



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

Management of Homegardens in Indonesian Agricultural Landscapes and its Impact on Invertebrate Diversity and Herbivore Predation

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Abstract

Over the last three decades Indonesia has experienced an accelerated expansion of monocultures at the cost of forest and traditional cash-crop agriculture and food production. This landscape transformation can have serious impacts on biodiversity and associated ecosystem services, as well as on the livelihood of the local people. Due to their generally high plant biodiversity and low intensity management, traditional small scale agricultural systems such as homegardens could play an important role in the preservation of biodiversity in modified landscapes. Moreover, homegardening in the tropics can ensure food security of low income households. Here, in agricultural landscapes of Sumatra, we (1) investigate the impact of homegarden size, crop diversity and management-intensity on the invertebrate community composition, and more specifically, diversity of bees and wasps, (2) estimate the impact of homegarden type on predation pressure on insect herbivores using dummy caterpillar exposure. Finally, we (3) contrast insect communities in homegardens with those found in the main agricultural systems observed in the region (oil palm, intensive rubber, and extensive rubber plantations). To determine the social and ecological factors as well as management practices driving invertebrate community composition in homegardens (e.g. crop diversity, home garden size, ethnic origin of owner, weeding, application of fertilisers, herbicides and pesticides) we completed crop inventories, and interviewed the owners in 24 homegardens. Vane traps, pitfall traps and sweep netting were used to survey the invertebrate communities in 24 homegardens and four oil palm, intensive rubber and extensive rubber plantations for comparisons between the systems. We expect higher species richness and enhanced herbivore predation rates associated with higher crop diversity and reduced intensity of management practices. The results will allow us to estimate the importance of small scale agricultural systems to maintain invertebrate communities in modified landscapes and to suggest management practices oriented to enhance crop beneficial invertebrate communities, such as hymenopteran, in home gardens.

Keywords: Bees and wasps, crop diversity, ecosystem services, herbivore predation, homegardens, invertebrate-community composition, landscape transformation, management-intensity