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Date Palm Pests and Their Control.

Abstract

Date palm plantations are infested by several numbers of important pests in the Sultanate of Oman. Some of them attack fronds and some attack fruits whereas others attack the main trunk. The survey of insect pests of date palm indicated that there are more than 24 arthropod species (insects and mites) associated with date plantation. Among

those dubas bug *Ommatissus lybicus* DeBergevin, red palm weevil (RPW) *Rhynchophorus ferrugineus* Olivier, lesser date moth (LDM) *Batrachedra amydraula* Meyer are major economically important pests affecting growth and yield of date palms quantitatively and qualitatively.

Biological studies indicated that Dubas bug has two generation per year (Spring and Autumn). Spring generation,



Nymphal stage during Spring generation lasted for 48 days, whereas during Autumn generation stage lasted for 43 days. However, ecological studies indicated that during Autumn generation, nymphs started to appear from the 1st week of September and the peak of emergence was recorded during middle of October. Adult stage started from 2nd week of October. However, during Spring generation, nymphs started to appear from the 2nd week of February and the peak of emergence was recorded during 2nd and 4th week of March whereas adult stage started from 2nd week of April.

Ecological studies on the population dynamics of RPW showed that the minimum number of insects was recorded during December and January. However, four maximum peaks were recorded in March, May, August and October. A new trunk injection method was implemented as a control method of RPW in date palm where three holes were drilled into the palm. One hole was drilled at the oozing point, the second one 20cm above this point and the third one 20cm below it. Into each hole 50ml of the insecticide, diluted with water at the ratio of 12ml insecticide to 38ml water, was poured. This method resulted in successful treatment of RPW infestation.

Biological studies indicated that LDM had three generations. First and second generation ranged between 27 to 34 days whereas in third generation ranged between 274-313 days.

Seasonal fluctuation in the adult population of LDM showed that adult moths emerged from late February and peaks of infestation were recorded at the 2nd week of March, 2nd week of April and 2nd week of May.

Introduction:

The date palm phoenix *dactylifera* L. is considered a major crop grown in Gulf countries such as in the Sultanate of Oman. It is grown in the Sultanate in an

area of about 35.5 thousand hectares, which occupies more than 82% of the total fruit area and about 42% of the total agricultural land. Date palm plantation reaches about 8 million palms, 64% are for fresh consumption and 36% for industrial consumption. More than 250 varieties of date palm are grown throughout the Sultanate with a production of about 281 thousand tones per year (MAF, 2002).

Date palm plantations have been suffering from number of important insect pests. Some of them attack fronds and some attack fruits whereas others attack the main trunk. The survey of insect pests of date palm conducted during 1993-1994 indicated that there are more than 24 arthropod species (insects and mites) associated with date plantation (Annual Report, 1994). Among those of major economic importance affecting growth and yield of date palms quantitatively and qualitatively are dubas bug *Ommatissus lybicus* DeBergevin, red palm weevil (RPW) *Rhynchophorus ferrugineus* Olivier, lesser date moth (LDM) *Batrachedra amydraula* Meyer and old world date mite *Oligonychus afrasiaticus* McGregor.

Dubas Bug, *O. lybicus*:

It is a very serious sucking pest on date palm. Both nymphs and adults suck the sap and produce honeydew in copious amount over the leaf surface and fruits which gathers dust and leads to the growth of sooty mold. This reduces the photosynthetic activity of the leaves which results in reduction of the yield of the palm lowering of the grade of the crop and making the fruits unfit for human



consumption. Since its recording in 1962, the Ministry of Agriculture and Fisheries is concerned every year in managing the Dubas bug infestation, and that is by aerial and ground applications of selected insecticides in an area of about 12.6 thousand hectares (MAF, 1997).

Since 1980, several pesticides were evaluated for controlling dubas bug by aerial and ground applications. The recommended pesticides were Nogos 50 EC at the rate of 3.75L/Hectare, Malathion 96% ULV at the rate of 2L/Hectare, Somithion 99% ULV at the rate of 1/Hectare and Somicomdi Alfa 50% ULV at the rate of 2L/Hectare, for aerial application, and Nogos 50 EC at the rate of 200ml/100L, Decis 25 EC at the rate of 100ml/100L and Elsan 50 EC at the rate of 100ml/100L for ground application. In addition, a new method based on collecting and counting honeydew droplets produced by the insect was developed during 1989-1990. This method was established to determine the effectiveness of control measures used against dubas bug. It was effective, rapid and less hazardous and saves labour and time (Mokhtar and Al-Mjeni, 1999).

Several biological and ecological studies were conducted in the Sultanate, as from 1994 to 1996 the biological studies of dubas bug were conducted where the nymphal stages of two generations (Spring and Autumn) were determined in the field and in the laboratory. During Spring generation, nymphal stage lasted 45 - 52 days in an average of 48 days,



whereas during Autumn generation, nymphal stage lasted 37 – 47 days in an average of 43 days (Abd-Allah, et al. 1998a).

The population dynamics of Autumn and Spring generations of Dubas bug were also investigated in 1994-1996 season. The results showed that during Autumn generation, nymphs started to appear from the 1st week of September and the peak of emergence was recorded during middle of October. Adult stage started from 2nd week of October. However, during Spring generation, nymphs started to appear from the 2nd week of February and the peak of emergence was recorded during 2nd and 4th week of March whereas adult stage started from 2nd week of April (MAF, 1997).

However, several biological control agents were recorded on dubas bug such as *Aprostocetus* sp., *Cheilomenes sexmaculata*, *Chrysoperla carnea* and *Runcinia* sp. (Annual Report, 1994). Never the less, more studies are needed to determine their ability to be used in managing the infestation of Dubas bug.

The results of these studies supported the

Dubas bud management programme which is based on monitoring the appearance of the pest and then determine the infestation level and then targeting the 3rd instar and the control measures should be completed before the appearance of the adult stage of the pest. The infestation level is determined by selecting 5 date palms and 3 fronds from each date palm and 20 leaflets and then counting the number of instar on the leaflets. If average number of instar on a leaflet is 5 or more, the infestation level is high, and therefore control measures should be applied (MAF, 1997).

Red Palm Weevil, *R. ferrugineus*:

It is a destructive pest of several palm species of economic importance whereas date palm is among them. It was first discovered in the Sultanate in the Wilaya of Mahdha in 1993 and then subsequently reported in the Governorate of Musandam and the following Wilayas: Buraimi, Shinas, Sohar, Saham and Yanqul (Abdallah and Al-Khatiri, 2000).

The damage to the palm is caused by the grubs. These grubs make tunnels in

the trunk and feed on the tissues of the palm. Decay of the tissues results in the production of a foul smell. While feeding, the grubs make gnawing sound which is often audible. At the point of attack, thick reddish-brown fluid is putrid and gives a strong acrid odour. At a later stage of attack, chewed up fibers are also extuded from this hole. The oozing fluid and/or the presence of these plant fibers provide external evidence of attack by the RPW (Abdallah and Al-Khatiri, 2000). In very severe infestation the trunk may be hollowed out and the palm dies and topples over. Since the introduction of RPW in 1993 till 1997, 3094 date palms were infested by the pest. Among the infested trees 1604 date palm were eradicated due to heavy infestation.

As the introduction of RPW, a quarantine law was made to stop an introduction of any plant material from the plant family *Palmae* in the Sultanate (Al-Khatiri, et al. 1998). In addition, aggregate pheromone traps were used in 1994 as a method of monitoring and controlling of RPW in order to reduce the high population. The trap consists of 10 litter plastic bucket covered with gunny and contain four halls on the lade and six holes on the side of the backed to allow the entrance of the pest. The trap contains 1 kg fermented date fruit as bait and RPW aggregate pheromone (MAF, 1995).

A new trunk injection method was implemented as a control method of RPW in date palm in 1998. In this method of application, three holes were drilled



into the palm. One hole was drilled at the oozing point, the second one 20cm above this point and the third one 20cm below it. Into each hole 50ml of the insecticide, diluted with water at the ratio of 12ml insecticide to 38ml water, was poured. This method resulted in successful treatment of RPW infestation (Abdallah and Al-Khatiri, 2000).

The population dynamics of RPW was also conducted during 1996-1998 season, and the results showed that the minimum number of insects was recorded during December and January. However, four maximum peaks were recorded in March, May, August and October. The daily activity of RPW population was also studied and the highest activity was recorded during sunrise and sunset (Al-Khatiri and Adallah, 2003). In addition, by 1999, a new RPW trap was introduced. The trap consists of uncovered 10 liter plastic bucket containing 1 kg fermented date fruit as bait and RPW aggregate pheromone (Adallah and Al-Khatiri, 2000).

Integrated Pest Management (IPM) committee for managing RPW was formed in 1998, which was responsible to provide the necessary requirement needed to manage RPW in infested areas. In addition, the committee was responsible to monitor the implementation of IPM programme of RPW and to overcome any problem facing the programme. The programme was mainly based on monitoring the villages with infested date palms by using aggregate pheromone traps for monitoring and catching the adults, and also conducting concentrated survey at pre-maximum peaks of the pest where most of the RPW stages are larvae stage. Further-more, the programme was to control the infested date palms and eradicate the heavily infested that can not be treated, in order to reduce the pest status level and in the long run eradicate the pest in most villages. The infestation level during 1993-1997 was 3194 date palms and 50.2% of them were eradicated. However, the implementation of IPM



programme of RPW in 1998 resulted in the reduction of date palms eradicated to 23.7% eradication out of 1843 infested date palm in 1998 and 2.6% eradication out of 953 infested date palms in 2003.

Lesser Date Moth, B. amydraula:

It is known in the Sultanate and elsewhere as Hummeira. It is a very important pest which attacks date fruits and causes several damages to dates, thus reducing the crop yield. The damage is caused by the larvae, which bore deep tunnels into the fruit, ultimately the fruit dries and drops. Infestation can be easily recognised by turning brown and remaining attached to the fruit stalks by a silken thread. Infestation may cause more than 70% loss of fruits.

Biological studies of LDM were conducted during 1994-1995 season. The results indicated that the duration of each insect stage, total life cycle and annual generation were studied under laboratory conditions. The duration of egg, larvae, pupal and adult stages of the first and second generations were 4-5, 12-17, 9-15 and 4-8 days, respectively. However, in the third generation, the egg and larval stage lasted 4-5 and 8-13 days, respectively. The results also demonstrate that the total life cycle of first and second generations ranged between 27 to 34 days whereas in third generation it ranged between 274-313 days. It was found that the pest had three generations (Abd-Allah, et al. 1998b).

Seasonal fluctuation in the adult population of LDM was studied during 1994-1995 season. Adult moths emerged from late February and peaks of infestation were recorded at the 2nd week of March, 2nd week of April and 2nd week of May. The results indicated that the infestation levels were generally significantly affected by the temperature as well as the combined effect of temperature and relative humidity (Annual Report, 1994).

Field experiments were carried out in 1994 season in order to evaluate the efficacy of some insecticides against LDM on date palm trees. The results indicated that Malation 50% EC and Kafil 10% EC at the rate of 125ml/100L of water and Diptrex 80 WP at the rate of 250g/100L of water gave more than 80% reduction in fruit infestation after 7 days of application (Annual Report, 1994).

Reference:

- 1- Abdallah, F. F. and Al-Khatiri, S. A., (2000). Efficacy of different attractant traps on red palm weevil *Rhynchophorus ferrugineus* (Curculionidae: Coleoptera). Proceedings of First Workshop on Control of Date Palm Red Weevil 20-22 November 2000 – 24-26 Shabaan 1421H. Ministry of High Education, King Faisal University. Kingdom of Saudi Arabia 79-419.
- 2- Abdallah, F. F. and Al-Khatiri, S. A., (2000). The effectiveness of trunk injection and fumigation for the control of the red palm weevil, *Rhynchophorus ferrugineus* oliver, in date palm. Journal of Plant Protection in the Tropics. 13, 17-21.
- 3- Abd-Allah, F. F.; Al-Zadjali, T. S. and Al-Khatiri, S. A., (1998a). Biology of *Ommatissus lybicus* Bergevin Under Field and Laboratory Conditions During Spring 1995. Proceeding of the International Conference on Integrated Pest Management. Sultan Qaboos University, Sultanate of Oman. 75-79.
- 4- Abd-Allah, F. F.; Al-Zadjali, T. S. and



Al-Khatri, S. A., (1998b). Biology of *Batrachedra amydraula* Meyrick (Lepidoptera; Cosmoperygidae) Under Laboratory Condition. Proceeding of the International Conference on Integrated Pest Management. Sultan Qaboos University, Sultanate of Oman. 81-86.

5- Al-Khatri, S. A. and Adallah, F. F., (2003). Seasonal fluctuation of *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae) in the Sultanate of Oman. Proceedings of the International Conference on Date Palm 16-19 September 2003. Ministry of High Education, King Saud University, Qaseem Branch. Kingdom of Saudi Arabia. 317 – 387.

6- Al-Khatri, S. A.; Abdallah, F. F. and El-Haidary, H. S., (1998). Integrated Pest Management for controlling Red Palm Weevil. Ministry of Agriculture and Fisheries. Sultanate of Oman. 16 p.

7- Annual Report, (1994). Survey of insect pests attacking date palm in Oman Interior and Al-Dhahira regions in Sultanate of Oman. Directorate General of Agricultural Reserch. Ministry of Agriculture and Fisheries. Sultanate of Oman. 306-310.

8- MAF, 1995. Red Palm Weevil. Ministry of Agriculture and Fisheries. Sultanate of Oman. 14 p.

9- MAF, 1997. Dubas bug, *Ommatissus lybicus* (Homoptera: Tropiduchidae). Ministry of Agriculture and Fisheries. Sultanate of Oman. 19 p.

10- MAF, (2002). Horizons of Date Palm Development. Ministry of Agriculture and Fisheries. Sultanate of Oman. 18www p.

11- Mokhtar, A. M. and Al-Mjeni, A. M., (1999). A Noval Approach to Determine the Efficacy of Control Measures Against Dubas Bug, *Ommatissus lybicus* DeBerg, on Date Palms. *Agricultural Sciences*, 4: 1-4.