

# Effect of Chilling Treatment and Different Growth Media on Seed Germination and Seedling Growth Performance of *Picrorhiza kurrooa*: An Endangered Medicinal Herb

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**ABSTRACT:** An experimental trial was conducted to access the impact of cold stratification and different growth media on seed germination and seedling growth performance of *Picrorhiza kurrooa* under ex-situ conditions at lower altitude. The experiment was carried out in CRD (Completely Randomized Design) with 20 treatments, three replications and 60 seeds per treatment. Influence of growth media on seed germination was measured by thirteen parameters. Parameters such as minimum and maximum days required for initial ( $8.00 \pm 1.00$ ) and final ( $28.67 \pm 2.08$ ) germination was observed in T10 (Soil+Sand+Azot obacter+Cocopeat) and T18 (Soil+FYM+Cocopeat+Rockphosphate+Vermicomposte). The maximum germination percentage ( $83.33 \pm 8.82\%$ ), plant height ( $2.50 \pm 0.10$ ) and number of shoots ( $3.67 \pm 0.58$ ) were recorded in T5 (Soil+Sand+FYM+Moss). The maximum number of leaves ( $9.00 \pm 3.46$ ), leaf length ( $1.53 \pm 0.35$ ), leaf width ( $0.93 \pm 0.15$ ), shoot length ( $2.70 \pm 0.26$ ), number of roots ( $4.33 \pm 2.31$ ) and root length ( $2.63 \pm 0.15$ ) was found significantly superior in T18 (Soil+FYM+Cocopeat+Rockphosphate+Vermicomposte).

**KEYWORDS:** Chilling Stratification, Growth Media, *Picrorhiza kurrooa*, Seeds, Endangered.

## INTRODUCTION

Alpine vegetation is predominantly vulnerable to present threats to plant diversity such as unrestrained tourism (Ferrarini et al., 2008) and climatic changes (Thuiller, 2007; Parolo and Rossi, 2008). Due to harsh climatic conditions prevailing in high altitude regions, flowering and fruiting are highly hampered in many species and in some species little viable or no seeds are produced (Bliss, 1985). Ex-situ conservation through seed banks will play an imperative role in the preservation of alpine species and will provide propagating plant material for in situ conservation and habitat restoration (UNEP, 1992). Seed banking projects are recognized as a valid option for the survival of alpine plants (Rossi et al., 2007) and the endangered and endemic alpine plants have already been initiated (Bonomi et al., 2005). However, until now little is known about seed life span in the dry storage of alpine plants.

*Picrorhiza kurrooa* Royle ex Benth (Family: Plantaginaceae), commonly known as Kutki or Kadvi is one of the most vital medicinal herb, endemic to alpine meadows of North-Western Indian Himalayan region distributed from Kashmir to Sikkim between 3000-5000 m. asl. (Chettri et al., 2005 and Pandit et al., 2012). It contains a number of active principle constituents; occur in stolons, roots and leaves. Kutkin is the active principle

compound; composed of several important iridoid glycosides like picroside-I, picroside-II and kutkosides, have great importance in pharmaceutical industries (Jia et al., 1999). The major bioactive compound viz., Picroside-I and Picroside-II are used in herbal formulations such as Aroyga, Katuki, Kutaki, Livocare, Livomap, Livomyn, Livoplus, Pravekliv and Vimliv for the treatment of liver disorders, asthma, jaundice (Chaturvedi & Singh 1966; Yegnarayan et al., 1982), allergy, inflammation and hepatitis-B, etc. (Shah and Varshney, 2013). It is also possesses a wide range of biological activities and used for a number of clinical studies such as, anti-inflammatory (Zhang, et al., 2012), anticancer (Mallick, et al., 2015), antiasthmatic (Malviya, et al., 2011), Immunomodulatory (Sane, et al., 2011), anti diabetic (Sanjay, et al., 2015), antimalarial (Banyal, et al., 2014), antitumor, antiviral, antioxidant (Tiwari, et al., 2012), purgative, anti-phosphodiesterase, neuritogenic, molluscicidal and leishmanicidal, etc.

Due to vital medicinal properties, the demand of raw material was increasing at an alarming rate. Global supply of *Picrorhiza kurrooa* (except China and Pakistan) is 375 tonnes with India contributing about 70 tonnes (Shitiz et al., 2013). In India, the medicinal plants trade is estimated to be around 1 US \$ year (Joshi et al., 2004). The requirement of medicinal plants based raw material is rising at the rate 15-25% annually. According to WHO, the demand of medicinal plants raw material is likely to enhance more than US 5 \$ trillion in 2050 (WHO, 2000). Annual transactions of more than 10,000 kg of *Picrorhiza*

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