ABSTRACT

*Podophyllum hexandrum* is an important medicinal plant in Himalayan region. It is important source of podophyllotoxin for the pharmaceutical industries. It has been so extensively harvested from its natural habitat, and listed as endangered in the Red data book of Indian plants, Vol. 3. The present studies were carried out; 1) to standardize the germination of *Podophyllum hexandrum* form seeds, and 2) optimize the *in vitro* and cell suspension techniques and the effect of elicitors and precursors for the production of podophyllotoxin. For the *in vitro* cultivation of *Podophyllum hexandrum*, the seed dormancy was overcome by hot water treatment at 80°C for 60 seconds, which showed 16-18 % seed germination. On the other hand, Whatman filter paper technique, followed by direct sowing of seeds in the soil showed 10-12 % seed germination. For the *in vitro* callus induction, MS medium supplemented with NAA (3 mg/l) and BAP (1 mg/l) showed best callus induction. *In vitro* cell proliferation in the liquid suspension culture showed maximum growth in MS medium supplemented with NAA (2 mg/l), BAP (1 mg/l), and 2,4-D (2 mg/l). As determined by HPLC, podophyllotoxin content in roots, leaves and callus was found 2.1, 2.0, and 1.83 % respectively. The addition of precursors such as ferrulic acid and eugenol to the cell suspension culture showed 5.84 % and 4.19 % podophyllotoxin content respectively. On the other hand, addition of methyl jasmonate and isosafrole resulted in 8.61 % and 5.24 % podophyllotoxin production respectively as compared to 2.43 % in control.

Hence, the present studies have been carried out with the following objectives:

1. Standardization of *in vitro* culture of *Podophyllum hexandrum*.
2. *In vitro* optimization of cell proliferation by cell suspension method.
3. Production of podophyllotoxin by callus and cell suspension method.
4. Use of enhancers and elicitors for podophyllotoxin production