

ABSTRACT

Soil fertility is essential for supporting sustainable rice production in irrigated agricultural lands. The availability of macronutrients nitrogen, phosphorus, and potassium varies depending on soil type and land management practices. This study aimed to map the nutrient status of N, P, and K based on soil types in irrigated rice fields in Peusangan Sub-district, Bireuen Regency, Aceh Province. The main issue addressed in this research is the limited information regarding nutrient distribution across different soil types, which hinders effective fertilization planning. A field survey was conducted using a purposive sampling method on three dominant soil types: Alluvial, Regosol, and Podsol. Soil samples were collected at two depths (0–20 cm and 20–40 cm) and two distances (0–400 m and 400–800 m) from secondary irrigation channels, resulting in 12 composite samples. Laboratory analyses were performed to determine total using the Kjeldahl method, available phosphorus (P_2O_5) using the Bray I method, and exchangeable potassium using 1 M NH_4OAc . The analysis results showed that nitrogen content ranged from 0.18% to 0.48% (classified as low to medium), available phosphorus ranged from 1.46 to 17.65 ppm (very low to very high), and exchangeable potassium ranged from 0.25 to 0.76 me/100g (low to high). Alluvial showed the highest potassium content, Regosol had better potassium availability and the highest nitrogen content, while Podsol generally had the lowest nutrient levels. These differences were strongly influenced by soil characteristics such as texture, pH, organic matter, and mineral composition. The study concluded that soil type significantly affects the availability of N, P, and K, and emphasized the importance of applying location-specific fertilization strategies. The findings are expected to support more efficient and sustainable nutrient management to improve rice productivity in irrigated farming areas in Peusangan.

Keywords: Available phosphorus, exchangeable potassium, organic matter, pH, total N.