INDUCED PRODUCTION OF PACLITAXEL AND SECONDARY METABOLISM IN *TAXUS BACCATA* L. CELL CULTURE BY ULTRASOUND AS ABIOTIC ELICITOR

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Phytoalexins are organic metabolites that are produced by plants in response to biotic elicitor (e.g. fungal infection) or abiotic elicitor such as UV light, heavy metal ions or ultrasound [1]. Paclitaxel (taxol) is one of the most important phytoalexins, which is a potent antimitotic agent with outstanding activity against various cancers. It is synthesized particularly in the barks and needles of yew trees. The very limited supply of the drug from the plant prompts deep efforts to develop further methods for taxol production. Yew cell culture is the most promising method for the sustainable production of taxol and related taxoids [2]. In this study the effect of ultrasound as an abiotic elicitor on the production efficiency of taxol and some parameters related to secondary metabolism in *Taxus baccata* L. cell cultures was investigated. Ultrasound was given into the system via an ultrasonic bath by the application of continuously ultrasonic irradiation at 40 kHz with 3 power levels (3.5, 13.75 and 61.5 mW/Cm^3). Results showed that uultrasound had effects similar to elicitors and while induced defensive responses, stimulate the production of secondary metabolites. Increase in power level of ultrasound waves, while decreased the cell growth, induced production of taxol, malondialdehyde and phenolic compounds and activity of secondary metabolism enzymes such as phenylalanine ammonia-lyase, polyphenoloxidase and peroxidase. Ultrasound at power of 13.75 mW/Cm^3 had a significant role on induced taxol production, specific yield and its release by the cells into the medium, which were 8.3 mg/l, 0.62 mg/g dried cell and 62%, respectively. It seems that increase in production of taxol under ultrasound effect is probably due to its elicitor like effects including induction of defensive responses such as increased membrane lipid peroxidation and enzymes activity.

References

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THE EFFECTS OF ENVIRONMENTAL FACTORS ON THE SPREADING OF MEDICINAL PLANTS COMPONENET IN AGROFORESTRY SYSTEMS IN FARS PROVINCE, IRAN

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Medicinal plants are very important because of their contribution to primary health care by providing an easily accessible and affordable source of medication. Considering the important values that these species have, it is necessary to conserve them and sustain their biodiversity. One conservation strategy is cultivation of these species. Sustainable utilization and production may be ensured by linking their cultivation with agroforestry systems which can effectively replace the collection from wild stands while providing other ecosystem benefits. Agroforestry offers a convenient way of producing many medicinal plants without displacing the traditional crops in agricultural systems. Generally, environmental factors influence the phenology of flowering and fruiting of plants. So it can affect the utilization of medicinal plants in agroforestry systems and their development. This study quantified the effects of rainfall and temperature on medicinal plants component of multipurpose agroforestry systems in Fars province, Iran. Two cities of Sepidan with cold climate and Kazerun with warm climate were selected because of diverse agroforestry systems in them due to other cities in the province. The agroforestry systems and their components including medicinal plants were investigated in the study areas. Also the maps of precipitation and temperature were obtained by analyzing the related data. The observations showed that 12 and 7 agroforests were in Sepidan and Kazerun respectively. Considering the identified components of the agroforestry systems in the study areas, 5 agroforests in Sepidan and 6 ones in Kazerun had medicinal plants in tree and crop components. Although the spreading of pharmaceutical herbs such as Christ's thorn (*Ziziphus spina-christi*), Daphne (*Daphne spp.*), Artichoke (*Cynara cardunculus*) and Milkweed (*Asclepias procera*) was broader in Kazerun, the diversity of the medicinal species like Liquorice (*Glycyrrhiza glabra*), Saffron (*Crocus sativus*), Asafoetida (*Ferula assafoetida*) and Galbanum (*Ferula gummosa*) was higher in 3 locations in Sepidan. The mentioned environmental factors affected significantly on the range of medicinal plants and their species selection by the stakeholders. It was concluded that medicinal plants were an invariable component of agroforestry systems in the study areas. The relationship between environmental factors and the agroforests explained the presence of some medicinal species and their development in the studied components. It is imperative; therefore, that cultivation of such species outside their natural habitats in agroforestry systems ensures their regular supply for human needs as well as to preserve their diversity.