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Development and Rainfed Paddy Soils Potency Derived from Lacustrine Material in Paguyaman, Gorontalo

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ABSTRACT

Rainfed paddy soils that are derived from lacustrine and include of E4 agroclimatic zone have many unique properties and potentially for paddy and corn plantations. This sreseach was aimed to: (1) study the soil development of rainfed paddy soils derived from lacustrine and (2) evaluate rainfed paddy soils potency for paddy and corn in Paguyaman. Soil samples were taken from three profiles according to toposequent, and they were analyzed in laboratory. Data were analyzed with descriptive-quantitative analysis. Furthermore, assessment on rainfed paddy soils potency was conducted with land suitability analysis using parametric approach. Results indicate that all pedon had evolved with B horizons structurization. However, pedon located on the summit slope was more developed and intensely weathered than those of the shoulder and foot slopes. The main pedogenesis in all pedons were through elluviation, illuviation, lessivage, pedoturbation, and gleization processes. The main factors of pedogenesis were climate, age (time) and topography factors. Therefore, P1 pedons are classified as *Ustic Endoaquerts, fine, smectitic, isohypertermic*; P2 as *Vertic Endoaquepts, fine, smectitic, isohypertermic*; and P3 as *Vertic Epiaquepts, fine, smectitic, isohypertermic*. Based on the potentials of the land, the highest of land suitability class (LSC) of land utilization type (LUT) local paddy was highly suitable (S1), while the lowest one was not suitable with nutrient availability as the limiting factor (Nna). The highest LCS of paddy-corn LUT was marginally suitable with water availability as the limiting factor (S3wa), while the lower LSC was not suitable with nutrient availabily as the limiting factor (Nna).

Keywords: Corn, lacustrine, land suitability, paddy, rainfed paddy soil

INTRODUCTION

National rice demand is increasing due to the increasing of population in a rate of about 2%. According to Ministry of Agriculture (2007), national rice production in 2006 reached 57,157,435 Mg of dry milled grain or equivalent with 32.30 Mg million rice, which is 94.83% contributed by lowland rice and the remainder are from rainfed fields. However, this achievement has failed to meet the same year demand of 36.35 Mg million (BPS RI 2007). In this context, it requires development of other potential wetland, especially rainfed paddy soils. Rainfed paddy soils (RPS) with an area of 2.1 million ha is the second source of grain after the irrigated lowland rice in Indonesia (Toha and Pirngadi 2004). In Gorontalo Province, RPS is of 13,081 ha or 0.47% of national RPS areas (BPS Gorontalo Province 2007), whereas 7,744 ha of it are in Paguyaman. One of the problems faced in RPS development is that its low production yield which is between 2.0-2.5 Mg ha^{-1} (Pirngadi and Makarim 2006), compare to 5.68 Mg ha^{-1} of Irrigated Paddy Soil (IPS) production (Pramono *et al.* 2005).

Rainfed paddy soils in Paguyaman Gorontalo areas were developed from lacustrine materials (Hikmatullah *et al.* 2002; Prasetyo 2007). Formation of lacustrine material depends on its natural properties, deposition process, and the environment characteristics where the deposition occurs resulting in various properties and characteristics of the soil derived from it. Paddy soils, including RPS are formed from various soil types and its characteristic depends on the soil properties (Arabia 2009) and its forming environments. Hikmatullah *et al.* (2002) and Prasetyo (2007) reported that Paguyaman areas consist of quartz minerals and a few of orthoclase, sanidine and andesine minerals. Epidote, amphibole, augite, and hyperstine minerals are found in very small amounts, so it can be said that nutrient stocks in this area are average. Thus, confirming that paddy soil properties are influenced