

Cultivation Protocol For

Valeriana jatamansi



Family: Valerianaceae

Local/common names: Indian Valerian, Muskroot (English), Tangra (Sanskrit), Sugandhabela, Mushkbala (Hindi)

Status: Critically endangered (IUCN)

Distribution and habitat: *Valeriana* grows naturally in the temperate range of the Western and Central Himalayas at an altitude of 1800 to 3000 m and in the Khasi mountains of the eastern range between 1200 to 2000 m.

Environment for growth: The plant is found growing on a variety of soils ranging from heavy clay to chalk and lime stone soils. However, the herb prefers loamy soil with a pH ranging from 6.0 to 7.0 and that is rich in organic matter with plenty of moisture but free drainage. *Valeriana* is a temperate plant and prefers very cold winters and mild summers for its good growth. The plant flourishes in damp and shaded places with temperatures of 15-25°C. It can be cultivated under apple orchards as a viable intercrop.

Parts used: The dried rhizomes and roots are used and contain the herbal drug 'valerian', which has been used for the past 3,000 years.

Market Rate: The market value of dried roots and rhizomes of mushkbala depends on quality and degree of processing and ranges from Rs. 180-200/kg. The current price of valerian oil is about Rs. 12,000-13,500/kg.

Agro-technology

- **Means of propagation:** The plants can be propagated by vegetative means or through seeds. It can be propagated by pieces of old rootstocks or rhizomes in autumn or spring. The plant may also be propagated from mature seeds collected from the wild.
- **Collection of seeds:** Fresh robust seeds are collected from a 3-4 year old healthy mother plants. Seed collection is generally done in the month of September. The seeds are very small and light in weight. It should be noted that the seeds lose their viability rapidly and care should be taken to obtain fresh viable seeds. Sufficient care should be taken to store the seeds in a moisture free and clean environment to maintain optimum viability.
- **Seed treatment and germination:** Germination takes place within a week of sowing in open fields. As the seeds are sown close to the surface, they require adequate moisture conditions to aid germination.
- **Land preparation and soil work:** After the rock boulders are removed from the field, the land is ploughed to get a good tilth. Deep-rooted weeds should be uprooted thoroughly and clods must be broken during subsequent ploughing. The land attains a fine tilth after 2-3 rounds of ploughing. FYM is mixed with the soil at 5000 kg/ha or an equivalent of 400 kg/bigha. Beds of convenient size are laid with proper leveling of the soil to raise a nursery. Generally, plain beds with a slight tilt (10-15°C) are found suitable to raise a nursery. However, in the eastern Himalayan ranges, beds with a good drainage system provide better yield as this area has high rainfall. The plants must be planted into rows 40-50 cm apart at 20-30 cm spacing.

- **Nursery preparation:** The seeds are sown at a depth of 0.5 cm in the nursery beds. For one bigha of land, 550 g of seeds is required for sowing. Line sowing is mostly practiced at a distance of 20-30 cm between the two rows. The beginning of the rainy season is the optimum time for sowing. The field is given slight irrigation after seed sowing.
- **Transplanting:** The seedlings should be transplanted to the main field after 6-8 weeks from sowing, at the two-leaf stage, when they are acclimatized. The beds from which the plants are to be transplanted are slightly irrigated. Transplantation is done from moist beds with a hand hoe or garden fork. Care should be adopted to avoid injuries to the plant parts while removing them from the nursery bed. The plants should not be pulled out with force or subjected to any intense radiation or heat prior to planting. Transplantation of the seedlings is done in small pits or trenches dug in the field. The plant is then carefully placed along with the soil from the nursery bed. A light irrigation is done after transplanting.
- **Vegetative propagation** Vegetative propagation through root cuttings obtained from 2.5-3 year old plants has been found to be more successful than cultivation from seeds. These plants are found to attain maturity with lesser vegetative growth phase than seed-sown crops. Root division should be done early enough in the season to allow the plants to get well established before winter. Treatment of the root splits with Rootex or Keradix (commercial forms of Indole Butyric Acid – IBA) results in faster germination of root cuttings.
- **Water management:** This crop is sufficiently hardy and requires moderate amount of water for its growth. The field is irrigated for the first time just after seed sowing or after the plantation of saplings or cuttings. Freshly transplanted plants need alternate day irrigation till they are established, then once in a week or every ten days depending upon the moisture in the soil. However, no irrigation is required during the monsoons. Also, waterlogging conditions should be avoided for the better growth of roots.
- **Weed & pest control:** Good weed control is essential to achieve good yields of Valerian. The land is kept weed free by hand weeding the plots at regular intervals. Interspaces are harrowed to keep the soil loose. A low ridge of soil is usually raised along the crop row to promote the formation of large rootstocks. To promote higher yield, cutting of floral leaves is carried out in summer. Side dressing with compost/FYM in the second year gives extra nitrogen to the crop and facilitates root growth. Valerian can be rotated or intercropped with nitrogen fixers. Leaf mulching can be adopted in case of seed sown crops for protecting the young plants from intense solar radiation. Increasing the organic matter content of the soil helps in the improvement of the soil texture. Valerian is a hardy crop and appears to be relatively free from pests and diseases. However, in a few cases, *Rhizoctonia* root rot has been observed in plants propagated through root cuttings. A preventive spray of neem or *Artemesia* based preparations can be given at the beginning of the cropping season to prevent insect attacks from adjoining cropped fields. The plant based extracts (leaf/root) of valerian can also be used in the preparation of the spraying mixture. This helps repelling leaf feeders including caterpillars/hoppers and sap sucking pests like flies or aphids.

- **Maturity and harvesting:** Flowering starts from April to May and seeds are ready in the month of June of the second year. Although the plants can be harvested after one year of planting, it is recommended to harvest them after two years, since they have a higher yield of underground parts and essential oil content. The rhizomes and roots are dug up after two years of plantation in the month of October or November after the yellowing of leaves. On an average, the yield of dried roots is 800-1000 kg/ha in the second year. However, dried root yields of 1500 kg/ha are available under good conditions.
- **Post harvest techniques:** Post harvest handling involves preservation of the roots. After digging, the rhizomes and roots are cleaned to remove adhering soil by thoroughly washing them in water. The shoot material that must be removed during washing. Then it is chopped uniformly and dried under shade by spreading on trays and mats. It can also be dried mechanically with the help of a seed drier. The best method to prevent enzymatic and thermal breakdown of the constituents is to dry the crop as rapidly as possible without overheating. To retain valepotriates as well as essential oil, the overall best method is drying at 40°C with an airflow rate of 0.25 m³/min. The odour becomes more pronounced with drying. The dried rhizomes are normally stored in well-closed aluminum containers at low temperature to retain their quality. The dried rhizomes and roots contain a volatile oil of typical valerian odour. The oil can be obtained by steam distillation of dried rhizomes and roots, which gives a yield of nearly 0.5-0.7% of volatile oil.