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Zaprionus indianus is invading Drosophilid communities in the southern Brazilian city of Porto Alegre.

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Biological invasions are interesting subjects for both applied and evolutionary studies, and because of this we have been studying the Porto Alegre Drosophilid communities since the 1980's, during which time we have documented the progressive adaptation and expansion of the non-urban species *Drosophila willistoni* and *Drosophila paulistorum* in this unusual urban environment. Over the years we have been studying the urban populations of these two species, we have been able to elucidate some of the genetic characteristics that allow them to exploit new habitats (Valente and Araújo, 1986; Santos and Valente, 1990; Regner *et al*., 1993; Valente *et al*., 1993; Valiati and Valente, 1996, 1997).

Porto Alegre (30°02´S, 51°14´W) is the main city of the southernmost Brazilian state of Rio Grande do Sul (RGS) and is situated in a region in which the transition between subtropical and temperate climates occurs (Moreno, 1961), having well defined seasons with temperatures of about 0ºC commonly being registered during the winter (June, July, and August).

The African fly *Zaprionus indianus* Gupta, 1970 (Diptera: Drosophilidae) is a member of the Genus *Zaprionus* Coquillett, 1901, composed of two sub-genera and 56 species and is characterized by its ability to colonize new territories (Gupta, 1970; Shakoori and Butt, 1979; Amoudi *et al*., 1991, 1995). Although *Z. indianus* is not native to Brazil, it has been found in the Brazilian state of São Paulo (Vilela, 1999) and, recently, much of the rest of Brazil (De Toni *et al*., 2001). Using fruits of both exotic plants (*e.g*., *Aleurites mollucana*) and one of the commonest palm trees in Brazil, the native *Arecastrum romanzoffianum* (syn. *Syagrus romanzoffiana*), as bait, De Toni *et al.* (2001) have shown that *Z. indianus* occurs in the Atlantic Islands of the southern state of Santa Catarina.

In the course of studying the dynamics of the colonization of Porto Alegre urban habitats by the wild species *D. willistoni* and *D. paulistorum*, we have recently detected *Z. indianus.* The finding of this fly is a matter of concern because, unlike *Drosophila* species, *Z. indianus* females lay their eggs in immature fruits and can cause extensive damage to crops such as figs, widely grown in São Paulo state (Vilela, 1999; Stein *et al*., 2000). This invasion is also worrying because *Z. indianus* can also threaten the stability of Brazilian *Drosophila* communities which are very rich in the number of species and where delicate interactions occur between the different members of the communities.

In our study, Drosophilid samples were obtained exclusively by the collection of pre-adults living in the rotten fruits of *Syagrus romazoffiana* in 5 Porto Alegre sites chosen to represent different levels of urbanization according to Rusczyk's (1986, 1987) criteria. For each site about 100 fruits were sampled, 10 of which were placed in glass bottles containing vermiculite and incubated at 25ºC ± 1ºC for 18 days until emergence of all flies, the incubation time being chosen to allow for differences between life-cycles. After emergence the adult flies were aspirated out of the jars, etherized, identified and counted, the emergence data being shown in Table 1.

Z. indianus was well represented in almost all Autumn samples (March, April, May 2000), but was not present in Winter (June, July and August 2000) and Spring (September, October, and November

2000) samples, but was again found in Summer (December 2000, January and February 2001) samples from Farroupilha Park (highly urbanized) and the Porto Alegre Botanic Garden (low urbanization) – a site in which it had not previously been detected.

Table 1. Emergence data for Drosophilid flies from *Syagrus romazoffiana* fruits collected at Porto Alegre sampling sites with different levels of urbanization (Ruszczyk, 1986,1987). HR= Hilario Ribeiro Street (medium urbanization); FP= Farroupilha Park (high urbanization); MCS= Mauricio Cardoso Square (medium urbanization); BG= Botanic Garden (low urbanization). A = Autumn, W= Winter, Sp = Spring, S = Summer.

Species	***HR***				***FP***				***MCS***				***BG***			
	A	W	Sp	S	A	W	Sp	S	A	W	Sp	S	A	W	Sp	S
D. cardinoides	0	0	0	0	3	0	0	0	1	0	0	0	1	0	0	0
D. immigrans	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	0
D. kikkawai	7	2	1	0	1	0	0	0	3	0	0	0	1	0	0	0
D. maculifrons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2
D. mediopunctata	0	5	0	0	0	0	0	0	0	5	0	0	0	0	0	0
D. mercatorum	2	0	1	0	297	18	39	0	3	0	0	0	10	2	5	2
D. polymorpha	0	0	0	0	0	0	0	0	6	1	1	0	8	1	3	0
D. simulans	24	11	11	72	29	80	54	54	4	42	19	92	44	21	136	191
D. willistoni	23	0	9	0	0	0	0	0	5	0	3	0	19	0	6	0
Zaprionus indianus	1	0	0	0	310	0	0	104	31	0	0	0	4	0	0	108
N	57	18	22	72	640	98	93	158	53	48	23	92	91	25	154	303

These findings could mean that *Z. indianus* was able to survive in the low winter temperatures found in this region, suggesting that it is capable of adjusting to temperate regions, or that the flies sampled in the subsequent summer corresponded to a new *Z. indianus* invasion. Future genetic characterization of the populations should allow us to obtain clues about this process.

It is interesting to note that until the appearance of *Z. indianus*, *Drosophila simulans* was always the most well-represented species in Porto Alegre *Drosophila* communities, but this numerical superiority now seems to be threatened by *Z. indianus*. We also observed low frequencies of *D. willistoni* in the Autumn, contrary to the situation pertaining before the *Z. indianus* invasion (Valiati and Valente, 1996). The study of these fly communities is still in progress, and we hope that new data can help us to understand the new competitive interactions occurring between the members of these communities.

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