

## Ant fauna in central Amazonian polyculture systems and forests

Garcia, Marcos V. B.<sup>(1)</sup>; Verhaagh, Manfred<sup>(2)</sup> and Martius, Christopher<sup>(3)</sup>

<sup>(1)</sup> Embrapa Amazônia Ocidental, Manaus, Brasil <sup>(2)</sup> Staatliches Museum für Naturkunde Karlsruhe, Germany, <sup>(3)</sup> Center for Development Research – ZEF, Bonn, Germany

Between July 1997 and March 1999 ants of soil and litter were taken every three months with core samplers (21 cm Ø) in a primary rain forest, a secondary forest and two different systems of polycultures in Central Amazonia and extracted in Berlese funnels. The collected ants were classified to generic level. Greatest generic diversity was found in primary forest, while in secondary forest and the two polycultures it was about 20 and 30% lower, respectively. Biomass and median density of ants were also highest in primary forest ( $1322 \pm 611$  ind/m<sup>2</sup> and  $187,9 \pm 93,3$  mg/m<sup>2</sup>; n=160 samples) followed by secondary forest ( $865 \pm 378$  ind/m<sup>2</sup> and  $87,8 \pm 33,5$  mg/m<sup>2</sup>; n=160) and one of the polycultures ( $782 \pm 284$  ind/m<sup>2</sup> and  $91,3 \pm 39,8$  mg/m<sup>2</sup>; n=80), whereas the lowest number and biomass of ants was found in the second polyculture ( $574 \pm 299$  ind./m<sup>2</sup> and  $45,9 \pm 15,9$  mg/m<sup>2</sup>, n= 80).

Most frequent in all areas were ants of the genera *Solenopsis* (subfam. Myrmicinae) and *Hypoponera* (subfam. Ponerinae). The predatory species of *Hypoponera* represented the biggest part of ant biomass in all areas (20-33%), whereas the very abundant mostly tiny species (< 2mm) of *Solenopsis* made up only 1,4 – 3,9% of the ant biomass. The biology of these tiny species is poorly known. They might be predominantly acting as predators including on brood of other ant species (lestobiosis) but there might be also a lot of scavenging on dead animals (decomposing activity). Among the many predatory species are a good number that as far as known are highly specialized in their type of prey, e.g. *Thaumatomyrmex* (polyxenid millipedes), *Cylindromyrmex*, *Acanthostichus*, *Centromyrmex* (termites) *Discothyrea* (arthropod eggs) or *Smithistruma* and *Strumigenys* (mainly collembolans), but indeed observations for many of these species are very scarce because of their rarity. These specialized predators are more than twice as frequent in primary and secondary forests than in polycultures. Army ants have been registered only in the forests by the method used.

Many ant species utilize plant resources especially nectar from extrafloral nectaries or honeydew from homopterans beside their predatory activities thus acting as least partly as herbivores. These are often arboreal species like *Camponotus*, *Cephalotes* or *Pseudomyrmex* which are clearly underrepresented in our soil samples. Up to now no quantitative studies exist for these species that investigate the proportions of the different utilized food sources. Subterranean species of the genus *Acropyga* predominately depend on honeydew of subterranean Coccidae, Homoptera. Other plant resources known to be exploited by ants of this study are pollen (*Cephalotes*, probably *Pseudomyrmex*), probably seeds (several genera), and leaves and leaf sap (leaf cutter ants of the genera *Atta* and *Acromyrmex*). Although leaf cutter ants do not ingest leaves directly but cultivate with them a fungus in their nests which they eat (fungivory), their ecosystematic effect is that of a herbivore, not a detritivore or decomposer. The latter role play the small species of other attine genera like *Cyphomyrmex*, *Apterostigma*, or *Trachomyrmex* which collect plants residues, arthropod corpses and insect faeces on which they cultivate their fungus. Many predatory or “omnivorous” species (utilizing plant and animal resources more or less alike) also act as detritivores by their scavenging activity on invertebrate and vertebrate carcasses. So far no studies exist for Amazonian ants that evaluate the importance of these resources for the entire diet of the species.