INTISARI

Penelitian bertujuan untuk (1) Mengetahui pengaruh kalium (K) pada perubahan aktivitas biokimia bibit kelapa sawit yang mengarah pada skema ketahanan terhadap cekaman kekeringan (2) Menentukan dosis K yang optimum untuk menginduksi perubahan aktivitas biokimia bibit kelapa sawit dalam rangka pertahanan diri terhadap cekaman kekeringan. Penelitian dilaksanakan pada September 2017 – Oktober 2018 di Desa Madurejo, Kecamatan Prambanan, Kabupaten Sleman, Daerah Istimewa Yogyakarta, Laboratorium Manajemen Produksi Tanaman, Fakultas Pertanian, dan Laboratorium Penelitian dan Pengujian Terpadu, Universitas Gadjah Mada, Yogyakarta. Percobaan disusun menggunakan Rancangan Acak Kelompok Lengkap (RAKL) faktorial dua faktor dengan tiga blok sebagai ulangan. Faktor pertama adalah dosis pupuk K, terdiri dari lima taraf yaitu 0%, 50%, 100%, 150%, dan 200% dosis standar K. Faktor kedua adalah kadar lengas tanah yang ditentukan berdasarkan *fraction of transpirable soil water* (FTSW), terdiri dari tiga aras yaitu FTSW 1,00 (tidak tercekam kekeringan), FTSW 0,35 (cekaman kekeringan moderat), dan FTSW 0,15 (cekaman kekeringan berat). Pengamatan dilakukan terhadap variabel iklim mikro, karakter fisika dan kimia media tanam, aktivitas biokemis, dan pertumbuhan bibit kelapa sawit pada tahapan pembibitan utama. Data dianalisis menggunakan Analisis Varian (ANOVA) pada level 5%, dan dilanjutkan dengan uji polinomial orthogonal jika hasil analisis varian menunjukkan perbedaan yang nyata antar perlakuan. Hasil penelitian memberikan informasi bahwa cekaman kekeringan menyebabkan perubahan pada aktivitas biokemis, berupa peningkatan kandungan ABA, peningkatan kandungan superoksida, peningkatan kandungan H_2O_2, peningkatan kandungan SOD, peningkatan kandungan MDA, peningkatan REL, peningkatan kandungan prolin, peningkatan kandungan fenolik total, penurunan potensial air daun, penurunan kehijauan daun, penurunan kandungan klorofil A, penurunan kandungan karotenoid, dan penurunan ANR, serta penurunan bobot biomassa bibit kelapa sawit. Pemberian K mampu meningkatkan ketahanan bibit kelapa sawit terhadap cekaman kekeringan, melalui mekanisme penurunan kandungan ABA, peningkatan kandungan giberelin, zeatin dan kinetin, penurunan kandungan MDA, penurunan REL, dan peningkatan potensial air daun. Dosis optimum K untuk meningkatkan ketahanan bibit kelapa sawit terhadap cekaman kekeringan adalah 158,34% dosis standar atau setara dengan 26,95 g K_2O/bibit/tahun.

Kata kunci : kelapa sawit, kalium, biokimia, cekaman kekeringan

ABSTRACT

The research objectives were to (1) determine the effects of potassium (K) on biochemical changes of oil palm seedlings that lead to resistance scheme to drought stress, and (2) determine the optimum K dose to induce changes in the biochemical activities of oil palm seedlings in order to defend against drought stress. The research was conducted in September 2017 - October 2018 in Madurejo Village, Prambanan District, Sleman Regency, Yogyakarta Special Region, Laboratory of Plant Production Management, Faculty of Agriculture, and Integrated Research and Testing Laboratory, Gadjah Mada University, Yogyakarta. The research was arranged using two factors of Randomized Complete Block Design (RCBD) with three blocks as replications. The first factor was the doses of K, consisting of five levels, namely 0%, 50%, 100%, 150%, and 200% of K dosage standard. The second factor was soil water content that determined with fraction of transpirable soil water (FTSW), consisting of three levels, namely FTSW 1.00 (no drought stress), FTSW 0.35 (moderate drought stress), and FTSW 0.15 (severe drought stress). Observations were made on several variables of microclimate, physical and chemical characteristics of planting media, biochemical activities, and growth of oil palm seedlings at main nursery stage. Data were analyzed using Variant Analysis (ANOVA) at the 5% levels, and continued with orthogonal polynomial tests if there were significant differences among treatments. The results showed that drought stress causes changes in biochemical activities of oil palm seedlings, namely increased of ABA, superoxide, H_2O_2, SOD, MDA, REL, proline, total phenolic, and decreased of leaf water potential, leaf greenery, chlorophyll a, carotenoid, NRA, as well as dry weight of oil palm seedlings. The application of K was able to increase the resistance of oil palm seedlings to drought stress, through decreased of ABA, MDA, and REL, as well as increased of GA3, zeatin, kinetin, and leaf water potential. The optimum K dose that was able to increase the resistance of oil palm seedlings to drought stress was 158.34% of K dosage standard or equivalent to 26.95 g of K_2O/seedling/year.

Keywords : oil palm, potassium, biochemical, drought stress