

Production of pharmacologically active compounds via plant tissue culture

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Plants have been historically used as a renewable source for bioactive compounds in traditional therapeutic regimens such as ayurveda in India and traditional Chinese medicine. With the increase in population, globalization and economic development, there is also persistent demand for natural products including secondary metabolites which are economically important as drugs, flavor and fragrances, dye and pigments, pesticides, and food additives. Supply of these compounds from natural bio resources proves to be a challenge because of depleting natural plant populations, low yields, slow rate and seasonal variability in accumulation of desirable compounds. Natural compounds are difficult to produce through chemical synthesis due to their complex structures and high cost of production. Plant biotechnology has shown potential as an alternative way for production of bioactive compounds in *in vitro* systems independent of climate, soil and plant growth conditions. We have developed callus, shoot and hairy root culture systems for seven plant species. Bioactive compounds belonging to sesquiterpenes, phenylethyl chromone derivatives, flavanoids and fatty acids groups are identified using GC-MS analysis. Addition of abiotic and biotic elicitors to the culture medium enhanced production of these secondary metabolites. Some compounds from these plants of interest are *Aquilaria crassna* (Guai 1(10),11-diene, beta-eudesmol, humulene), *Melia dubia* (aromadendrene, germacrene, copaene), *Syzygium aromaticum* (eugenol which can further be converted to vanillin), *Morus indica* (megastigmane), *Artemisia pallen* (devanone), *Pelargonium citrosum* (geraniol, linalol, citronella) and *Phlegmariurus phlegmaria* (Huperzine A). Efforts are underway towards commercial scale production of these compounds, elucidation of biosynthetic pathways and characterization of genes involved in secondary metabolite production.

Biography

Somika Bhatnagar has completed her PhD in 2003 from University of Delhi, South Campus, India and Post-doctoral research at Temasek Life Sciences Laboratories, Singapore. She is currently Head of Plant Transformation and Tissue Culture at Temasek Life Sciences Laboratories, Singapore. Her research work has been patented and published in many peer reviewed journals. It has also led to a spin-off company (Bioforest Private Limited, Singapore). Her research interest includes "Translational plant research areas like biotech crop development, forestry biotechnology, herbal medicine with special focus on conservation and large scale sustainable production of useful compounds both *in vitro* and *in vivo*".

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