

INTISARI

Indonesia menempati urutan keempat dalam tingkat produksi ubi kayu terbesar di dunia. Produksi ubi kayu di Indonesia terjadi penurunan sebesar 2,09% pada tahun 2018-2022. Upaya perbanyak ubi kayu lewat metode pembungaan relatif jarang dilakukan. Hal ini membatasi kemampuan merakit varietas ubi kayu yang diinginkan secara efisien. Waktu pembungaan yang bersamaan menjadi salah satu hal penting dari pemuliaan tanaman. Gen *TFL1* masih kurang diteliti di Indonesia sebagai gen yang berperan menghambat pembungaan dan terdapat pada ubi kayu. Penelitian ini bertujuan mengidentifikasi perbedaan karakteristik gen *TFL1* pada ubi kayu varietas Rengganis, Gajah, Palembang, Ketan Pacitan, Adira dan Malang, serta menganalisis ekspresi gen *TFL1* pada varietas Adira dan Malang sebagai varietas unggul yang telah dikomersialkan. Karakterisasi gen dilakukan dengan mengisolasi gDNA dari daun ubi kayu, dilanjutkan dengan mengamplifikasi gen *TFL1* dan purifikasi amplicon kemudian dilakukan sekuensing sanger. Analisis ekspresi gen relatif dilakukan melalui sampling daun ubi kayu dengan tiga ulangan biologis pada interval waktu jam 08.00; 12.00; 16.00 serta 20.00, isolasi RNA daun ubi kayu varietas Adira dan Malang, sintesis cDNA dan qPCR menggunakan primer *TFL1* dan 18s sebagai *gene reference*. Data hasil sekuensing dianalisis dengan *software DNA baser assembler 5.21.0* untuk memperoleh *consensus* enam varietas ubi kayu. Kemudian dilanjutkan dengan *alignment* Mega 11, pembuatan pohon filogenetik *Maximum likelihood* serta BLAST sekuens melalui NCBI untuk mengetahui nilai *Query*. Ekspresi gen dianalisis dengan metode *livak*, *two-way* dan *one-way ANOVA post hoc*. Hasil penelitian analisis filogenetik memperlihatkan nodus cabang dari asal yang sama antar enam varietas ubi kayu dengan *MeTFL1*, berbeda *outgroup* dalam pohon filogenetik yang nodusnya berlawanan. Sedangkan untuk ekspresi gen relatif paling tinggi yakni, pada daun muda ubi kayu komersial varietas Adira dan Malang yang menunjukkan perbedaan nyata.

Kata kunci: Gen *TFL1*, Ubi Kayu, Gen Pembungaan, Varietas Adira, Varietas Malang.

ABSTRACT

Indonesia ranks fourth in the world's most significant cassava production. Cassava production in Indonesia decreased by 2.09% from 2018 to 2022. Efforts to propagate cassava through flowering methods are relatively rare, which limits the ability to develop desired cassava varieties efficiently. Synchronized flowering time is one of the essential aspects of plant breeding. The *TFL1* gene, which inhibits flowering and is present in cassava, has been insufficiently studied in Indonesia. This study aims to identify the differences in *TFL1* gene characteristics in cassava varieties Rengganis, Gajah, Palembang, Ketan Pacitan, Adira, and Malang, as well as to analyze *TFL1* gene expression in the commercially successful Adira and Malang varieties. Gene characterization was conducted by isolating gDNA from cassava leaves, followed by amplifying the *TFL1* gene, purifying the amplicons, and then performing Sanger sequencing. Relative gene expression analysis was conducted by sampling cassava leaves at three biological replicates at intervals of 08:00, 12:00, 16:00, and 20:00, isolating RNA from the Adira and Malang cassava varieties, synthesizing cDNA, and performing qPCR using *TFL1* and 18s primers as reference genes. Sequencing data were analyzed with DNA base assembler 5.21.0 software to obtain a consensus for the six cassava varieties. This was followed by alignment using MEGA 11, construction of a Maximum Likelihood phylogenetic tree, and BLAST sequence analysis through NCBI to determine the Query value. Gene expression was analyzed using the Livak method, two-way and one-way ANOVA post hoc. The results of the phylogenetic analysis showed branch nodes of the same origin among the six cassava varieties with *MeTFL1*, differing from the outgroup in the phylogenetic tree whose nodes were opposite. Meanwhile, the highest relative gene expression was observed in the young leaves of the commercial cassava varieties Adira and Malang, showing significant differences.

Keywords: TFL1 Gene, Cassava, Flowering Gene, Adira Variety, Malang Variety.