

## Work in Darkness: How Hawk Moth Produce Mangabas (*Hancornia speciosa*, Apocynaceae) in Brazilian Cerrado

REISLA OLIVEIRA<sup>1</sup>, FERNANDO C.V. ZANELLA<sup>2</sup>, CELSO F. MARTINS<sup>3</sup>,  
YASMINE ANTONINI<sup>1</sup>, BEATRICE GRIEB<sup>4</sup>, CLEMENS SCHLINDWEIN<sup>5</sup>

<sup>1</sup>Federal University of Ouro Preto (UFOP), Dept. of Biodiversity, Evolution and Environment, Brazil

<sup>2</sup>Federal University of Latin-American Integration (UNILA), Brazil

<sup>3</sup>Federal University of Paraíba (UFPB), Dept. of Systematics and Ecology, Brazil

<sup>4</sup>Justus-Liebig University of Gießen, Chair of Organic Agriculture, Germany

<sup>5</sup>Federal University of Minas Gerais (UFMG), Botany, Brazil

Mangaba (*Hancornia speciosa*, Apocynaceae), native to Cerrado in Brazil, is a tropical fruit crop, consumed mainly as juice. Supply, however, does not satisfy the market because mangabas are still harvested mainly in natural populations. Thus, the species has a great potential as future fruit crop. Recently, first experimental mangaba orchards arose in agricultural research stations in northeastern Brazil.

We analysed floral biology and breeding systems, determined effective pollinators and evaluated the pollination success of mangaba in natural environments and experimental orchards. Furthermore, we evaluated environmental demands of effective pollination.

*Hancornia speciosa* is a self-incompatible tree with nocturnal flowers. Insects with long mouthparts of more than 30 species, especially nocturnal hawk moths (Sphingidae), visited the flowers. The flowers exhibit a precise pollination apparatus, which optimises pollen transfer between flower and pollinator. During a flower visit, almost half of exogenous pollen grains adhering to the proboscis are deposited on the stigma surface.

While the pollination mechanism avoids self-pollination, mass-flowering promotes geitonogamy. A pollination experiment with nylon threads simulating consecutive flower visits within a crown revealed that there is no fruit set after the third consecutive flower visit. Nevertheless, all groups of flower visitors with long mouthparts were effective pollinators and, mangaba plants, in general, benefit by a high pollinator abundance and diversity.

Fruit set in the studied populations were strongly pollinator limited, and the mangaba berries showed a high variation in size and weight. Seed number was directly correlated to fruit weight. An optimised pollinator mediated flow of cross pollen, thus, is responsible for large fruits.

Our data suggest that fruit set could be increased two to three times with better pollination service. The study indicates that pollinator management implies management of

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**Contact Address:** Reislax Oliveira, Federal University of Ouro Preto (UFOP), Dept. of Biodiversity, Evolution and Environment, Campus Universitário Morro Do Cruzeiro, 35400-000 Ouro Preto, Brazil, e-mail: reislaxoliveira@gmail.com

the surrounding vegetation of the mangaba orchards guaranteeing a diversified environment. Strong pollinator populations require sphingophilous plants in the surroundings of the plantation that provide nectar when mangaba does not flower. Moreover, their oligotrophic caterpillars need specific species of host plants to survive. Orchards with clonal mangaba plants will result in low fruit set.

**Keywords:** Brazil, *Euglossini mangaba*, pollination, pollinator management, Sphingidae, tropical fruits