

ABSTRACT

Upland drylands of Bener Meriah District, Aceh Province, are dominated by volcanic-derived soils under high rainfall that intensifies nutrient leaching, potentially limiting the availability of the secondary macronutrients calcium, magnesium and sulfur. Comprehensive data on these nutrients were previously unavailable, despite their importance for fertilization recommendations. This study aimed to determine the status of Calcium, Magnesium, and Sulfur in dryland soils of Bener Meriah District using a survey method covering preparation, preliminary survey, main survey, and data analysis. Land mapping units (LMUs) were delineated by overlaying soil type, land use, and slope maps, yielding 16 units, of which 10 were sampled (LMU 1, 2, 3, 4, 5, 7, 8, 12, 15, and 16). Topsoil samples (0-30 cm) were analyzed at the Laboratory of the Department of Soil Science and Land Resources, IPB University, using Atomic Absorption Spectrophotometry for Calcium and Magnesium and spectrophotometry for Sulfur. Results showed Ca ranged from 68.2 to 3,711.0 ppm (very low to very high), highest in LMU 15 and lowest in LMU 12. Mg ranged from 8.22 to 196.58 ppm (high to very high), following the same spatial pattern. High Ca and Mg were attributed to weathering of base-cation-rich volcanic materials and to vegetation cover that reduced nutrient loss. In contrast, S was uniformly very low (6.75-19.56 ppm) across all units, likely due to sulfate mobility under leaching and limited organic matter and fertilizer inputs. The study concludes that Ca and Mg status is generally high to very high, while S status is very low across all observed units, indicating the need for vegetation conservation on low-Ca units and sulfur fertilization across the district's dryland.

Keywords: Andisol, upland, land mapping unit