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# Editorial: The forgotten pollinators: the importance and conservation of wild pollinators

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## Editorial on the Research Topic

The forgotten pollinators: the importance and conservation of wild pollinators

Pollination is one of the main ecosystem services that ensures the reproduction and outcrossing of wild and domesticated plant species supporting global diversity and food production. While about two-thirds of the world's crops depend on pollinators to guarantee seeds and fruit production (Klein et al., 2007; Gallai et al., 2009), nearly 95% of wild flowering plants in tropical zone are animal-pollinated (Ollerton et al., 2011). Several studies have shown the decline in wild pollinators, mainly in temperate areas, indicating that the major causes are land-use change, intensive agriculture, excessive use of agrochemicals, reduced habitat and resource availability, the introduction of alien species, pathogen spillover, climate change and emerging infectious diseases (Potts et al., 2010). Consequently, the loss of pollinators may cause a decline in the pollination rate, leading to a decrease in plant reproduction, lower seed and fruit set of crops, and thus, a reduction in food production.

Another serious problem is that most of the studies focus only on commercial and managed pollinators such as honeybees and bumblebees, causing a large gap in information about the situation of the rest of the species of wild floral visitors that may also play an important role as pollinators. Therefore, assessing the complex relationship and impact of the drivers of pollinator decline on wild pollinator populations and pollination dynamics is a priority for conserving and improving pollination services for the development of sustainable agriculture and food security.

In this Research Topic, we aim to collect recent evidence on the impact of the drivers observed within agricultural practices and agricultural areas on wild pollinators and the potential effective strategies to conserve pollination services in agroecosystems. For example, one of the main threats that wild pollinators face in crops is the excessive use of pesticides. Rondeau et al. suggested that ground-nesting bees and crop-flower visitors associated with crops in North America (Canada and USA) were more likely exposed to pesticide residues (in soil, nectar, and pollen) than those bee species that do not nest in the ground or feed on crop flowers. This bee inventory permits us to know the main risks that wild pollinators face in North American crops and suggests conservational practices focus on more threatened bees.

Another factor that endangers wild pollinator community is habitat loss which can negatively impact pollinator diversity. Sciligo et al. demonstrated that agricultural diversification on farms positively influences wild pollinator communities and pollination services to strawberries on the Central Coast of California, and that the proportion of natural cover in the surrounding landscape further increased the abundance and richness of wild pollinators. In addition, while berry malformation was observed to be greater when the abundance of honey bees was greater, this reduction in strawberry marketability was mitigated by higher pollinator richness. This study suggested that both polyculture and semi-natural areas support larger and more diverse wild pollinator communities and pollination services provided to crops. In a study conducted in neotropical highlands, Escobedo-Kenefic et al. demonstrated that seminatural vegetation (i.e., early successional stages of plant community) favors floral visitors at both local and landscape scales. Seminatural areas favor the abundance of hoverflies and bumble bees at landscape scale. At local scale, flower richness favors bumble abundance and modularity of the network but reduces connectance. This study suggests that heterogeneous areas represented by seminatural vegetation at landscape scale and flower diversity and flowering weed diversity at local scale maintain stable pollinator communities and robust ecological interactions in the Neotropics.

Education can play a key role in pollinator conservation efforts. Meliponiculture, or stingless bee breeding, is an agroecological and bioculturally significant practice that has been an important part of rural and indigenous cultures across Mesoamerica for millennia. Due to its deep cultural importance, meliponiculture is well-suited as a tool for agroecological education and pollinator conservation. Aldasoro Maya et al. found that meliponiculture and stingless bees have traits well-suited for biocultural conservation and agroecological education, such as human-bee relationships, ecological/cultural roles, and productive potential. Thus meliponiculture provides a potential pathway to advance both agroecological practices and pollinator conservation through education-focused initiatives.

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This Research Topic compiled some studies that show the main threats that wild pollinators face such as pesticide use, habitat loss, and the lack of recognition of biocultural heritage related to native pollinators. These studies provide guides to the development of appropriate strategies for pollinator conservation such as maintaining the natural cover and seminatural areas around crops and human settlements and encouraging the use of biocultural knowledge related to native pollinators. Finally, agroecological education can be a key component of pollinator conservation.

## Author contributions

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