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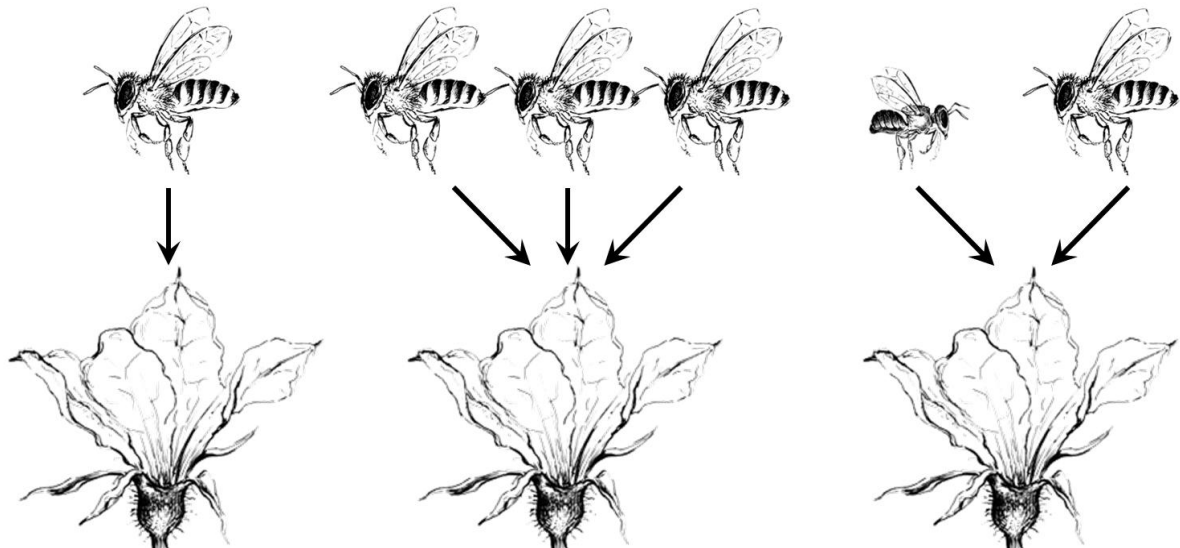
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Master Thesis

Pollination Effectiveness of Different Flower-Visiting Taxa on Annual Crops in Indonesia



by

Sascha Achhammer

Matriculation-Nr.: 1250309
SaschaAchhammer@gmx.de

Supervisors

PD Dr. Gregor Aas

Prof. Dr. Alexandra-Maria Klein

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1 Abstract

Pollination by wild animals, especially insects, can be important for crop production but is threatened by agriculture intensification and land conversion. However, gaps in knowledge of pollinator community and species-specific effectiveness to contribute to the overall pollination services impede effective management planning. Many studies argue that not all flower-visiting-species are effective pollinators and some taxonomic guilds effectively pollinate some plant species but not others. Therefore this thesis studies the effectiveness of different pollinator guilds on cucumber (*Cucumis sativus* L.) as commonly grown annual crop species in traditional Indonesian homegardens.

The study was located on the Indonesian island Sulawesi, in the vegetable growing region Kebun kopi. The pollination effectiveness was tested for *Apis cerana* Fabricius and *Trigona* spp., the two high abundant pollinators visiting cucumber flowers in this area. Other pollinating species occurred just scattered in the study plot. Different flower visitor combinations were observed on virginal flowers: (1) Single pollinator visit of *Apis cerana* or *Trigona* spp., (2) multiple flower visits (from one to ten) of *Apis cerana* on one flower and (3) multiple flower visits of pollinators from the two species (*Apis cerana* / *Trigona* spp. and *Trigona* spp. / *Apis cerana*) on one flower.

For a high cucumber yield insect pollination is essential. Without pollination crop yield achieved only 25% of its maximum. Of the two observed pollinator species only *Apis cerana* was an effective pollinator for cucumber. *Trigona* spp. had no direct pollination effect at all. But through indirect interaction it slightly affected the *Apis cerana* effectiveness.

The number of *Apis cerana* visits on a single flower has not affected the crop yield in total. But it influenced fruit set and fruit weight, the two important factors for crop yield. Fruit set decreased with increasing *Apis cerana* visits. In contrast a higher *Apis cerana* visit number, with a higher summed visiting time resulted in higher fruit weight. Therefore, few visits resulted in a high fruit number with small mean fruit weight, whereas many visits resulted in a smaller fruit number but with high mean fruit weight. It is assumed, that with a certain number of *Apis cerana* visits the negative effects of decreasing fruit set outstrip the positive effects of increasing fruit weight and crop yield declines.