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Pollination Services in Irrigated Rice Based Production Landscapes

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Abstract

Pollination is an important ecosystem service and essential for seed and fruit set of major crops. Thus, it is of outstanding ecological and economic importance and crucial for farmers' well being. There is increasing evidence that pollinator diversity is declining due to land use intensification and losses of suitable habitats in agricultural landscapes. Extensively managed woody areas represent important nesting and foraging habitats for bees in the tropics. Within the framework of the LEGATO Project (<http://www.legato-project.net/>) this study focuses on the effects of woody areas on bee species richness and abundance and pollination services in landscapes dominated by rice production systems. We ask the following questions:

1. Does the presence of woody habitats positively affect pollinator richness and abundance in landscapes with rice based production systems?
2. Are pollination services higher in and around rice fields that are located in the vicinity of woody habitats?
3. How do woody habitats in the surroundings influence seed set and fruit quality of cucumber, *Cucumis sativus* L., on the bunds of rice fields?

The study takes place near Los Banos, Laguna Province, Philippines. Eight study areas were chosen within a region of 15 km². Each study area contains three different study sites: 1. woody habitat adjacent to rice cropping area, 2. paddy rice field adjacent to woody habitat, and 3. rice paddy without any woody habitats in the surroundings. Pollination services are determined with a phytometer experiment using potted cucumber plants (three insect-pollinated plants and one self-pollinated plant per site). Pollinator richness and abundance are recorded with direct observations of the potted plants and yellow pan traps (four traps per site).

We expect that pollination services, bee abundance and richness are increased in and around rice fields adjacent to woody habitats. Thus, ecosystem services, such as pollination, may benefit from ecological engineering measures that enhance the availability of suitable habitats for bees and other beneficial insects, such as biocontrol agents, in rice production landscapes.

Keywords: Bee, cucumber, ecosystem services, habitat, pan traps, sustainability

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