

SURVEY AND MANAGEMENT OF CARPENTER ANTS ON URBAN TREES IN THE CITY OF SÃO PAULO, BRAZIL

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Abstract One thousand four hundred seventy-seven botanical specimens represented by urban trees and palm trees, found in gardens, public squares and streets in the area of Cidade Jardim, a district in Sao Paulo, Brazil, were evaluated from 2004 to 2008. The aim was to determine which species of carpenter ants are there, assess the presence of infection in the tree population and highlight the relationship between these pests with native and exotic species, and perform curative treatments aiming at the control besides qualifying their efficiency. A census of trees on site determined 29 families and 52 botanical specimens. The carpenter ant *Camponotus atriceps*, *Camponotus crassus*, *Camponotus sericeiventris*, *Camponotus rufipes*, *Camponotus renggeri*, and a species called *Camponotus* sp. 1, were identified in the study area. *C. atriceps* proved to be predominant in all plant species studied, but with greater significance in *Caesalpinia rainy* var. *peltophoroides* (Caesalpinaceae) and *Tipuana tipu* (Tipuana). The other species were found at negligible levels, with no preference for any of the components of trees. *C. rufipes* was significantly found in palm trees, being prone to appear in the Arecaceae family.

Key Words *Camponotus*, carpenter ants, urban forestry, surveying

INTRODUCTION

Known popularly as the carpenter ant, *Camponotus* species belong to the family Formicidae family, Formicinae subfamily and Camponotini tribe according to Caetano (2000). Gender is more or less artificially grouped in different subgenera (Mariano; Delabie, Nascimento, 1998), with controversies in the provision reported by several authors. The geographical distribution of the *Camponotus* genus is very wide, according to Loureiro and Queiroz (1990) quoted by Simas et al. (2000), being dispersed by the North, Central and South America among other zoogeographical regions of the world. It is the most representative and heterogeneous genus of tropical and neotropical regions, occurring also in temperate regions of the globe (Robinson, 1996). According to Holldobler and Wilson (1990), Robinson (1996), Campos-Farinha et al. (1997), Bueno and Campos-Farinha (1998 and 1999), Dash (2004), Hansen (2005), the *Camponotus* genus is represented by more than 1500 species worldwide, among which 200 species are in the Neotropic Region. The species of the *Camponotus* genus are usually nocturnal in habit, usually nesting in cavities in the soil, timbers, live or dead trees, behind door or window hinges, roof beams, baseboards, floors, cracks in walls, inside drawers and wooden ceilings, and they possess secondary or satellite nests, attached to the main nest. The species described as most common in Brazil are *Camponotus atriceps* (= *C. abdominalis*), *Camponotus crassus*, *Camponotus rufipes*, *Camponotus arboreus* and *Camponotus fuscocinctus*. (Robinson, 1996; Campos-Farinha et al., and Bueno 1997; Campos-Farinha, 1998, 1999). According to Zorzenon (2004, 2009); Campos-Farinha and Zorzenon (2008), the *Camponotus* species most commonly found in urban trees are *C. atriceps*, *C. crassus*, *C. rufipes*, *C. sericeiventris* and *C. renggeri*. Despite the excavation of timbers or the use of existing openings in the same shape for the nest, these ants do not feed from pulp, preferably looking for sweet substances, fat, among others (Robinson, 1996; Campos-Farinha et al., 1997; Bueno; Campos-Farinha, 1998; Bueno, Campos-Farinha, 1999). According to Graham (1929); Mariano, Delabie, Nascimento (1998), carpenter ants generally nest in many different environments, colonizing branches and trunks of live or dead trees, soil, abandoned termite nests, rotting timbers and building homes, almost all materials made of wood.

Ogg et al. (2007) and Suiter (2003) indicated control through direct application in nests, or external barriers in infested sites, using non-repellent active ingredients fipronil, imidacloprid or chlorfenapyr (professional use) or even boric acid baits indoors (household). For holes in trees or use inside trunks after their drilling, they preferably prescribe the use of imidacloprid. Robinson (1996) reported that there are few species of *Camponotus* that keep nests inside homes. The same author claimed that the location of primary and secondary nests (satellites) is one of the biggest problems for the control.

MATERIAL AND METHODS

The experiment was conducted between January 2004 and August 2008 in an urbanized area in Cidade Jardim neighborhood (coordinates S 23° 35' 34.72" / WO 46° 41' 57.60") in São Paulo, Brazil, covering 1,609 botanical specimens. Of these, 1477 were identified, where 1339 were trees and 138 urban palm trees. The species were planted in streets, squares and public gardens. Four main study groups have been agreed, namely: Native, Exotic, Palm Trees and Others. For the formation of the Exotic and Native groups, the minimum number of plants was 20. The group called Palm Trees defined a set of several species of Arecaceae observed during the experiment.

Measurements were taken from the CAP (circumference at breast height) agreed at 1.30m from the plant base, according to Daniel (2006) and geographical coordinates (latitude, longitude and altitude) of each of the studied trees. For the determination of infestation by carpenter ants, visual observations were made. The ants were collected and packed into jars containing 70% alcohol for subsequent identification.

The product with the active ingredient imidacloprid (200 g / L ai) at a dose of 2.5 ml / l of water was used for control. The plants were treated annually with 5 ± 2 liters of water per tree / palm. To describe the profile of the sample according to the study variables, frequency tables categorical variables were made (damage caused by ants, species, types and families), with values of absolute frequency (n) and percentage (%). To compare categorical variables between the species, type (Exotic and Native) and families of trees were used Chi-square (degree of freedom 3) or the Fisher exact test, when expected values are inferior to 5. The level of significance for statistical tests was 5%.

RESULTS AND DISCUSSION

Seven native species were studied, identified as: *Caesalpinia pluviosa* var. *peltophoroides* / (Sibipiruna); *Caesalpinia ferrea* var. *leiostachya* / Pau-ferro; *Gochnatia polymorpha* / Cambará; *Erythrina speciosa* / eritrina; *Tibouchina granulosa* / Quaresmeira; *Tabebuia* spp. / Ipe; *Piptadenia gonacantha* / Pau-jacaré. In the Exotic group, nine important species were studied, as follows: *Jacaranda mimosifolia* / Rosewood dainty; *Spathodea campanulata* / Espatódea; *Lagerstroemia indica* / Resedá; *Platanus acerifolia* Platano, *Pinus elliottii* / U.S. Pinheiro, *Ligustrum lucidum* / privet; *Tipuana tipu* / Tipuana; *Delonix regia* / Flamboyant; *Bauhinia variegata* / Pata-de-vaca.

It was found that the botanical healthy population represented the largest percentage in the study area, accounting for more than 92% of the total assessed. However, the percentage of infested trees and palms was still representative.

The species of carpenter ant *Camponotus atriceps*, *Camponotus crassus*, *Camponotus rufipes*, *Camponotus sericeiventris*, *Camponotus renggeri* and *Camponotus* sp.1 were determined in the study area and their proportionality are represented in Figure 1. *C. atriceps* was the most prevalent in the study area, representing 68% (n = 77) of the samples, followed by *C. crassus* with 18% (n = 20), *C. rufipes* with 8% (n = 9) and *C. sericeiventris*, *C. renggeri* and *Camponotus* sp.1 with 2% (n = 2) respectively.

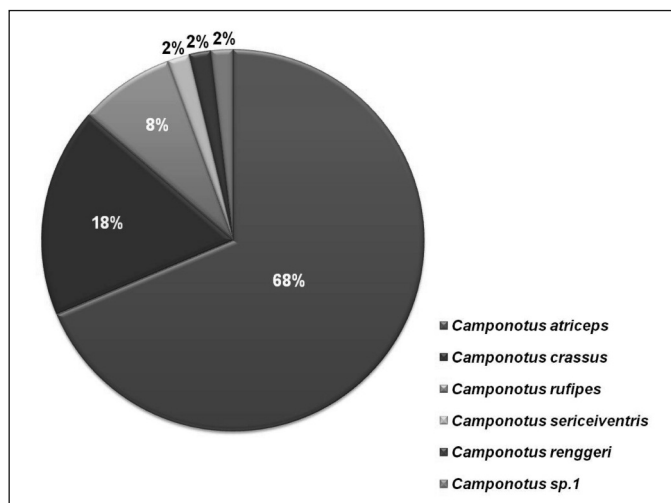


Figure 1. *Camponotus* species in botany population studied, found in urban area established in São Paulo, between the years 2004 to 2008.

Within the four botanical groups, the carpenter ants were present in 7.90% (n = 49) in Native, 6.84% (n = 36) in Exotic, 9.42% (n = 13) in Palm Trees and 7.25% (n = 14) in others. In the seven native plant species evaluated, *C. atriceps* was observed mostly in sibipiruna with 9.36% occurrence, followed by Pau-ferro with 7.41% and Quaresmeira with 4.31%. In other species there was no occurrence of the species. The percentages are represented by Figure 2.

C. atriceps was observed in seven of nine exotic plant species evaluated, appearing in 11.11% of Tipuanas, 10% in Rosewood-dainty, 8.33% in Alfeneiro, 7.69% in Maple, 7.14% in Flamboyant, 5.41% in Pata-de-vaca and 2.04% in Pinheiro americano. The species was not observed in Espatódea or Resedá. It was observed the increased presence of *C. atriceps* in Imperial Palm Trees (*Roystonea* sp.) with 12.5%, followed by Palmeiras Reais (*A. alexandrae*) with 11.11% and Jerivá (*S. romanzoffiana*) with 2.99%. In the remaining species carpenter ants *C. atriceps* were not found. However, while *C. atriceps* was found in a widespread way among trees and palms, *C. rufipes* occurred significantly in palm trees what means some preference of *C. rufipes* for this botanical group was found. After the

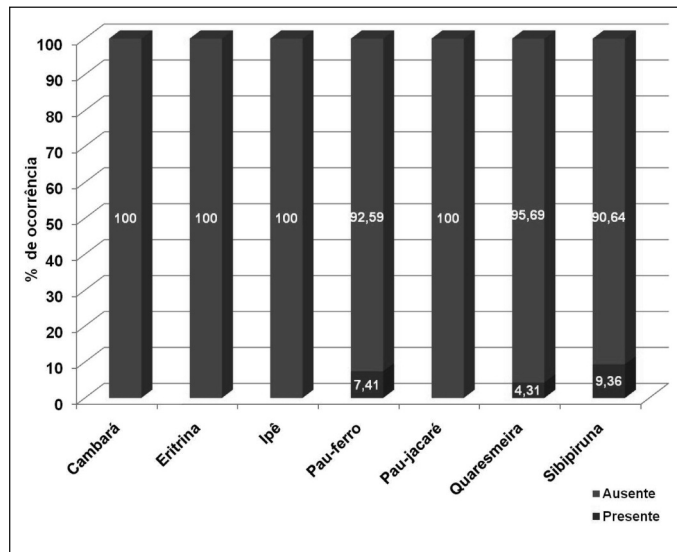


Figure 2. Comparison of native tree species found in urban area established in São Paulo, between the years 2004 to 2008, in presence of *Camponotus atriceps* (P = 0.004).

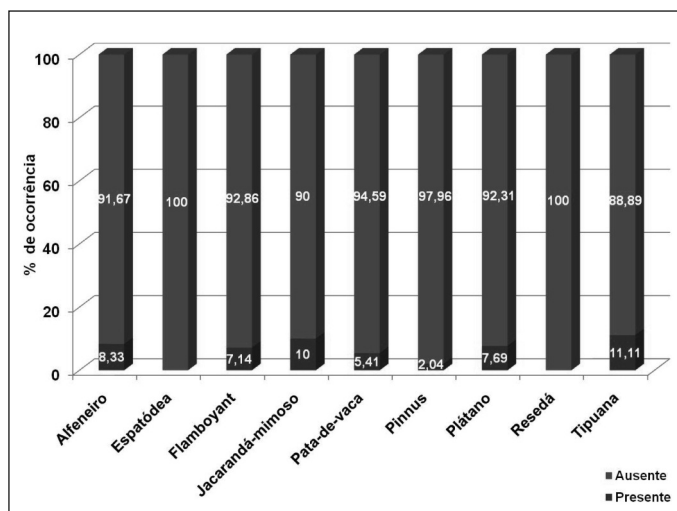


Figure 3. Comparison of native tree species found in urban area established in São Paulo, between the years 2004 to 2008, in presence of *Camponotus atriceps* (P = 0.012).

final evaluation regarding the application of insecticide, a reduction of 7.49% (n = 112) of the infestation to 2.43% (n = 36) was obtained, due to constant re-infestation of *C. atriceps* present among the treated trees. There was no reinfestation caused by *C. crassus*, *C. rufipes*, *C. sericeiventris*, *C. renggeri* and *Caponotus* sp1.

CONCLUSIONS

C. atriceps proved to be predominant in all plant species studied during the years of research; however, there was no significant differentiation among the botanical groups studied. The control for *Camponotus* was satisfactory, with significant reduction of general infestation, despite the occurrence of reinfestations of *C. atriceps*. Probably what happened was due to the large number of trees present within the buildings adjacent to Road trees, as well as squares that could not be contemplate, like the tree reserve. There is a need for further studies on other factors related to the presence of pests in afforestation.

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