

ABSTRACT

Muhammad Danish Syahran Nabil Tirta, 24020221140065. **Expression Analysis of *CHS* (chalcone synthase) and *KAT-2* (3-ketoacyl-coA Thiolase) Genes Associated with 6-Gingerol Compounds as Antioxidants in Ginger (*Zingiber Officinale*) Leaves and Tubers** (under the guidance of Hermin Pancasakti Kusumaningrum and Siti Zulaeha).

The Zingiberaceae family, which includes ginger (*Zingiber officinale*), is known for its potential as a source of natural antioxidants. Ginger has high antioxidant activity, which is largely due to its antioxidant compounds in ginger, one of which is 6-gingerol. 6-gingerol can interact with ROS (Reactive Oxygen Species), which can damage plant cells and neutralizes them. Several genes are involved in the synthesis of 6-gingerol, including the *CHS* (Chalcone synthase) and the *KAT-2* (3-ketoacyl-coA Thiolase) genes. The aim of this study is to determine how to obtain RNA from ginger leaves and rhizomes, as well as to determine the expression levels of the *CHS* and *KAT-2* genes in ginger rhizomes and leaves. Methods includes RNA extraction, cDNA synthesis, Real Time quantitative Polymerase Chain Reaction (PCR), and relative quantitative analysis using the $\Delta\Delta C_t$ method. RNA extracted using the Ribospin kit produced high-quality RNA, as indicated by the presence of distinct and intact 28S and 18S rRNA bands in the electrophoresis results. These results indicate that the RNA is of sufficient quality for gene expression analysis. The highest expression of the *CHS* gene in rhizome tissue was recorded in the Ciinjuk accession (2,358 fold), followed by Pangandaran (2,292 fold) and Serpong (1,035 fold). In leaf tissue, the highest expression was shown by the Serpong accession (1,005 fold), followed by Pangandaran (0.234 fold), and the lowest expression was shown by the Ciinjuk accession (0.215 fold). Meanwhile, the highest expression of the *KAT-2* gene in ginger rhizome tissue was recorded in the Pangandaran accession (2,433 fold), followed by Ciinjuk (1,488 fold) and Serpong (1,414 fold). In leaf tissue, the Pangandaran accession again showed the highest expression level at 4.465-fold, followed by Ciinjuk (3.187 fold), and the lowest expression was observed in the Serpong accession (1.055 fold).

Keywords: *Antioxidant, CHS, KAT-2, RT-qPCR, Zingiber officinale, 6-Gingerol*