

Project Update: September 2023

Study progress:

This study was part of a collaborative project between various research centers in the country, and was co-financed by three grants (NGC, PIP and The Rufford Foundation). The fieldwork was carried out between October 2021 and April 2023: during the first stage, nest traps were placed in 56 sites with different degrees of urbanisation distributed in nine cities in Argentina, which were also variable in surface area and population size. The second stage of sampling was carried out in the City of Buenos Aires and its surroundings, with nest traps placed in six sites already used during the first stage of sampling. During these three years, very valuable and innovative data was obtained that will help us to better understand the floral visitors that nest in pre-existing cavities and what is the influence of urbanisation on them. The main issues to understand are the reproductive biology, behaviour and ecological processes underlying different pollinators and floral visitors in diverse environments.

1926 nests were collected: wasps built 55% of the nests while 38% were built and occupied by bees. The remaining 12% was occupied by other taxa such as ants, beetles and spiders. Most of the nests were built in non-urban environments, both agricultural and natural, totaling 986 nests, while in peri-urban sites, that is, with an intermediate degree of urbanisation, 700 nests were found. In urban sites, the total number of nests was, in comparison, much lower than these sites, finding 240 nests. Up to now, 2,847 floral visitors have emerged from all the nests (1,735 are wasps, and the rest are bees and other minority groups of Coleoptera). On the other hand, there are nests belonging to the second stage of sampling that still present developing floral visitors (possibly in the pupal stage).

All emerged individuals were taxonomically determined with the help of Dr. Juan Pablo Torretta and deposited in the entomological collection of the Cátedra de Botánica General (Faculty of Agronomy, University of Buenos Aires).

Wasps were the group that dominated the occupation of nests in all sites and environments (1263 individuals), specifically three species that correspond to the genus *Trypoxylon*: 622 individuals corresponding to *Trypoxylon* sp. 1, 542 corresponding to *Trypoxylon* sp. 2 and only 98 individuals of species 3. The necessary statistical analyses were performed on these individuals and we found that: the number of nests built by wasps of the genus *Trypoxylon* decreased significantly as the percentage of impermeable surface increased (used as a proxy for urbanisation: the impervious surface is directly proportional to the degree of urbanisation) (Fig. 1). The second response variable analysed was the average number of brood cells built per nest, and in this case, no significant differences were found regarding the percentage of impermeable surface. As a third response variable, the total abundance of parasitoids in the nests was analysed: here the same pattern is observed as for the number of nests, that is, the parasitoids decrease in abundance as the degree of urbanisation increases (Fig. 2). It should be noted that parasitoids play an important ecological role as biological controllers and/or population stabilisers. In this study, only the most abundant parasitoids corresponding to the genera *Neochrysis*, *Chrysis* and *Chrysididae*. Although the results are still preliminary and do not allow us to draw conclusions, it is possible to consider that the decrease in wasp abundance as urbanisation increases may be

due to limited food resources, both prey and floral.

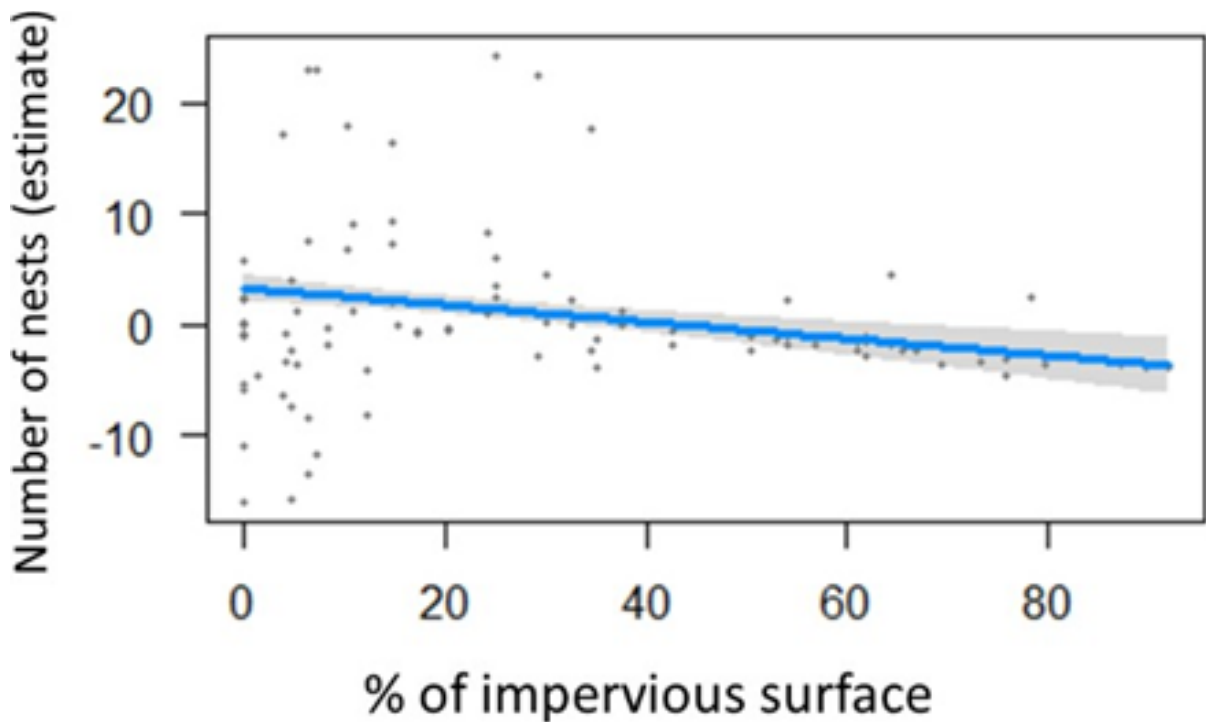


Figure 1. Relationship between the number of nests built by wasps of the Gn. *Trypoxylon* and the percentage of impervious surface.

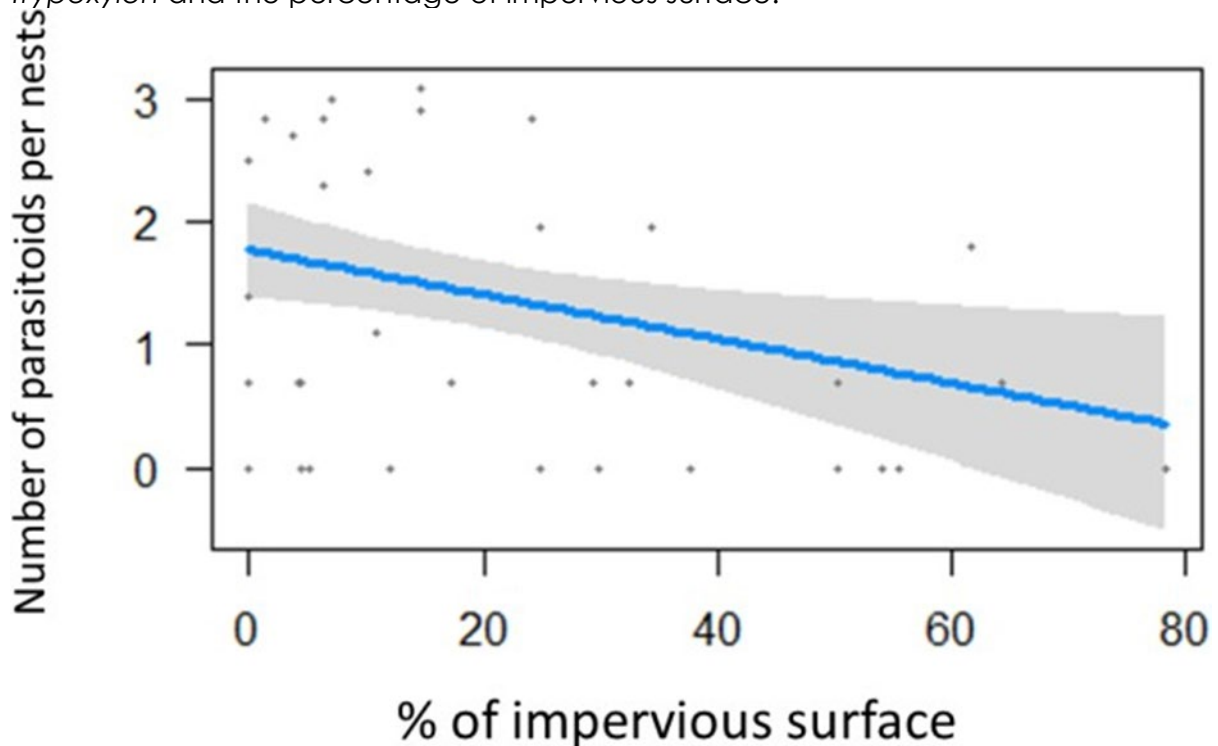


Figure 2. Relationship between the number of wasp parasitoids and the percentage of impervious surface.

In conclusion, the partial results show the adverse impact of urbanisation on these wasp populations: the decrease in their abundance translates into poorer and less diverse successive generations, accentuating their vulnerability and affecting their interactions (wasp-parasitoid) against the growing anthropization.

The tasks that lie ahead involve measuring the body size of floral visitors and analysing the variation in the sex ratio of each taxonomic group in different environments in order to elucidate how insect communities behave in different environments and how it influences urbanisation on its biological and ecological aspects.