

RINGKASAN

Salah satu komoditas pertanian yang jumlah produksinya cukup tinggi adalah padi. Jumlah produksi padi di Indonesia merupakan hal yang sangat diperhatikan karena berpengaruh terhadap ketahanan pangan nasional. Program peningkatan produktivitas tanaman pangan melalui perbaikan teknologi pemupukan telah berhasil meningkatkan produksi tanaman pangan terutama padi. Kekurangan unsur hara mikro silika merupakan kendala dalam mencapai produktivitas tanaman padi yang optimal. Meskipun syarat sebagai unsur hara esensial tidak terpenuhi, silika telah lama diketahui diserap tanaman dalam jumlah besar terutama tanaman akumulator silika. Sumber silika sebenarnya berlimpah di alam, sehingga menjadi peluang untuk pengembangan pupuk yang bisa diaplikasikan pada tanaman padi. Pupuk silika alami di penelitian ini diformulasikan dengan tiga bahan yang terdiri atas zeolit, arang tebu (SCB) dan arang sekam. Penelitian bertujuan untuk mengetahui pengaruh formulasi dan ukuran pupuk Silika alami terhadap sifat kimia tanah, hasil tanaman dan interaksi antara formulasi dan ukuran pupuk Silika alami terhadap sifat kimia dan hasil tanaman.

Penelitian telah dilaksanakan pada April 2021 hingga Januari 2022 di *screenhouse* tempat penelitian Fakultas Pertanian Universitas Jenderal Soedirman. Penelitian dilakukan dengan rancangan acak kelompok lengkap pada 2 faktor yaitu pemberian pupuk silika alami dan ukuran granul pupuk yang digunakan dengan 3 blok. Faktor pemberian pupuk silika alami terdiri atas 6 taraf meliputi 1 kontrol dan 5 pupuk dengan komposisi bahan berbeda. Faktor ukuran granul terdiri atas 2 taraf meliputi granul ukuran 1-3 mm dan granul dengan ukuran 3-5 mm. Rancangan tersebut terdiri atas variabel hasil panen dan kimia tanah. Variabel hasil panen meliputi bobot 1000 biji, bobot gabah bernas per rumpun, jumlah anakan, bobot segar tanaman, bobot kering tanaman, dan Si-Serapan, sedangkan variabel kimia tanah dan tanaman meliputi KTK, N-Total, N-Tersedia, Si-Tersedia, pH dan DHL. Hasil pengamatan sesuai variabel kemudian dianalisis metode sidik ragam ANOVA derajat ketepatan 95%. Jika didapatkan hasil berbeda nyata akan diuji lanjut metode uji DMRT (*Duncan Multiple Range Test*) derajat ketepatan 95%.

Hasil penelitian menunjukkan pemberian pupuk silika alami berpengaruh terhadap sifat kimia tanah yaitu pada variabel Kapasitas Tukar Kation (KTK). Perlakuan formulasi dan ukuran granul belum mampu mempengaruhi sifat kimia lainnya dan hasil tanaman padi. Hal ini disebabkan karena dispersi pupuk belum secara optimal dapat menyediakan hara terkandung dalam pupuk ke tanah tempat penyerapan akar tanaman padi.

SUMMARY

One of the agricultural commodities with relatively high production is rice. The production of rice in Indonesia is closely monitored due to its impact on national food security. Programs aimed at increasing the productivity of food crops through improved fertilization technology have successfully enhanced the production of food crops, especially rice. A deficiency in the micro-nutrient silica is a challenge in achieving optimal rice productivity. Although silica does not meet the criteria for an essential nutrient, it has long been known to be absorbed by plants in large amounts, especially by silica-accumulating plants. Silica sources are actually abundant in nature, which presents an opportunity for developing fertilizers that can be applied to rice plants. In this study, natural silica fertilizer was formulated with three components: zeolite, sugarcane bagasse (SCB), and rice husk charcoal. The study aimed to determine the effects of the formulation and size of natural silica fertilizer on soil chemical properties, crop yield, and the interactions between fertilizer formulation and size on soil chemical properties and crop yield.

The research was conducted from April 2021 to January 2022 in the screenhouse at the Faculty of Agriculture, Jenderal Soedirman University. The study used a complete randomized block design with 2 factors: natural silica fertilizer application and fertilizer granule size, with 3 blocks. The silica fertilizer application factor consisted of 6 levels, including 1 control and 5 fertilizers with different compositions. The granule size factor consisted of 2 levels: granules sized 1-3 mm and granules sized 3-5 mm. The design included variables related to crop yield and soil chemistry. Crop yield variables included 1000-grain weight, weight of filled grains per clump, number of tillers, fresh plant weight, and dry plant weight. Soil and plant chemistry variables included Cation Exchange Capacity (CEC), Total Nitrogen (N-Total), Available Nitrogen (N-Available), Available Silicon (Si-Available), Silicon Absorption (Si-Absorption), pH, and Electrical Conductivity (EC). The observed results were analyzed using the Analysis of Variance (ANOVA) method at a 95% confidence level. If significant differences were found, further tests were conducted using Duncan's Multiple Range Test (DMRT) at a 95% confidence level.

The results showed that the application of natural silica fertilizer had an effect on the soil chemical property of Cation Exchange Capacity (CEC). The formulation and granule size treatments did not significantly affect other soil chemical properties or rice crop yields. This is because the dispersion of the fertilizer was not yet optimal in supplying the nutrients contained in the fertilizer to the soil for plant root absorption.