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First Record of *Zaprionus indianus* (Gupta, 1970) (Drosophilidae: Diptera) in Jordan

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Abstract: The African fig fly, *Zaprionus indianus*, is recorded for the first time from Jordan. Samples of this fly were collected from heavily infested dates (Madghool variety) from a farm in the central Jordan Valley. In addition, it was reared in the laboratory on apricots, cherries and figs. Our preliminary observations, photographs for the adult insect, larva and pupa are presented. The pest distribution and propable pest status are discussed.

Key words: *Zaprionus indianus* · African fig fly · Jordan · Date palm · Dates

INTRODUCTION

Zaprionus indianus (Gupta 1970) (Diptera: Drosophilidae) is native to Africa, the Middle East and southern Eurasia [1]. In the Middle East, Amoudi *et al*. [2] recorded *Z. indianus* on pomegranate from Saudi Arabia and studied the effect of temperature on its life cycle. Yassin and Abou-Youssef [3] recorded *Z. indianus* in Egypt for the first time as a result of a survey in the oases of the Northern-Western Desert of Egypt. Zinetti [4], mentioned that larvae of this pest were found associated with larvae of Medfly *Ceratitis capitata* inside kiwi fruits in the costal area of Lebanon. Al T'Oma *et al*. [5] recorded *Zaprionus indianus* for the first time from Basra province in Iraq where it was collected on dates, grape, pomegranate, nabq (*Ziziphus zizyphus*) and banana.

Z. indianus was first recorded in South America Vilela *et al*. [6]. After that several studies were published about its expansion and other aspects like the hosts plants [7, 8], ecology and distribution [9-14], control using traps [15], life cycle [16], parasitoids [17], courtship behavior [18], some morphological or physiological traits [19-22] and chromosomal gene arrangements [23]. Commar *et al.* [24] presented a taxonomic and evolutionary analysis of *Zaprionus indianus* and its colonization of Palearctic and Neotropical regions. They used molecular markers and alloenzymes and quantitative traits to describe the probable scenario for the expansion of *Zaprionus indianus* from its center of dispersal (Africa) to regions of Asia (ancient dispersal) and the Americas (recent dispersal). They described a probable route for this species' dispersal during its recent expansion.

From North America, Steck [25] recorded *Zaprionus indianus* as a genus and species new to Florida and issued a pest allet regarding this pest.

Yassin and David [26] revised the Afrotropical species of *Zaprionus* and described two new species. They mentioned the occurrence of this insect in many countries in Africa, North and South America, Europe, the Middle East and India.

The objectives of this paper are to report the occurrence of this pest for the first time on date palms in Jordan and to give some preliminary observations on the ecological and biological status of this pest.

MATERIALS AND METHODS

Infested dates were collected from date palms of Madghool variety on 25th of June 2012 from an orchard in Cenral Jordan Valley. A field visit were conducted on July 7th 2012 to collect infested dates directly from the trees and not from the dropped fruits. The infested fruits were kept in cages under room temperature unitl adult emergence in order to invesigate the taxonomical morphology and to identify the insect pest. Specimens of all developmental stages were kept at the University of

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Jordan Insects Museum, Faculty of Agriculture, University of Jordan. The symptoms of infestation on friuts were recorded and photos for different stages of the pest were taken. In addition the fly was reared till adult emmergence on apricot, cherries and figs. This was done by placing healthy fruits in cages containing infested dates.

RESULTS AND DISCUSION

Many flies emerged from the infested fruits on July 12th 2012 and the next few days. The adult fly (Fig. 1) was found to belong to *Zaprionus indianus* (Gupta, 1970) according to the key of Yassin and David [26]. The fore- femur (Fig. 2.) with a row of spines fused with long bristles at their basis, thorax without submedian stripes, width of black vittae surrounding the white vittae not enlarged posteriorly, abdomn light yellow, head and thorax concolorous redish brown, aedeagal flap highly smooth apically and serrated basally and the oviscape with 6 peg-like ovisensilla. The larva (Fig. 3) is miscidiform tapeing anteriorly, with a pair of anterior and posterior spiracles. The mouth parts and the cephalophanyngeal skeleton can be seen as the darker parts at fron of the larva (Fig. 3). The pupaparium (Fig. 4) is yellowish-brown, with 2 branched anterior breathing tubes and 2 caudal spiracles.

The infestation of *Z. indianus* on dates starts when the insect lays eggs through cracks or other opening made by other insects (Fig. 5). The larvae feed on the tissues of the friut liquifying the tissues through the entrance of bacteria and yeast. After that, rotten fruits drop or stay hanged on the fruit bunch.

It is difficult to predict the time of *Z. indianus* presence in Jordan, because usually dorophilids are known to be secondary pests of fruits after some intitial infestation by other pests. Some farmers mentioned that they have seen the symptoms of infestations on dates last year. Since no farmers noticed the pest on other hosts it may have introduced into Jordan recently. The fly could have entered the country through the importation of infested fruits from neighbouring countries such as Palestine, Lebanon or Saudi Arabia.

Al T'Oma *et al*. [5] assumed that the arrival of this species to Iraq was not necessarily recent and probably it travelled with fruit transports between countries. Or individuals may have been transported as "aeroplankton" across the inhabitable stretches of dessert between locations.

Fig. 1: *Z. indianus* adult, dorsal view

Fig. 2: Fore femure of *Z. indianus* adult

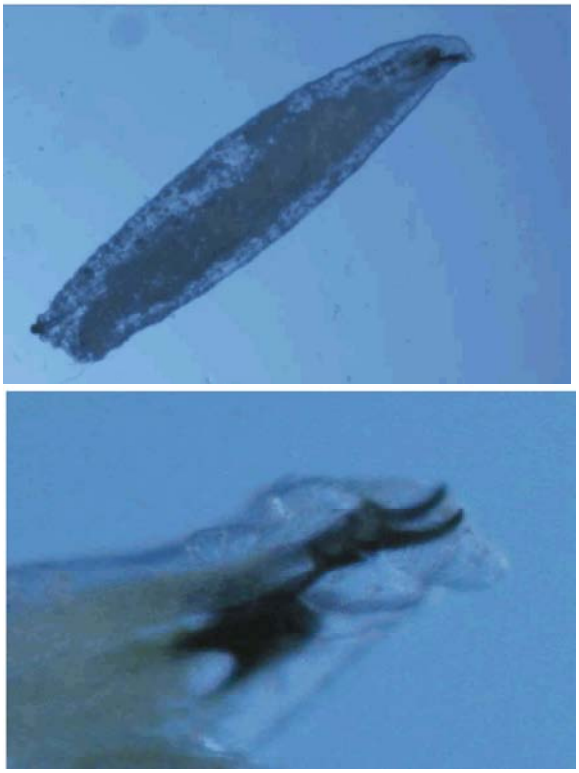

Fig. 3: Larva of *Z. indianus* (above) and enlargement of the Cephalopharyngeal skeleton (below)

Fig. 4: Puparium of *Z. indianus* (left) and enlargement of the breathing tube (middle) and caudal spiracles (right)

Fig. 5: A crack (left) and a hole (right) caused by insects other than *Zaprionus indianuson* dates

The fact that this insect was reared on apricot, figs, cherries and it was known to breed in more than 70 plant species [6] we expect that *Z. indianus* will spread quickly on a wide variety of plants among them dates and citrus in the Jordan Valley and figs and other fruits trees in the different fruit production areas in Jordan.

Mata *et al.* [13] mentioned that *Z. indianus* was a very successful invasive species that presented high adaptive flexibility and extreme physiological tolerance. They found that *Zaprionus indianus* quickly expanded ranges into different environments in the invaded areas, suggesting climatic niche shifts, primarily in India.

Since Jordan is geologically divers having mountanous areas, deserts and the Jordan Valley which reaches about 400 below sea level. This pest is expected to become a serious pest on date palms in th Jordan Valley, Wadi Arabah and other desert areas. The polyphagy and relatively short lifetime of this species in an extremely hot environment have contributed to its dispersion throughout Brazil [6]. This may become the case in hot Jordanian parts like the Jordan valley. Nava *et al.* [16] found that the biological cycle of the insect (egg-adult) lasted less than one month at the seven temperature conditions studied (8-32°C), creating conditions for the occurrence of several generations of the pest throughout the year in Brazil. Accordingly, several generations are expected to occur in the Jordan Valley which allows for more damage of fruits and more reduction in the yield. The insect may become also a pest on citrus in Jordan Valley and on figs in the different parts of Jordan.

The distribution of this pest, its host range, population dynamics, infestation percent and damage to the different friuts needs investigation in Jordan. In addition, different control methods should be evaluated such as closing natural openning of fig fruits (ostiole protectors), the effeciency of the use on bait traps, elimination of food substrates in the area and chemical treatments. Raga *et al*. [27] evaluated different fig ostiolar protection systems against *Zaprionus indianus*. They found that adhesive tag, gel and Bordeaux mixture provided a significant reduction of fig fly infestation while the foliar fertilizer Bordasul® showed no consistent results in protecting the figs from *Z. indianus* colonization. Pasini and Link [15] evaluated four different traps and found that the best trap for capturing *Z. indianus* was colorless plastic bottle of 0.6 L with two perforations of 8mm in diameter which were made in the bottles for insects to entry. They were hung 30cm from the branch and 30-50cm of soil level. The McPhail trap was inefficient in capturing the fly.

Search for natural enemies in Jordan Valley may reveal some native parasitoids. The parasitoid *Spalangia endius* (Walker) (Hymenoptera: Pteromalidae) was reported by [17] which was collected from the pupae of *Zaprionus indianus* using traps with fruit bait in Brazil.

Barbosa *et al*. [14] reported that presence of a great number of individuals of *Z. indianus*, a relatively recent invasive alien species, in a trap containing dog feces, especially in an anthropic environment, is an indication that this fly exhibits opportunistic behavior and has a potential to become synanthropic. This fly may become important synanthropic fly in the Jordan Valley as well where huge amounts of fresh manure are used each year for fertilizing agricultural areas in which the house fly is a major problem.

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