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Adventious root culture in *Rauvolfia serpentina*: An alternative source for bioactive constituent production

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Plants play an important role in the daily life of every person throughout the world as they provide basic need from food, clothing, and shelter to healthcare. They are proved to be an excellent source of biologically active compound and thus widely used in pharmaceutical industries. About 85% of traditional medicine composition and approximately 40% of modern pharmaceutical drugs are derived or at least partially derived from natural resources. Now-a-days expanding awareness on health hazards and toxicity associated with indiscriminate use of synthetic drugs has enhanced the interest in the use of herbal drugs. Most of the medicinal plants are not cultivated rather they are collected from wild plants which imposes a great threat to the natural resources. For the present study, the selected medicinal plants, *Rauvolfia serpentina* (Apocynaceae), composed of number of biologically active compounds mainly obtained from the roots. The present investigation have been carried out for the production of adventitious root by the manipulation of various hormone (Auxins) concentrations under *in vitro* condition which provides an alternative approach for the improvement and enhancement of biologically active compounds. This can help in providing a base for the conservation of *R. serpentina* by reducing pressure on its natural population. In addition, root biomass production, accumulation and quantification of secondary metabolite studies in selected medicinal plant have been studied in the light of different plant growth regulators.

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The plant immune system is activated by root colonization of beneficial micro-organisms

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Mycorrhizal fungi, endophytic fungi and rhizobacteria play a key role in preserving soil fertility in forest agro-ecosystems. Enriching soil of potted plants with these beneficial micro-organisms lead to activation of plant innate immunity with decreased sensitivity to soil borne phytoparasitic nematodes and miner insects. Immune response in plants is regulated by phytohormones that are low molecular weight molecules which interact in a complex network to regulate many aspects of plant growth, photosynthesis, flowering, reproduction, seed production and response to environmental abiotic challenges. Energy resources supporting innate immunity in plants are the same as those involved in plant growth processes; thus, expressing constitutive defense systems occurs only at the cost of plant growth and encounters the risk of allocating resources to defense in the absence of natural pathogens and pests. An effective alternative is to fine-tune immune responses by modulating the "immunological memory" of plants, as it occurs in animals. An aspect of this modulation may be represented by the so-called "priming" by which previously attacked plants respond more quickly or more strongly to a subsequent attack. Beneficial micro-organisms stimulate both salicylic acid (SA)-mediated (Systemic Acquired Resistance, SAR) and jasmonic acid (JA) and ethylene (ET)-mediated (Induced Systemic Resistance, ISR) induced resistance. Expressions of marker genes of SAR and ISR are monitored by qRT-PCR after treatment of plants with beneficial micro-organisms and after parasite inoculation. Activation of plant immunity by beneficial micro-organisms may be repressed by pathogens and parasites that have developed sophisticated molecular mechanisms to deregulate the biosynthesis of hormones and/or to interfere with hormonal signaling pathways.

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