

**DISTRIBUSI SPASIAL *ANDIK SOIL PROPERTIES* GUNUNG  
MARAPI BAGIAN BARAT HINGGA UTARA**

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PADANG  
2026**

# DISTRIBUSI SPASIAL *ANDIK SOIL PROPERTIES* GUNUNG MARAPI BAGIAN BARAT HINGGA UTARA

## ABSTRAK

Aktivitas gunung api berperan penting dalam pembentukan dan distribusi sifat andik tanah melalui suplai material vulkanis muda yang kaya mineral liat non-kristalin. Tanah yang berkembang dari material vulkanis umumnya dicirikan oleh berat volume rendah ( $\leq 0,90 \text{ g/cm}^3$ ), retensi fosfat tinggi ( $\geq 85\%$ ), serta kandungan Al dan Fe aktif yang besar ( $\geq 2\%$ ) akibat dominasi mineral liat non-kristalin seperti alofan dan imogolit. Penelitian ini bertujuan untuk mengkaji dan memetakan distribusi spasial sifat tanah andik di wilayah bagian Barat hingga Utara Gunung Marapi. Sebanyak 47 sampel tanah diambil menggunakan metode survei grid dengan interval  $750 \times 750 \text{ m}$  pada kedalaman 0–20 cm pada penggunaan lahan hortikultura, sawah, kebun campuran, dan hutan yang tersebar pada radius 4–7 km dari puncak Gunung Marapi. Parameter yang dianalisis meliputi berat volume (BV), kemasaman tanah (pH H<sub>2</sub>O dan pH KCl), C-organik, P-tersedia, P-potensial, P-retensi, serta kandungan  $\text{Al}_0 + \frac{1}{2}\text{Fe}_0$ . Hasil penelitian menunjukkan bahwa tanah di wilayah penelitian memiliki nilai BV berkisar 0,61–0,95  $\text{g/cm}^3$ , pH H<sub>2</sub>O 4,59–6,19, pH KCl 3,08–5,60, kadar C-organik 3,10–14,18%, P-tersedia 0,06–90,11 ppm, P-potensial 5,95–156,47 ppm, nilai P-retensi sangat tinggi yaitu 85,02–98,83% serta kandungan  $\text{Al}_0 + \frac{1}{2}\text{Fe}_0$  yang memenuhi kriteria sifat andik. Secara spasial, wilayah Barat Laut–Utara cenderung memiliki berat volume lebih rendah dan kadar C-organik lebih tinggi dibandingkan wilayah Barat Laut–Barat. Perbedaan penggunaan lahan menunjukkan lahan hutan memiliki BV terendah dan kandungan C-organik tertinggi, sedangkan lahan sawah memiliki nilai P-potensial lebih tinggi akibat akumulasi pemupukan.

Kata kunci: distribusi spasial, Gunung Marapi, ordinary kriging, sifat andik

# SPATIAL DISTRIBUTION OF ANDIC SOIL PROPERTIES IN THE WESTERN TO NORTHERN PARTS OF MOUNT MARAPI

## ABSTRACT

Volcanic activity plays a crucial role in the formation and spatial distribution of andic soil properties through the continuous supply of young volcanic materials rich in non-crystalline clay minerals. Soils developed from volcanic materials are commonly characterized by low bulk density ( $\leq 0.90 \text{ g/cm}^3$ ), high phosphate retention ( $\geq 85\%$ ), and high contents of active Al and Fe ( $\geq 2\%$ ), resulting from the dominance of non-crystalline clay minerals such as allophane and imogolite. This study aimed to examine and map the spatial distribution of andic soil properties in the western to northern parts of Mount Marapi. A total of 47 soil samples were collected using a grid survey method with an interval of  $750 \times 750 \text{ m}$  at a depth of 0–20 cm across different land uses, including horticultural fields, paddy fields, mixed gardens, and forest areas, located within a 4–7 km radius from the summit of Mount Marapi. The analyzed parameters included bulk density (BD), soil acidity (pH H<sub>2</sub>O and pH KCl), organic carbon content, available P, potential P, phosphate retention, and the content of  $\text{Al}_o + \frac{1}{2}\text{Fe}_o$ . The results showed that soils in the study area had bulk density values ranging from 0.61 to  $0.95 \text{ g cm}^{-3}$ , pH H<sub>2</sub>O of 4.59–6.19, pH KCl of 3.08–5.60, organic carbon contents of 3.10–14.18%, available P of 0.06–90.11 ppm, potential P of 5.95–156.47 ppm, very high phosphate retention values (85.02–98.83%), and  $\text{Al}_o + \frac{1}{2}\text{Fe}_o$  contents that met the criteria for andic properties. Spatially, the northwestern to northern areas tended to exhibit lower bulk density and higher organic carbon contents compared to the western–northwestern areas. Differences in land use indicated that forest soils had the lowest bulk density and the highest organic carbon contents, whereas paddy soils showed higher potential P values due to the accumulation of fertilizer inputs.

Keywords: spatial distribution, Mount Marapi, ordinary kriging, andic soil properties