

FIRST RECORDS OF *ZAPRIONUS INDIANUS* GUPTA (DIPTERA: DROSOPHILIDAE) FROM COMMERCIAL FRUIT FIELDS IN ONTARIO AND QUEBEC, CANADA

J. M. RENKEMA¹*, M. MILLER¹, H. FRASER², J-PH. LÉGARÉ³, AND
R. H. HALLETT¹

¹School of Environmental Sciences, University of Guelph,
50 Stone Road West, Guelph, ON, Canada N1G 2W1
email: renkemaj@uoguelph.ca

Scientific Note

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Zaprionus indianus Gupta (Diptera: Drosophilidae) was described in India (Gupta 1970) (Fig. 1) but is suspected to be native to the Afrotropical Region (Chassagnard and Kraaijeveld 1996). In the New World, it was first found in late 1998 in São Paulo, Brazil and has since spread rapidly throughout South and Central America (Vilela 1999; Goni et al. 2001; Tidon et al. 2003). *Zaprionus indianus* was first detected in North America in July 2005 in Florida (Steck 2005) and is now reported from many eastern, central and southwestern states (van der Linde et al. 2006; van der Linde 2013). This species is now globally widespread and considered cosmopolitan, present in temperate and tropical regions (Tidon et al. 2003; Commar et al. 2012).

Zaprionus indianus is a generalist, with the ripe fruits of at least 74 plant species in 31 families in Africa recorded as breeding sites (Lachaise and Tsacas 1983). It has a similarly wide host range in South and North America and has become a significant pest of figs (*Ficus carica* L.) in Brazil (Santos et al. 2003; Stein et al. 2003; van der Linde et al. 2006). While *Z. indianus* is often associated with damaged or fallen rotting fruit, larvae are able to invade the soft tissue of figs before harvest and have been reared in Florida from tree-ripened *Malpighia emarginata* (Barbados cherry), *Punica granatum* (pomegranate), *Eriobotrya japonica* (loquat) and *Dimocarpus longan* (longan) (van der Linde et al. 2006; Pasini et al. 2011). In northeastern USA, *Z. indianus* has been reported in high numbers in net collected samples in a vineyard and was found in apple cider vinegar traps in cherry, raspberry and blackberry fields (Biddinger et al. 2012).

Here we report the first records of *Z. indianus* in Canada, with all specimens found in southern Ontario and Quebec. Specimens of *Z. indianus* were found during surveys for *Drosophila suzukii* (Matsumura) in apple cider vinegar traps in pre- and post-harvest fields of

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*Author to whom all correspondence should be addressed.

²Ontario Ministry of Agriculture and Food and Ministry of Rural Affairs, Box 8000, 4890 Victoria Avenue North, Vineland ON, Canada L0R 2E0

³Ministères de l'Agriculture, des Pêcheries et de l'Alimentation du Québec, Complexe scientifique, 2700 rue Einstein, local C. RC 105, Québec, QC, Canada G1P 3W8



FIGURE 1. *Zaprionus indianus* from Africa dorsolateral habitus (Photograph by Stephen A. Marshall).

peach, blueberry, raspberry, strawberry, cherry and plums. Many of the Ontario specimens were collected by the Ontario Ministry of Agriculture and Food and Ministry of Rural Affairs (OMAF/MRA); all were identified by M. Miller and S. A. Marshall and deposited in the University of Guelph Insect Collection, Guelph ON (DEBU). The specimens collected in Quebec were identified at the Laboratoire de diagnostique en phytoprotection of Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ), confirmed by M. Miller and S. A. Marshall, and deposited in the Collection d'insectes du Québec, Québec QC (CIQ). Voucher specimens from both provinces are deposited in the Canadian National Collection, Ottawa, ON.

Material examined. ONTARIO. Essex. Near Harrow, blueberries, 10.ix.2013, OMAF/MRA (1♀1♂, DEBU). Near Harrow, blueberries, 3.ix.2013, OMAF/MRA (1♀, DEBU). Near Harrow, peaches, 10.ix.2013, OMAF/MRA (21♀26♂, DEBU). Near Ruthven, peaches, 12.ix.2013, OMAF/MRA (1♀3♂, DEBU). **Chatham-Kent.** Near Blenheim, raspberries, 10.ix.2013, J. Renkema (1♀, DEBU). Near Blenheim, raspberries, 10.ix.2013, OMAF/MRA, (1♀1♂, DEBU). Near Blenheim, 2.ix.2013, J. Renkema (1♀, DEBU). **Niagara.** Near Beamsville, plums, 12.ix.2013, OMAF/MRA, (1♀1♂, DEBU). Near Niagara-on-the-Lake, cherries, 11.ix.2013, OMAF/MRA, (1♂, DEBU). **Simcoe.** Near Barrie, peaches, 10.viii.2013, H. Fraser (1♀, DEBU). **QUEBEC. Château-Richer.** La Côte-de-Beaupré, strawberries, 2.x.2013, MAPAQ (1♀, CIQ). **Compton.** Coaticook, raspberries, 7.x.2013, MAPAQ (1♂, CIQ). **Laval.** Laval, strawberries, 7.x.2013, MAPAQ (1♀, CIQ). Laval, strawberries, 15.x.2013, MAPAQ (1♀, CIQ). **Pierreville.** Nicolet-Yamaska, strawberries, 8.vii.2013, MAPAQ (1♀, CIQ). Nicolet-Yamaska, raspberries, 19.viii.2013, MAPAQ (1♀, CIQ). **Sainte-Pétronille.** L'Île-d'Orléans, raspberries, 3.x.2013, MAPAQ (1♀,



FIGURE 2. *Zaprionus indianus* from Ontario, Canada, male, lateral habitus.

CIQ). **Sainte-Sabine.** Brome-Missisquoi, strawberries, 6.ix.2013, MAPAQ (1♀, CIQ). Brome-Missisquoi, strawberries, 10.x.2013, MAPAQ (CIQ). **Salaberry-de-Valleyfield.** Beauharnois-Salaberry, raspberries, 17.ix.2013, MAPAQ (1♂, CIQ). **Yamaska.** Pierre-De Saurel, blueberries, 21.viii.2013, MAPAQ (1♂, CIQ).

Zaprionus indianus is the only member of *Zaprionus* Coquillett present in Canada to date. It is distinguished from all other Canadian Drosophilidae by its reddish-brown head and thorax with unique silvery stripes that extend dorsally from the antennae to the tip of the scutellum (Fig. 3) and laterally from the leading edge of the thorax to the base of each wing (Fig. 2) (Gupta 1970; Steck 2005; van der Linde et al. 2006; Yassin and David 2010). Because future invasion by other *Zaprionus* species is possible (van der Linde 2010), including the invasive *Z. tuberculatus* Malloch, currently established in Egypt and Israel, and the potentially invasive *Z. ghesquieri* Collart, introduced to Hawaii and Cyprus, but without established populations (Patlar et al. 2012; Yassin A, 2013, pers. comm.) we provide additional features that would confirm that specimens are *Z. indianus*.

The keys to African (Yassin and David 2010) and European (Bächli et al. 2004) *Zaprionus* species, the description in van der Linde (2010), and the original species description by Gupta (1970) were used to identify our specimens of *Z. indianus*. *Zaprionus indianus* specimens have 4–6 composite spines with second short branches arising directly from the fore femur (a character of all 15 members of the *vittiger* species group) (Fig. 4); the silver stripes with black borders are narrow and the black borders do not widen at the scutellum; the scutellum lacks a white tip; the abdomen is light yellow; and the subapical setae on the fourth and fifth abdominal tergite arise from dark spots. In males, the aedeagal flap is smooth apically and serrated basally (distinguishing it from *Z. africanus* Yassin and David with a deeply serrated apical margin and *Z. gabonicus* Yassin and David with a



FIGURE 3. *Zaprionus indianus*, head and thorax, dorsal view.



FIGURE 4. *Zaprionus indianus*, fore femur, lateral view, showing the composite spines.

complete lack of serration apically and basally). In females, the oviscapae has six peg-like ovisensilla (*Z. africanus* with 7 or 8 ovisensilla), and the spermatheca length to width ratio is 0.95–1.16 (Gupta 1970; Steck 2005; van der Linde et al. 2006; Yassin and David 2010).

Zaprionus indianus is unlikely to become an established pest of fruit in Ontario and Quebec. The small numbers of flies we report from Ontario and Quebec suggest *Z. indianus* may have moved in from the United States in late summer and autumn 2013. However, it can adapt to a wide range of climates (Karan et al. 2000), and if it can successfully overwinter it may also spread rapidly in Canada, as evidenced by its rapid expansion in the USA since its first discovery there (van der Linde 2013). Large populations are often observed the year after its initial detection, particularly in urban environments (Ferreira and Tidon 2005). Unlike *D. suzukii*, *Z. indianus* is not known to infest ripe, undamaged fruit, but if it can use ripening fruit already attacked by *D. suzukii*, there is the potential for increased damage to harvested fruit. Therefore, future monitoring for *D. suzukii* should include *Z. indianus*. Further study on the biology and ecology of this fly is warranted, if population levels in Canada are found to increase.

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