



Ant Diversity within three habitats in San Luis de Monteverde

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Abstract

In tropical ecosystems, ants have a high diversity, abundance, and behavioral attributes that cause them to play an important role (Risch and Carroll 1982). Costa Rica is home to 881 species of ants, and they are considered indicators of habitat disturbance across several habitats. Given their prominent role, it is important to determine the types and distribution of ants in tropical ecosystems. We looked at this distribution of ants among three separate habitats on the CIEE Costa Rica campus (1) forest, (2) a guava grove, and (3) in open grass areas. To sample, we placed petri dishes baited with tuna (Roth et al 1994), returning to take photos every 30 minutes, and at 90 minutes we collected ants for identification to morphospecies and abundance. We quantified ant abundance by species and habitat, the relative abundance by habitat, as well as the ant change in abundance over time by both species and habitat. I found *Solenopsis* spp. to be the most prevalent ants in the area, especially in the forest, followed by *Pheidole* spp. and lastly a *Monomorium* sp. that only appeared in the open grass area. Future studies should use a variety of sampling methods (e.g. pitfalls, ground-litter, sugar bait) to get a more comprehensive look at the ant species in the area. Future work should also look at the impact of the aggressive *Solenopsis* ants on other species (Ascunce et al 2011).

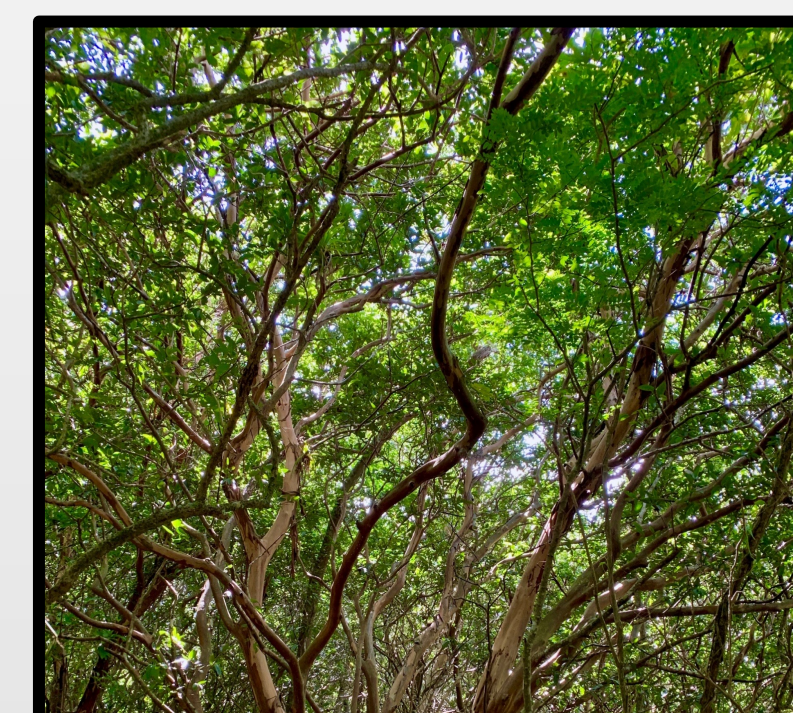
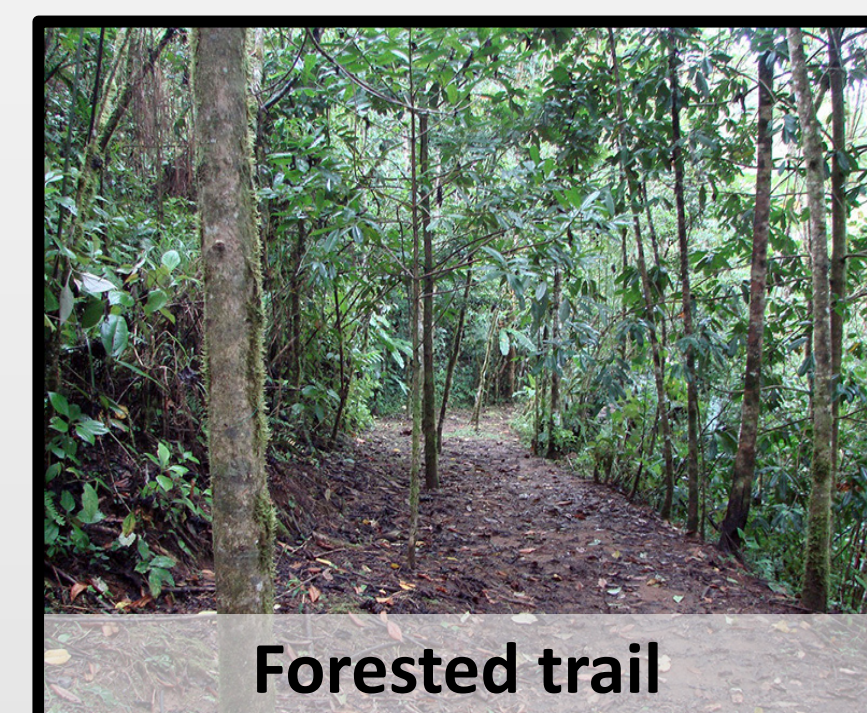
Questions and Hypothesis

- Does habitat type influence ant abundance and species richness?
- What ant species on campus respond to tuna fish bait?

Hypothesis: Tropical forests contain higher plant diversity and number of niches than guava groves and grass fields, therefore forests will have the highest species abundance and richness.

Methods

- Sampled three times in three habitats around the CIEE campus in Monteverde: under a grove of guava, out on forest trails, and in open grass areas
- Placed two transects of five petri dishes baited with a small amount of tuna fish
- Returned to dishes after 30, 60, 90 minutes to take pictures and notes
- Took ant sample at the 90-minute mark
- Took microscope photos



Solenopsis ant latched onto *Pheidole* queen

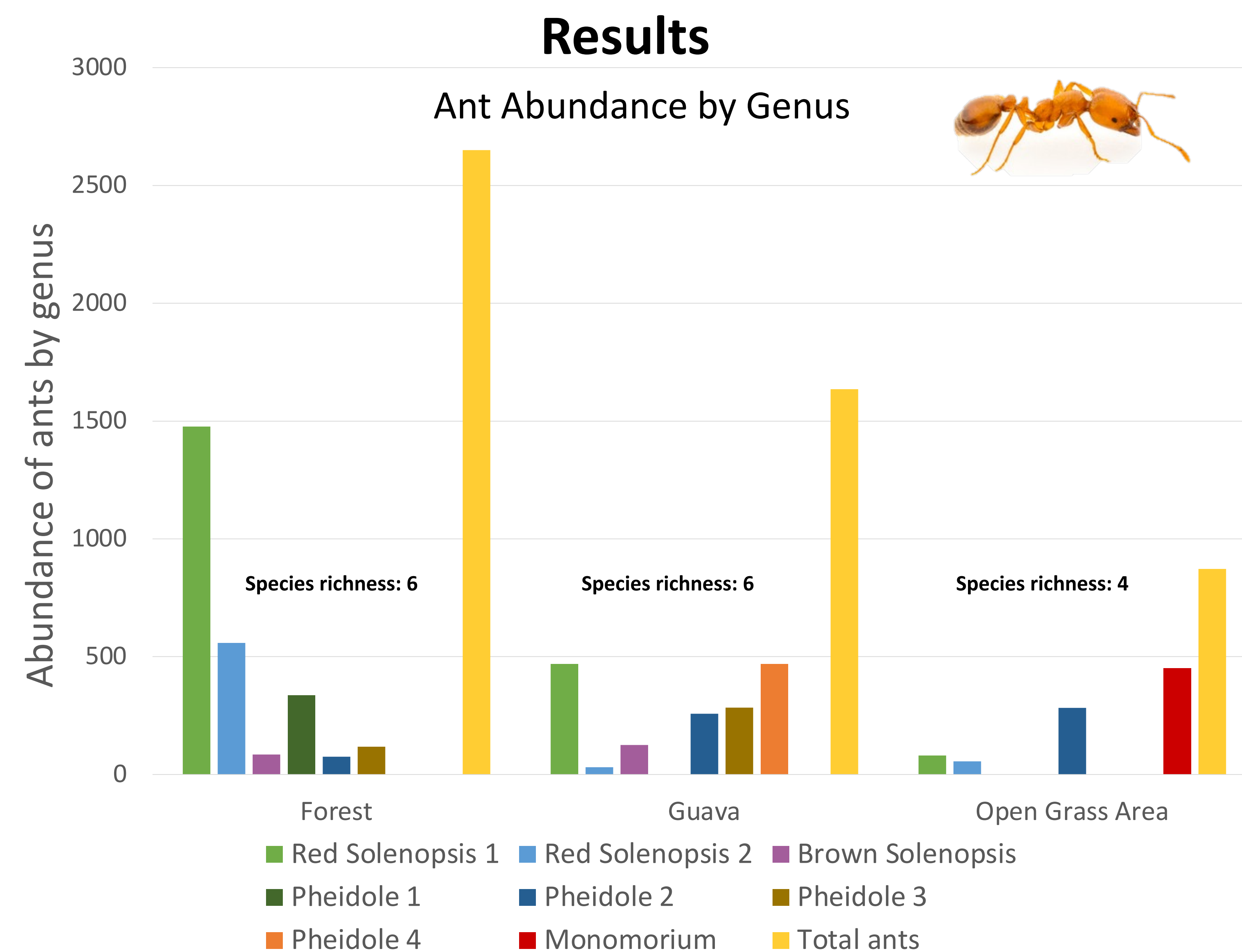


Fig 1. The total number of ants observed over three samples, with the abundance taken in each tray at the 90-minute mark. The number of ants was much higher in the forest than the other habitats. The grassland contained the fewest ants and had the lowest species richness, but it was the only location that *Monomorium* ants appeared. *Solenopsis* ants were the most numerous across the habitats, specifically the red morphos, but *Pheidole* ants showed a slightly greater variety.

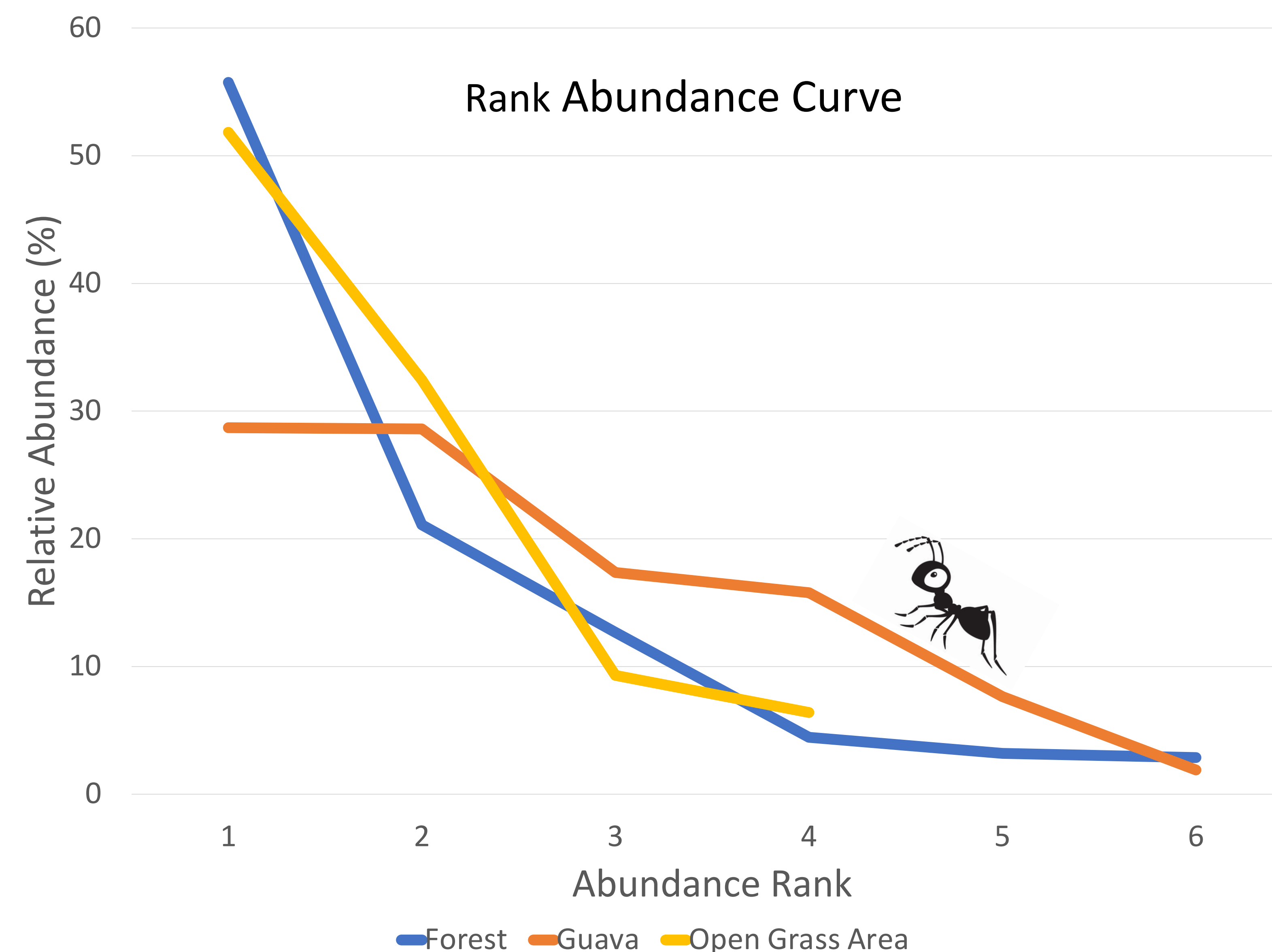


Fig 2. The rank abundance curves for the three habitats, which gives an idea of species evenness and richness. The guava grove showed the most species evenness, while the other two habitats showed a similar, low level of evenness. A steep curve indicates high ranking species have much higher abundances than low ranking species.

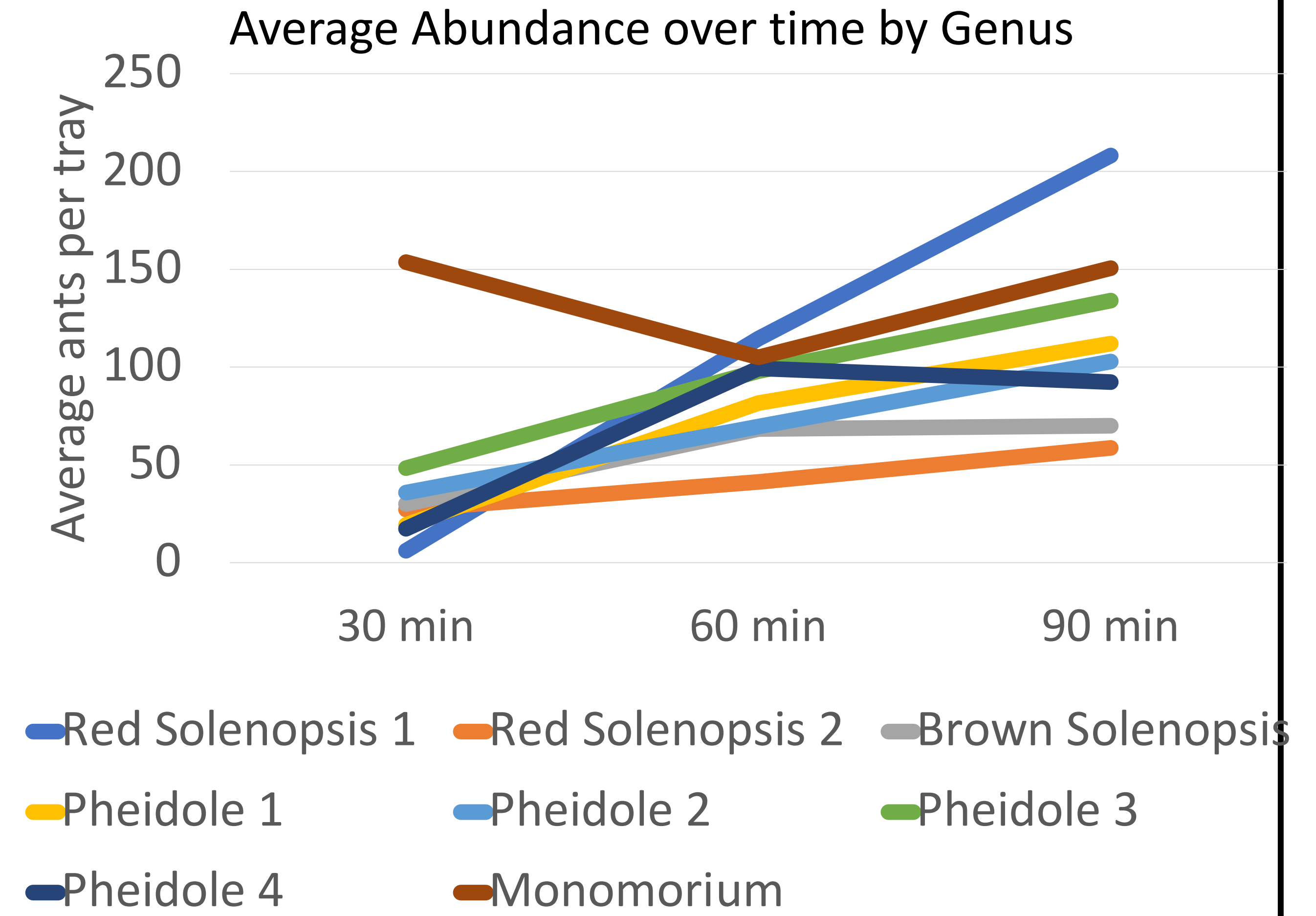
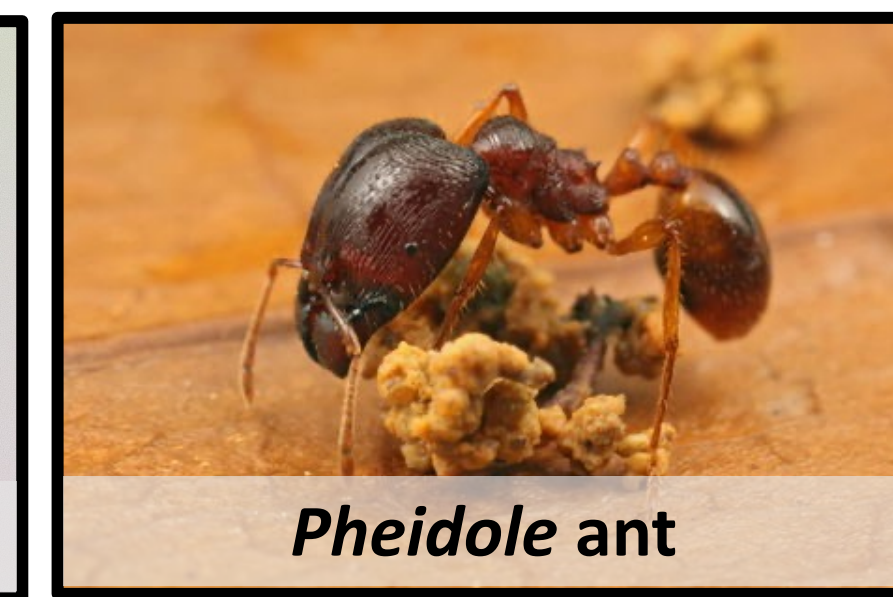
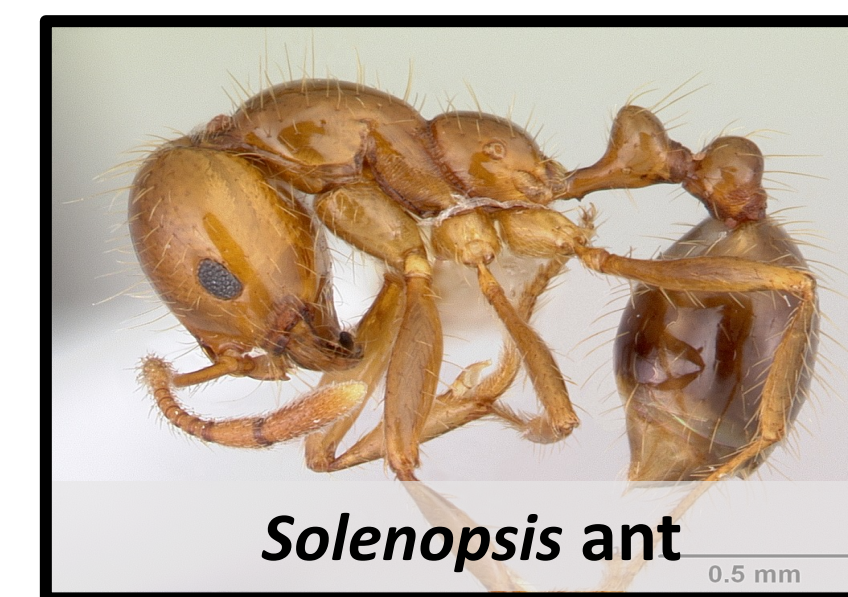


Fig 3. Nearly all the ant morphos show constant average growth, with a Red *Solenopsis* morpho showing the greatest increase in ants over time. *Monomorium* ants show an irregular pattern of change despite being by far the most prevalent ant after 30 minutes.



Conclusions

- Habitat type influenced both ant abundance and diversity, with the forest containing the largest abundance of ants
- Only three types of genera found: *Solenopsis*, *Pheidole*, and *Monomorium*
- Species richness was the same under the guava and in the forest but was slightly lower in open grass areas
- *Solenopsis* morphos were the most common
- *Monomorium* found exclusively in grassland

Future Work

- Using more methods for sampling ants: pitfall traps, by hand as they are seen, ground-litter sampling, different bait.
- More detailed look under a microscope with an expert opinion to determine ant species
- Conduct studies to see if certain ant species are outcompeting others

Acknowledgements

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