

RINGKASAN

Padi merupakan komoditas pangan utama bagi masyarakat Indonesia, tetapi produksi padi nasional masih belum optimal akibat menyusutnya lahan pertanian dan menurunnya kesuburan tanah. Permasalahan ini diperparah oleh intensifikasi lahan tanpa pengelolaan yang tepat yang menyebabkan degradasi unsur hara esensial, seperti Nitrogen, Fosfor, dan Kalium. Pemanfaatan lahan suboptimal, seperti tanah Entisol di wilayah pesisir, khususnya di Kecamatan Adipala, Cilacap, menjadi salah satu strategi intensifikasi pertanian yang perlu dikembangkan. Tanah Entisol memiliki keterbatasan sifat fisik dan kimia, tetapi tetap berpotensi untuk budidaya padi jika dikelola dengan pemupukan berimbang yang sesuai dengan karakteristik tanah. Salah satu inovasi yang menjanjikan adalah penggunaan pupuk berbasis zeolit, seperti NSZeo-SR yang dapat meningkatkan efisiensi penyerapan hara, memperbaiki sifat kimia tanah, dan mendukung keberlanjutan pertanian.

Penelitian ini berlangsung September 2024 hingga Maret 2025 di Desa Glumpangpasir, Kecamatan Adipala, Kabupaten Cilacap, Provinsi Jawa Tengah dengan menggunakan Rancangan Acak Kelompok (RAK) yang terdiri atas 12 perlakuan yang diulang sebanyak 3 kali, sehingga terdapat 36 petak percobaan. Bahan yang digunakan, meliputi akuades, HCl 25%, pereaksi P pekat, kertas saring, tanah Entisol, padi Inpari 32, pupuk NSZeo-SR yang terdiri atas zeolit alam, sulfur, abu sekam, montmorilonit, pupuk KCl, pupuk SP-36, dan pupuk urea. Alat yang digunakan, meliputi meteran, patok, tali rafia, gunting, cangkul, bor tanah, ayakan, alat tulis, alat dokumentasi, timbangan, oven, mortar and pestle, serta peralatan untuk analisis sampel di laboratorium, seperti botol kocok, mesin kocok, corong, pipet, gelas ukur, gelas piala, flamephotometer, dan spektrofotometer. Variabel yang diamati, meliputi tinggi tanaman, jumlah malai per rumpun, jumlah gabah per malai, serapan K, serapan P, P total, P tersedia, K total, dan K tersedia.

Hasil penelitian menunjukkan bahwa aplikasi pupuk NSZeo-SR tidak memberikan pengaruh yang signifikan terhadap sifat kimia tanah tetapi dapat meningkatkan kandungan Fosfor dan Kalium, serta menunjukkan potensi dalam mempertahankan atau memperlambat laju penurunan P tersedia. Dosis NSZeo-SR terbaik untuk memperoleh produktivitas padi yang tinggi pada lahan Entisol pantai Adipala terdapat pada perlakuan D6 hingga D8, yakni antara 320–426,66 gram. Dosis ini memberikan hasil terbaik dari berbagai parameter, seperti peningkatan K total tanah, peningkatan jumlah gabah per malai, serta pertumbuhan vegetatif dan generatif yang lebih baik dibandingkan dosis lainnya.

SUMMARY

Rice is a staple food commodity for the Indonesian population; however, national rice production remains suboptimal due to shrinking agricultural land and declining soil fertility. This issue is further exacerbated by land intensification without proper management, which leads to the degradation of essential nutrients such as Nitrogen, Phosphorus, and Potassium. The utilization of suboptimal land, such as Entisol soils in coastal areas—particularly in Adipala District, Cilacap Regency—has become a key strategy for agricultural intensification that requires further development. Although Entisols are characterized by limitations in their physical and chemical properties, they still hold potential for rice cultivation if managed through balanced fertilization tailored to soil characteristics. One promising innovation is the use of zeolite-based fertilizers, such as NSZeo-SR, which can enhance nutrient uptake efficiency, improve soil chemical properties, and support sustainable agriculture.

This study was conducted from September 2024 to March 2025 in Glempangpasir Village, Adipala District, Cilacap Regency, Central Java Province. The research employed a Randomized Complete Block Design (RCBD) consisting of 12 treatments with three replications, resulting in a total of 36 experimental plots. The materials used included distilled water, 25% HCl, concentrated phosphorus reagents, filter paper, Entisol soil, Inpari 32 rice variety, and NSZeo-SR fertilizer composed of natural zeolite, sulfur, rice husk ash, montmorillonite, KCl fertilizer, SP-36 fertilizer, and urea. The equipment utilized included measuring tapes, stakes, raffia strings, scissors, hoes, soil augers, sieves, writing tools, documentation tools, scales, ovens, mortar and pestle, and laboratory instruments such as shaking bottles, shakers, funnels, pipettes, measuring cylinders, beakers, flame photometers, and spectrophotometers. The observed variables included plant height, number of panicles per clump, number of grains per panicle, potassium uptake, phosphorus uptake, total phosphorus, available phosphorus, total potassium, and available potassium.

The results of the study showed that the application of NSZeo-SR fertilizer did not have a significant effect on soil chemical properties but could increase the content of Phosphorus and Potassium, and showed potential in maintaining or slowing the rate of decline in available P. The best dose of NSZeo-SR to obtain high rice productivity on Adipala coastal Entisol land was found in treatments D6 to D8, namely between 320–426.66 grams. This dose provided the best results from various parameters, such as increasing total soil K, increasing the number of grains per panicle, and better vegetative and generative growth compared to other doses.