

Wildfire Influence on the Assemblage of Bees and Wasps (Hymenoptera) in 'El Impenetrable' National Park

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Introduction & Aim

Wildfires, mostly caused by human activities, represent a growing threat in Argentina and are aggravated by climate change, which increases favorable conditions for their spread. In addition to their devastating effects on vegetation, they generate smoke emissions that negatively affect human health and fauna, especially insects. This study focused on 'El Impenetrable' National Park, where bee and wasp populations were compared before and after the fires that occurred in 2022.



Methods

Samples were collected at various locations within 'El Impenetrable' National Park in November 2021 (before the fires) and November 2023 (after the fires), using 40 traps per year.

The composition of bee and wasp assemblages was evaluated in terms of species richness between the pre- and post-fire periods. In addition, beta diversity was estimated based on Sørensen's qualitative similarity index (β_{SIM}).



Results & Discussion

A total of 273 specimens of social bees and wasps were captured, allowing the identification of six subfamilies, 11 tribes, 15 genera, and 17 species/morphospecies.

A decrease in species richness was observed between the pre- and post-fire years.

The diversity measure based on the Sorensen similarity index across all combinations yielded high values (Fig.1), suggesting that each year presents a unique species composition, with **species loss (β_{SNE}) being the main contributor to beta diversity.**

This study shows a response of bee and wasp assemblages to the effects of forest fires within El Impenetrable National Park. Some authors attribute these trends not only to the direct impact of the fire but also to the large smoke plumes and pollution generated by it. **Smoke causes behavioral changes in flying insects, such as triggering escape mechanisms or causing larval death.**

Although several groups are part of communities in fire-prone environments (such as the genera *Apis*, *Brachygastra*, *Lasioglossum*, *Polybia*, among others), the degree of danger posed by smoke plumes to all aerobic-breathing fauna remains uncertain. Finally, the observable difference between the pre- and post-fire periods marks the beginning of a future proliferation of these insect assemblages, which may become apparent 1-6 years after these fire events.

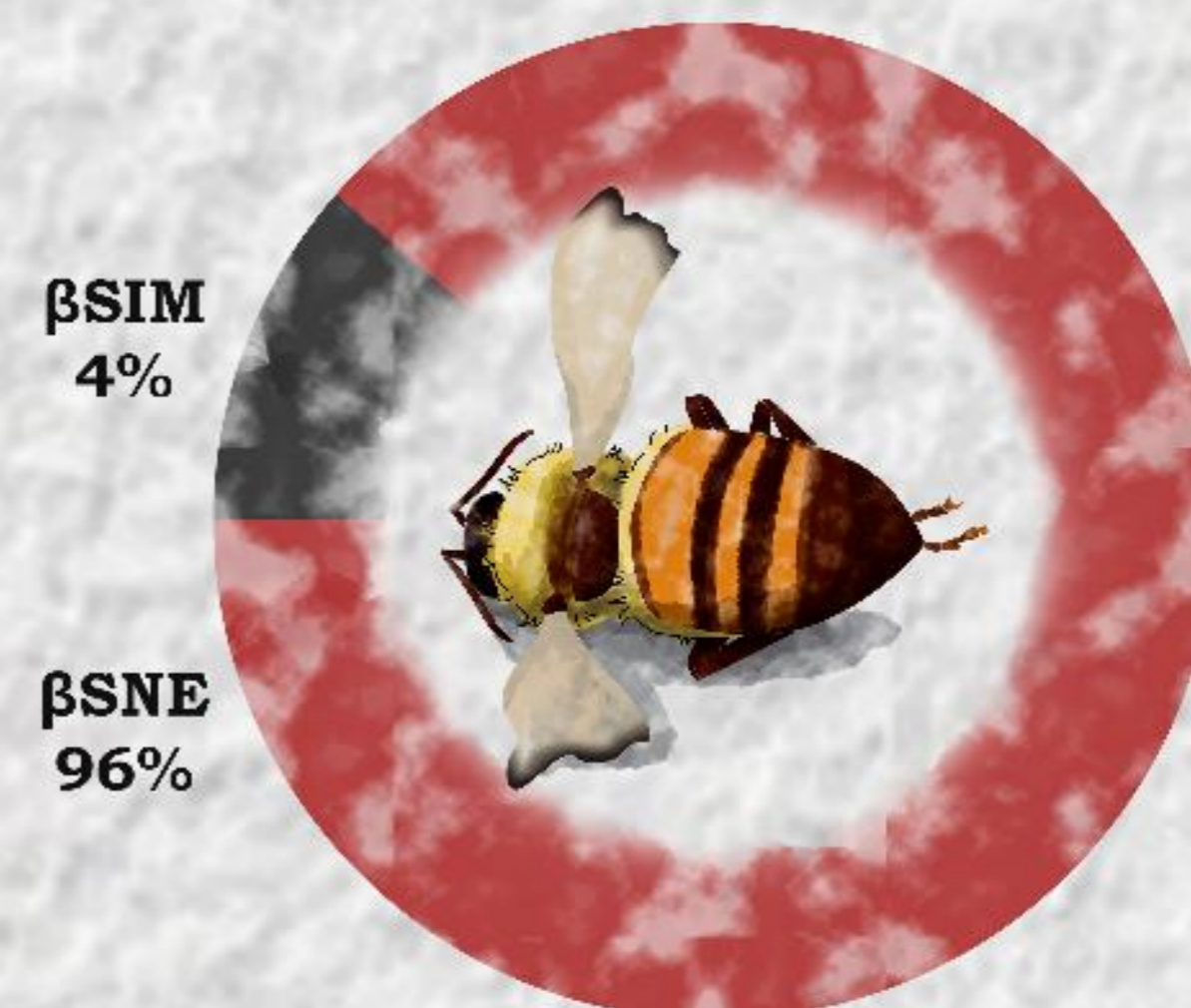


Figure 1. Similarity analysis of species composition before and after the fires.

Conclusions

Wildfires negatively affected the assembly of bees and wasps in 'El Impenetrable' National Park in 2022, initiating a post-fire period with low levels of richness and diversity. The importance of monitoring these insects and studying the fire regime of the region is emphasized to better understand the complex interactions in ecosystems and propose actions for the conservation and sustainable usage of the resources.

References

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