

# Occurrence of *Zaprionus indianus* (Diptera: Drosophilidae) in Agudo, Rio Grande do Sul, Brazil

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**Abstract.** This work has the first record of *Zaprionus indianus* Gupta (Diptera: Drosophilidae) found in the rural area of Agudo in the state of Rio Grande do Sul, Brazil. The adults were first found in plums (*Prunus salicina* Lindl). Subsequently it was found in mature figs (*Ficus carica* L.) in two orchards. In the first orchard about 80% of the collected figs were infested by *Z. indianus*. In the second orchard, 50% of the figs cv. "Pingo de mel" and 80% of the figs of cv. "Roxo de Valinhos" were infested. On these collected figs a total of 1364 adult insects emerged. Figs of cultivar "Roxo de Valinhos" had higher adult emergence number. Besides being present in residues of the figs, *Z. indianus* was observed flying over debris from *Syagrus romanzoffiana* (Cham), *Cucumis melo* L., *Citrullus vulgaris* Schrad. and *Vitis vinifera* L., associated with other Drosophilidae. These findings indicate that measures for monitoring and pest control should be adopted in the county to ensure high quality figs.

**Keywords:** Abundance; *Ficus carica*; Fig fly; Preference.

## Ocorrência de *Zaprionus indianus* (Diptera: Drosophilidae) em Agudo, Rio Grande do Sul, Brasil

**Resumo.** Este trabalho faz menção ao primeiro registro de *Zaprionus indianus* Gupta (Diptera: Drosophilidae) encontrado na zona rural do município de Agudo, no estado do Rio Grande do Sul, Brasil. Os adultos da mosca foram encontrados primeiramente em frutos de ameixa (*Prunus salicina* Lindl) posteriormente em figos maduros (*Ficus carica* L.) em dois pomares. No primeiro pomar cerca de 80% dos figos coletados apresentaram ataque de *Z. indianus* e, no segundo pomar 50% dos figos da cv. "Pingo de mel" e 80% da variedade "Roxo de Valinhos" foram infestados. No período correspondente a emergência dos adultos, coletou-se um total de 1364 indivíduos. Os figos da cv "Roxo de Valinhos" apresentaram maior emergência de adultos. Além de estar presente em restos culturais de figo, *Z. indianus* foi visualizada sobrevoando restos culturais de *Syagrus romanzoffiana* (Cham.), *Cucumis melo* L., *Citrullus vulgaris* Schrad. e *Vitis vinifera* L., associada a outros drosofilídeos. Ressalta-se que medidas de monitoramento e controle da praga deverão ser adotadas no município para garantir figos de alta qualidade e sadios.

**Palavras-Chave:** Abundância; *Ficus carica*; Mosca do figo; Preferência.

This work intends to report the first record of *Zaprionus indianus* Gupta, in Agudo county, located in the central region of Rio Grande do Sul state (RS), Brazil, which it is not characterized at the national or regional levels, as an important fig producer. The existing orchards are of small size, with figs destined for raw consumption, as well as in production of sweet pastes, jams, and confectioneries (pies and cakes).

The first record of *Z. indianus* in the American continent was observed on rotting persimmon fruits (*Diospyros kaki* L.) in the city of Santa Isabel, São Paulo (VILELA 1999). Later, it was also observed attacking fig fruits (*Ficus carica* L. cv. "Roxo de Valinhos") at the early maturing stage in the municipality of Valinhos, São Paulo (VILELA *et al.* 2000). Gradually, observations were made in other states such as Minas Gerais (KATO *et al.* 2004), Santa Catarina (DE TONI *et al.* 2001) and Rio Grande do Sul, in the coastal city of Porto Alegre (SILVA *et al.* 2005). In the American continent, registrations were performed in Uruguay (GOÑI *et al.* 2001), Panama, United States (VAN DER LINDE *et al.* 2006) and Argentina (LAVAGNINO *et al.* 2008).

The fly has a short development period whereby lays its eggs on the fig ostiole, and the larvae penetrate the fruits, rendering them unfit for consumption. This point of entry creates vulnerability for

the fruits to then be infected with the fungus *Candida tropicalis* Berkhout, leading to produce significant losses of figs (VILELA *et al.* 2000; GOMES *et al.* 2003). Losses have been estimated at 40% in "fresh" figs and 80% reduction in fruits eligible for export (STEIN *et al.* 2003).

In Agudo County (RS), adults of *Z. indianus* were observed flying above decomposing cultural remains of plum trees (*Prunus salicina* Lindl). Adults were later found in figs (*F. carica*) in two orchards in that same county. The first home orchard (P1) had the variety "Roxo de Valinhos", with three plants. The second orchard (P2) had two cultivars of figs, "Roxo de Valinhos", with seven plants, and "Pingo de mel", with three plants. The distance between the orchards was about five kilometers.

On January, 30, 2011 after detecting *Z. indianus* in those orchards, figs damaged by birds, attacked by Dermestidae (Coleoptera) as well as and figs lying on the ground, were collected. In the first orchard, 12 figs were collected and in the second 45 figs (25 "Roxo de Valinhos" and 20 "Pingo de mel"). The fruits were placed individually into sealed one-liter pots and taken to cool place under sunlight. The pots were examined every week until no more adult specimens emerged. In each test the emerged adults were removed from pots, identified, sexed, and inventoried.

The adult emergence covered the period from February 6 to February 27, 2011. Throughout the period there was no observed emergence of the hymenoptera parasitoids known to attack *Z. indianus* (MARCHIORI *et al.* 2003; MARCHIORI & SILVA 2003; SILVA *et al.* 2004). In the first orchard, 83% of fruits collected were infested by *Z. indianus*. In the second, 50% of “Pingo de mel” and 80% of “Roxo de Valinhos” presented infestation.

From the infested figs, 1364 adults were obtained, 609 males and 755 females. Of these, 323 adults were from the first orchard and 1041 were from the second orchard. The average adult emergence rate in individual fruits by orchards were similar, being 32.3 ( $\pm$  14.33) adults per fruit, 15 ( $\pm$  6.7) males and 17.3 ( $\pm$  7.8) females in P1 and 34,02 ( $\pm$  16.03) adults, 15,03 ( $\pm$  6.99) males and 19 ( $\pm$  9.99) females in P2 (Table 1). In the cv. “Roxo de Valinhos” figs, fruits presented a higher average emergence of adults per fruit compared with the cv. “Pingo de mel” specifically, 42.35 ( $\pm$  12.39), 18.45 ( $\pm$  5.42) males and 23.9 ( $\pm$  8.3) females emerged from the first, opposed to 19.4 ( $\pm$  11.34), 9 ( $\pm$  5.51) males and 10.4 ( $\pm$  6.75) females that emerged from the second (Figure 1). The largest number of adults was observed in the second week after fig harvest. The cv. “Pingo de mel” showed higher emergence in the third week after fruit gathering (Figure 2).

Besides being present in fig residues, *Z. indianus* was observed flying over cultural debris from *Syagrus romanzoffiana* (Cham.), *Cucumis melo* L., *Citrullus vulgaris* Schrad. and *Vitis vinifera* L., fruits associated with other Drosophilidae. These findings indicate that measures for monitoring and pest control should be adopted in the county to ensure a high quality of the figs

produced.

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Table 1. Emerged adults of *Zaprionus indianus* in two orchards in the county of Agudo Caunty, RS, Brazil, 2011.

Orchard	cv <sup>3</sup>	n <sup>4</sup>	Adults captured			$\chi$ <sup>8</sup>	SD <sup>9</sup>	CV <sup>10</sup>
			♂ <sup>5</sup>	♀ <sup>6</sup>	$\Sigma$ <sup>7</sup>			
1 <sup>1</sup>	“Roxo de Valinhos”	10	150	173	323	32,3	14,32	0,44
2 <sup>2</sup>	“Roxo de Valinhos”	20	369	478	847	42,35	12,38	0,29
	“Pingo de mel”	10	90	104	194	19,4	11,33	0,58
<b>1 + 2</b>		<b>40</b>	<b>609</b>	<b>755</b>	<b>1364</b>	<b>34,1</b>	<b>15,58</b>	<b>0,45</b>

<sup>1</sup> Orchard 1; <sup>2</sup> Orchard 2; <sup>3</sup> cv – cultivars; <sup>4</sup> n – number of fruits attacked by *Z. indianus*; <sup>5</sup> ♂ - males; <sup>6</sup> ♀ - females; <sup>7</sup>  $\Sigma$  – sum of males and females captured; <sup>8</sup> arithmetic mean; <sup>9</sup> dp – Standard Deviation; <sup>10</sup> CV – coefficient of variation.

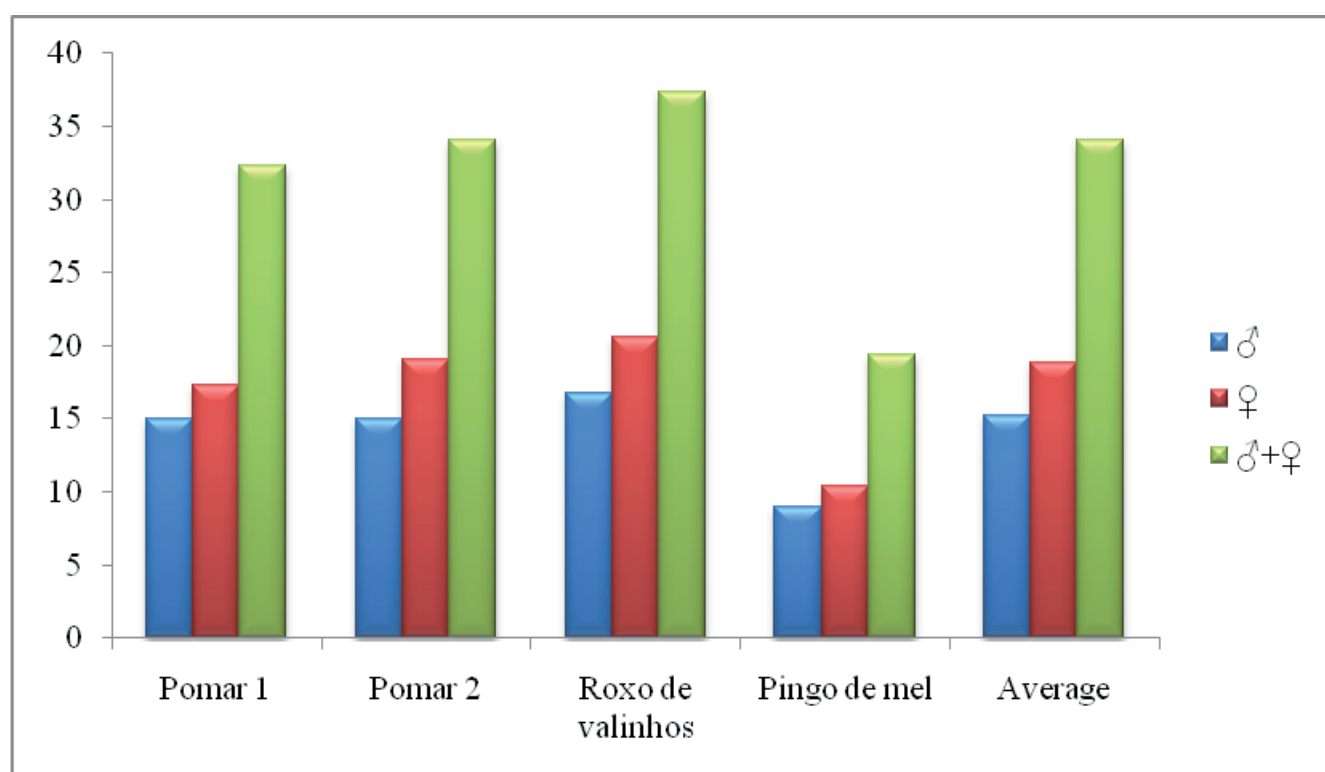


Figure 1. Average number of adults of *Z. indianus* (males, females, and males + females) emerged from figs cv. “Roxo de Valinhos” and cv. “Pingo de mel” in two locations of Agudo county, RS, Brazil, 2011.

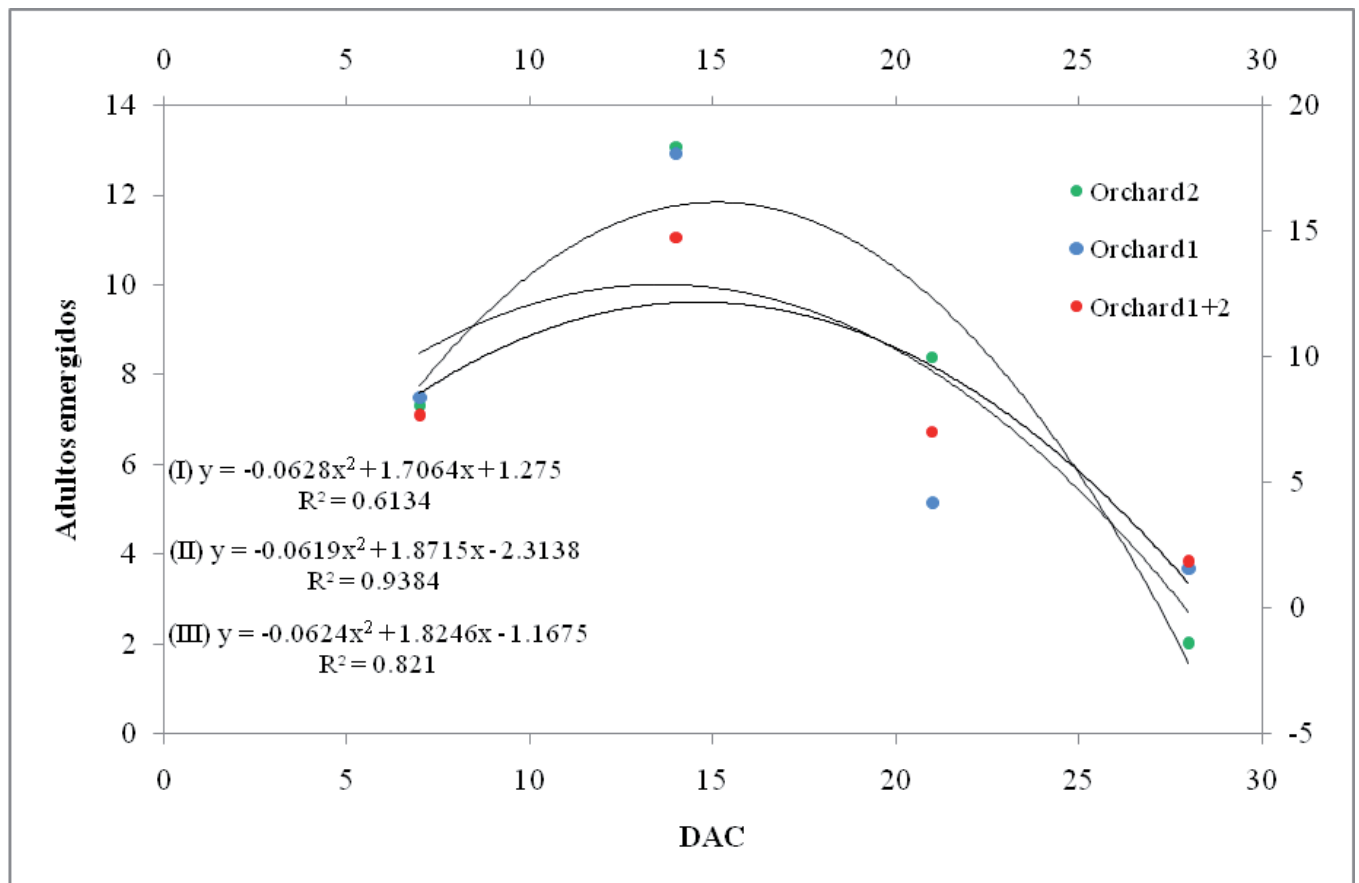


Figure 2. Adults emerged of *Z. indianus* in different days after collection of figs (DAC) in Agudo, RS, Brazil, 2011. (I) Orchard 1; (II) Orchard 2; (III) Orchard 1 + 2.



Figure 3. *Z. indianus* incidence in fig cv. "Roxo de Valinhos" in Agudo County, RS, Brazil, 2011. (Foto: Mauricio Pasini)



Figure 4. *Z. indianus* in fig cv. "Roxo de Valinhos" with hole caused by Dermestidae (Coleoptera) in Agudo County, RS, Brazil, 2011. (Foto: Mauricio Pasini)



Figure 5. Occurrence of *Z. indianus* with any other drosophilids, using this substrate for food and oviposition in Agudo County, RS, Brazil, 2011. (Foto: Mauricio Pasini)

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