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Gene expression in the lignin biosynthesis pathway during soybean seed development

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ABSTRACT. The study of gene expression in plants is fundamental, and understanding the molecular mechanisms involved in important biological processes, such as biochemical pathways or signaling that are used or manipulated in improvement programs, are key for the production of high-quality soybean seeds. Reports related to gene expression of lignin in seeds are scarce in the literature. We studied the expression of the phenylalanine ammonia-lyase (*PAL*), cinnamate 4-hydroxylase, 4-hydroxycinnamate 3-hydroxylase, and cinnamyl alcohol dehydrogenase genes involved in lignin biosynthesis during the development of soybean (*Glycine max* L. Merrill) seeds. As the endogenous control, the eukaryotic elongation factor 1-beta gene was used in two biological replicates performed in triplicate. Relative quantitative expression of these genes during the R4, R5, R6, and R7 development stages was analyzed. Real-time polymerase chain reaction was used for the gene expression study. The analyses were carried out in an ABI PRISM 7500 thermocycler using the comparative Ct method and SYBR Green to detect amplification. The seed samples at the R4 stage were chosen as calibrators. Increased expression of the cinnamate-4-hydroxylase and *PAL* genes occurred in soybean seeds at the R5 and R6 development stages. The cinnamyl alcohol dehydrogenase gene was expressed during the

final development phases of soybean seeds. In low-lignin soybean cultivars, the higher expression of the *PAL* gene occurs at development stages R6 and R7. Activation of the genes involved in the lignin biosynthesis pathway occurs at the beginning of soybean seed development.

Key words: Gene expression; Quantitative real-time PCR; Lignin; Seeds; Soybean

