A Rapid, Continuous and Renewable Method for Production of The Anticancer Drug Camptothecin

(Bio-Science Group)

A promising viable technology for production of the anticancer drug camptothecin was developed using plant tissue cultures of the indigenous medicinal plant Ophiorrhiza. This plant is prone to seasonal and geographical variations. Camptothecin is a high value drug used in cancer therapy and effective against colon cancer. Production of camptothecin from the nature involves destruction of the various plant parts. Due to the considerable importance of camptothecin, more and more trees are uprooted which in turn results in the extinction of the species from the natural flora. A biotechnological method, using plant tissue cultures of Ophiorrhiza (Fig.1) for camptothecin production developed in NA&BTD, produced significant levels of camptothecin (multifold 20-25 fold) (Fig.2) during a short period of 35 days and without the destruction of the plants while plants growing in nature contained only low levels- 0.002% dry weight of the alkaloid (Roja et al., 2014). In short, the method, consists of growing the plant tissues in the laboratory, in a nutrient medium supplemented with plant growth regulators under sterile and controlled conditions of temperature and incubating them under fluorescent light. The cultures remain unaffected by external seasonal conditions and may thus be used continuously for the production of camptothecin. Tissue cultures are maintained in the laboratory by regular subculture and therefore form a renewable source for the production of camptothecin. Additionally, the method also facilitates micropropagation of Ophiorrhiza plants through shoot cultures (Fig.3) (Roja 2008), which may be advantageous to preserve and conserve these endangered plants. Higher yields of camptothecin obtained in these multiple shoot cultures is a significant observation and is noteworthy since it is a prerequisite and beneficial for commercialization of any technology. Thus it provides a rapid, continuous and a renewable method for the production of camptothecin. This technology developed by Nuclear Agriculture and Biotechnology Division, Bio-Science Group of BARC was transferred to Patanjali Bio-Research Institute (PBRI), Haridwar in February 2014.

Publications: