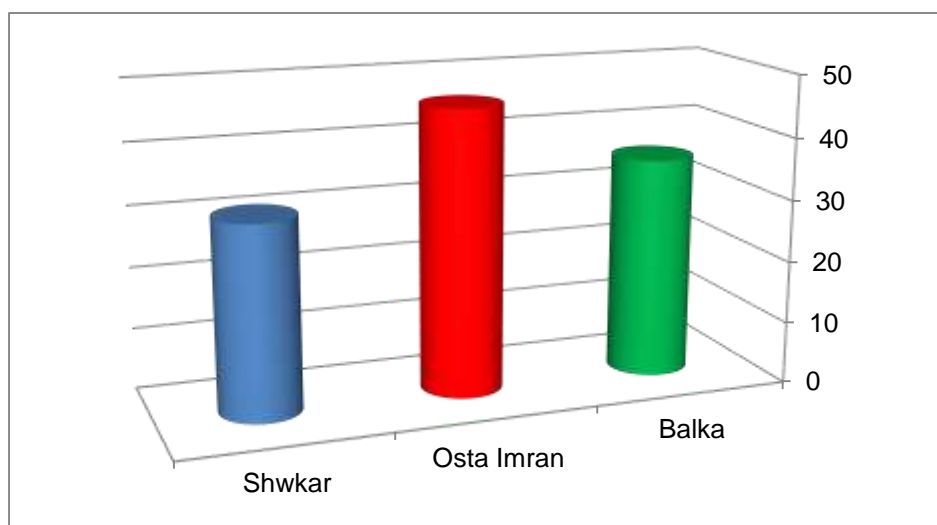


Figure (2) shows that the Osta Imran variety was the most sensitive of the other varieties, recording the highest infection rate of 46%, followed by the Balka variety with a sensitivity rate of 35.7%, while the Shwkar variety was the least sensitive with an infection rate of 31%.The Hababouk stage

represents the most critical and susceptible phase for infestation, owing to its high moisture content and tender tissues, which collectively provide an optimal microenvironment for larval feeding and subsequent development. These findings are in close agreement with those reported by

Al-Dulaimi (2004) and Al-Musafir *et al.* (2021), who stated that *B. amydracula* infestations peak during early fruit development stages and are heavily influenced by environmental variables as well as host cultivar characteristics. The susceptibility of cultivars fluctuates depending on their distinct physiological and biochemical properties.

The results illustrated in Figure (1) demonstrated significant variations in fruit drop rates among the evaluated date palm cultivars. The Osta Imran cultivar recorded the highest mean fruit drop, reaching 46 fruits, compared to the other cultivars. Conversely, the Shwkar cultivar exhibited the lowest drop rate, with an average of 35 dropped fruits. This elevated fruit drop in Osta Imran can be primarily attributed to the high infestation severity of *B. amydracula*; larval feeding on the internal contents of the

young fruits during early developmental stages weakens the fruit attachment to the strand, triggering premature abscission.

These findings align with Al-Dulaimi (2004), who reported that the feeding activity of lesser date moth larvae induces fruit desiccation and subsequent dropping during the Hababouk stage. Furthermore, the fruit drop rate may be influenced by confounding environmental and agricultural factors, such as high wind velocity, elevated relative humidity, and frequent irrigation practices, which collectively exacerbate the dropping of young fruits, in addition to the varying susceptibility of cultivars to insect attacks. Similarly, Basheer and Metwally (2014) pointed out that *B. amydracula* infestations compromise fruit structural integrity, leading to a substantial increase in fruit drop percentages.

Figure (2) Number of palm fruits that fell due to the *Batrachedra amydracula* in the hierarchy stage

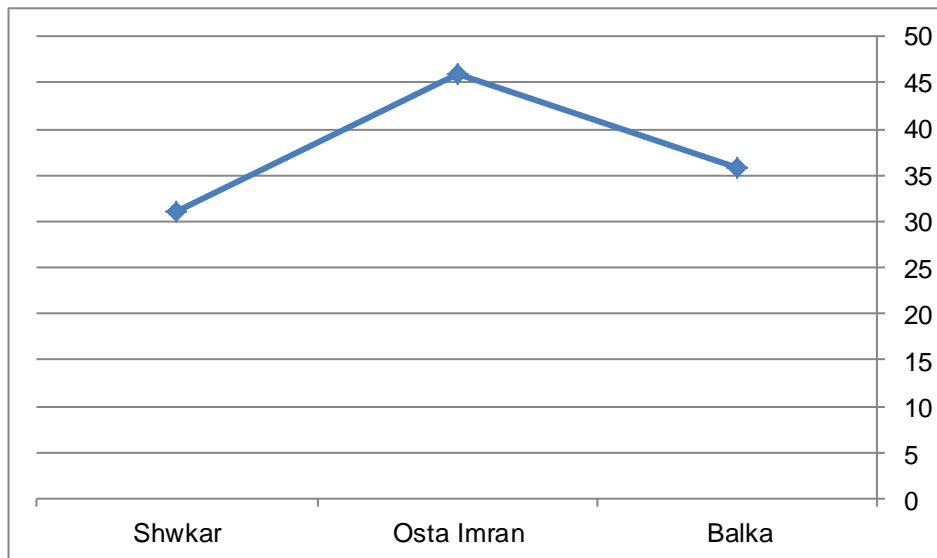
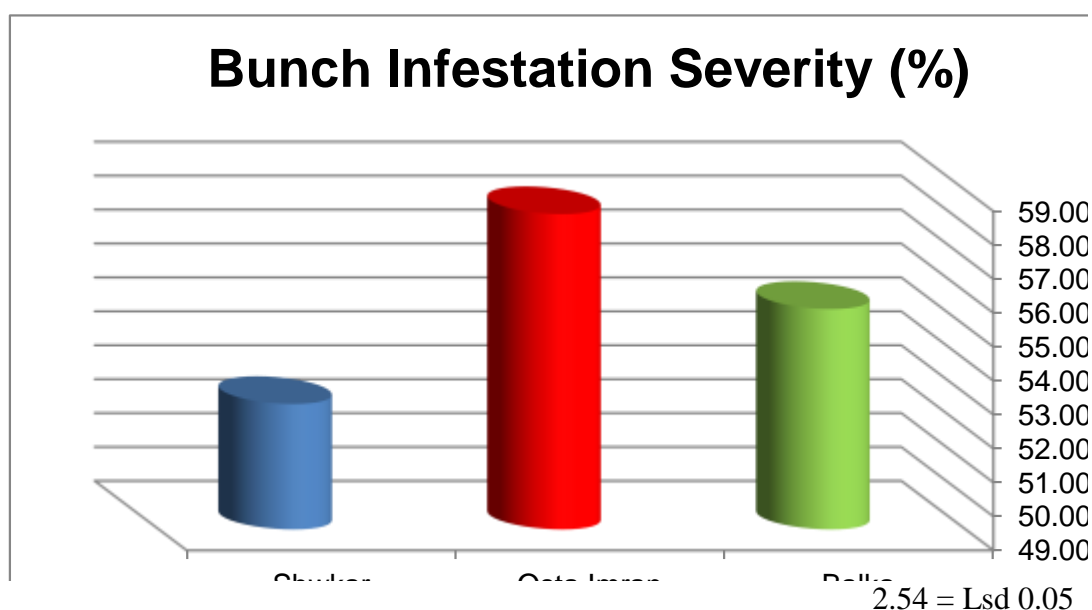


Figure (3) illustrates the infestation severity on fruit bunches of the evaluated date palm cultivars cultivated in Al-Samawa District, Al-Muthanna Governorate. The field data revealed that the 'Osta Imran' cultivar exhibited the highest susceptibility to *B. amydraula*, recording a bunch infestation severity of 58.3% (corresponding to 21 infested bunches). Conversely, the Shwkar cultivar was the least susceptible, displaying an infestation severity of 52.7% (with an average of 19 infested bunches); this cultivar is characterized as a mid-to-late maturing variety.

The variation in infestation severity across cultivars is closely linked to specific phenotypic and biochemical traits of the fruit. The thickness of the epicuticular wax layer and fruit firmness serve as critical defense traits influencing oviposition and feeding

preferences of the pest. Additionally, biochemical factors within the fruit—such as the concentration of total sugars, proteins, moisture content, tannins, and phenolic compounds—play a pivotal role in determining host suitability (Basheer & Metwally, 2019; Al-Hussainawy *et al.*, 2021).

Table 2. Bunch Infestation Severity of *Batrachedra amydraula* on the Studied Date Palm Cultivars.



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