

## RINGKASAN

Bawang merah merupakan komoditas hortikultura strategis nasional karena perannya dalam ekonomi dan ketahanan pangan. Salah satu tantangan dalam budidaya bawang merah adalah efisiensi pemupukan nitrogen pada jenis tanah marginal seperti Inceptisol. Inovasi berupa pupuk majemuk NPK-Zeo-SR berbasis zeolit dengan karakteristik slow-release berpotensi meningkatkan serapan nitrogen dan hasil tanaman. Penelitian ini bertujuan untuk: (1) mengetahui pengaruh diameter pupuk majemuk NPK-Zeo-SR dan ukuran zeolit alam terhadap serapan N dan karakter fisiologi tanaman bawang merah di tanah Inceptiso, (2) menentukan diameter pupuk majemuk NPK-Zeo-SR dan ukuran zeolit alam yang paling baik pengaruhnya terhadap serapan N dan karakter fisiologi tanaman bawang merah di tanah Inceptisol.

Penelitian telah dilaksanakan di Laboratorium Ilmu Tanah dan *Sreen House* Fakultas Pertanian, Universitas Jenderal Soedirman, Purwokerto. Pelaksanaan penelitian dilakukan pada bulan Desember 2021 sampai dengan bulan Juni 2022. Penelitian menggunakan Rancangan Acak Kelompok Lengkap (RAKL) dua faktor, yaitu diameter pupuk (0–5 mm) dan ukuran zeolit (60 mesh dan 100 mesh), dengan 12 kombinasi perlakuan dan 3 ulangan. Diameter pupuk majemuk NPK-ZEO-SR dengan 6 aras diameter, yaitu: P0 (tanpa pemberian pupuk majemuk NPK- Zeo-SR), P1(pupuk majemuk NPK-Zeo-SR dengan diameter 1 mm) P2 (Pupuk majemuk NPK-Zeo-SR dengan diameter 2 mm), P3 (pupuk majemuk NPK-Zeo-SR dengan diameter 3 mm), P4 (pupuk majemuk NPK-Zeo-SR dengan diameter 4 mm), P5= (pupuk majemuk NPK-Zeo-SR dengan diameter 5 mm). Ukuran zeolit alam terdiri atas 2 aras, yaitu: Z1 (zeolit alam dengan diameter 60 mesh) dan Z2 (zeolit alam dengan diameter 100 mesh). Variabel pengamatan pada penelitian ini meliputi: serapan N, kehijauan daun, klorofil, jumlah daun, luas daun, bobot tanaman segar, bobot tanaman kering, bobot tajuk segar, bobot tajuk kering, bobot umbi segar, dan bobot umbi kering.

Hasil penelitian menunjukkan bahwa diameter pupuk berpengaruh sangat nyata terhadap serapan nitrogen, dengan diameter 4 mm menghasilkan serapan N tertinggi. Ukuran zeolit 100 mesh memberikan pengaruh positif terhadap kehijauan daun dan kandungan klorofil, sedangkan zeolit 60 mesh lebih baik dalam meningkatkan bobot segar dan kering tajuk tanaman. Interaksi antara diameter pupuk dan ukuran zeolit menunjukkan pengaruh nyata pada bobot segar dan kering umbi, dengan kombinasi terbaik adalah P4Z1 (diameter 4 mm, zeolit 60 mesh). Penelitian ini menyimpulkan bahwa kombinasi diameter pupuk dan ukuran zeolit memengaruhi efisiensi pemupukan dan fisiologi tanaman, serta dapat menjadi acuan pengembangan pupuk berbasis zeolit untuk tanah marginal seperti Inceptisol.

Kata kunci : bawang merah, pupuk NPK-Zeo-SR, zeolit, Inceptisol

## SUMMARY

*Shallots are a national strategic horticultural commodity due to their role in the economy and food security. One of the challenges in shallot cultivation is the efficiency of nitrogen fertilization on marginal soil types such as Inceptisols. Innovation in the form of zeolite-based NPK-Zeo-SR compound fertilizer with slow-release characteristics has the potential to increase nitrogen uptake and crop yields. This study aims to: (1) determine the effect of the diameter of the NPK-Zeo-SR compound fertilizer and the size of natural zeolite on N uptake and physiological characteristics of shallot plants in Inceptisol soil, (2) determine the diameter of the NPK-Zeo-SR compound fertilizer and the size of natural zeolite that best influence N uptake and physiological characteristics of shallot plants in Inceptisol soil.*

*The research has been carried out at the Soil Science Laboratory and Screen House, Faculty of Agriculture, Jenderal Soedirman University, Purwokerto. The study was conducted from December 2021 to June 2022. A completely randomized block design (RAKL) was used with two factors: fertilizer diameter (0–5 mm) and zeolite size (60 mesh and 100 mesh), with 12 treatment combinations and three replications. The diameter of the NPK-ZEO-SR compound fertilizer with 6 levels of diameter, namely: P0 (without giving NPK-Zeo-SR compound fertilizer), P1 (NPK-Zeo-SR compound fertilizer with a diameter of 1 mm), P2 (NPK-Zeo-SR compound fertilizer with a diameter of 2 mm), P3 (NPK-Zeo-SR compound fertilizer with a diameter of 3 mm), P4 (NPK-Zeo-SR compound fertilizer with a diameter of 4 mm), P5 = (NPK-Zeo-SR compound fertilizer with a diameter of 5 mm). The size of natural zeolite consists of 2 levels, namely: Z1 (natural zeolite with a diameter of 60 mesh) and Z2 (natural zeolite with a diameter of 100 mesh). Observation variables in this study include: N absorption, leaf greenness, chlorophyll, number of leaves, leaf area, fresh weight of plant, dry weight of plant, fresh weight of crown, dry weight of crown, fresh weight of shallot tuber, dry weight of shallot tuber.*

*The results showed that fertilizer diameter significantly affected nitrogen uptake, with a 4 mm diameter producing the highest N uptake. A 100-mesh zeolite had a positive effect on leaf greenness and chlorophyll content, while a 60-mesh zeolite was better at increasing the fresh and dry weight of plant shoots. The interaction between fertilizer diameter and zeolite size significantly affected the fresh and dry weight of shallot tubers, with the best combination being P4Z1 (4 mm diameter, 60 mesh zeolite). This study concludes that the combination of fertilizer diameter and zeolite size influences fertilization efficiency and plant physiology and can serve as a reference for developing zeolite-based fertilizers for marginal soils such as Inceptisols.*

*Keywords: shallot, NPK-Zeo-SR fertilizer, zeolite, Inceptisols*