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Assessment of cropping systems and net economic returns in three agroecosystems of southern myanmar

PHYU THAW TUN, ZIKRULLAH SAFI, ANDREAS BUERKERT

University of Kassel, Organic Plant Production and Agroecosyst. Res. in the Tropics and Subtropics, Germany

Abstract

Cropland expansion in the Kyunsu Township of Southern Myanmar has diminished natural forests and led to a decline of ecosystem services. To assess options for reducing production constraints and increasing net income on current cropland, a field survey of 301 households inhabiting three agroecological zones of the township: the plantation zone (15% of households), the lowland zone (35% households), and the sea zone (50% of households), was conducted in 2020, and addressed characteristics of cropping activities. To identify types of cropping systems in each zone, the data were analysed by applying hierarchical clustering of principal components. The analysis revealed three types of cropping systems in each zone. The plantation zone consisted of a low productive system with limited input use (Type 1) and the high productive systems with limited (Type 2) and intensive input use (Type 3). These types (perennial-based) were the most beneficial as indicated by a gross value added (GVA, $\text{ha}^{-1} \text{yr}^{-1}$) of US\$ 746 (Type 1), 1693 (Type 2), and 1838 (Type 3). The same GVA tendency was observed for the three lowland zone types (rice-based): the low productive systems with intensive (Type 1) and limited (Type 2) input use and a high productive mixed (rice-perennial based) system with limited input use (Type 3), which hold a respective GVA of US\$ 141, 276, and 470 $\text{ha}^{-1} \text{yr}^{-1}$. In the sea zone, Type 1 (low productive perennial-based system with limited input use), Type 2 (high productive perennial-based system with intensive input use), and Type 3 (low productive rice-based system with intensive input use) were identified and yielded a GVA of US\$ 528, 695, and 232 $\text{ha}^{-1} \text{yr}^{-1}$. The most common production constraints across the observed cropping systems were poor soil quality, high input price, water scarcity, labour scarcity, unavailability of assets, inaccessible technology, lack of improved varieties, pest and disease infestation, and saltwater intrusion. To compensate production declines, farmers in the lowland and sea zones with lower land productivity may increasingly clear natural forest land for expanding their production. Resolving farmers' apparent production constraints may improve land productivity, increase household crop income, and help to sustain ecosystem services.

Keywords: Agroecological zones, cropping types, Kyunsu Township