
Land-use change impacts weed communities' assembly and soil protection in mountainous Northern Thailand

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Abstract

Soil protection is one of today's major challenges in insuring agriculture sustainability, and could be favored by enhanced management of non-cultivated plants. In Mountainous South-East Asia, rapid agricultural intensification in the past decades led to drastic biodiversity losses and intense soil degradation. Weeds provide diverse ecosystem services, including soil protection and support of biodiversity at higher levels. However, the determinants of weed communities in mountainous areas of SE Asia, and the precise interactions of these communities with soil characteristics, are still largely unknown. Here we show that land use and to a lesser extent landscape and past land uses are the main drivers of plant communities. We conducted soil characterization and botanical inventories in Huai Lang, Northern Thailand, in 20 fields from different land uses along the transition from annual crops to mature rubber tree plantations twice a year from 2016 to 2018. We found that species richness was mostly affected by landscape (e.g. increased with forested area) while plant biomass was affected primarily by land use. Mature rubber tree plantations had very specific weed communities, usually associated with low plant biomass. This low abundance and richness of weeds might explain the high rates of soil erosion under rubber trees described elsewhere. Altogether, our results suggest that less intense weeding practices could provide cost-effective and sustainable support for soil protection in threatened forested areas.

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