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Dynamics and Diversity of Undergrowth Vegetation in Lychee Orchards in Northern Thailand: Considerations for Sustainable Land Use

PETER SCHÜTZ^{1,2}, DIRK EULER^{1,2}, KONRAD MARTIN¹, VICHIAN HENGSAWAD²

¹*University of Hohenheim, Agroecology in the Tropics and Subtropics, Germany*

²*Chiang Mai University, Thailand*

Abstract

In slopy hillsides, lychee (*Litchi chinensis*) is a typical fruit tree of the mountainous regions of northern Thailand. There, lychee production is subject to limitations by abiotic and biotic factors, which are mainly soil erosion, soil fertility depletion, weed pressure (grass-dominated herbicide flora) and pest/pesticide problems. Considering the constraints of sustainable agricultural production, the soil covering vegetation holds a key position in the agro-ecosystem. Adopting sustainable weed structure management strategies will favour synergies between individual measures including diversification of attending understory vegetation, soil conservation and pest control. It is well documented that wild plants play an important role by harbouring and supporting a complex of beneficial arthropods. Besides, the enhancement of plant biodiversity would contribute to the replacement of the current grass-dominated herbicide flora and creates a more suitable environment for beneficial arthropods which will help to suppress populations of lychee pests.

The present study deals with the effects of different mowing strategies of the natural ground vegetation on cover, structure and species diversity. In a lychee orchard, four different combinations of two pesticide (with vs. without) and mowing (monthly vs. once per year) treatments were conducted over a period of two and a half years. Effects of the four treatments on plant species numbers and abundances were recorded using vegetation quadrates. Diversity indices were calculated and multivariate statistical methods were applied to show differences between treatments. A total number of 170 species was recorded from the lychee orchard studied. Temporal species-specific reactions of selected species on the four treatments are documented. It was shown that mowing caused a shift in species composition. Generalisations referring to phenology or habit cannot be extracted, since each species reacted very specific regardless of the affiliation to certain phenology or habit groups. Seasonal and species-specific flowering of the species was documented in addition, because flowers provide important food resources for beneficial insects. The data provide information which are also of relevance for management approaches in order to restore degraded grassland areas.

Keywords: Diversity, lychee, management, sustainable land use, vegetation

Contact Address: Dirk Euler, University of Hohenheim, Plant Production and Agroecology in the Tropics and Subtropics

private address: Hohenheim Office Faculty of Agriculture Chiang Mai University, 50200 Chiang Mai, Thailand, e-mail: dirk.euler@web.de