

# ISeBAF

## Insect Service and Biodiversity in Agroecological Farming

### DURATION

15/12/2019 - 15/03/2024

### BUDGET

947 630 €

### PROJECT DESCRIPTION

Insects play a fundamental role in agricultural production. Animal pollination is estimated to be responsible for 30% of global food production whereas common pests such as tephritid fruit flies (Diptera, Tephritidae) cause major economic losses for farmers and traders and reduces the availability of essential dietary components to local populations. Insect pest control is frequently done by indiscriminate, expensive and often inefficient use of synthetic pesticides, having a negative impact on the farmers' health, on their environment and, notably, on beneficial insects for agriculture such as pollinators. For this reason there is a growing interest in the development of more environment-friendly and socially sustainable methodologies, along agroecological principles. Agroecology aims, inter alia, at strongly reducing the impact of chemical control methods on agroecosystems while having a positive effect on beneficial organisms, such as pollinators. A general paradigm of the agroecological approach is that ecosystem services and biodiversity are directly linked, so that promoting biodiversity (including species and genetic diversity) represents one of the founding principles of this discipline. In this context, agroecological practices aim at increasing diversity of land compositional heterogeneity including natural and semi- natural habitats, and at promoting invertebrate biodiversity in farmland, including diversity of beneficial insects. Biodiversity is inherently a hierarchical concept encompassing different levels of organization, i.e. genes, populations, species, ecological communities and ecosystems. ISeBAF aims at providing a reference test-case with a first quantitative description of relationships between agroecological farming, biodiversity of insect pollinators and pests, and cucurbit crop production in sub-Saharan Africa. We focus on two major functional groups of insects that are of interest in agroecological farming, namely pollinators, particularly bees (Hymenoptera, Apoidea) and flower flies (Diptera, Syrphidae), but also pests, particularly fruit flies (Diptera, Tephritidae) as targets and proxies for the evaluation of pollinator & pest biodiversity in contrasting agroecosystems. Using these data, we aim at providing an environmental assessment and socio- economic analysis that will quantify cost-benefits of agroecological practices compared to conventional cucurbit farming.





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Relationships between agroecological farming and insect diversity are tested by comparing agroecological and conventional farms in the Morogoro region (East-Central Tanzania) and by focussing on cucurbit crops commonly grown in Tanzania. Small farms (1- 4 ha) have been identified in collaboration with SUA and Sustainable Agriculture Tanzania (SAT), a non-profit organisation promoting agroecology among small holders in Tanzania. Insect species composition and abundance are estimated following well-established trapping protocols for quantitative analyses. Trapped insects are identified in collaboration with reference taxonomists for bees, flower flies and fruit flies. Following morphological, genomic and metagenomic analyses, the diversity of pollinators and pests is compared between agroecological and conventional farms in a multi-disciplinary framework. Four local and Belgian PhD students, with the support of the personnel hired by the project, have an active role in sample collection, sorting and identification. Vouchers for each of these insect groups will be made available as reference collections for future studies. For the socio-economic aspects, yields of cucurbits and their economic value are monitored and compared between agroecological and conventional productions. The multi-disciplinary approach of ISeBAF, which brings together ecology, genomics, agriculture and socio-economics, will provide guidelines for an agroecological transition in cucurbit production among a range of stakeholders (including farmers, end consumers, local authorities).



## CONTACT INFORMATION

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## LINKS

[https://www.africamuseum.be/en/staff/896/project\\_detail\\_view?prjid=714](https://www.africamuseum.be/en/staff/896/project_detail_view?prjid=714)

<https://www.naturalsciences.be/en/science/do/97/scientific-research/research-projects/project/19048>

<https://www.researchgate.net/project/Insect-Service-and-Biodiversity-in-Agroecological-Farming-ISeBAF>

<https://www.africamuseum.be/en/research/news/agroecology>