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Alternative Fallow Management through Treatment of Mulch and Enrichment Technology on Sustainable Agricultural System in Southeast Sulawesi

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Abstract

Huge secondary forests consisting of various species composition are still found in Southeast Sulawesi — a place situated in the eastern part of Indonesia. Within the forests shifting cultivation characterized by low productivity is being practiced by more than 80 % of the local farmers. The occurrences of secondary vegetation are predominantly caused by anthropogenic activities, resulted mostly from the slash-and-burn system which fallow as an integral part of the land-use productivity. Fallow plays an important role to accumulate biomass that may act as a source of organic mulch and restore nutrients into the plant tissues for the agricultural system. The objectives of this paper are to break the vicious circle as to reduce physical, chemical and biological degradation with the introduction of mulch technology and to shorten the fallow period with the introduction of fallow improvement. The potential use of biomass accumulation as organic mulch derived from secondary vegetation was described, as well as the screening of certain indigenous species which are capable of rapid accumulating biomass during fallow was studied, using ten 1 x 5 m square transects randomly set up in each fallow. The results of study show that eleven to 235 t ha⁻¹ of biomass was accumulated in all fallow ages ranged from 2 to 15 years with and without enrichment. The high quantity of biomass provides sufficient amount of N, P, K, Ca and Mg nutrients to supply the demand of the following cultivated crop. The use of various indigenous species recorded in the study region such as *Albizia lebbek* Benth. (*Fabaceae*), *Macaranga hispida* M.A. (*Euphorbiaceae*), *Trichospermum* sp. (*Tiliaceae*), *Geunsia quaternifolius* H. Hallier (*Verbenaceae*), *Melochia umbellata* L. (*Sterculiaceae*) and *Chromolaena odorata* L. (*Asteraceae*) is favorably a promising approach applied for enrichment fallow due to the rapid growth and high contribution to biomass accumulation. The proper application of organic mulch from secondary vegetation and the appropriate choice of indigenous plant species for fallow management, both increase crop productivity per unit area per unit time, are the most suitable alternatives for the management of fallow system in maintaining sustainable agricultural production of the study region.

Keywords: Enrichment fallow, indigenous species, Indonesia, slash-and-burn agriculture, sustainability