

ABSTRAK

Penelitian ini bertujuan untuk (1) Mengetahui pengaruh cekaman kekeringan terhadap karakter anatomi akar dan daun bibit kelapa sawit. (2) Mengetahui apakah pemberian K dapat meningkatkan kekuatan struktural jaringan bibit kelapa sawit tercekam kekeringan sehingga bibit lebih toleran terhadap cekaman kekeringan. Penelitian ini dilaksanakan pada bulan September 2017 – Oktober 2018 di Dusun Bendosari, Desa Madurejo, Kecamatan Prambanan, Kabupaten Sleman, Daerah Istimewa Yogyakarta, Laboratorium Manajemen Produksi Tanaman Fakultas Pertanian dan di Laboratorium Biologi, Fakultas Biologi Universitas Gadjah Mada, Yogyakarta. Penelitian ini disusun dengan menggunakan rancangan acak kelompok lengkap dengan 2 faktor, yaitu dosis pupuk kalium (0%, 50%, 100%, 150%, dan 200% dosis standar K) dan lengas tanah yang ditentukan dengan 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) dengan tiga blok sebagai ulangan. Pengamatan dilakukan terhadap variabel anatomis jaringan akar, pelepah daun, dan daun. Data yang diperoleh selanjutnya dianalisis Analisis Varian (ANOVA) pada tingkat kepercayaan 95%, dan dilanjutkan dengan Duncan's Multiple Range Test (DMRT) jika hasil analisis varian menunjukkan perbedaan yang nyata antar perlakuan. Hasil penelitian memberikan informasi bahwa cekaman kekeringan moderat dan berat pada bibit kelapa sawit menyebabkan penurunan ukuran diameter xilem dan floem akar, panjang sel epidermis akar, lebar sel korteks akar, tebal sel endodermis akar, dan tebal sel sklerenkim akar; penurunan ukuran panjang epidermis atas dan bawah daun, lebar hipodermis atas, panjang hipodermis bawah daun, tebal mesofil daun, lebar sel palisade daun, dan diameter floem daun; serta penurunan ukuran panjang dan lebar epidermis pelepah daun, tebal hipodermis pelepah daun, diameter xilem dan floem pelepah daun. Pemupukan K dengan dosis sebesar 100% standar (28,36 g KCl/bibit) mampu memperbaiki karakter anatomis organ akar dan daun bibit kelapa sawit khususnya yang mengalami cekaman kekeringan moderat, dalam bentuk kenaikan panjang sel epidermis akar, lebar sel korteks akar, tebal sel endodermis akar, diameter stele akar, tebal sel sklerenkim akar, lebar sel palisade daun, panjang epidermis atas daun, panjang bunga karang daun, dan diameter floem daun.

Kata kunci: kelapa sawit, cekaman kekeringan, kalium, karakter anatomi

ABSTRACT

The aims of study were (1) to determine the effects of drought stress on the anatomical characters of oil palm roots, petioles, and leaves. (2) to determine whether the applications of potassium (K) able to increase the structural strength of the oil palm seedlings tissue which were prone to drought stress, so that the seedlings were more tolerant. The research was conducted in September 2017 to September 2018, at Bendosari, Madurejo Village, Prambanan District, Sleman Regency, Yogyakarta Province, Laboratory of Plant Production Management, and Laboratory of Biology, Gadjah Mada University. The research was conducted with randomized complete block design (RCBD), two factors, with three blocks as replications. The first factor was K doses, namely 0%, 50%, 100%, 150%, and 200% of standard. The second factor was drought stress, that was indicated by 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 done on several variables of roots, petioles, and leaves anatomy. Data were analyzed using Variant Analysis (ANOVA) at 5% levels, and continued with Duncan's Multiple Range Test (DMRT) if the results of analysis of variance showed significant differences among treatments. The results showed that moderate and severe drought stresses were able to decrease 1) roots anatomical characters: xylem and phloem diameters, root epidermal cell length, root cortex cell width, root endodermis cell thickness, and root sclerenkim cell thickness, 2) leaves anatomical characters: length of leaf upper and lower epidermal, width of upper hypodermis, length of leaf lower hypodermis, leaf mesophyll thickness, leaf palisade cell width, and leaf phloem diameter, 3) petioles anatomical characters: length and width of the epidermal, thickness of hypodermis, xylem and phloem diameters. The application of K, with a dose of 100% standard (28.36 g KCl / seedling), was able to improve the anatomical characters of roots and leaves of oil palm seedlings under moderate drought stress, namely root epidermal cell length, root cortex cell width, endodermal cell thickness of root, diameter of root stele, thickness of root sclerenkima, width of leaf palisade, length of leaf upper epidermal, length of leaf sponges, and leaf phloem diameter.

Keywords: oil palm, drought stress, potassium, anatomical characters