



ABSTRAK

Padi merupakan tanaman pangan utama di Indonesia yang sangat bergantung pada ketersediaan hara tanah untuk mencapai produktivitas optimal. Unsur hara makro dan mikro seperti fosfor (P), kalium (K), seng (Zn), serta silikon (Si) memegang peranan penting dalam mendukung pertumbuhan dan hasil padi. Fosfor berperan dalam pembentukan energi (ATP) dan perkembangan akar, kalium berfungsi dalam regulasi osmotik serta pengisian gabah, sedangkan Zn berperan dalam sintesis enzim dan hormon pertumbuhan. Silikon, meskipun bukan unsur esensial klasik, terbukti sangat penting bagi padi karena meningkatkan kekuatan batang, ketahanan terhadap hama dan penyakit, serta efisiensi penyerapan hara lain. Namun, kondisi lahan sawah di Indonesia menunjukkan bahwa ketersediaan hara tersebut sering tidak seimbang, salah satunya akibat pemupukan yang lebih menitikberatkan pada N, P, dan K, sementara kebutuhan Zn dan Si masih sering diabaikan. Hal ini dapat berimplikasi pada penurunan efisiensi pemupukan dan produktivitas padi.

Penelitian ini bertujuan untuk menganalisis kesuburan tanah sawah berdasarkan bahan induk di Cekungan Yogyakarta dan sekitarnya. Kesuburan tanah dipengaruhi oleh sifat fisika dan kimia tanah serta perlakuan manusia, seperti pemupukan yang umumnya belum mempertimbangkan karakteristik tanah secara spesifik. Sebanyak 60 sampel tanah diambil dengan metode purposive sampling dari berbagai jenis bahan induk. Analisis laboratorium mencakup tekstur, pH (H_2O dan $CaCl_2$), C-organik, pF 4,2, kapasitas tukar kation (KPK), serta kandungan P-tersedia (metode Olsen), K-tersedia, Ca-tersedia, Mg-tersedia, Zn-tersedia, dan Si-tersedia. Hasil penelitian menunjukkan bahwa fraksi lempung mendominasi sebagian besar sampel dan berkorelasi positif dengan pF 4,2, KPK, serta unsur hara seperti Ca dan Mg. Korelasi antar parameter menunjukkan bahwa fraksi lempung berperan penting dalam meningkatkan ketersediaan hara, sedangkan fraksi pasir dan debu cenderung menurunkan ketersediaan unsur tertentu. Berdasarkan hasil analisis, disusun rekomendasi pemupukan untuk unsur P, K, Zn, dan Si sesuai kondisi kesuburan tiap lokasi. Penelitian ini diharapkan dapat menjadi dasar perbaikan strategi pemupukan tanah sawah secara lebih tepat guna dan berkelanjutan di wilayah Cekungan Yogyakarta.

Kata kunci: kesuburan tanah, bahan induk, padi sawah, P-olsen, Zn, Si, Cekungan Yogyakarta



ABSTRACT

Rice is the primary food crop in Indonesia and is highly dependent on soil nutrient availability to achieve optimal productivity. Both macronutrients and micronutrients, such as phosphorus (P), potassium (K), zinc (Zn), and silicon (Si), play crucial roles in supporting rice growth and yield. Phosphorus is involved in energy formation (ATP) and root development, potassium regulates osmotic balance and grain filling, while zinc is essential for enzyme synthesis and growth hormone production. Although silicon is not considered a classical essential nutrient, it has been shown to be very important for rice, as it enhances stem strength, resistance to pests and diseases, and the efficiency of other nutrient uptake. However, the conditions of paddy fields in Indonesia indicate that the availability of these nutrients is often imbalanced, partly due to fertilization practices that focus more on N, P, and K, while the needs for Zn and Si are frequently overlooked. This imbalance can reduce fertilizer efficiency and rice productivity. Therefore, research on soil fertility status, particularly the availability of P, K, Zn, and Si, is essential as a basis for formulating more precise and sustainable fertilization strategies for paddy fields in Indonesia.

This study aims to analyze paddy soil fertility based on parent material in the Yogyakarta Depression Area and its surroundings. Soil fertility is influenced by physical and chemical soil properties as well as human interventions such as fertilization, which often neglects site-specific soil characteristics. A total of 60 soil samples were collected using purposive sampling from various parent material types. Laboratory analyses included texture, pH (H₂O and CaCl₂), organic carbon (C-organic), water retention at pF 4.2, cation exchange capacity (CEC), and the availability of nutrients including P (Olsen method), K, Ca, Mg, Zn, and Si. The results showed that clay fraction dominated most samples and had a positive correlation with pF 4.2, CEC, and nutrients such as Ca and Mg. Correlation analysis revealed that the clay fraction plays a significant role in enhancing nutrient availability, while sand and silt fractions tend to decrease the availability of certain elements. Based on the findings, fertilizer recommendations for P, K, Zn, and Si were formulated according to the fertility status of each site. This study is expected to contribute to the development of more site-specific and sustainable fertilization strategies for paddy soils in the Yogyakarta Depression Area.

Keywords: soil fertility, parent material, paddy rice, P-Olsen, Zn, Si, Yogyakarta Depression Area