IN SILICO STUDY OF MITOCHONDRIAL UNCOUPLING PROTEIN IN LEGUMINOUS PLANTS REVEALS GENE DUPLICATION AND ALTERNATIVE SPlicing EVENTS


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The role of the mitochondrial uncoupling protein (UCP) in plants is linked to the reduction of reactive oxygen species (ROS), which are generated as a result of environmental stresses. The multigene family of UCP has been well characterized in Arabidopsis and sugarcane, revealing 6 and 5 genes, respectively. Expression analyses showed that each gene member is differentially regulated across cells and tissues/organs. UCP gene studies in leguminous plants are limited to Vigna unguiculata. Thus, the aim of this study was to characterize the UCP multigene family in 11 leguminous plants whose genomes are available in public databases. UCP genes were identified in genome databases by BLAST searches using Arabidopsis UCP sequences as a reference. The identified genes were manually annotated and the deduced cDNAs were translated into amino acid sequences. A phylogenetic analysis of UCPs was performed using the MEGA 5.2 program and the neighbor-joining method. Several UCP genes were identified in leguminous plants revealing 10 genes in Glycine max, 7 genes in Medicago truncatula, Cicer arietinum, Lupinus angustifolius, Vigna radiata, Arachis duranensis and Arachis ipaensis and 6 in Cajanus cajan, Phaseolus vulgaris, Vigna angularis and Glycine soja. Some differences in relation to Arabidopsis were found: UCP6 deletion and UCP1 duplication in all leguminous species; UCP4 duplication in G. max and L. angustifolius; and UCP5 duplication in G. max, V. angularis, V. radiata, M. truncatula, C. arietinum and A. ipaensis. EST analyses also revealed an alternative splicing in UCP1b1. Experiments are under way to determine the expression profile of the UCP genes in G. max during plant development and under stress conditions in order to find the role of each gene member in leguminous plants. This knowledge will provide information to select UCP genes that could be used in biotechnological applications to obtain leguminous plants more adapted to environmental stresses.

Keywords: gene annotation; multigene family; Fabales order

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