

SHORT COMMUNICATIONS

**SPATIAL DISTRIBUTION AND SEASONALITY  
OF *HELIOCHARIS AMAZONA* SELYS  
IN A CERRADO AREA OF SÃO PAULO STATE, BRAZIL  
(ZYGOPTERA: DICTERIIDAE)**

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The study was conducted on 2 nature reserves in NE São Paulo State, SE Brazil. *H. amazona* populations naturally occur in low densities. 25 ♂, 2 ♀ and 23 larvae were recorded, only at streams with riparian vegetation. All larvae were collected during the dry season and adults only during the wet season. The highest number of larvae was collected in pools having litter as substrate, but they were also found in slow and moderate velocity water. Due to their patched distribution, *H. amazona* may face high risk of local extinction and such a possibility should be taken into account in the management of both studied nature reserves.

INTRODUCTION

*Heliocharis amazona* is a South American species that lives in rivers and small or medium creeks. PAULSON (2004) reports it occurring in all South American countries but Chile and Uruguay. In Brazil, it can be found in São Paulo, Goiás, Mato Grosso and Minas Gerais (SANTOS & COSTA, 1988; COSTA et al., 2000). Despite such information, no ecological requirement for this species is known. Here, we show some data regarding *H. amazona*'s seasonality, habitat preference and spatial distribution.

## STUDY AREA

The study area included two nature reserves situated in northeast São Paulo State, where sugar cane, citrus and eucalyptus monocultures dominate the very fragmented landscape. The climate is divided into a dry season (May to October) and wet season (November to April) (CAVALHEIRO et al., 1990). One reserve is the Estação Ecológica Jataí (EEJ; 21°33' and 21°37'S, 47°45' and 47°51'W), with 9,074.63

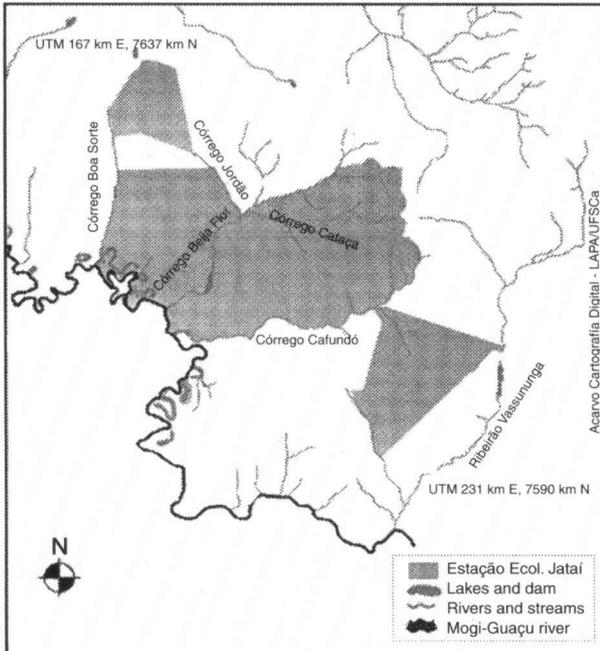


Fig. 1. Map of Estação Ecológica Jataí in Luis Antônio. Only the sampled streams are indicated.

were in two streams located inside the PEV. All sampled streams belong to the drainage basin of the Mogi Guaçu River and the sampling points can be characterized as follows:

- Stations 1 and 2: on Cafundó stream, 2 m width, sand and fine gravel substrate. The first riverbed is outside EEJ;
- Station 3: on Beija Flor stream, 3 m width, substrate of sand and silt, litter in pools, water level strongly influenced by the flood pulse of the Mogi Guaçu River;
- Station 4: on Boa Sorte stream, 1 m width, substrate of silt and sand;
- Station 5: on Jordão stream, 0.8 m width, sand, fine gravel and litter in pools;
- Station 6: on Cabaça stream, 0.9 m width, sand, fine gravel and litter in pools;
- Station 7 (21°38'45.5"S, 47°38'05.9"W): Fragment Pé de Gigante (Cerrado), on Paulicéia stream, 1.5 m width, substrate of sand and litter;
- Station 8 (21°43'11.6"S, 47°35'43.8"W): Fragment Capetinga Oeste (SDTF), on Gruta stream, 2 m width, substrate of silt from the red soil bank and litter. Stream banks well vegetated, with trees 20-40 m high (e.g. *Cariniana legalis*) and sign of erosion. The streambed is in areas of sugar cane monoculture;

All stations had riparian vegetation of at least 10 m width on one bank, except Station 4, in which

ha, localized in the municipality of Luis Antônio. It is the largest continuous area of Cerrado (*lato sensu*) of São Paulo State (SÃO PAULO, 1997), under 45 years of regeneration and has a dense second-growth semi-deciduous forest. The other one is Parque Estadual de Vassununga (coordinates below), located in the municipality of Santa Rita do Passa Quatro. It has 1,732.14 ha and is composed of five sections, four of Semi Deciduous Tropical Forest and one of Cerrado (Fig. 2). The narrowest distance between borders of EEJ and PEV is 5 km.

Six sampling stations were selected in five streams protected by EEJ, four of them (stations 1, 4, 5, 6) at the border of the nature reserve (Fig. 1). The other two sampling stations (7 and 8)

the right riverside is about 7 m from a sugar cane plantation.

For comparison, three streams in the surroundings of EEJ were sampled but *H. amazona* was not found. These streams are in the monoculture areas and have less than 5 m of riparian vegetation on their shores.

#### METHODS

During two years, from July 2000 to April 2002, adults and larvae were collected in EEJ. Samplings in PEV were carried out in July 2001 and March/April 2002). In both reserves, the sampling period encompassed dry and wet seasons.

Quantitative observations ( $n = 510$ ) were made following FERREIRA-PERUQUETTI & DE MARCO (2002). Adults were counted in stream segments of 5 m on two consecutive days, between 10:00 and 15:00 h. The second sampling was a repetition of the first. Some of the adults were caught using an entomological hand net and only observations made during days with temperatures higher than 19°C were used for data analysis.

Larvae were collected using a hand net-D (mesh 0.5mm). Samples ( $n = 229$ ) were quantified by collecting three times the same stream segment of 5 m (FERREIRA-PERUQUETTI & FONSECA-GESSNER, 2003). Such segments were not necessarily the same where the quantitative observations of adults were made.

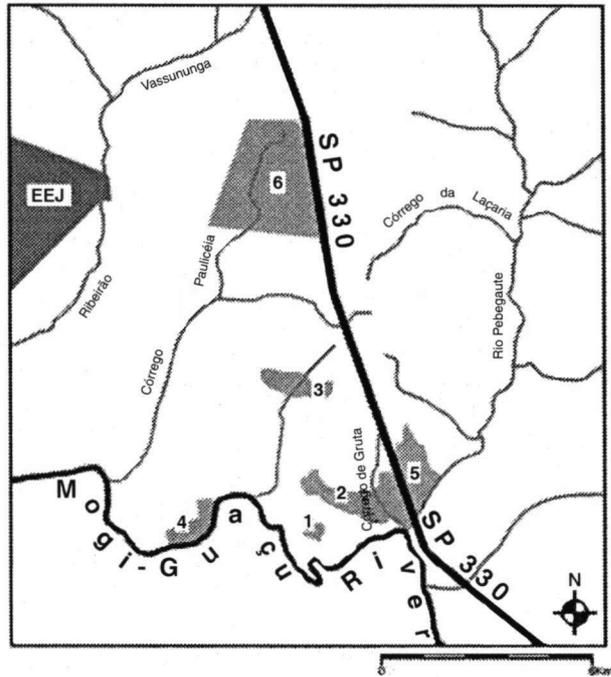


Fig. 2. Map of Parque Estadual de Vassununga, Santa Rita da Passa Quatro, São Paulo, Brazil. Fragments sampled: (2) Capetinga Oeste (Córrego da Gruta); – (6) Pê de Gigante (Córrego Paulicéia); – SP 330: Highway; – EEJ: Estação Ecológica Jatá.

#### RESULTS AND DISCUSSION

Twenty-five males, two females and twenty-three larvae were recorded during the period of study (Tab. I). Therefore, *H. amazona* seems to occur naturally in low densities. The highest number of adults were found at stations 2 (9 ♂) and 7 (7 ♂, 1 ♀). Another female was collected at station 4. The adults were observed only in streams with riparian vegetation, mainly in sunlight spots, although some were found at forest edge along streams. No male-female interactions were seen.

At station 3, no adults but 8 larvae were collected. All larvae were collect-

Table I  
Abundance of *Heliocharis amazona* per sampling station and season in two nature reserves of São Paulo State, Brazil. Stations 1-6, Estação Ecológica Jataí; 7-8, Parque Estadual de Vassununga

Station	Season	Male	Female	Larva
1	wet	1	0	0
	dry	0	0	2
2	wet	9	0	0
	dry	0	0	0
3	wet	0	0	0
	dry	0	0	8
4	wet	1	1	0
	dry	0	0	0
6	wet	4	0	0
	dry	0	0	3
7	wet	7	1	0
	dry	0	0	10
8	wet	2	0	0
	dry	0	0	0
Total		25	2	23

ed during the dry season and adults only in the wet season. Larvae were found predominantly in pools and slow flow (7 individuals each habitat) and they prefer litter as substrate (Figure 3). One larva was found in moderate velocity water. Since particles of litter and roots are common substrates in pools and lotic slow habitats, it is possible to argue that the long legs the larvae of *H. amazona* possess (SANTOS & COSTA, 1988) might increase its ability to explore that habitat.

In the stream segments studied, it was common to find many *Hetererina rosea* and *Argia reclusa* individuals, which perch in sunlit spots, but no aggressive behaviour among those was observed. When males *H.*

*amazona* shared the same sunlit spot, they perched at different heights (e.g. tree or bush). According to PAJUNEN (1966) and FINCKE (1988) some species are not territorial at low densities, and can manifest an alternative behaviour, for example, threat behaviour or perching at the edge of a stream (GONZÁLEZ-SORIANO & NOVELO-GUTIÉRREZ, 1985). It seems that *H. amazona* do not defend territories, but their alternative strategies are still unknown.

*H. amazona* was not found at the three streams sampled in the surroundings of EEJ, which have poor riparian vegetation. This indicates that it might be restricted to high quality habitats. Such a preference, associated with low local abundance, might expose *H. amazona* to a high risk of local extinction due to stochastic or demographic events (CARO & LAURENSEN, 1994). For taxonomic reasons the IUCN Odonata Specialist Group classified it as a priority species (MOORE, 1997). The local extinction risk should be considered an important element when either management plans or the establishment of research priorities are drawn. Such assessments are not easy without detailed studies, involving basic biological data and

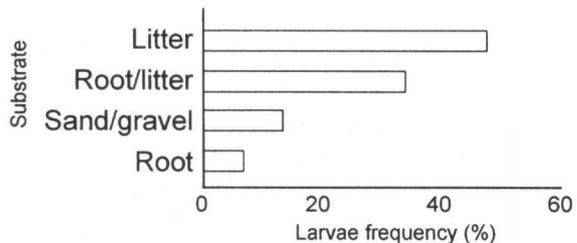


Fig. 3. Larvae frequencies of *Heliocharis amazona* in four different substrates.

ecological requirements. The two nature reserves sampled are close to each other, about 5 km apart, and natural corridors between them would decrease the effect of fragmentation. Further studies of population genetics would help to understand how isolation by fragmentation might affect low-density odonate populations (BOHONAK, 1999; SIMPKIN et al., 2000). Of particular concern in a rapidly changing environment is the reduced potential for evolutionary response the organisms may exhibit as a result of diminished genetic variation in fragmented populations (FRANKEL & SOULÉ, 1981; McCAULEY, 1993).

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