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DIFFERENTIALLY EXPRESSED GENES (DEGS) *Dryobalanops aromatica* YANG DITUMBUHKAN PADA MEDIA GAMBUT DAN TANAH MINERAL

Differentially Expressed Genes (DEGs) Dryobalanops aromatica grown in peat media and mineral soil

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ABSTRACT

Dryobalanops aromatica is a highly economic value resin-producing tree. The resin has been known as an important international trade commodity that is widely used in the perfume, cosmetic, medicine, and wood industries. In its natural habitats, this species has been found to grow well on both peatland and mineral soils that has raised a question on the molecular mechanism for adaptation. However, the information regarding adaptive genes in Indonesian native trees to abiotic stress is still very limited. This research was conducted to analyse the differentially expressed genes (DGEs) that can elucidate the role of several up-regulated and down-regulated genes of D. aromatica grown in peat media and mineral soil. DGE analysis was carried out using R software, Bioconductor package 'edgeR'. Using the Benjamini and Hochberg approach to control FDR (FDR 0,05), with a Log2FC 2 and p-value of 0,05, showed 320 contigs were up-regulated and 439 contigs were down-regulated, while 58129 contigs were not significantly expressed. Furthermore, this study also presents an overview of the genes involved in different pathways, such as photosynthesis, carbon and energy metabolism, hormone-related genes, nitrogen metabolism, reactive oxygen species, and transcription factor. This information will be useful in understanding D. aromatica molecular responses to stress condition that may be of use for selecting genotypes in the breeding programs or peatlands restoration

Keywords: adaptation, Dryobalanops, transcriptome, RNA-seq

ABSTRAK

Dryobalanops aromatica merupakan pohon penghasil resin yang bernilai ekonomi tinggi. Resin tersebut telah dikenal sebagai komoditas perdagangan internasional penting yang banyak digunakan dalam industri parfum, kosmetik, farmasi, dan kayu. Di habitat alami, spesies ini ditemukan tumbuh baik di lahan gambut dan tanah mineral yang menimbulkan pertanyaan terkait mekanisme molekuler adaptasi jenis. Namun, informasi mengenai gen adaptif pada pohon asli Indonesia ini terhadap cekaman abiotik masih sangat terbatas. Penelitian ini dilakukan untuk menganalisis *differentially expressed genes* (DGEs) yang menjelaskan peran beberapa gen *D. aromatica* yang *up-regulated* dan *down-regulated* terhadap perlakuan media gambut dan tanah mineral. Analisis DGE dilakukan dengan menggunakan perangkat lunak R, Bioconductor package 'edgeR'. Pendekatan Benjamini dan Hochberg digunakan untuk mengontrol FDR (FDR 0,05), dengan Log_2FC 2, dan nilai p 0,05, memberikan hasil 320 *contigs up-regulated* dan 439 *contigs* d*own-regulated*, sedangkan 58129 *contigs* tidak diekspresikan secara signifikan. Selanjutnya, penelitian ini juga menyajikan keberadaan gen yang terlibat dalam *different pathway* seperti fotosintesis, metabolisme karbon dan energi, gen terkait hormon, metabolisme nitrogen, spesies oksigen reaktif (ROS), dan faktor transkripsi. Informasi ini akan berguna dalam memahami respon molekuler *D. aromatica* terhadap kondisi cekaman yang mungkin berguna untuk memilih genotipe dalam program pemuliaan atau restorasi lahan gambut

Kata kunci: **adaptasi, Dryobalanops, transkriptom, RNA-seq**