A Preliminary Survey of Harmful Date Palm Fauna in D.I.Khan

ABSTRACT

A survey was conducted to find out date palm fauna in D.I.Khan on the variety "Dhakki" in the months of June to September, 2014. The observed insects including *Rhynchoforus ferrugineus*, *Palaminus simony*, *Palaminus nilgirienses* (Staphylinidae), *Sparostes striatulus* (Carabidae), *Coccinella septumpunctata* (Coccinellidae), *Clerada apicicornis* (Lygidae), *Monomorium indicum* (Formicidae) and *Blata orientalis* (Blattidae). All the three stages (larva, pupa and adult) of *Rhynchophorus ferrugenius* were collected from within the palm and it was found as the major insect. Among the pollinating insects; beetles, bees (honey bees and bumble bees) and flies were observed and collected. In addition to above mentioned insects, myriads of arachnids viz. *Peucitia prasina*, *Acanthodan crassus*, *Acanthodan fortis* and snails viz. *Monoca obstructa* were also collected from the leaves and stem, respectively. All the insects had no effect (harmful or useful) on the date palm, except Red Palm Weevil (RPW)

Key words: Date palm, Dhakki variety, Red palm weevil, Fauna

INTRODUCTION

In Pakistan, date palm (*Phoenix dactylifera* L.) is the most important fruit tree (Rizk and Sharabasy, 2007). It is exported to the Middle East, USA, India and Europe. Dhakki date is grown in the nearby village of Dhakki, 49 Km away on chashma road from D.I.Khan (KPK) to Mianwali (Punjab).

The cultivation of edible date palm (*Phoenix dactylifera* L.) was started 8000 years ago. It plays an influencing role in flourishing of civilization in arid areas (Khattak, 2002).

In 2012, total production of date palm was 600 thousand tons in Pakistan which made it its 5th largest producer worldwide (FAO, 2014). Date is nutritive, economical and most important fruit of D.I.Khan. It is an ideal food commodity with enormous benefits for human health due to its essential nutrient contents (El-Hadrami and Al-Khayri, 2012). On percentage basis it contains 2.3-5.6% proteins, 6.4-11.5% dietary fibers, 0.2-0.5% fats and 44.88% of soluble sugars (Zeeshan *et al.*, 2017). Dhakki is high yielding cultivar and has best drying quality. Presently

Dhakki date is one of the major export items of our country. Many insects pests attack date and adversely affect its quality and quantity, however, borers are the major pests of date.

Among the borers, the Red Palm Weevil (RPW) is the most harmful one which has expanded over a large geographic area since 1980s. In 1985, it reached UAE and Saudi Arabia from where it spread to Egypt and Middle East. In Israel, Jordan and Spain, its presence was confirmed in 1994, while it was detected in Palestine in 1999, Italy in 2004, Canary Islands in 2005, Greece, France and Balearic Islands in 2006, and Turkey in 2007 (Malumphy & Moran 2007).

It completes its entire life cycle inside the trunk of date palm tree. About 300 eggs are deposited by the female in different holes or injured sections of the trunk (Kari et al., 2022; Almaghrabi, 2022; Faiad et al., 2022). The legless grubs hatch from these eggs after 2-5 days which readily start boring the interior of the trunk by feeding on the soft tissues and discarding the entire fibrous material. The larval stage may range from 1 to 3 months. In pupa stage, it makes a fibrous cocoon around itself, while after 14-21 days of pupa stage, an adult weevil emerges (Hussein *et al*., 2010).

Abdullah and Latif (2002) described morphology, life cycle and control of red palm weevil in D.I.Khan, Pakistan.

In a survey conducted by the date palm institute of Khairpur, 219 date palms i.e. 5.81% out of the selected 46 orchards were found to be infested with RPW (Al-Saoud, 2010).

Considering that Phoenix plays an important role in increasing employment and capital income shortage, the date palm biodiversity requires a more comprehensive knowledge in order to solve its insect pest problems. So it is necessary to elaborate a strategy of preservation to protect its production, adaptation and resistance.

MATERIALS AND METHODS

A survey of fauna attacking on date palm orchards in Paharpur Tehsil, District Dera Ismail Khan (KP), Pakistan was carried out during June to September 2014. Several date palm growing locations were inspected for insect infestation. At any selected location, date palm trees with their offshoots were carefully examined. Inspection covered roots, stem, leaflet and leaf midrib. Sample per orchard ranged between 40-50 palms.

The quantitative description of the fauna is as under;

Red palm weevil: 2-20 per orchard

Ants: Numerous on each tree in all the selected locations

Rove beetles: 5-40 per orchard

Spiders: Gregarious colonies on all trees in each orchard.

Mites: 200-500 on average

Snails: 50-100 on average

Lady bird beetles: Numerous

Bees: 20-70 on average

RESULTS AND DISCUSSION

A survey was carried out from June to end of September from cultivated orchard of *Phoenic dactylifera*. 12 species i.e. red palm weevil, rove beetle, ground beetle, lady bird beetle, bug, ant, spider, cockroach and snail were recorded. The maximum infestation by weevil was noted during fruit ripening season (July, August).

Keeping in view the economic effects and previous literature, the insect pest of date palm fall in to following categories.

MAJOR PEST:

Table 1 depicted the density of major pests of date palm. Red palm weevil (RPW), *Rhynchophorus ferrugenius* Olive (Curculionidae: Coleoptera) is the most common and economically important insect pest on date palm in D.I.Khan. It is also called Asian palm weevil. It was observed in each collection during June, July and August. About 300 eggs are laid by the female, which hatch normally after 2-5 days. The larvae feeds on the soft tissues of the trunk and make it hollow. Larval stage prevails for 1-3 days and then the pupa emerges which makes a fibrous cocoon around itself. After 2-3 weeks of the pupa stage an adult is formed. *Rhynchophorus ferrugenius* grub mine their way in to stem from bases and as a result palm becomes hollow inside. Initially, the weevil affects the fruit production but later on the attacked orchards are killed.

According to local orchard owners, none of the available insecticides are effective against it. They further reported that the attacked plants never recover completely. *Rhynchophorus ferrugenius* remained on trees throughout the year, with its population reaching the peak during the rainy season. RPW, besides date palm, is also a serious pest of coconut palm and royal palm. Our visual survey has confirmed the RPW presence.

ECONOMIC DAMAGE

RPW is commonly considered to be the most damaging pest of palms in this location. RPW's are usually attracted to unhealthy palm trees, but they will often healthy palms too. RPW larvae feed the epical growing point of palm creating extensive damage to palm tissues and weakening the structure of palm trunk.

SYMPTOMES OF DAMAGED BY RPW

Following symptoms were noted during survey

1. Presence of tunnel on the trunk or base of fronds.
2. Infested palms may emit gnawing sounds caused by larvae feeding inside.
3. Oozing of viscous fluid from tunnels
4. Appearance of chewed plant material at the external entrances of feeding materials (Fass) at the external entrance of feeding tunnel and an highly distinctive formentated order.
5. Empty pupal cases and the bodies of dead adults of RPW in and around heavily infested palms.
6. Breaking of the trunk or toppling of the palm crown

Feeding damage leading to the death of infested palm is widely reported in survey area. Early RPW infestation can be difficult to detect in the large palm in the landscape unless excess to the actively growing portions can be attained.

IDENTIFICATION:

Adult Red Palm Weevils are very large beetles, attaining body lengths, including the rostrum of 35 to 40mm (1.4-1.6 inches). The weevils have a long, slender rostrum or "snout" which the female uses to penetrate palm tissue and create access wounds in which eggs are deposited. Coloration in *Rhyncophorus ferrugineus* is extremely variable and has historically led to the erroneous classification of color- defined polymorphs (variants) as and has historically led to the erroneous classification of color- defined polymorphs (variants) as distinct species. Coloration in the adult weevils is predominately reddish-brown in the most typical form.

Plate 1(A-G) : Some pictorial view of Red Palm Weevil during the survey.

A 

B 

C

D 

E 

F 

G 

CONTROL OPTIONS:

Suppression of Red Palm Weevil infestations can be attempted in several ways. Insecticides are probably the most common control tool used against Red Palm Weevil, and can applied in a variety of ways for RPW suppression including applications as dusts, liquid sprays. Trunk injections or soil applications of systemic insecticides that move inside the palm poisoning weevil larvae and adults may also be effective. Good sanitation practices are needed to prevent Red Palm Weevil spreading from infested palms. Chipping, burning, and burying infested material deeply can reduce the likelihood that Red Palm Weevil will emerge and escape from infested palms. Mass trapping has been used to reduce spreading from infested palms. Chipping, burning, and burying infested material deeply can reduce the likelihood that Red Palm Weevil will emerge and escape from infested palms. Mass trapping has been used to reduce Red Palm Weevil densities.

The pest had been reported in Asia, Australia, Philippine and Thailand as early as 1962 (Mathen and Kurian, 1962). Lever advocated that the origin of RPW is tropical Africa, while Abraham *et al*. (1975) claimed that its origin was India. Later on the weevil was reported in Srilanka, Burma, Indonesia and Pakistan. Cox reported this pest from United Arab Emirates in 1985, in Saudi Arabia in 1987 and Egypt in 1992.

FREQUENT PEST:

Table 1 showed the frequent pest density also. The insects of frequent occurrence on date palm were ants (*Monomorium indicum*) and rove beetles (*Palaminus simony* and *P. nilgiriensis*).

The ants (*Monomorium indicum*) were collected from the roots of the date palm trees, where they were found in greater density. These were found in every tree but no harmful effect was seen.

The rove beetle was also observed in huge number during the fruiting season only in fallen fruits. Two species were identified as *Palaminus simony* and *P. nilgiriensis*.

OCCASIONAL PEST:

Table 1 showed the occasional pest density. In addition to above mentioned major and frequent insects pests, some occasional insects were also observed in the study area.

Lady bird beetle (*Coccinella septumpunctata*) was collected from leaves of tree in orchard having Berseem fodder. It belongs to the family Coccinellidae which has six sub-families, out of which five are predacious while one sub-family is phytophagous in nature (Ullah *et al*., 2012). About 90% of the 4200 species of Coccinellidae family are predators of insects like, aphids, scale insects and phytophagous mites etc. which are harmful for several agricultural and forest plants.

Ladybird beetles lay eggs on leaves, stems and sometimes on the trunk of palm tree as well. Larvae are usually brightly colored which pupates on the leaves by attaching the body to leaf surface. The life cycle is completed in one month, depending on the temperature and location. Adults can be seen in winter mostly in sheltered locations such as tree holes (Majerus and Kearns, 1989).

Ground beetle *Sparostes striatulus* was another specie collected from the trunk at two localities. Two specimens were found, one in each of the June and September collection. It had mandibular mouth parts.

One bug specimen as *Clerada apicicornis* was collected from trunk of palm tree. Although it had sucking mouth parts, it still cannot be considered as a pest owing to its solo appearance in the collection.

A female *Blata orientalis* was also collected from date palm tree. Roaches are commonly found in household localities.

FREQUENT POLLINATORS

Table 2 indicated the density of frequent pollinator. Frequent pollinators of date palm included ladybird beetles, bees and flies. However, beetles constitute the most important group of pollinators in palms, followed by bees and flies.

OCCASIONAL POLLINATORS

Occasional pollinators include mammals like bats.

GENERAL REMARKS

Apart from the insects, some other arthropods and mollusks were also observed on date palm trees.

Three species of spiders; *Peucitia prasina, Acanthodon crassus* and *A. fortis* were collected from leaves. Spiders were present in gregarious colonies in all localities. Each leaf contained at least one spider. Spiders are carnivorous in habit and are present as one of the major predators. Spiders spin web on the leaves that may indirectly affect the photosynthesis process.

A specie of snail, *Monacha obstructa*, both mature and immature forms were found in large number on the palm trees. In fact all the trees were occupied by snails.

CONCLUSION

The population of insects, other arthropods and mollusks collection was affected by environmental factors, insecticide residues and presence of other crops in the date palm field.

It can be concluded from the survey that all the date palm varieties are susceptible and cannot withstand the attack of red palm weevil, except dhakki variety which showed resistance towards this pest.

Special attention should be paid to control red palm weevil (RPW).

Agriculture research institutes should focus on the following strategies;

- Application of integrated pest management program.
- Taking great care during the plantation to avoid infested suckers.
- An understanding of biology and behavior of *R. ferrugineus*.
- Taking accurate control measures using effective insecticides.

From agricultural point of view it is an important export item, keeping in view the significant goodness of date variety (dhakki), it is a task for Biotechnologists to produce pest resistant varieties, as the complete control is justifiably difficult.

Table 1 Showed pest of date palm (%) during survey 2014.

Fauna (pest)	Density (%)
Rhynchoforus ferrugineus	30
Palaminus simony	10
Palaminus nilgirienses	5
Sparostes strieatulus	5
Coccinella septumpunctate	4
Clerade apiciornis	3
Monomorium indicum	20
Monomorium destructor	12
Blata orientalis	11
Isoptera spp.	16

Table 2 Showed pollinating insects (%) during survey 2014.

Fauna (Pollinating insects)	Density (%)
Beetles	15
Honey bees (*Apids mellifera*)	20
Bumble bee (*Bombus terrestis*)	10
House flies (*Musca domestica*)	17
Hornest spp.	5
Carpenter bee (*Xylocopa virginica*)	3

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