



From threats to solutions: meliponists' perceptions and proactive practices in Brazilian meliponiculture

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Introduction

Modern agriculture heavily relies on monocultures and intensive pesticide use, practices that harm not only the land but also pollinators, including native bees, which are essential for most crop plantations [1,2]. In Brazil, integrating meliponiculture (stingless bee beekeeping) into rural properties can play a crucial role in promoting more sustainable land use while fostering rural development [3,4].



⚠ Meliponiculture faces various threats that impact bee health and productivity, requiring adaptive responses from meliponists.

Aims

The study analyzed rural meliponists' perceptions of threats to meliponiculture and the strategies they employ that address these challenges.

Methodology

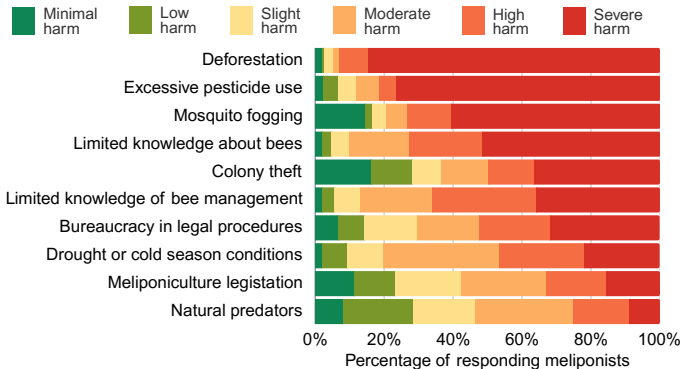
In 2022 an online survey was completed by 252 rural meliponists from across Brazil.

Figure 1. Geographic Distribution of Survey Responses



Results

Figure 2. Perceived level of harm caused by different threats to meliponiculture

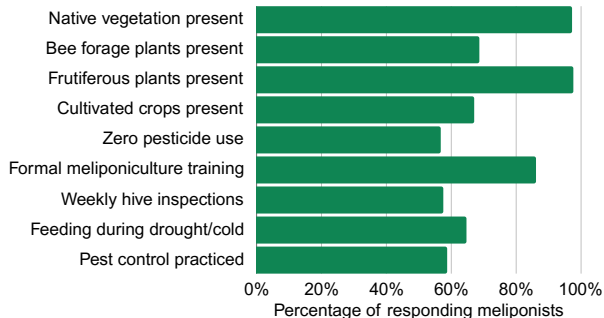


The results show the impact of conventional agricultural practices on meliponiculture in rural areas: pesticides and deforestation are perceived as the main threats to the activity. In addition, lack of technical knowledge and colony theft further increase risks [5].

Meliponists demonstrate adaptive strategies and sustainable land use through the avoidance of pesticides, forage planting, forest preservation, and regular colony monitoring.

Formal training in meliponiculture emerges as a key factor to reduce vulnerabilities and strengthen the activity [6].

Figure 3. Actions undertaken by meliponists that mitigate threats to meliponiculture



Excessive red tape within the legal system poses a greater challenge to meliponists than the actual legislation itself. Targeted public policies are needed to streamline processes, support management, and promote sustainable practices [7]. Participatory governance can further enhance the sector's potential and long-term growth.

Integrating stingless bee beekeeping into agriculture can promote food security, biodiversity conservation, and sustainable rural development [8].

Conclusion

Meliponiculture in Brazil faces major challenges including deforestation, pesticides, mosquito fogging, and limited technical knowledge. Despite this, rural meliponists show resilience through sustainable practices such as forest preservation, forage planting, pesticide avoidance, and training that strengthen sustainable beekeeping. This study offers practical insights for new meliponists and promotes targeted management strategies, participatory governance, and specific public policies to support the long-term sustainability of meliponiculture and its vital role in biodiversity, pollination, and rural development.

References

1. IPBES. The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. Potts, S. G., Imperatriz-Fonseca, V. L., Ngo, H. T., (eds). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany, 2016.
2. Khalifa, S.A.M. et al. Overview of Bee Pollination and Its Economic Value for Crop Production. *Insects* 2021, 12, 688.
3. Giannini, T. C. et al. The dependence of crops for pollinators and the economic value of pollination in Brazil. *J. Econ. Entomol.* 2015, 108, 849-857.
4. Meléndez-Ramírez et al. Crop Pollination by Stingless Bees. In *Pot-Pollen in Stingless Bee Melittology*; Viti, P., Pedro, S. R. M., Roubik, D. W., Eds.; Springer: Cham, Switzerland, 2018; 139-153.
5. Cortesassi-Lauro, M. et al. Global meliponiculture: challenges and opportunities. *Apidologie* 2006, 37, 275-292.
6. Jaffe, R. et al. Bees for development: Brazilian survey reveals how to optimize stingless beekeeping. *PLoS one*. 2015, 10, e0121157.
7. Koser, J. R.; Barbieri, C.; Franco, T. M. Legislation on Meliponiculture in Brazil: Social and Environmental Demand. *SustDev* 2020, 11, 164-194.
8. Barbieri, C.; Franco, T. M. Theoretical model for interdisciplinary analysis of human activities: Meliponiculture as an activity that promotes sustainability. *Ambient. soc.* 2020, 23, 1-20.



More about LABBEES

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Modern agriculture heavily relies on monocultures and intensive pesticide use, practices that harm not only the land but also pollinators, including native bees, which are essential for most crop plantations. In Brazil, integrating meliponiculture (stingless bee beekeeping) into rural properties can play a crucial role in promoting more sustainable land use while fostering rural development. However, meliponiculture faces various threats that impact bee health and productivity, requiring adaptive responses from beekeepers. Thus, this study analyzes rural meliponists' perceptions of threats in meliponiculture and the strategies they employ that address these challenges. A survey was conducted in 2022 with 252 rural meliponists across Brazil. Data covered threats in meliponiculture and questions about land use, bee management, and beekeeper training. Respondents identified deforestation, pesticide overuse, and mosquito fogging as the primary detrimental factors impacting meliponiculture. Half of the respondents highlighted the lack of knowledge about bees as a significant issue. Additionally, drought, winter conditions, and natural predators were noted as harmful, while colony theft and insufficient bee management expertise were considered highly detrimental. The perception of legal procedures as highly harmful was notably higher than that of the legislation itself, which was viewed as detrimental by only a small proportion of respondents. The vast majority of respondents reported having fruit trees and maintaining native forest on their properties. A minority use pesticides and four out of five have undergone some form of meliponiculture training. Finally, almost three-quarters indicated that they plant species for bee foraging and the majority check on the bees weekly, controlling predators and feeding them during periods of drought and winter. The findings indicate that despite the challenges, meliponists are taking proactive steps to mitigate the threats to the bees and meliponiculture. This study offers valuable insights for emerging rural meliponists, enhancing their understanding of threats to meliponiculture and effective mitigation strategies. It also underscores the importance of developing targeted management approaches and public policies to ensure the sustainability of meliponiculture in rural Brazil, thereby supporting its long-term viability and contribution to sustainable agriculture.