

Evaluation of the Sex Pheromone Efficiency of the Lesser Date Moth, *Batrachedra amydracula* Meyrick (Lepidoptera: Batrachedridae), in Baghdad, Iraq

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Abstract: The study was conducted in date palm groves in Swaib region of Baghdad for the agricultural season 2012. The main objective of the present study was to evaluate the efficacy of lesser date moth, *Batrachedra amydracula*, sex pheromone lure and its longevity in harsh desert climate. Various trap types and height have been studied for traps baited with *B. amydracula* pheromone lure. Results indicated that an average of 11.33 males/trap/week was captured on traps baited *B. amydracula* lure during the last week of April, which represents the onset of insect in the field. The highest rate of trap catches was recorded as 20 males/trap/week during the first week of May. Around 90% of the moths were emerged during these two weeks. *B. amydracula* pheromone lure remained effective over a period 7-8 weeks. Traps which placed at a height of three meters from the ground level were found more efficient than those suspended at six meters. An average of trap catches was 1.99-5.32 males/trap/week for traps placed at three meters height and whereas 1-3.99 males/trap/week was recorded on traps placed in six meters height. Delta trap was found more effective than funnel traps when applied against *B. amydracula*.

Key words: Lesser date moth, Humera, *Batrachedra amydracula*, sex pheromone, Delta trap, Iraq.

1. Introduction

The lesser date moth, *Batrachedra amydracula* Meryrick (Lepidoptera: Batrachedridae), commonly known, as Humera is a serious pest of date palm trees. Until today, the lesser date moth has been spread to the entire date palm growing regions in the Middle East and North Africa including Iraq, Saudi Arabia, United Arab Emirates, Qatar, Bahrain, Oman, Israel, Jordan, Egypt, Libya, Tunisia, Iran and India [1-5]. In Iraq, Date palm (*Phoenix dactylifera* L.) is the most important cultivated tree, especially in the central and southern part of the country. The total number of date palm is estimated to 16,253,300 trees with a yield of 544,931 tons. The most important commercial varieties are Zahdi, Khastawi, Sayer, Khadrawi, Halawi, Derry,

Maktoum, Barhi and Barban as well as other varieties [6]. The lesser date moth larvae attack inflorescences and newly set green fruits. The larvae make a hole near fruit calyx and feed on soft pulp and immature seeds [7]. Infested fruit becomes darken, and fall to the ground within four weeks after attack; the branches stop growing and eventually turned into dry. Lesser date moth early season infestation causes significant fruit drops and losses of up to 75% of the yield [1, 3]. In case of sever infestations, fruit damage can be reached up to 100% [8-10]. Date palm varieties differ in the degree of their susceptibility to lesser date moth infestation; many of them are highly sensitive cultivars as Khstawi and Zahdi while the resistant cultivars are Sayer and Beram [11]. Generally, dry dates palm varieties are less sensitive to *B. amydracula* infestation than semi-dry and soft ones [12]. Late season infestation on large fruits may cause fruit decay and

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fermentation, which may accelerate the buildup of sap beetle (Nitidulidae) population [1, 12] reported the lesser date moth infestation in stored dates.

Monitoring as well as control of lesser date moth mainly relies on inspection of fruits for damage [13] and application of conventional insecticides. Use of pheromone trap can pin point infestation before becoming serious. To date use of pheromone trap is the corner stone for insect monitoring system as it is highly sensitive, species specific and very effective in low concentration. It [7] identified two sex pheromone components of *B. amydracula* for the first time. Since then same authors succeeded to identify four acetates that were emitted by females during the scotophase at intervals of 2 h during several days. In 2011, Levi-Zada et al., optimized *B. amydracula* pheromone lure and found that the optimal attractive blend is a three-component mixture of (Z4, Z7)-4,7-decadien-1-yl acetate, Z5-decen-1-yl acetate and Z5-decen-1-ol in a ratio of 1:2:2. This blend showed about fivefold higher trap catch of *B. amydracula* males as compared to the previously identified binary blend of (Z4, Z7)-4,7-decadien-1-yl acetate and Z5-decen-1-yl acetate in a ratio of 1:2.

In the present study, the authors report the results of the evaluation of the *B. amydracula* sex pheromone lure using three components blend as described by Levi-Zada et al., 2011 in Iraq. Information on early emergence period and numerical density of *B. amydracula* will be key tools to build an integrated pest management program. Moreover, pheromones baited mass trapping can be used for the strategic control of lesser date moth, *B. amydracula* as an alternative to cover spray of conventional pesticides. Therefore, this research aims to evaluate the efficacy of Humera palm sex pheromone lure, with optimization of trap type and height for trapping males of *B. amydracula* in Iraq agro-ecological condition.

2. Materials and Methods

The Red rubber septa lures containing (Z4,

Z7)-4,7-decadien-1-yl acetate, Z5-decen-1-yl acetate and Z5-decen-1-ol in a ratio of 1:2:2 were used to attract males of *B. amydracula*. The *B. amydracula* sex pheromone lure was developed by Russell IPM Ltd and supplied for present study. The experiment was conducted in date palm grove covering an area of approximately 1 ha in Swaib region southern Baghdad, during the agricultural date season 2012. This date palm grove contains about 90% of the Khestawi date cultivar, where trees length ranged between 4-12 m, aged 10-15 years, cultivated on lines distant between 8-10 m. The surrounded groves are 100-200 m far away contain Khestawi, Zahdi and Barban cultivars. The experimental orchards have not been treated with chemical pesticides for last five years. Six Delta traps baited with *B. amydracula* pheromone lure were suspended on 4/14/2012. Three traps were placed at a height of 3 m and the other at a height of 6 m, and the distance between traps was 20-30 m. Another three groups of traps (six traps in each group) were suspended after 3, 5, 7 weeks from the application of the first group (on the dates 5/5, 5/19, 6/9, 2012) with the continued deployment of all traps until the end of the experiment in the first week of July. The distance between two groups of trap was 200-300 m. The number of catches was recorded weekly and the sticky inserts of the delta traps have been replaced whenever necessary.

2.1 Trap Optimization

In order to compare efficiency, six funnel traps and six delta trap baited with *B. amydracula* pheromone lure were suspended on 5/5/2012, three of each trap type on the height of 3 m and the others at a height of 6 m. The distance between traps was 20-30 m as well. Trapped males were counted weekly till the end of the experiment up to first week of July.

3. Results and Discussion

Results in Table 1 indicated the efficiency of the sex pheromone for attracting males of *B. amydracula* and

determined the period of its arrival in the field. An average of 11.33 males/trap/week was captured in the last week of April, which gradually increased and reached up to 20.00 males/trap/week during first week of May. These periods represent the first emergence of overwintered adults. Then, the captures of males of *B. amydracula* gradually decreased to 0.33 males/trap/week by the end of June.

No capture has been noticed for the period of 14-21 April 2012, indicating that the first appearance of the insect in the field was between 4/21-4/28/2012. This period coincides with the end of the palm pollination in the center of Iraq, where fruits in this stage (locally called Hababuk) are more attractive to female to lay eggs and newly emerged larvae are ready to feed. The emergence of adult female in the field also depends on the weather conditions, especially temperature (thermal units accumulated). It [14] indicated that the onset of adult was March 30, March 26 and March 27 for the years 2003, 2004 and 2005, respectively, following a survey of hibernated larvae and pupa of both male and female moth kept in rearing cages in the province of Baghdad.

However, it [15] has mentioned that the first emergence of Humera palm adult was in the first week of March in 2010 and the last week of March in 2011, using light traps. Although, the previous studies showed different emergence dates, but they

agreed with the current results that 90% of hibernated adult have emerged during the last week of April and the first week of May where the emergence lasted approximately a month and half. The results (Table 1) showed that the effectiveness of the sex pheromone to attract male had continued for 60 days for the first group of traps placed in date palm trees on April 14 2012. This similar trend of effectiveness was found in other groups of traps till the disappearance of all adults from the field until last week of June, 2012.

However, the mean number of capture/trap was lower because of the reduction in male's population density. Table 1 reveals that traps containing new pheromone capsule were found more attractive to males than aged used lure baited traps. This finding is more evident when comparing the first group (3.33 males/trap/week) with the second group (6 males/trap/week) for the period of 12-16 of May, and comparing the second group (0.66 Males/trap/week) with the third group (2.33 males/trap/week) for the period of 20-26 of May. Similar trend was found on third and fourth set of traps.

3.1 Trap Height

Results in Fig. 1 showed that the height of traps influences the sex pheromone efficiency in *B. amydracula* male attraction. In fact, traps placed at a

Table 1 Efficacy of sex pheromone lure for capturing male lesser date moth, *Batrachedra amydracula*, in Baghdad, Iraq.

Date	Group 1* Adult/trap/week	Group 2* Adult/trap/week	Group 3* Adult/trap/week	Group 4* Adult/trap/week
4/21	0.00			
4/28	11.33			
5/5	20.33			
5/12	3.33	6.00		
5/19	2.66	2.00		
5/25	0.00	0.66	2.33	
6/2	0.33	0.33	1.83	
6/9	0.66	0.66	1.33	1
6/16	1.33	1.33	0.66	1.66
6/23	1.22	0.33	0.33	2.00
6/30	1.15	0.33	0.21	0.66

* Each number represents 6 traps.

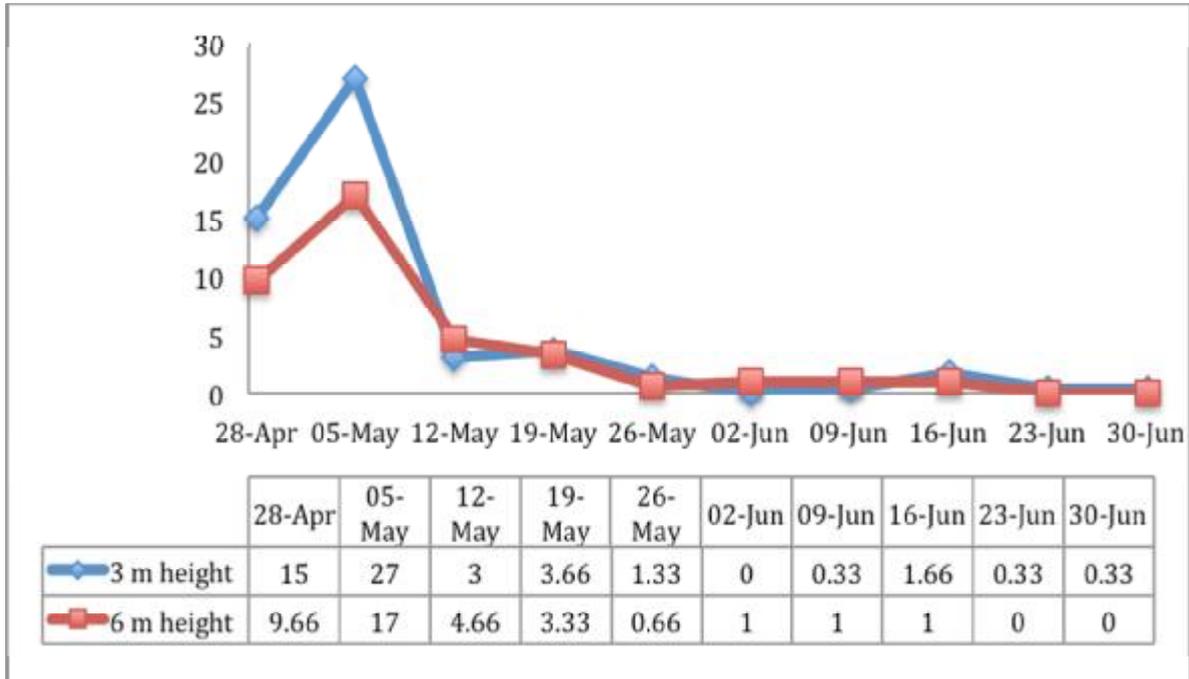


Fig. 1 The impact of trap height on the sex pheromone efficiency to attract males of lesser moth and their mean rate of capture.

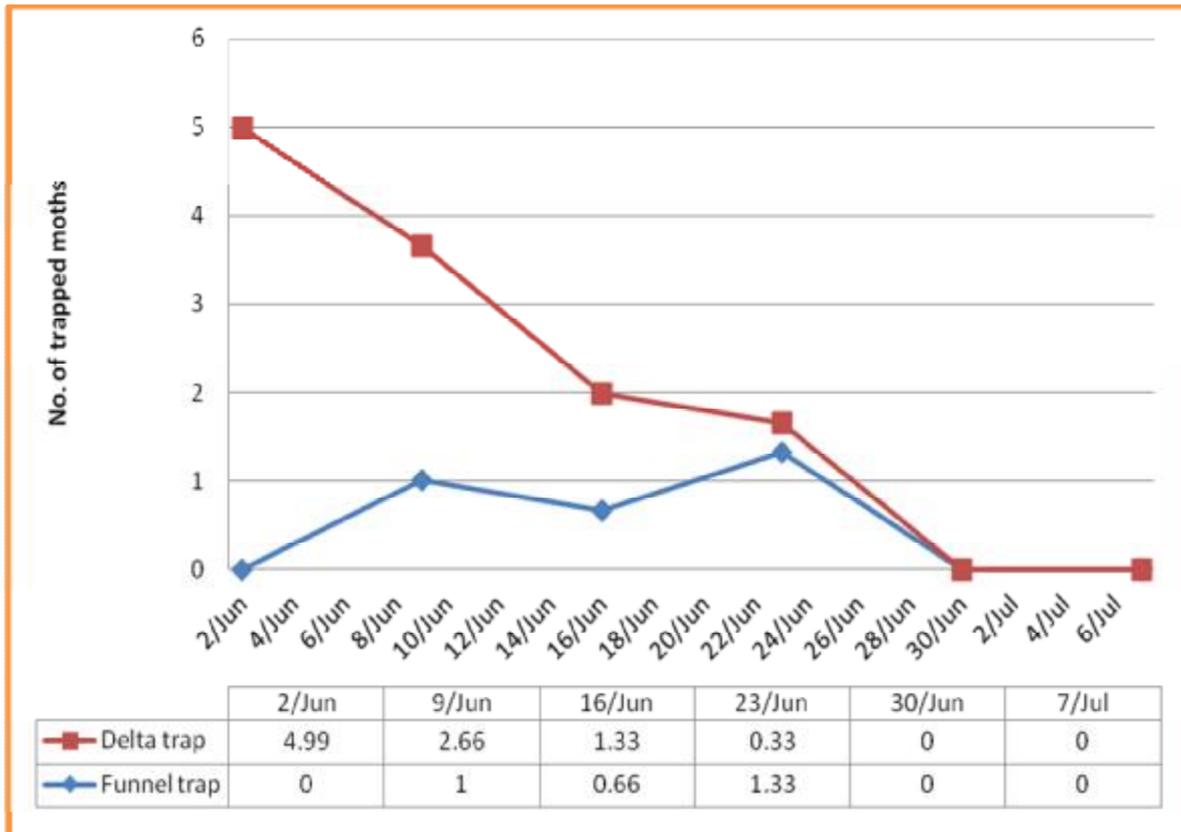


Fig. 2 Effect of trap design on male moths in traps baited *B. amydraula* pheromone lure.

height of 3 m above the ground were more efficient than those placed at a height of 6 m, where the rate of capture for the first two weeks of the insect emergence were 15, 27 males/trap/week in traps on a height of 3 m, compared with 9.66, 17 males/trap/week for traps placed at a height of 6 m.

The total number of males capture during the season was 52.64, 38.31 males/Trap for both heights, respectively. The adult female did not prefer to lay eggs on spikelet of high palms as the percentage of infested fruits recorded higher in short and medium trees than those of high trees.

3.2 Trap Type

Results in Table 3 showed the efficiency of Delta traps and Funnel traps in capturing *B. amydracula* males. Despite the low population density during the setup of the experience as mentioned in previous results (Table 1), the average of capture was 4.99, 2.66, 1.33 males/trap/week for Delta traps, compared with 0.00, 1.00, 0.66 males/trap/week for Funnel traps (moth catcher) during the first two weeks of June, 2012.

The total male captures for both heights during June were 9.31, 2.99 males for Delta and Funnel traps, respectively. Moreover, the results showed that traps, which were suspended at a height of three meters for both trap types were more efficient than those were suspended at a height of 6 m.

Present study indicated that the pheromone based trap can be used successfully as monitoring tool of the lesser date moth, *B. amydracula*. However, trapping time is crucial in obtaining good level of trap capture. Future research will be conducted on mass trapping of *B. amydracula* in order to reduce fruit damage substantially.

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