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Environmental bio-indicators: ants as a tool for monitoring urban green in the south of Portugal

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INTRODUCTION

Ants contribute to the regulation and survival of many organisms as a result of being involved in numerous interactions through herbivory, predation and/or mutualism with other organisms, such as bacteria, plants, fungi, arthropods and vertebrates. Until recently, it was thought that urban areas were not interesting for biodiversity studies. However, there is much research on ant diversity in green areas within urban landscapes worldwide. In fact, urban ecosystems can ensure a high diversity of native ant species and contribute to their preservation.
The present study was aimed at providing a baseline data on ant species diversity in Polytechnic Institute of Beja Campus and evaluating the disturbance level of habitats exposed to different anthropogenic pressure, using ants as bio-indicators of ecosystem health.

MATERIAL AND METHODS

The study was conducted at IPBeja Campus (38° 00' 46.87''N 7° 52' 22.19''W). Ants were surveyed from May - July 2017 by installing 4 pitfall traps at three different habitat. Pitfall traps consisted of 12 cm cylindrical containers partially filled with propylene glycol. The ants falling into traps were collected after a week and preserved in 96% ethanol. Identification was based on Collingwood & Prince (1998) and Gómez & Espadaler (2007). Species richness was determined for each sampled habitat. Ant species were assigned to functional groups and global disturbance indices were determined accordingly to Roig & Espadaler (2010). The corresponding indices of disturbance, stability and cryptic species were calculated as the percentage of ant species indicators of disturbance, stability and cryptic species, respectively, in relation to the total number of collected ant species.

RESULTS

The lowest level of disturbance (60%) was found on ESTIG-IPB plot, while the highest one (75%) was observed in IPB Park. Ant species indicators of disturbance (generalists, opportunists and invasive) dominated in plots and sampling sites. Cryptic species, being sensible to habitat change, were particularly important in the Eucalyptus (ESTIG-IPB plot), where were found Leptothorax and Temnothorax species.

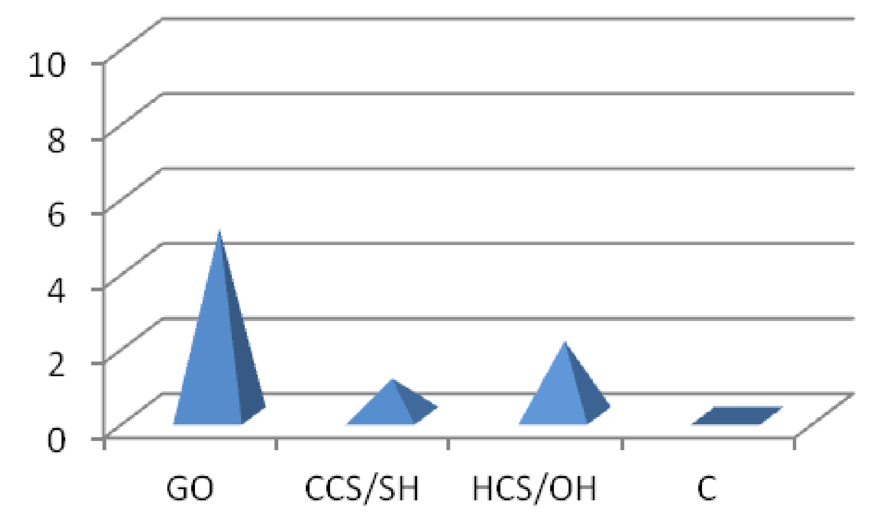

Figure 1 – Functional group of ant species in ESA Garden plot.

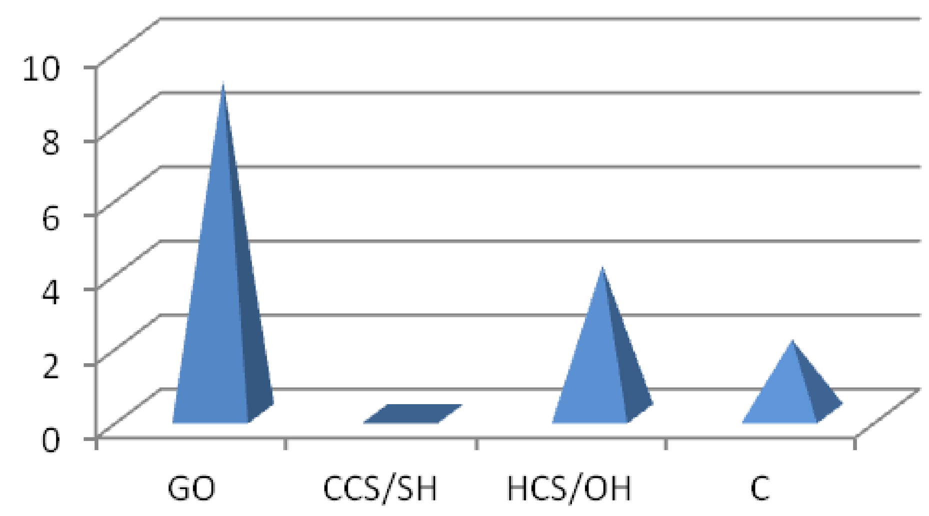

Figure 2 – Functional group of ant species in ESTIG-IPB plot.

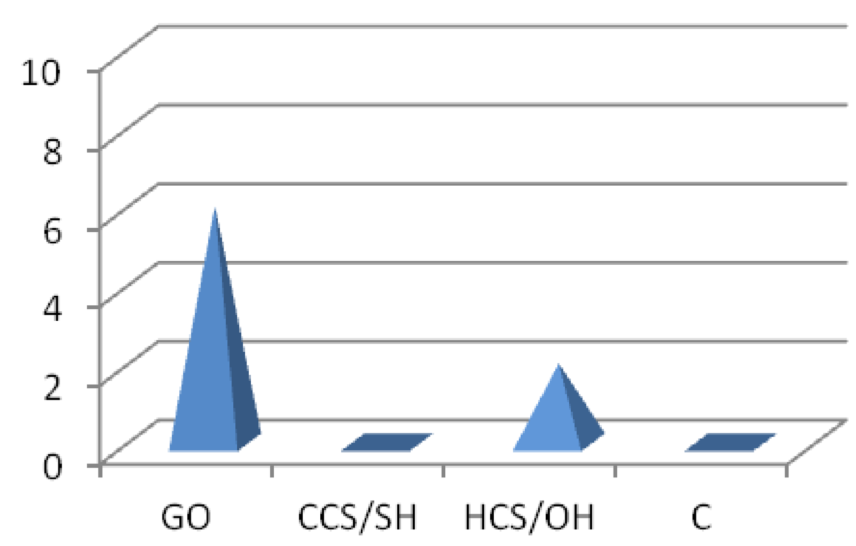

Figure 3 – Functional group of ant species in IPB Park plot.

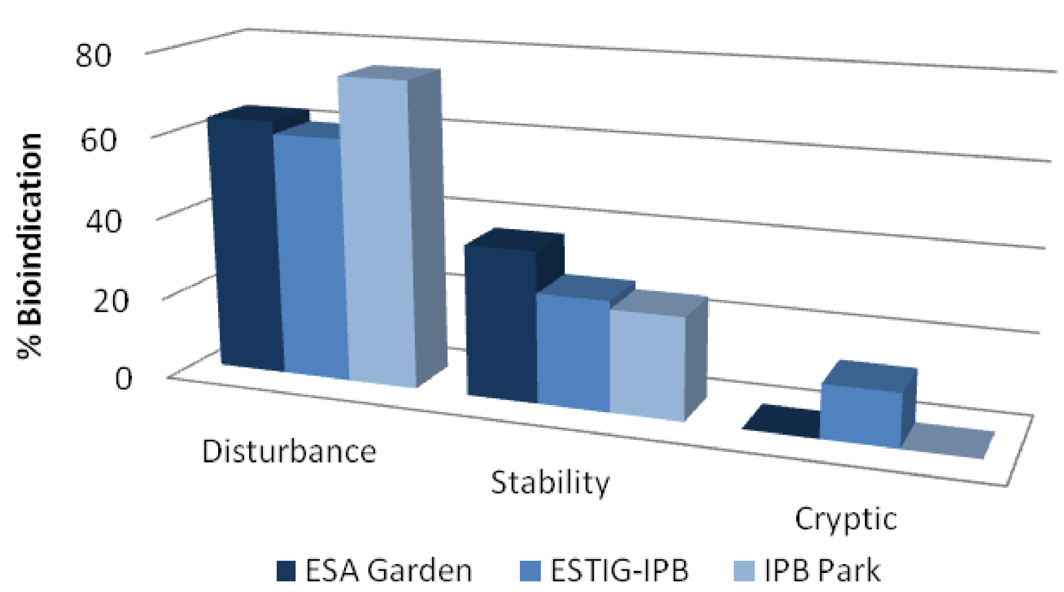

Figure 4 – Disturbance, Stability and Cryptic species Index in each plot.

Table 1 – Presence/Absence of ant species during the study of total pitfall traps in 2017. For each specie, the functional group is indicated: generalists and/or opportunists (GO), cold climate and/or shadow habitats specialists (CCS/SH), hot climate and/or open habitats specialists (HCS/OH) and cryptic (C).

Species	**Functional Group**	**ESA Garden**	**ESTIG-IPB**	**IPB Park**
Aphaenogaster senilis	GO		■	
Camponotus cruentatus	HCS/OH		■	
Camponotus truncatus	HCS/OH		■	■
Cardiocondyla batesii	GO	■	■	■
Cataglyphis iberica	HCS/OH		■	
Crematogaster auberti	GO		■	
Crematogaster scutellaris	GO		■	■
Formica subrufa	HCS/OH	■		
Lasius grandis	CCS/SH	■		
Leptothorax sp.	C		■	
Messor barbarus	HCS/OH	■	■	■
Pheidole pallidula	GO		■	
Plagiolepis pygmaea	GO	■	■	■
Tapinoma nigerrimum	GO	■	■	■
Temnothorax nylanderi	C		■	
Tetramorium forte	GO	■	■	■
Tetramorium semilaeve	GO	■	■	■
Species number/plot		8	15	8

CONCLUSIONS

- The new proposal of functional groups was applied to three habitats obtaining a first assessment of the health of the habitat.
- It is essential to be very clear about the role that each of these groups has in the ecosystem when making an assessment of the status of the habitat studied, so that later on, relevant decisions can be made in the management of ecosystems.

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