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

Anoop Badoni¹, Chetna Bisht² and J. S. Chauhan¹

¹Researcher, Young Scientist (UCOST), Department of Seed Science and Technology, Faculty of Agriculture, H. N. B. Garhwal University, (Chauras Campus), Srinagar- 246 174, Uttarakhand, India
For Correspondence: e-mail- annabadoni@yahoo.co.in

²Research Scholar, High Altitude Plant Physiology Research Center, Faculty of Agriculture, H. N. B. Garhwal University, Srinagar- 246 174, Uttarakhand, India

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 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).

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).
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%.

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

<table>
<thead>
<tr>
<th>Hormones concentrations with MS media (mM/l)</th>
<th>Average shoot length (cm.)</th>
<th>Rooting percentage</th>
<th>Average root length (cm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kn 0.2</td>
<td>3.5±0.5</td>
<td>10</td>
<td>5.5±0.2</td>
</tr>
<tr>
<td>3.0 0.5</td>
<td>4.5.6±0.2</td>
<td>40</td>
<td>6.2±0.5</td>
</tr>
<tr>
<td>5.0 1.0</td>
<td>6.8±0.2</td>
<td>80</td>
<td>8.5±0.5</td>
</tr>
</tbody>
</table>

References


Gaur, R. D., Flora of the district Garhwal North West Himalayas (with ethnobotanical notes), Transmedia Publication, Srinagar, India;1999

Hemant Lata, Biochemical characterization and micropropagation of different population of an endangered medicinal herb Podophyllum hexandru Royle, D. Phil. Thesis, H. N. B. Garhwal University, Srinagar, Uttarakhand, India, pp. 57-64; 1997

http://www.sciencepub.net/stem
Murashige, T. and Skoog F. A revised medium for rapid growth and bio-assays with tobacco tissue cultures. Physiol. Plant 15: 473-497; 1962
Naithani, B. D. Flora of Chamoli, Botanical Survey of India, Howrah; 1984: I
Naithani, B. D., Flora of Chamoli vol.-II, Botanical Survey of India, Howrah; 1985: II
Nautiyal, M. C. and Nautiyal, B. P., Agrotechniques for high altitude medicinal and aromatic plants, Bishan Singh Mahendra Pal Singh Publishing House, Dehradun, India, pp. 82-87; 2004
NMPB (National Medicinal Plant Board), Agrotechniques of selected medicinal plants, Published by The Energy and Resources Institute Darbari Seth Block, Habitat Place Lodhi Road, New Delhi, www.teriin.org, pp. 93-98; 2008
Singh, R. S., Vanausadhi Nidarshika (Ayurvedic Pharmacopeia), Uttarpradesh Hindi Sansthan, Lucknow, India; 1983
Thakur, R. S., Puri, H. S. and Husain, A., Major medicinal plants of India, CIMAP, Lucknow, India, pp. 28-30; 1989

Correspondence to
Anoop Badoni
Researcher and Young Scientist (UCOST)
Department of Seed Science and Technology
H. N. B. Garhwal University, (Chauras Campus), Srinagar- 246 174, Uttarakhand, India
E-mail- annabadoni@yahoo.co.in

11/20/2009