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Establishment of Callus Tissue and Effect of Growth Regulators on Enhanced Sterol Production in *Cissus quadrangularis* L.

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A new protocol has been established for the enhanced production of phytosterols involved in bone healing from *in vitro* raised callus tissue, according to a new study by researchers at Department of Botany, University of Rajasthan, Jaipur, India.

The study shows that the phytoserols production can be enhanced by the help of plant growth regulators and this protocol, after scale-up may be utilized for large scale industrial production of these compounds. Potu *et al*. (2009) have given several key findings about the enhancement of bone marrow mesenchyma stem cell proliferation and osteoblastogenesis in the selected species *Cissus quadrangularis*.

Gluco-corticosteroids are believed to interfere with the action of osteoblasts, the cells that are responsible for the deposition of new bone material. Progesterone antagonists used to treat osteoporosis have side effects such as endometrial hyperplasia, which are serious enough to prelude the routine use for the treatment of osteoporosis. According to Hoffman (2008), the plant *Cissus* seems to be devoid of such side effects and may prove to be a viable compound in osteoporosis treatment.

Cissus quadrangularis is an important medicinal plant having various phytochemicals such as steroids, calcium oxalate and ascorbic acid; all of these are natural plant products and important components of bone disease treatment.

"Phytosterols are important phytochemicals involved in various bone diseases. These phytochemicals are natural products having no side effect and these anabolic steroidal principles from the plant show a marked influence on the rate of fracture healing by influencing early regeneration and quicker mineralization of bone callus". Says study leader Dr. Vidya Patni, Assistant professor, Department of Botany, University of Rajasthan.

The first author Nidhi Sharma along with the group leader Dr. Vidya Patni has isolated phytosterols from static tissue culture of *Cissus quadrangularis* reported in PCBMB (Sharma and Patni, 2007).

Our collective results indicate that phytosterols are outstanding components for further enhancement and very much beneficial for the drug formulation of various bone diseases.

The research by Dr. Vidya Patni and group of colleagues used plant growth regulators for enhancement of sterols components. It had several key findings related to enhancement of phytosterols:

- *In vitro* callus induction was successfully achieved on MS medium supplemented with NAA (2.5 mg L^{-1}) and BAP (0.5 mg L^{-1})
- Two phytosterols (β-sitosterol, Stigmasterol) were identified in six weeks old callus culture showing maximum GI
- These phytosterols were confirmed by various chromatographic techniques such as Co-TLC, IR and HPLC
- The addition of auxins regulates the synthesis of sterols and IAA and 2, 4-D enhanced the production of sterols up to 12 fold and 8 fold, respectively

Researchers involved in this study were Dr. Nidhi Sharma, Raghunandan Singh Nathawat, Kavi Gour and Dr. Vidya Patni from Department of Botany, University of Rajasthan, Jaipur (Rajasthan), India.

REFERENCES

Hoffman, K., 2008. An herbal extract with antiglucocorticoid action of *Cissus quadrangularis*. http://community.myprotein.com/supplements-formulas/19207-cissus-overview-article.html

Potu, B.K., K.M.R. Bhat, M.S. Rao, G.K. Nampurath, M.R. Chamallamudi, S.R. Nayak and M.S. Muttigi, 2009. Petroleum ether extract of *Cissus quadrangularis* (Linn.) enhances bone marrow mesenchymal stem cell proliferation and facilitates osteoblastogenesis. Clinics, 64: 993-998.

Sharma, N. and V. Patni, 2007. Isolation of phytosterols from static tissue culture of *Cissus quadrangularis* L. (Vitaceae): A potent bone healer. Plant Cell Biotechnol. Mol. Biol., 8: 93-96.