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Utilizing the indigenous biosynthetic capacity of medicinal and aromatic plants through optimization of tissue culture conditions

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Secondary metabolite production is one of the adaptation mechanisms of plant individuals to cope with the fluctuations of their indigenous environment. Therefore secondary metabolites productivity of medicinal and aromatic plants in nature is determined not only by the genetic predisposition of the species but also by of by the combined effects of climatic and geographic factors, as well as plant phenology.

By providing the tools for standardized environment maintenance, plant biotechnology is a flexible approach for targeting valuable phytopharmaceuticals through modification of growth conditions.

Inula and *Artemisia* species, known for the variability of volatile and extractable secondary metabolites production in their natural conditions were studied. The experimental model included modification of culture conditions such as application of plant growth regulators and utilizing either agar solidified or liquid media.

As a result, *in vitro* lines of the species were selected, based on the morphotypes obtained – such as root suppressed, normally root developing shoots, genetically non-modified root lines, as well as cell culture aggregates. The obtained lines were characterized by the selective stimulation of secondary metabolites characteristic for the species – such as terpenoids, sesquiterpene lactones and polyphenolics.

The understanding of key factors related to the production of target secondary metabolites makes it possible to optimize culture conditions in biotechnologically cultivated plants and utilize the indigenous biosynthetic capacity of the wild genotype without performing genetic modifications.

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