

Mini datasheet on *Zaprionus indianus* (Diptera: Drosophilidae) - African fig fly

Added to the EPPO Alert List in 2016 - Deleted in 2020

Reasons for deletion:

Zaprionus indianus has been included in EPPO Alert List for more than 3 years and during this period no particular international action was requested by the EPPO member countries. In 2020, the Working Party on Phytosanitary Regulations agreed that it could be deleted, considering that sufficient alert has been given.

Why: Following a proposal made by the French NPPO, the EPPO Panel on Phytosanitary Measures considered that two invasive drosophilids, *Zaprionus indianus* and *Z. tuberculatus* should be added to EPPO the Alert List.

Zaprionus indianus was first described in 1970 from specimens collected in India, but this species is considered to originate from tropical Africa. During the last decades, this species has clearly demonstrated an invasive behaviour. The history of its invasion across the Indian subcontinent is not well known but presumably not recent. The invasion of the Americas started in the 1990s, with a first published record in 1999 in Brazil which was followed by a rapid and broad expansion in South America. On the North American continent, it was detected for the first time in Chiapas (Mexico) in 2002 and in Florida (US) in 2005. *Z. indianus* is generally considered to be a secondary pest which can live on a wide range of fruit species. However, it has been able to cause economic damage as a primary pest to fig crops (*Ficus carica*) in Brazil.

Where: *Z. indianus* is an Afrotropical species which is now considered to be semi-cosmopolitan. Its presence has been reported in some countries around the Mediterranean Basin.

EPPO region: Cyprus, Egypt, France (first found in 2016, establishment not expected), Israel, Jordan, Lebanon, Malta, Morocco, Portugal (Madeira only), Spain (Andalucía, Islas Canarias), Tunisia.

Africa: Benin, Cameroon, Cape Verde, Comoros, Congo, Cote d'Ivoire, Egypt, Gabon, Guinea, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Morocco, Mozambique, Niger, Nigeria, Reunion, Saint Helena, Sao Tome & Principe, Senegal, Seychelles, South Africa, Sudan, Tanzania, Tunisia.

Asia: India (Andhra Pradesh, Chandigarh, Delhi, Haryana, Jharkand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Uttaranchal, Uttar Pradesh), Iran, Iraq, Israel, Jordan, Lebanon, Nepal, Oman, Pakistan, Saudi Arabia, United Arab Emirates.

North America: Canada (Ontario, Québec), Mexico, USA (Alabama, Arizona, California, Connecticut, Florida, Georgia, Kansas, Michigan, Minnesota, Mississippi, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Texas, Virginia, Wisconsin).

Central America and the Caribbean: Cayman Islands, Guadeloupe, Martinique, Panama.

South America: Argentina, Brazil (Amazonas, Bahia, Ceara, Distrito Federal, Espírito Santo, Goias, Maranhao, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Para, Paraiba, Parana, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Rondonia, Santa Catarina, Sao Paulo, Tocantins), Ecuador, French Guiana, Paraguay, Peru, Uruguay, Venezuela.

On which plants: *Z. indianus* is a generalist species which uses a wide range of cultivated and wild fruit species (approximately 80 host species) for feeding and mating. *Z. indianus* is a secondary pest which usually does not attack unripe and undamaged fruits (unlike *Drosophila suzukii*). *Z. indianus* mainly feeds on bacteria and yeasts (e.g. *Candida tropicalis*) found on decomposing fruits. However, in Sao Paulo (BR), *Z. indianus* has been reported to feed and cause direct damage to fig (*Ficus carica*) crops. *Z. indianus* has been found in association with- or reared from the following fruit species (the list is not exhaustive):

Actinidia chinensis (kiwifruit), *Aleurites mollucana* (Indian walnut), *Anacardium occidentale* (cashew), *Annona glabra* (pond apple), *Averrhoa carambola* (star fruit), *Campomanesia aromatica* (strawberry guava), *Citrus sinensis* (sweet orange), *Dimocarpus longan* (longan), *Diospyros kaki* (persimmon), *Eriobotrya japonica* (loquat), *Ficus carica* (fig), *Fragaria x ananassa* (strawberry), *Genipa americana*, *Malpighia emarginata* (Barbados cherry), *Malpighia puniceifolia* (acerola), *Musa* (banana), *Olea europaea* (olive), *Persea americana* (avocado), *Phoenix dactylifera* (date), *Prunus armeniaca* (apricot), *Prunus cerasus* (sour cherry), *Prunus persica* (peach), *P. persica* var. *nucipersica* (nectarine), *Psidium guajava* (guava), *Punica granatum* (pomegranate), *Rubus idaeus* (raspberry), *Solanum lycopersicum* (tomato), *Spondias tuberosa* (imbu), *Syagrus romanzoffiana* (queen palm), *Syzygium jambos* (rose apple), *Vaccinium* spp. (blueberry), *Vitis vinifera* (grape), *Ziziphus jujuba* (common jujube), *Ziziphus spina-christi* (Christ' thorn).

Damage: As is the case for most drosophilids, *Z. indianus* is a secondary pest which infests overripe, fallen, or rotting fruit, but it has been reported as a primary pest of fig in Brazil. It has been observed that females oviposit near the fig ostiole from where larvae can easily access and feed on the interior fruit flesh, causing the fruit to become soft and unmarketable. When it was first reported in 1999 in the Valinhos area (Sao Paulo), one of the main fig-producing areas in Brazil, losses were estimated at 40% in fresh figs with an 80% reduction in fruits eligible for export. However, apart from this initial observation, data is generally lacking about the present impact of the pest on Brazilian fruit crops. In a paper about the presence of *Z. indianus* in Jordan, it is reported that heavy losses were observed on figs but that no quantitative research was done.

Adults are small flies (about 3.5 mm long) with a reddish-brown head and thorax, yellow abdomen and red eyes. A pair of longitudinal white stripes, interspersed with black bands, are clearly visible on the back of the head and thorax. Eggs are small, white and oblong with 4 filaments. There are three larval stages. Larvae have white, cylindrical bodies (3.5 mm long when fully grown), tapered anteriorly with posterior spiracles. Pupae are spindle-shaped, reddish brown with two anterior stigmata.

Pictures can be viewed on the Internet

http://file.lacounty.gov/acwm/cms1_235106.pdf

<http://bugguide.net/node/view/71772/bgimage>

Dissemination: Studies have been carried out in Brazil to better understand the invasion history of *Z. indianus*. It is hypothesized that it first arrived in Sao Paulo state with air transport of fruit from Africa. It then further spread within the country by natural means and more importantly by road transportation of commercial fruit, in particular along two major highways (BR-153 (transbrasiliana highway) and BR-116). It is also supposed that *Z. indianus* has been introduced into other parts of the world by human activities and in particular by intercontinental movements of fruits.

Pathway: Fruit of host plants from countries where *Z. indianus* occurs.

Possible risks: *Z. indianus* has clearly demonstrated its invasive behaviour, and its ability to adapt to new environments and to use a wide range of fruit species, many of them being cultivated in the EPPO region. *Z. indianus* is generally considered to be a tropical and subtropical species, therefore more data would be needed on its potential of establishment under temperate conditions. For example, in the cooler areas of its invaded range (e.g. in Northern India or Canada/USA), it is not known whether the species survives periods of cold in diapause or populations re-establish through reintroductions. Its capacity to damage crops directly has been observed on figs which is an important crop around the Mediterranean Basin. Its interactions with other drosophilids or fruit flies might enhance the negative impacts of the latter on cultivated fruit crops. Recent studies have shown that *Z. indianus* could be reared in large numbers from fruits which were attacked by other pests such as, *D.*

suzukii (on grapes in Michigan, strawberries in Southern Brazil), *Ceratitis capitata* (on kiwifruit in Lebanon) and *Bactrocera oleae* (on olive in Iran). Although no economic losses have been reported from the Mediterranean countries where *Z. indianus* has been introduced, its potential to become a fruit pest in the EPPO region cannot be totally ruled out and considering the recent experience with the introduction of *D. suzukii*, it seems wise to monitor the situation of *Z. indianus* within the EPPO region.

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