4bs Effects of Yeast Elicitor on Secondary Metabolism and in-Vitro-Translated Protein Pattern of Eschscholtzia Californica Cell Culture

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Benzophenanthridine alkaloids, a subclass of the benzylisoquinolines, are produced in Eschscholtzia californica (California poppy, used as a sedative by Native Americans). Benzophenanthridine alkaloid biosynthesis begins with the conversion of L-tyrosine to dopamine and comprises several biosynthetic steps to sanguinarine. For more understanding of the biosynthetic mechanism of benzophenanthridine alkaloids production, systematic analysis of metabolite, protein and mRNA is necessary. Sanguinarine, chelirubine, chelerythrine and their dihydro form alkaloids production level with elicitation was investigated by HPLC with photo diode array detector. To investigate expression profiling of sanguinarine production-related enzymes, the whole cell protein was extracted and two dimensional electrophoresis was conducted. The results point out the association of soluble protein content and metabolite concentration and suggest the presence of marker proteins for sanguinarine production in this cultivar. Many important changes in cellular metabolism and physiology of E. californica were identified by combined analysis of metabolome and proteome. This relationship demonstrated the use of metabolome and proteome analysis as a tool for detecting bottle-neck step in benzophenanthridine alkaloid production pathway.