

EFEK KOMPOSIT (ALGINAT ZEOLIT) ZnO NPs SEBAGAI PUPUK CERDAS UNTUK PERTUMBUHAN DAN KUALITAS TANAMAN KANGKUNG DARAT (*Ipomoea reptans* Poir.)

Wafiq Nur Azizah

21/483174/BI/10899

Dosen Pembimbing: Prof. Dr. Kumala Dewi, M.Sc.St.

INTISARI

Kangkung salah satu tanaman yang memiliki nilai komoditas tinggi dan memiliki kandungan serat serta vitamin yang cukup lengkap. Kangkung memiliki kandungan nutrisi di antaranya mengandung asam askorbat, protein dan mineral seperti Ca, Fe, Mg, Zn dan P. Tanaman kangkung darat (*I. reptans* Poir.) mudah untuk dibudayakan namun hasil tanaman tergantung pada kesuburan tanah dan faktor internal lainnya. Pemanfaatan pupuk anorganik yang berkepanjangan dapat mengakibatkan dampak negatif pada tanaman. Pupuk komposit nano Zn dapat digunakan sebagai inovasi untuk mendukung ketahanan pangan dan pelestarian lingkungan. Penelitian ini bertujuan untuk mengetahui pengaruh pupuk nano Zn terhadap pertumbuhan tanaman kangkung darat (*I. reptans* Poir.) serta menentukan dosis komposit pupuk nano Zn yang tepat untuk meningkatkan pertumbuhan kangkung darat (*I. reptans* Poir.). Penelitian dilaksanakan di *green house* Fakultas Biologi Universitas Gadjah Mada. Rancangan percobaan yang digunakan yakni RAL dengan 7 perlakuan dan 5 ulangan pada masing-masing perlakuan yakni P1 (tanah), P2 (tanah + NPK), P3 (tanah + NPK + 25 ppm), P4 (tanah + NPK 50 ppm), P5 (tanah + NPK + 100 ppm), P6 (tanah + NPK + 200 ppm), P7 (tanah + NPK + 250 ppm). Data dianalisis dengan uji ANOVA kemudian dilanjutkan dengan SPSS. Parameter yang diamati berupa parameter pertumbuhan (jumlah akar, tinggi, bobot segar, dan rasio daun tanaman), parameter fisiologis (kadar klorofil, karotenoid, dan total fenol) dan parameter anatomis (densitas stomata dan diameter sel parenkim). Hasil yang diperoleh yakni aplikasi pupuk komposit alginat zeolit ZnO NPS pada berbagai perlakuan meningkatkan secara signifikan pertumbuhan jumlah akar, tinggi tanaman, klorofil, karotenoid, dan densitas stomata. Perlakuan NPK dan Komposit ZnO NPs 100 ppm paling baik untuk meningkatkan jumlah akar, tinggi tanaman dan klorofil jika dibandingkan dengan P1 (tanah), P2 (tanah + NPK), P3 (tanah + NPK + 25 ppm), P4 (tanah + NPK 50 ppm), P6 (tanah + NPK + 200 ppm), P7 (tanah + NPK + 250 ppm).

KATA KUNCI: Kangkung, Komposit nano, Pertumbuhan, Zn.

EFFECT OF NANO (ALGINAT ZEOLIT) ZnO NPs COMPOSITE AS SMART FERTILIZER ON THE GROWTH AND QUALITY OF WATER SPINACH (*Ipomoea reptans* Poir.)

Wafiq Nur Azizah

21/483174/BI/10899

Supervisor: Prof. Dr. Kumala Dewi, M.Sc.St.

ABSTRACT

Water spinach represents a botanical species characterized by its substantial economic significance and a comprehensive profile of dietary fiber and essential vitamins. This plant is rich in nutrients, including ascorbic acid, proteins, and minerals such as calcium, iron, magnesium, zinc, and phosphorus. The terrestrial variant of the water spinach plant (*I. reptans* Poir.) is relatively straightforward to cultivate; however, its productivity is contingent upon the fertility of the soil and various intrinsic factors. Prolonged application of inorganic fertilizers may adversely affect the growth and health of the plants. The implementation of nano Zn composite fertilizer presents a novel approach to bolster food security while promoting environmental sustainability. The objective of this investigation is to assess the impact of nano Zn fertilizer on the growth dynamics of land water spinach (*I. reptans* Poir.) and to ascertain the optimal dosage of nano Zn composite fertilizer necessary to enhance the growth of this species. The investigation was carried out at Gadjah Mada University's Faculty of Biology's greenhouse facilities. A randomized complete block design (RCBD) including seven treatments and five replications for each treatment was the experimental design employed: P1 (soil), P2 (soil + NPK), P3 (soil + NPK + 25 ppm), P4 (soil + NPK 50 ppm), P5 (soil + NPK + 100 ppm), P6 (soil + NPK + 200 ppm), P7 (soil + NPK + 250 ppm). Data analyzed using ANOVA and then continued with SPSS. Parameters observed were growth parameters (number of roots, height, fresh weight, and leaf ratio of plants), physiologi parameters (chlorophyll content, carotenoids, and total phenols), and anatomical parameters (stomatal density and parenchyma cell diameter). The findings indicate that the utilization of alginate zeolite ZnO NPS composite fertilizer under various treatments significantly enhances root growth, plant height, chlorophyll, carotenoids, and stomatal density. The NPK treatment and the 100 ppm ZnO NPs composite are the most effective for increasing root number, plant height, and chlorophyll compared to the P1 (soil), P2 (soil + NPK), P3 (soil + NPK + 25 ppm), P4 (soil + NPK 50 ppm), P6 (soil + NPK + 200 ppm), P7 (soil + NPK + 250 ppm).

KEYWORDS: Growth, Nano-composite, Water spinach, Zn.