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Pengaruh dosis zeolit, ukuran zeolit, dan pupuk urea terhadap sifat kimia, retensi air, dan serapan N jagung manis pada entisol Samas, Yogyakarta
Muh.rizky, Dr. Ir. Eko Hanudin, M.P., IPU., ASEAN Eng; Imas Masithoh Devangsari, S.P., M.Sc, Ph.D
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INTISARI

Tanah pasir memiliki kemampuan menyimpan air dan hara yang rendah sehingga efisiensi pemupukan nitrogen pada budidaya jagung manis masih rendah. Penambahan zeolit sebagai pembenah tanah diharapkan mampu memperbaiki sifat kimia tanah, meningkatkan retensi air, serta meningkatkan pemanfaatan nitrogen oleh tanaman. Penelitian ini bertujuan mengetahui pengaruh ukuran zeolit, dosis zeolit, dan dosis pupuk urea terhadap sifat kimia tanah, retensi air, serapan nitrogen, efisiensi pemupukan, dan pertumbuhan jagung manis pada tanah pasir Samas, serta menentukan kombinasi perlakuan terbaik. Penelitian menggunakan Rancangan Acak Lengkap (RAL) faktorial tiga faktor dengan tiga ulangan. Faktor pertama adalah ukuran zeolit (<20 mesh, dan >100 mesh), faktor kedua dosis zeolit (5, 10, dan 15 t ha^{-1-1}), dan faktor ketiga dosis pupuk urea (200 dan 400 kg ha^{-1}). Data dianalisis menggunakan analisis ragam (ANOVA) pada taraf kepercayaan 95% dan dilanjutkan dengan uji Duncan Multiple Range Test (DMRT) pada taraf 5%. Hasil penelitian menunjukkan bahwa ukuran zeolit berpengaruh sangat nyata terhadap pH H_2O, pH KCl, kapasitas tukar kation, dan kadar air tersedia, sedangkan dosis pupuk urea berpengaruh nyata terhadap serapan nitrogen tajuk. Rasio serapan nitrogen dipengaruhi sangat nyata oleh dosis zeolit, interaksi ukuran zeolit × dosis zeolit, dan interaksi tiga faktor, sedangkan efisiensi pemupukan dipengaruhi nyata oleh ukuran zeolit dan interaksi ukuran zeolit × pupuk urea. Kombinasi perlakuan zeolit berukuran >100 mesh dengan dosis 15 ton ha^{-1} dan pupuk nitrogen 400 kg ha^{-1} memberikan respons terbaik dengan efisiensi pemupukan nitrogen sebesar 3,26%, serapan nitrogen akar 0,56 g $tanaman^{-1}$, serapan nitrogen tajuk 1,63 g $tanaman^{-1}$, serta kadar air tersedia 12,57%.

Kata kunci: efisiensi pemupukan, jagung manis, urea, tanah pasir, zeolit.

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ABSTRACT

Sandy soils have low water and nutrient retention capacities, resulting in low nitrogen fertilizer use efficiency in sweet corn cultivation. The application of zeolite as a soil amendment is expected to improve soil chemical properties, increase water retention, and enhance nitrogen utilization by plants. This study aimed to evaluate the effects of zeolite particle size, zeolite application rate, and urea fertilizer rate on soil chemical properties, water retention, nitrogen uptake, nitrogen use efficiency, and the growth of sweet corn grown on Samas sandy soil, as well as to determine the best treatment combination. The experiment was arranged in a completely randomized design (CRD) with a three-factor factorial arrangement and three replications. The first factor was zeolite particle size (<20 mesh, and >100 mesh), the second factor was zeolite rate (5, 10, and 15 t/ha^{-1}), and the third factor was urea fertilizer rate (200 and 400 kg N ha^{-1}). Data were analyzed using analysis of variance (ANOVA) at the 5% significance level followed by Duncan's Multiple Range Test (DMRT). The results showed that zeolite particle size significantly affected soil pH, cation exchange capacity, and available water content, whereas nitrogen fertilizer rate significantly affected shoot nitrogen uptake. The nitrogen uptake ratio was significantly influenced by zeolite rate, the interaction between zeolite particle size and zeolite rate, and the three-way interaction. Nitrogen use efficiency was significantly affected by zeolite particle size and the interaction between zeolite particle size and urea fertilizer rate. The best treatment was the application of >100 mesh zeolite at 15 t ha^{-1} combined with 400 kg N ha^{-1}, resulting in a nitrogen use efficiency of 3.26%, root nitrogen uptake of 0.56 g plant^{-1}, shoot nitrogen uptake of 1.63 g plant^{-1}, and available soil water content of 12.57%.

Keywords: nitrogen fertilizer use efficiency, sweet corn, sandy soil, zeolite.