Seasonal incidence and abundance of palm borers in date palm plantations of Al-Hassa based on light trap captures

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ABSTRACT

The Al-Hassa region in the Eastern Province of Saudi Arabia, with an estimated three million date palms is the Kingdom's premier date palm oasis. Besides the red palm weevil, Rhynchophorus ferrugineus a group of three Coleopteran beetles viz. the stalk and stem borer, Oryctes spp Prell (Coleolpera : Scarabaeidae) the long horn stem borer, Jebusea hammerschmidti Reich (Coleoptera : Cerambycidae) and the frond borer Phonapate frontalis F. (Coleoptera : Bostrichidae) are wide spread in the Al-Hassa oasis and are emerging as major insect pests of date palm in the region. Adults of these Coleopteran beetles are known to be attracted to light traps. We studied the seasonal incidence and abundance of these beetles using 18 Robinson light traps stationed in the northern, central and southern villages of Al-Hassa for two years during 2010 and 2011. Observations were recorded once a week on the captures of these beetles in the traps. Results on the seasonal incidence indicated that, J. hammerschmidti was most active during May, June and July while Oryctes spp recorded maximum activity during June and July. Further, peak activity of P. frontalis was recorded during April and May. J. hammerschmidti was most abundant in the northern villages of Juleijlah, Muteirfy and Ain Mansour while it was least prevalent in the the south of the oasis in Al-Gowaybah. Oryctes spp was recorded in all the study areas and was most prevalent in Batalyah, Ashura and Kilabiyah in the centre of the oasis. Among the three beetles studied, P.frontalis was the least prevalent and could be considered of minor importance. There is a need to develop an Integrated Pest Management (IPM) strategy to combat the increasing incidence of these Coleopteran beetles in date palm.

Key words: Date Palm, borers, seasonal incidence, abundance

INTRODUCTION

The Kingdom of Saudi Arabia is among the top three date producing countries of the world with an annual production of over a million tones of dates accounting for 17% of the global production (http://faostat.fao.org). Saudi Arabia is estimated to have 25 million date palms with more than 400 different date palm cultivars (Anonymous 2006).The Al-Hassa region in the Eastern Province of Saudi Arabia, has three million date palms and is the Kingdom's premier date palm oasis (El-Baker, 1952; Asif *et al.,* 1982).

Coleopteran beetles have gained importance during the last 2-3 decades among which red palm weevil (RPW) *Rhynchophorus ferrugineus* (Olivier) (Coleoptera:

Curculionidae), is a key pest of date palm, first recorded in Al-Hassa during 1992 (Faleiro *et al.,* 2010; Anonymous, 1998). El –Sabea *et.al*., 2009 estimated the annual loss due to eradication of severely infested palms by RPW in Saudi Arabia to range from USD 1.74 to 8.69 million at an eradication level of 20 percent infested palms, at 1-5 per cent infestation, respectively. Besides RPW, a group of three other Coleopteran beetles *viz*. the stalk and stem borer, *Oryctes* spp Prell (Coleolpera : Scarabaeidae) the long horn stem borer, *Jebusea hammerschmidti* Reich (Coleoptera : Cerambycidae) and the frond borer *Phonapate frontalis* F. (Coleoptera : Bostrichidae) are wide spread in the Al-Hassa oasis and are emerging as major insect pests of date palm in the Gulf region (Aldryhim, 2008; Al-Deeb,2012; El-Shafie, 2012). These pests bore into the trunk, fruit stalks or leaf fronds resulting in loss of yield or even death of the palm incase of severe infestation by the stalk and stem borer and also the long horn stem borer.

Adults of these Coleopteran beetles are known to be attracted to light traps (Khalaf *et al.,* 2012; Al-Deeb, 2012). We studied the seasonal incidence and abundance of these beetles using 18 Robinson light traps stationed in the northern, central and southern villages of Al-Hassa for two years during 2010 and 2011.

MATERIALS AND METHODS

18 Robinson light traps were set in date palm plantations in the northern, central and southern villages of the Al-Hassa oasis (25^{O} 19’ 60” N latitude and 49^{O} 37’ 60” E longitude) during late 2009 as indicated below.

In the north, six traps were set the villages of Oun, Murrah, Juleijlah, Muteirfy and Ain Mansour. In the centre of Al-Hassa, nine light traps were set in Omran, Taraf, Al-Jisha, Jubail, Mizawi, Muneizlah, Batalyah, Ashura and Kilabiyah while in the south three Robinson light traps were set in the village of Al-Gowaybah.

Weekly observations were recorded on the adult beetle captures of the stalk and stem borer, *Oryctes* spp, the long horn stem borer, *Jebusea hammerschmidti* and the frond borer *Phonapate frontalis* for the entire duration of 2010 and 2011. Trap capture data was tabulated every month during the study period.

Monthly mean data including standard error of means for the beetle capture with respect to the seasonal incidence and abundance of the above three Coleopteran beetles was calculated using the web-based agriculture statistics package (WASP.1) available at www.icargoa.res.in

RESULTS AND DISCUSSION

Seasonal incidence

Results presented in figure 1 indicate that *Oryctes* spp and *J.hammerschmidti* attained peak activity in June during the summer. While *Oryctes* spp was active from March to November, *J.hammerschmidti* was active from March to August. Our findings are in agreement with a previous report from Al-Hassa which indicates highest adult activity *Oryctes elegans* and *J.hammerschmidti* during the summer months of July and June, respectively (Hammad, *et al.,* 1986). Studies conducted in Iraq indicate that *Oryctes elegans* is active from April to December attaining a peak during the summer in July.

The monthly mean *Oryctes* spp and *J. hammerschmidti* was 3.14±2.03 and 0.56±0.19, respectively. Aldryhim, 2008 reported that *J.hammerschmidti* was most active in Saudi Arabia during the months of May and June. With regard to number of generations per year, the study indicates that both *Oryctes* spp and *J.hammerschmidti* had one generation per year with single population peaks and is in agreement with previous reports by Najeej *et al.,* 1993a,b; Al-Deeb 2012.

In our study we recorded two species of the stalk and stem borer. However, previous reports from the region indicate the possibility of three species *viz* . *Oryctes elegans, O.agamemon and O. rhinoceros* to exist in the date palm plantations of the Middle East. One of the species endemic to the greater Middle Eastern region is *Oryctes agamemnon* (Coleoptera: Scarabaeidae) (Gassouma, 1991; Howarth and Gillett, 2008; Soltani *et al.,* 2008,). Two other species, *Oryctes rhinoceros* and *Oryctes elegans*, have been found in the region, although their distribution and exact impact on date palm plantations are not known (Gassouma,1991). Studies using pheromone lures will help ascertain the species complex of the stalk and stem borer in date palm.

Studies carried out in the UAE also indicate that *O.agamemon* is a univoltine pest with a single population peak. Adults appeared in the field around middle of April and early May and the population continued to build until maximum numbers were reached in mid June. No adults were found after the end of September. Photoperiod showed a significant correlation with the changes in adult population size (Al-Deeb *et. al*., 2012).

With regard to the frond borer, figure 1 reveals that this beetle was active from March to November with two peaks during April and November. The monthly mean for *P. frontalis* was 0.56±0.19. A report from Iraq indicate activity of this pest from April to December (Khalaf *et al.,* 2012).

Population abundance

Figures 2, 3 and 4 indicate the density of *Oryctes* spp*, J. hammerschmidti* and *P. frontalis* in the north, centre and south of the Al-Hassa date palm oasis. While *J. hammerschmidti* and *Oryctes* spp were dominant in the north and centre of the Al-Hassa oasis, *P. frontalis* was found to be important in the south of Al-Hassa. This can be attributed to the fact that both *J. hammerschmidti* and *Oryctes* spp are known to attack older date palms (Aldryhim, 2008, Al-Deeb, 2012) which exist in the north and centre of the oasis. *J. hammerschmidti* was most abundant in the northern villages of Juleijlah, Muteirfy and Ain Mansour while it was least prevalent in the south of the oasis in Al-Gowaybah. *Oryctes* spp was recorded in all the study areas and was most prevalent in Batalyah, Ashura and Kilabiyah in the centre of the oasis. Most of the date plantations in the south (Al-Gowaybah) of the Al-Hassa oasis are comparatively young (about 15-15years old) suitable for the frond borer, *P. frontalis*.

Of the three palm borers studied, *Oryctes* spp had the highest density and was most abundant followed by *J. hammerschmidti*. Based on our findings, these two palm borers could be considered as major pests of date palm in Al-Hassa as also indicated previously by Aldryhim, 2008 and Al-Deeb *et al.,* 2012 for which integrated pest management (IPM) strategies have to be devised. Based on our findings the frond borer, *P. frontalis* could be considered of minor importance.

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Figures

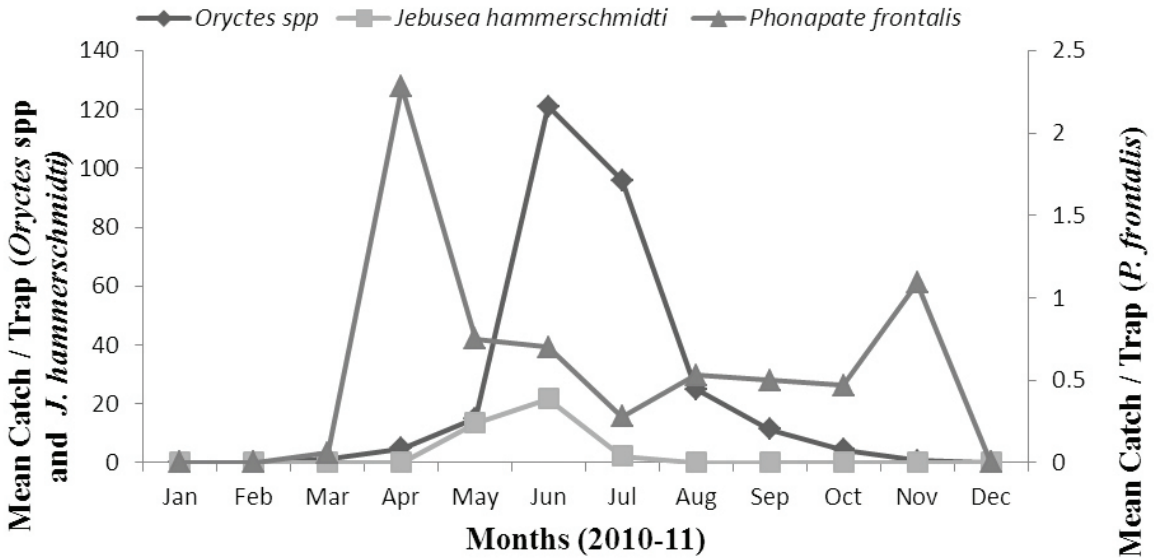

Figure 1. Seasonal incidence of palm borers attracted to light traps in date palm (Al-Hassa, Saudi Arabia, 2010-11). The monthly mean along with standard errors (±SE) for *Oryctes* spp, *J. hammerschmidti* and *P. frontalis* are 23.30± 11.79, 3.14±2.03 and 0.56±0.19, respectively

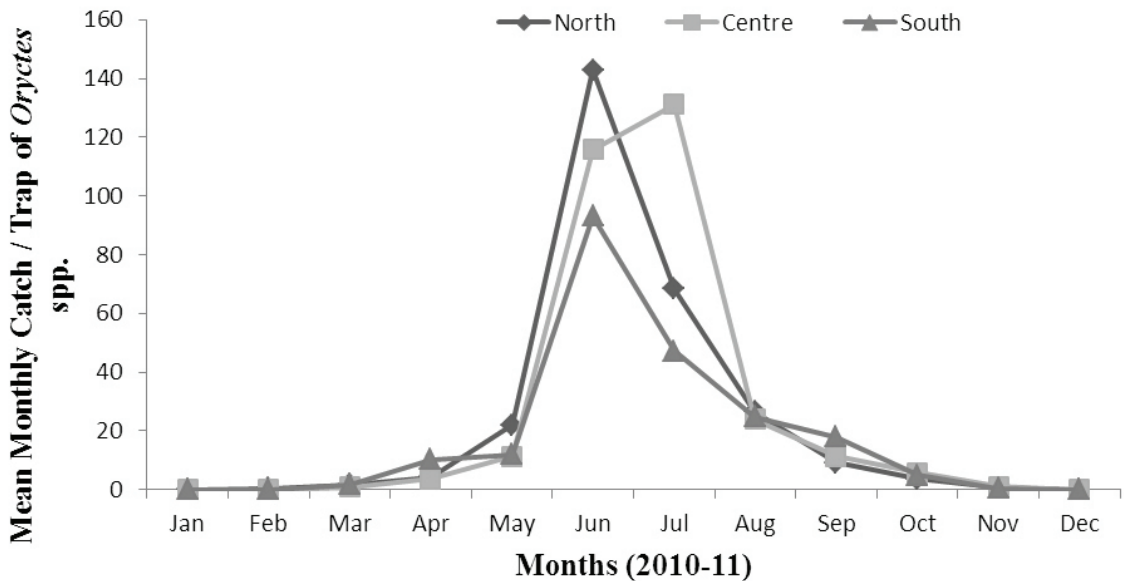

Figure 2. Abundance of *Oryctes* spp in date plantations of Al-Hassa, Saudi Arabia (2010-11). The monthly mean values for the north, centre and south of the oasis are 23.31±12.27, 25.39±13.41 and 17.68±7.96, respectively

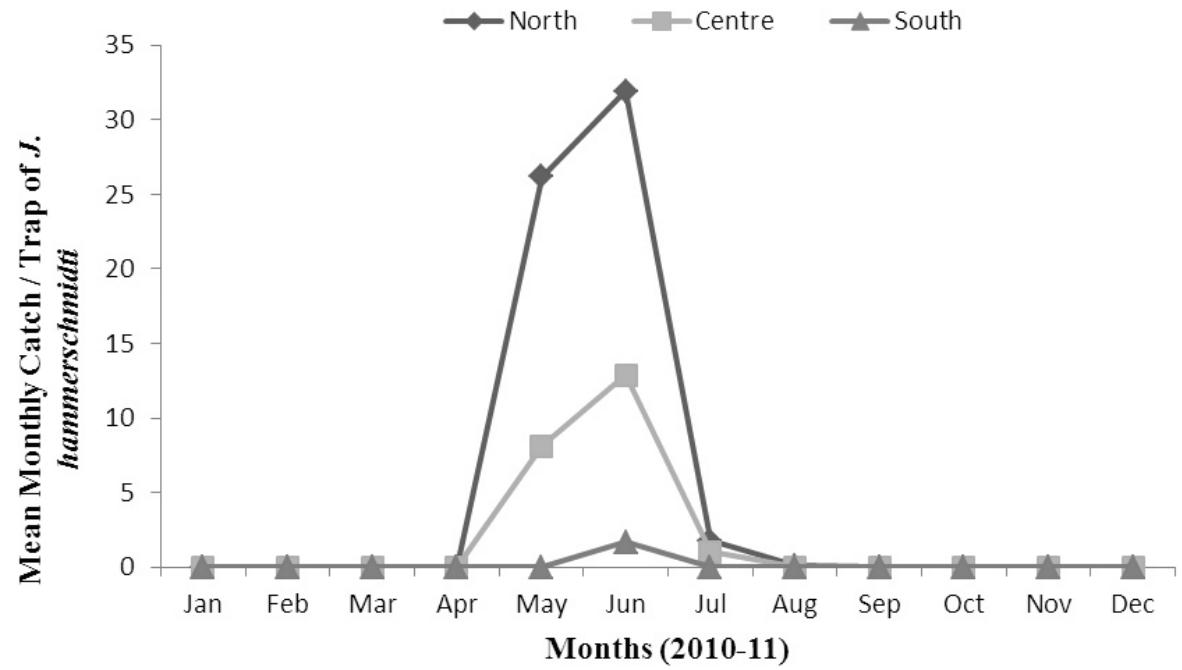

Figure 3. Abundance of *Jebusea hammerschmidti* in date plantations of Al-Hassa, Saudi Arabia (2010-11). The monthly mean values for the north, centre and south of the oasis are 5.00±3.27, 1.83±1.21 and 0.14±0.14, respectively

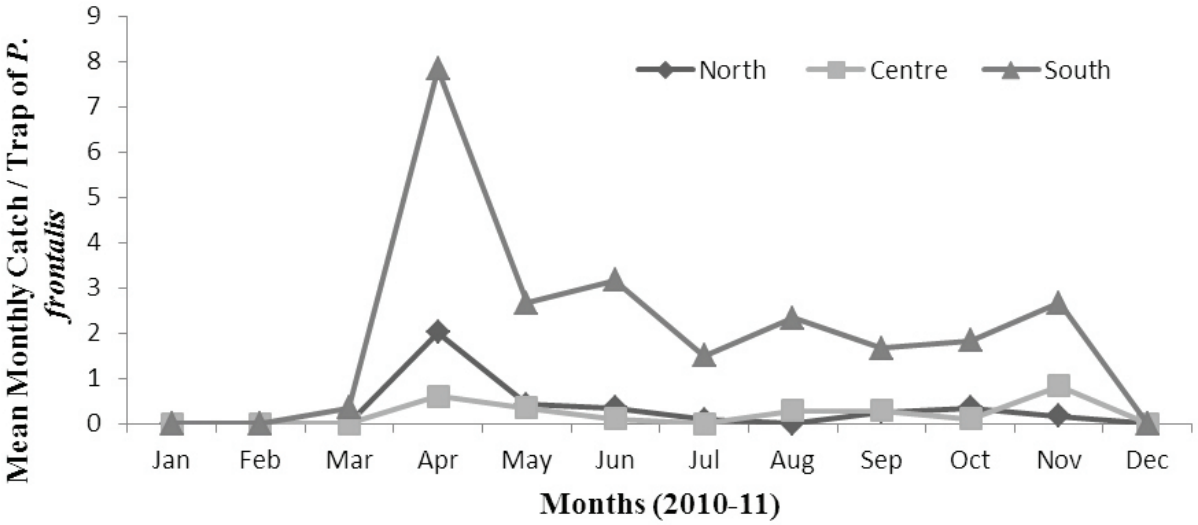

Figure 4. Abundance of *Phonapate frontalis* in date plantations of Al-Hassa, Saudi Arabia (2010-11). The monthly mean values for the north, centre and south of the oasis are 0.30±0.16, 0.21±0.08 and 2.00±0.63, respectively