

EFEK DOSIS FOSFAT PADA PROGENI KOMERSIAL DxP KELAPA SAWIT (*Elaeis guineensis* Jacq.) BERDASARKAN EKSPRESI GEN *EgPHT1* DAN RESPON MORFOLOGIS

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INTISARI

Kelapa sawit (*Elaeis guineensis* Jacq.) merupakan salah satu komoditas utama perkebunan rakyat, perusahaan, dan negara yang mendukung perkembangan ekonomi Indonesia. Terdapat tantangan dan hambatan dalam budidaya kelapa sawit, terutama dengan adanya defisiensi nutrisi fosfat. Diperlukan studi mendalam analisis dosis fosfat terhadap adaptasi molekular maupun morfologi kelapa sawit. Penelitian ini bertujuan untuk menganalisis efek dosis fosfat yaitu, P1 (kelaparan), P2 (kekurangan), dan P3 (optimal) terhadap pola ekspresi gen *EgPHT1* pada dua progeni komersial kelapa sawit ‘Dumpy’ dan ‘Yangambi’, serta hubungannya dengan karakteristik morfologis. Pola ekspresi gen yang terbentuk diukur menggunakan alat RTqPCR dan dianalisis menggunakan metode $2^{-\Delta\Delta C_t}$. Karakteristik morfologis yang diukur meliputi tinggi tanaman (cm), diameter batang (mm), panjang daun (cm), lebar daun (cm), luas daun (cm²), jumlah daun, warna daun menggunakan *RHS colour chart*, panjang akar (cm), jumlah akar primer, jumlah akar sekunder, biomassa akar (g), dan biomassa total tanaman (g). Pola ekspresi gen relatif menunjukkan bahwa semakin rendah dosis fosfat atau P1(kelaparan), semakin tinggi ekspresi gen *EgPHT1* pada kedua progeni. Peningkatan ekspresi gen sejalan dengan adaptasi morfologis, yaitu penghambatan tinggi tanaman, luas daun, diameter batang, dan panjang akar primer pada perlakuan P1(kelaparan) dan P2 (kekurangan), tetapi meningkatkan jumlah akar sekunder dan biomassa akar dibandingkan dengan P3 (optimal).

Kata kunci: Dumpy, *EgPHT1*, Ekspresi gen, Yangambi

EFFECT OF PHOSPHATE DOSAGE ON COMMERCIAL PROGENY DxP OF OIL PALM (*Elaeis guineensis* Jacq.) BASED ON THE *EgPHT1* GENE EXPRESSION AND MORPHOLOGICAL RESPONSES

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ABSTRACT

Oil palm (*Elaeis guineensis* Jacq.) is one of the main commodities of smallholder plantations, companies, and the state that supports Indonesia's economic development. There are challenges and obstacles in oil palm cultivation, especially with the existence of phosphate nutrient deficiency. An in-depth study of the analysis of phosphate dosage on the molecular and morphological adaptation of oil palm is needed. This study aims to analyze the effects of phosphate doses, namely P1 (starvation), P2 (deficiency), and P3 (optimal), on the expression pattern of the *EgPHT1* gene in two commercial oil palm progenies, 'Dumpy' and 'Yangambi', and its relationship with morphological characteristics. The resulting gene expression patterns were measured using RTqPCR and analyzed using the $2^{-\Delta\Delta C_t}$ method. The morphological characteristics measured included plant height (cm), stem diameter (mm), leaf length (cm), leaf width (cm), leaf area (cm²), number of leaves, leaf color using the RHS color chart, root length (cm), number of primary roots, number of secondary roots, root biomass (g), and total plant biomass (g). The relative gene expression pattern showed that the lower the phosphate dose or P1 (starvation), the higher the expression of the *EgPHT1* gene in both progeny. Increased gene expression was consistent with morphological adaptation, namely inhibition of plant height, leaf area, stem diameter, and primary root length in the P1 (starvation) and P2 (deficiency) treatments, but increased the number of secondary roots and root biomass compared to P3 (optimal).

Keyword: Dumpy, *EgPHT1*, Gene expression, Yangambi