Micropropagation of *Hedychium spicatum* Smith using *In Vitro* Shoot Tip

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Abstract

Hedychium spicatum Smith is a medicinally important species of the genus *Hedychium* commonly known as Vanhaldi, Palashi and Kapurkachari. This species occurs in subtropical and temperate Himalayan region between 1500 m and 2700 m altitudes. In the present study MS media supplemented with different growth regulators such as Kinetin and IAA were used for shoot elongation and root formation from *in vitro* shoot tip. Shoot elongation and rooting percentage (80%) was reported highest on medium with 5.0mM/l Kn and 1.0mM/l IAA. After rooting the complete plantlets were transferred to sterilized soil pots for acclimatization. About 40-50% plantlets survived well. [Stem Cell, 2010;1(1):11-13] (ISSN 1545-4570).

Key words: Shoot regeneration, rooting and acclimatization

Introduction

Various herbs of medicinal value growing naturally in the higher reaches of Himalayas are under indiscriminate exploitation pressure by traders. In the recent past, the uncontrolled and excessive extraction of Himalayan herbs has gone up to the extent that serious threats are now being feared for the long term availability of many of these species. It is therefore, prime time to recognize the problem and to develop strategies for the conservation and rational exploitation of these herbs (Rawat, 1989). As many of the medicinal species growing at high altitudes have slow growth and poor seedling establishment due to harsh environmental conditions, conventional methods of propagation are not sufficient, and especially for endangered species, attempts for conservation using both *in situ* and *ex situ* methods are immediately needed. In spite of this fact, the conservation measures for Himalayan plant species did not start until recently. It is, however, quite encouraging that in the past few years, there has been a growing interest in the conservation and multiplication of threatened species from the Himalayan region using tissue culture methods (Hemant lata, 1997).

Hedychium spicatum Smith is one of the medicinally important species of the genus *Hedychium* commonly known as Vanhaldi, Palashi and Kapurkachari. This species occurs in subtropical and sub-temperate Himalayan region in oak (Quercus spp.) and deodar (Cedrus deodara) forests on slopes between 1500 m and 2700 m altitudes (Nautiyal *et al.*, 2004; NMPB, 2008). Leaves of the plant are glabrous underneath, broadly lanceolate ending in a tail-like tip. Flowers fragment white with an orange-red base in a dense terminal spike borne on a robust leafy stem. Seeds are black with a red aril (Naithani, 1984; 1985). This species is widely used as Kapurkachari in Ayurvedic preparations. Aromatic rootstock contains essential oil, saccharin, albumin, starch and mucilage. The rhizomes are stomachic carminative, stimulant and tonic, and are used for the treatment of dyspepsia, asthma and bronchitis (Singh, 1983). Rhizome powder is sprinkled as an antiseptic agent and also used as a poultice for various aches and pains (Thakur *et al.*, 1989). Locally rhizomes are boiled and eaten with salt, and roasted powder is given for asthma and decoction of rhizome with Deodar sawdust is taken for tuberculosis (Gaur, 1999).

Material and Methods

The seeds were collected from Valley of Flower, Nanda Devi Biosphere Reserve, district Chamoli of Uttarakhand. The seeds were washed thoroughly in running tap water and surface sterilized with Tween-20 for 10 minutes. Sterilized seeds were rinsed with sterile double distilled water for 3-4 times. These seeds were treated with 0.5% (4% concentrated sodium hypochloride, qualigence) for 5 minutes and finally rinsed with sterilized double distilled water for 3-4 times to remove the traces of sterilants. Sterilized seeds were cultured on agar and

sucrose based medium for germination. After germination, the root portion of the seedlings was removed and shoot tip was used as explants. Shoot tip regenerated from seeds were shifted to MS media (1962) supplemented with different combinations of Kinetin and IAA concentrations (1.0 mM/l Kn + 0.2 mM/l IAA; 3.0 mM/l Kn + 5.0 mM/l IAA and 5.0 mM/l Kn + 1.0 mM/l IAA) for shoot elongation and root formation. After rooting the complete plantlets were transferred to sterilized soil field pots for acclimatization.

Result and Discussion

The results for shoot elongation and rooting indicates (Table-1; Plate-1-a and b) that MS media with higher concentration of Kn and IAA (5.0 mM/l Kn+ 1.0 mM/l IAA) showed higher growth of shoots and rooting percentage (80%). Similar type of shoot growth and rooting from rhizomes of *Hedychium spicatum* showed 80% establishment in MS medium supplemented with Kinetin (5.0 mM) and IAA (1.0 mM) (Bhatt *et al.*, 2008). The lower concentrations of Kn and IAA (1.0 mM/l Kn+0.2 mM/l IAA and 3.0 mM/l Kn+0.5 mM/l IAA) showed slow growth of shoots and low rooting percentage (10% and 40% respectively). Published information on the micropropagation using *in vitro* shoot tip explants of *Hedychium spicatum* is not found earlier. Hardening of the well rooted plantlets was done in the potting mixtures of soil sand and vermi compost (Plate-1-c) and kept under poly house condition for survival and growth. The plantlets were survived well as about 40-50%.

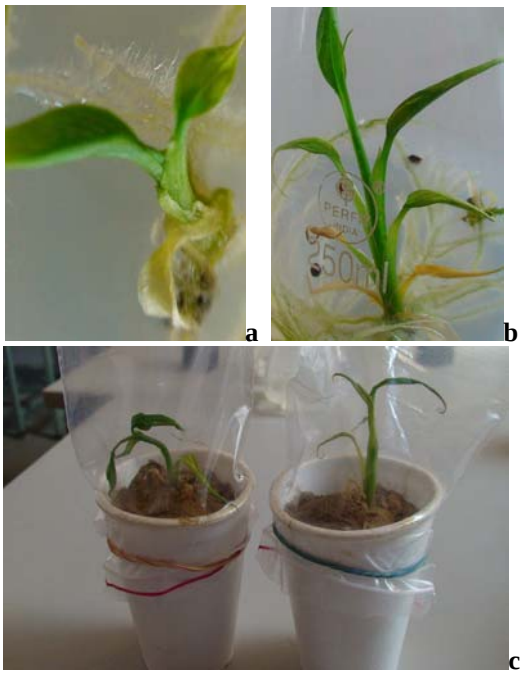

Plate-1 Micro-propagation of *Hedychium spicatum*: (a) and **(b):** Shoot regeneration, elongation and rooting on shoots and **(c)** Hardening of plantlets

The procedure will not only help in developing cultivation packages of the species but will also help in formulating appropriate strategies for conservation and utilization of rare and endemic medicinal plants of Himalayas.

Table-1 Effect of Kn and IAA on shoot elongation and rooting of shoots

Hormones concentrations with MS media (mM/l)		Average shoot length (cm.)	Rooting percentage	Average root length (cm.)
Kn	IAA			
1.0	0.2	3.5±0.5	10	5.5±0.2
3.0	0.5	4.5.6±0.2	40	6.2±0.5
5.0	1.0	6.8±0.2	80	8.5±0.5

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11/20/2009