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Well-preserved arboreal microhabitats in a highly urbanized landscape can support populations of specialized saproxylic hoverflies (Diptera: Syrphidae)

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Abstract
New saproxylic hoverfly data are reported from a survey in University Campus Park, Grugliasco (North-western Italy) with implications for the conservation of arboreal microhabitats in highly urbanized landscapes.

Key words *Myolepta obscura*, sap runs, urban park, saproxylic Syrphidae, hoverfly conservation.

Introduction

Organisms dependent on dead wood or decaying material associated with the woody parts of trees are known as saproxylic, and some saproxylic hoverflies have been proposed as indicators of ancient wood quality (Speight 1989). Saproxylic syrphid larvae develop in a great variety of microhabitats such as trunk cavities, branch holes, exposed heartwood, dead branches and sap-runs (van Steenis 2023) with a significant impact on ecosystem functioning (Read 2000; Przepióra & Ciach 2022). Small remnants of ancient woodland may be sufficient to preserve stable populations of rare and threatened hoverflies as in the woodland patches around Novi Sad, Serbia (van Steenis et al. 2019). Little is known about the potential value of small, well-preserved parks or single trees in a highly urbanized landscape. Therefore, this survey was conducted in woodland fragments in an urbanized area to document the potential of such fragments to provide suitable habitat for saproxylic hoverflies.

Material and methods

The survey area was the University Campus of Agriculture and Veterinary in Grugliasco municipality (University of Turin, Italy) located in a metropolitan area that has become densely urbanized in recent years. The Campus includes some mature trees with interesting microhabitats which have been chosen as main observation points (Fig.1) at altitude 290 m and located at: A = 45.03.58 N, 7.35.20 E; B

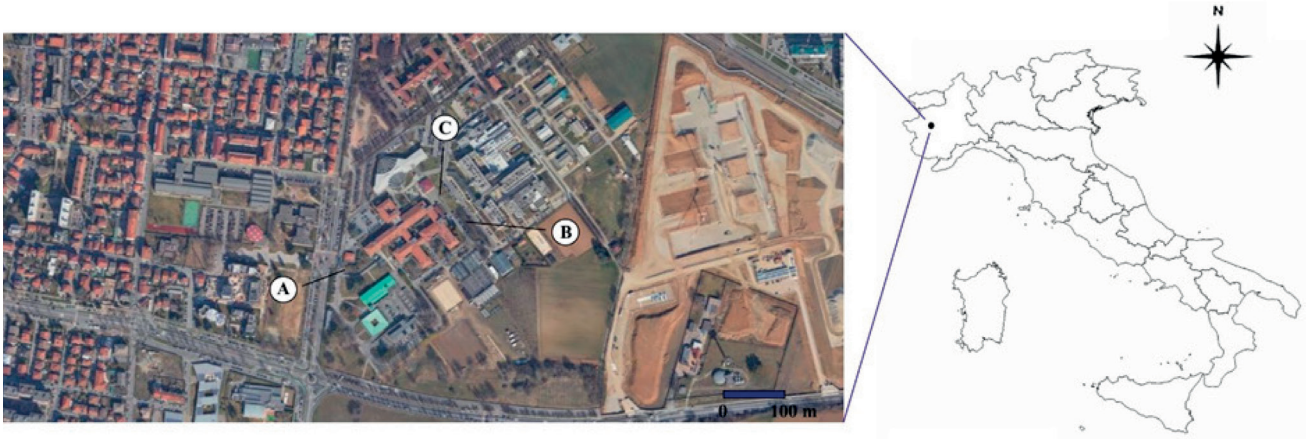

Fig. 1 – Map of the study area in Grugliasco municipality (North-western Italy). Observation points: A and C = *Ulmus minor*; B = *Tilia cordata*.

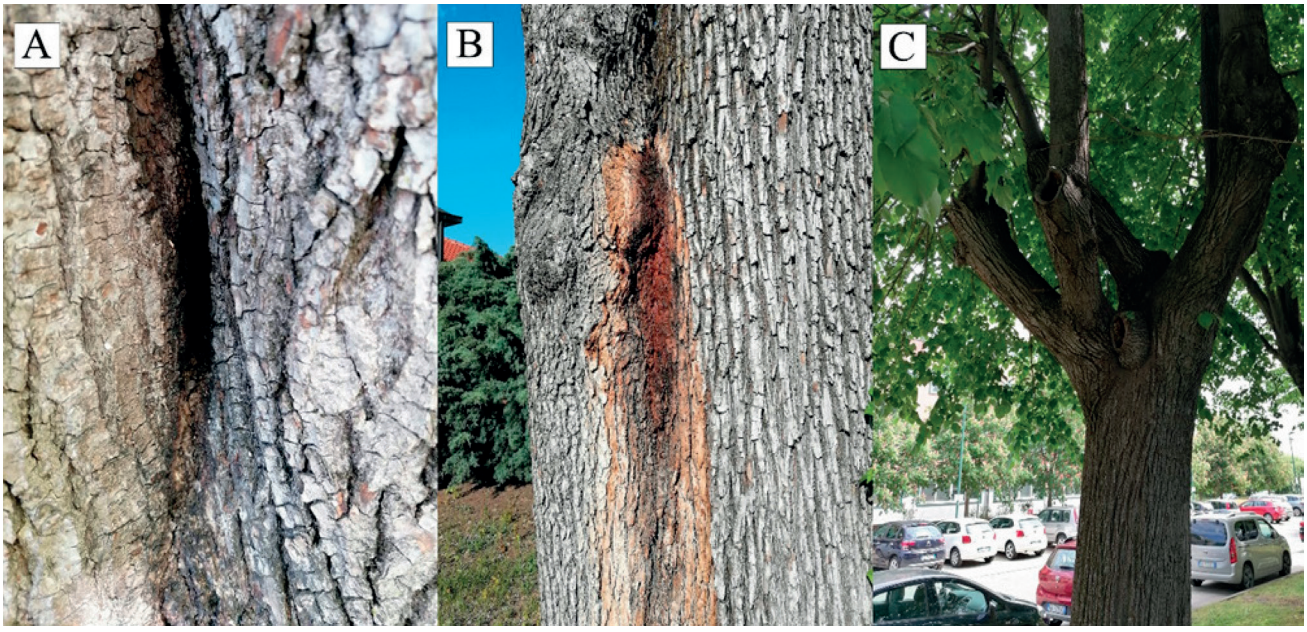

Fig. 2 – Details of some observed trees: **A**, dendrotelm fork split on *Tilia cordata* exact place (in the map is labelled as B) in which *Myolepta obscura* was collected; **B**, sap run on *Ulmus minor* (in the map is A), **C**, trunk rot-hole on *Tilia cordata* (point B on the map).

= 45.04.00 N, 7.35.28 E; C = 45.04.01 N, 7.35.27 E. The observation period chosen corresponds to a working stay of the author at the facility and the flight period of three saproxylic species with very particular habitat requirements covered in this article. Fifteen survey trips were made between (14 April-10 May 2023), in different hours of the day, in order to record data of highly specialized saproxylic hoverflies present on sap-runs or on the bark of veteran trees in the study area. Specimens were collected by sweep net and determined in laboratory following keys to the genera (Reemer at al. 2005; van Steenis et al. 2020) or observed in field if easy to identify.

Results

The University Campus has numerous avenues lined with linden trees (*Tilia cordata* Mill.) with rot-holes, and single elms (*Ulmus minor* Mill.) with sap runs (Fig. 2). On these trees a total of three species of saproxylic hoverflies adapted to microhabitats usually present in well-preserved ancient woodland were observed, for a total of 8 observations reported in Table 1.

All specimens observed or collected were adults (Fig. 3). All species recorded (Table 1) are listed as Least Concern category based on European Red List of hoverflies (Vujić

Table 1 – Saproxylic hoverflies observed in University campus, Grugliasco.

Species	Location	Date	Hour	Sex	Plant	Note
Brachyopa bicolor (Fallén, 1817)	A	18 Apr 2023	9:00 AM	female	*Ulmus minor*	collected on sap-run
Brachyopa bicolor (Fallén, 1817)	A	03 May 2023	5:45 PM	male	*Ulmus minor*	collected on sap-run
Myolepta obscura Becher, 1882	B	14 Apr 2023	1:00 PM	female	*Tilia cordata*	collected on a dendrotelm fork split
Sphiximorpha subsessilis (Illiger in Rossi, 1807)	A	25 Apr 2023	6:00 PM	male	*Ulmus minor*	observed on sap-run
Sphiximorpha subsessilis (Illiger in Rossi, 1807)	A	27 Apr 2023	5:50 PM	male	*Ulmus minor*	observed on sap-run
Sphiximorpha subsessilis (Illiger in Rossi, 1807)	A	28 Apr 2023	5:40 PM	male	*Ulmus minor*	observed on sap-run
Sphiximorpha subsessilis (Illiger in Rossi, 1807)	C	05 May 2023	11:25 AM	male	*Ulmus minor*	observed on sap-run
Sphiximorpha subsessilis (Illiger in Rossi, 1807)	A	05 May 2023	5:50 PM	male	*Ulmus minor*	observed on sap-run

et al. 2022) but with a different population trend: decreasing in *Brachyopa bicolor* (Fallén, 1817), unknown in *Myolepta obscura* Becher, 1882 and stable in *Sphiximorpha subsessilis* (Illiger in Rossi, 1807).

Discussion

The trees present in the study area attracted rare saproxylic hoverflies and may well be capable of supporting populations of these specialist hoverflies. *Myolepta obscura* is a very rare species in Italy (Sommaggio 2017) and in Europe (Ricarte et al. 2007). It was recorded in Piedmont region (North-western Italy) only in an old forest remnant (Maritano 2021) and in one locality in the south of the region (Maritano, unpublished data). Larvae develop in water-filled holes of live *Fraxinus* (Ricarte et al. 2007) but probably they can also exploit cavities of other deciduous trees like *Tilia cordata*, which is abundant in the University Campus with several rot-holes. The discovery of an adult of this species here is remarkable. *Sphiximorpha subsessilis* is a rare species in Northern Italy, historically present in Piedmont region two centuries ago (Sommaggio 2007), but recent findings are very uncommon (Maritano & Sommaggio 2020). Males sit on the bark of trees with sap runs for several days (Maritano personal observation; van Steenis et al. 2016). Their distribution is strictly localised but they are persistent in the areas where they are found. Consequently, this behaviour can be very important for developing a species-specific monitoring method. *Brachyopa* is a genus of hoverflies associated with sap-runs (van Steenis et al. 2020) with several species. Some species became extinct in Piedmont such as *Brachyopa maculipennis* and others have an insufficiently known distribution, even if relatively common as in the case of *Brachyopa bicolor*, which was collected in this survey.

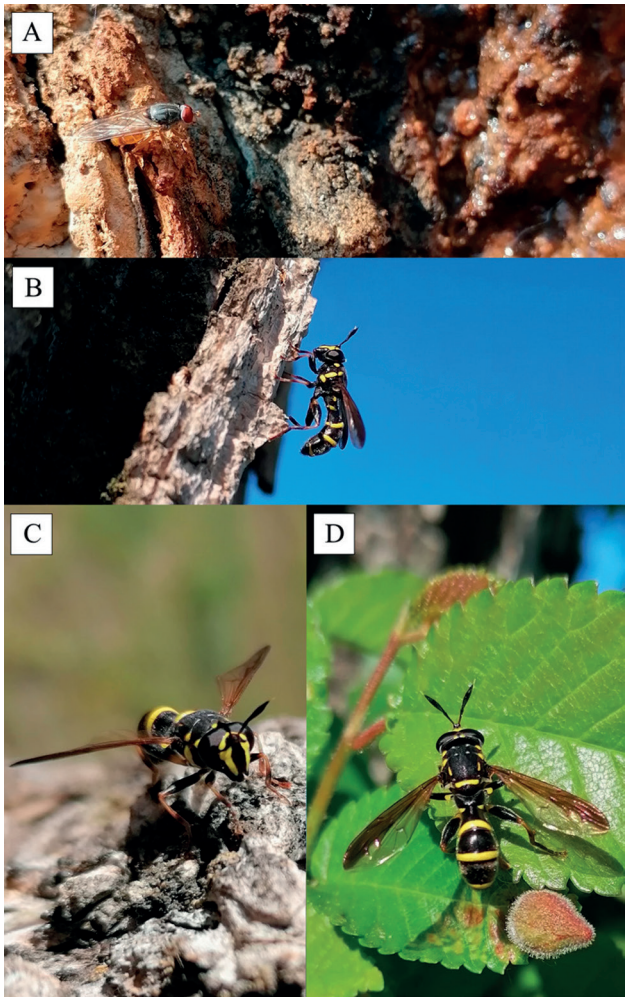

Fig. 3 – Saproxylic hoverflies observed: **A**, *Brachyopa bicolor* on sap run of *Ulmus minor*; **B**, **C**, **D**, *Sphiximorpha subsessilis* on sap run, bark and leaf of *Ulmus minor*.

The data collected with these observations are of conservation interest because they highlight the biodiversity value of the University Campus Park and underscore the importance of city parks for the conservation of valuable saproxylic species. These data emphasise the importance of preserving these veteran trees and creating favourable microhabitats which, together with adequate seasonal shrub blooms, contribute to maintaining stable populations of these rare hoverflies.

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