# To BEE or Not to BEE? – Species Diversity and Abundance in the Neotropics

Julianna Martinez, Julianna West, Bobby Boone, Troy Marshall, Drs. Amanda Hale, Dean Williams, and Michael Misamore
Department of Biology, Texas Christian University, Tropical Biology 2017

INTRODUCTION

- Euglossine (Orchid) bees belong to a monophyletic clade of neotropical bees and are specialized pollinators of orchids in the neotropics (Dressler 1982). Orchid bees are used to study the effects of deforestation and pollination patterns (Murren 2002).
- The males collect fragrances using specialized structures on their hindlegs. Using scented bait stations, the bees can be tracked and counted throughout a habitat (Powell and Powell 1987).
- Our goal was to compare the abundance and diversity of euglossine bees between a disturbed forest and a primary forest near San Ramón, Costa Rica.
- By placing different scents on filter papers, we counted and identified the number of bees attracted to each scent.
- According to previous research, we predicted there would be less diversity and lower abundance of bees at a forest edge versus primary forest, and that male orchid bees would prefer one specific scent over the others (Ferreria 2011).
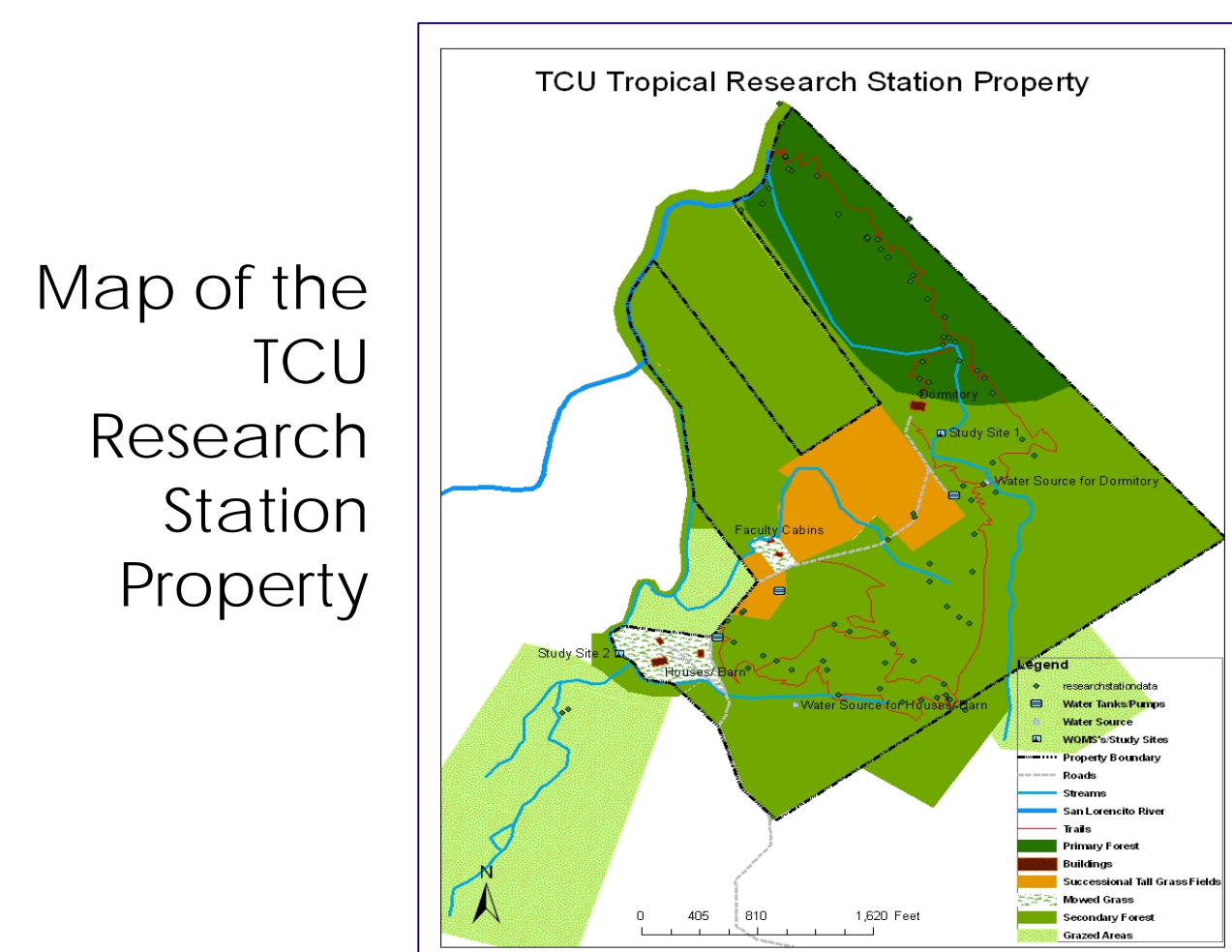
Map of the TCU Research Station Property

Orchid Bee specialized hindleg structure

METHODS

- We collected data from March 14th-16th, 2017 at the El Jamaical Field Station near San Ramón, Costa Rica.
- We set up three different survey sites on the property: two disturbed habitats and one primary forest habitat.
- We placed 6 scents on different filter papers and pinned the papers to trees at each location.
- We then caught, tagged, and recorded the number of bees attracted to each scent.
- We identified the bees using the Orchid Bees of Tropical American: Biology and Field Guide.

RESULTS

Over the course of three days, we observed 90 orchid bees within the two habitat types: 54 individuals in primary forest land 36 along the forest edge. Orchid bees were more abundant in the primary forest compared to the forest edge. The bees represented 9 species in the genera Eulaema, Euglossa, and Exaerate (Fig. 1).
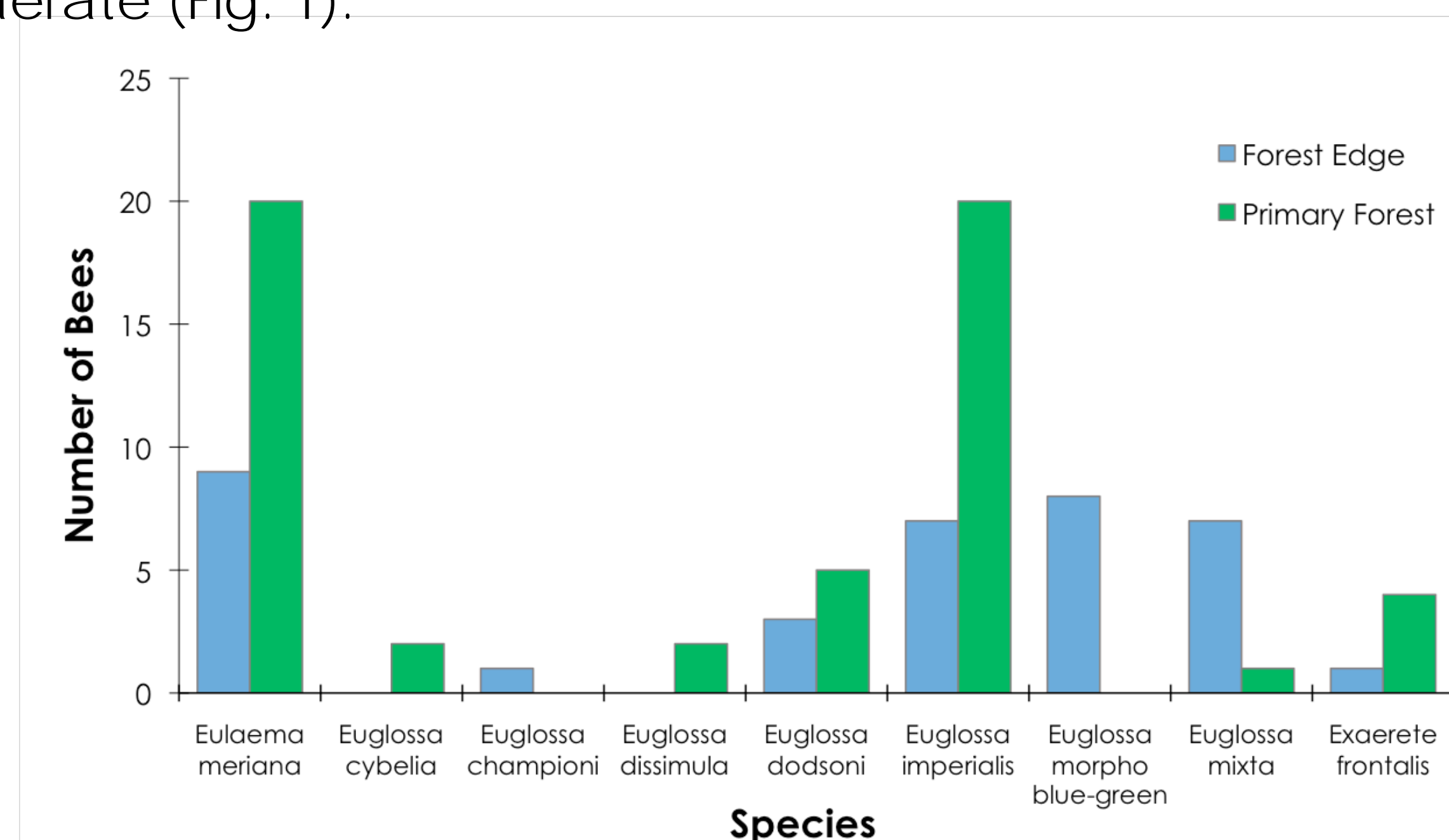
Figure 1. Number of orchid bees of each species recorded at two habitat types within the San Ramón Research Station in 2017.

There was a significant difference in scent preference for cineole, eugenol, methyl salicylate, and tea tree oil between the two habitats (chi-squared test; $\chi^2 = 19.64$, df = 3, P = 0.0002). Cineole attracted the greatest number of bees along the forest edge, whereas methyl salicylate and tea tree oil attracted the greatest number in the primary forest. Myrcene and pinene only attracted bees in the forest edge (Fig. 2).
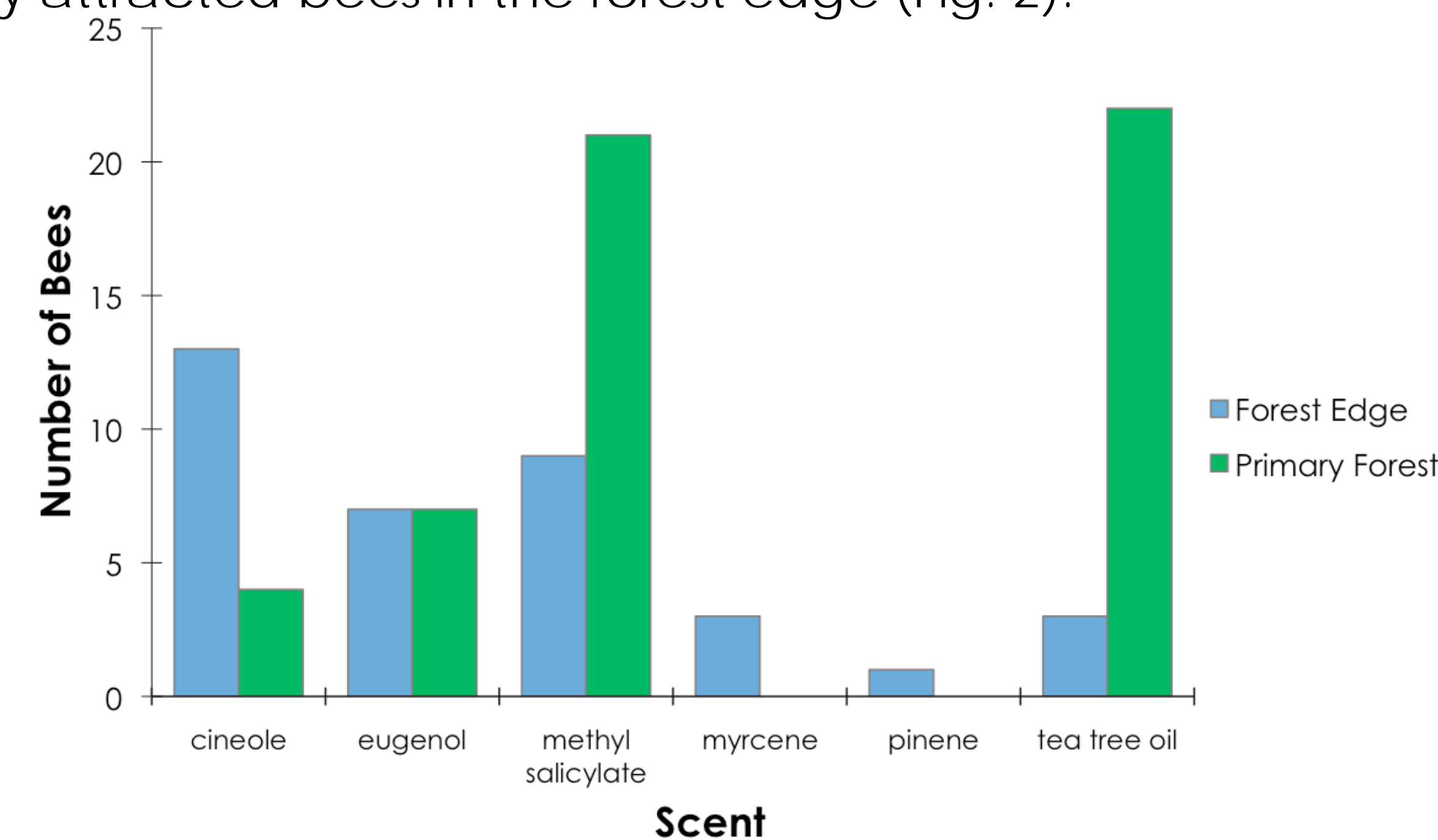
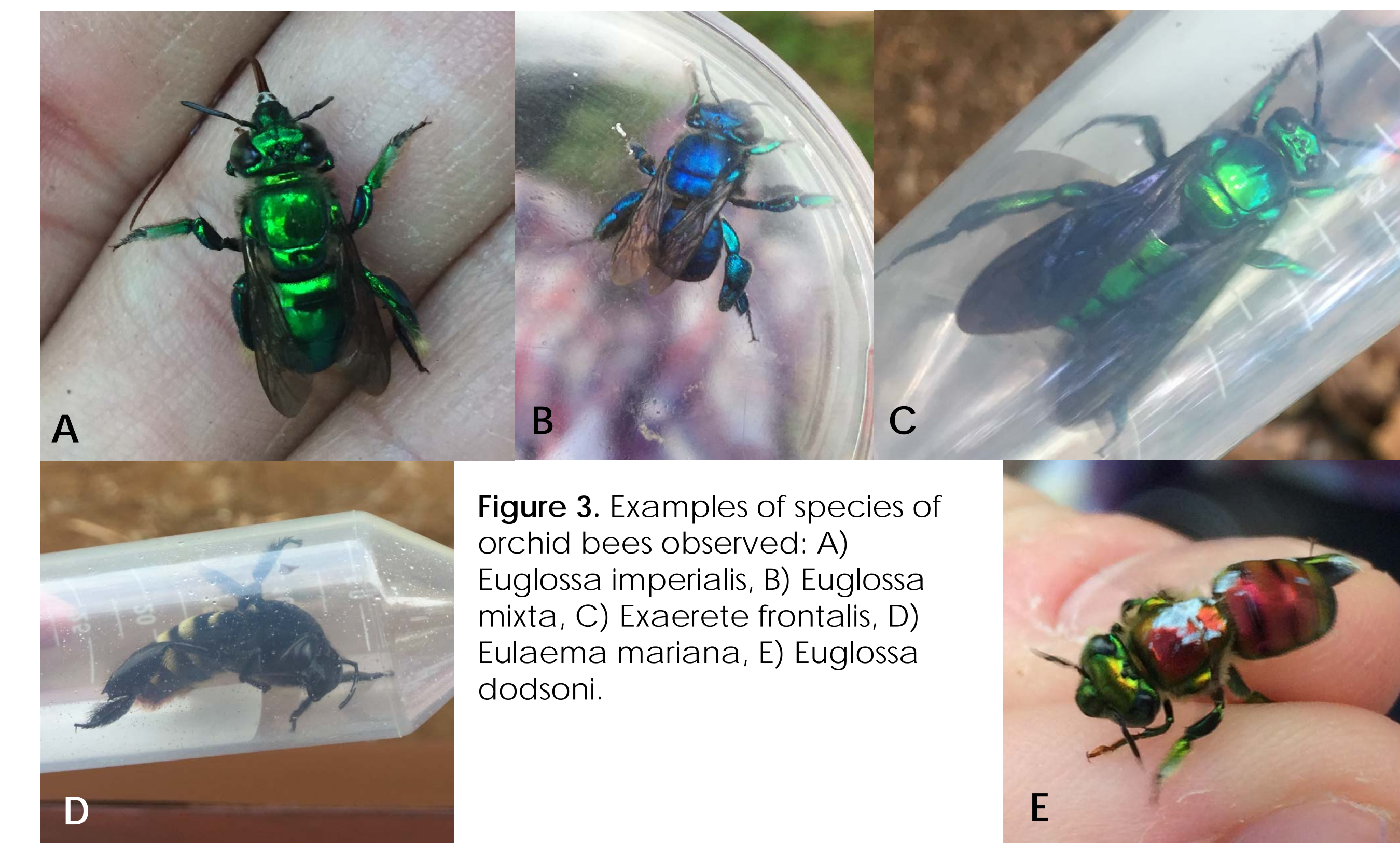**Figure 2.** Number of Bees per scent in two habitat types at the El Jamaical Research Station in 2017.

Figure 3. Examples of species of orchid bees observed: A) Euglossa imperialis, B) Euglossa mixta, C) Exaerete frontalis, D) Eulaema mariana, E) Euglossa dodsoni.

CONCLUSIONS

- Orchid bee abundance was greater in the primary forest compared to the forest edge.
- Bees in the primary forest preferred methyl salicylate and tea tree oil, whereas bees along the forest edge preferred cineole, indicating a difference in scent preference between bees in the two habitat types.

REFERENCES

Dressler, Robert L. "Biology of the Orchid Bees (Euglossini)." Annual Review of Ecology and Systematics, vol. 13, 1982, pp. 373–394.

Ferreira, MG, O.C. de Pinho, J.B.P. Balestieri, O. Faccenda, (2011) Fauna and Stratification of Male Orchid Bees and their Preference for Odor Baits in a Forest Fragment. Neotropical Entomology. 40:639-646

Murren, Courtney J. "Effects of Habitat Fragmentation on Pollination: Pollinators, Pollinia Viability and Reproductive Success." Journal of Ecology, vol. 90, no. 1, 2002, pp. 100–107.

Powell, A.H., Powell, G.V.N. 1987. Population-dynamics of male euglossine bees in Amazonian forest fragments. Biotropica. 19: 176-179. DOI: 10.2307/2388742

ACKNOWLEDGEMENTS