

Cultivation Protocol For

Dactylorhiza hatagirea



Family: Orchidaceae

Local/common names:
Salamoanja, Hatthajari, Panja,
Hathpanja, Salep

Status: Critically endangered (CAMP), Critically rare (IUCN), Appendix II (CITES)

Distribution and habitat: The species is generally found at an elevation of 2500-3500 m, near the timberline and in moist places in alpine and sub-alpine regions from Pakistan to southeast Tibet. It grows wild in moist temperate places by the sides of streams and springs. In the Garhwal Himalayas the species is found in Kedarnath, Panwali Kantha, Tungnath, Dayara, Har-ki-Dun and the Valley of flowers. Its concentration in one site is less than 250 mature individuals with less than 4 plants/m².

Environment for growth: It requires acidic, sandy loam with sufficient moisture and humus. The species also thrives well in porous soil. Partially sunny locations are better suited for its cultivation. The plant exhibits optimum growth conditions at altitude ranges of 2500- 3500 m. The tolerable thermal range for the species varies from 15 to 35°C. However, the plant growth has been noted to be optimal under the range of 15-25°C in the high altitude regions of Himalayas.

Parts used: Roots and tubers

Market value: Its approximate yield is 1750 kg/ha in natural conditions. Under greenhouse and cultivated conditions productivity may increase up to 1800-2000 kg/ha if appropriate techniques are used. The tubers fetch a very high price (Rs. 1,000-1,500/- per kg) and are in great demand in pharmaceutical industries.

Agro-technology

- **Means of propagation:** One of the peculiar properties of orchids is that the seeds for their germination require symbiosis with fungal species. Most orchids are epiphytes and require a base for their attachment to a tree trunk or rock. The fungal partner gets nourishment from the plant. Under natural conditions, orchids get their suitable fungal partners. However, it is difficult to cultivate orchids, as it is difficult to provide a suitable fungal partner. The same is the case for *Dactylorhiza*. Multiplication through seeds is very low and no fruitful results have been obtained so far.
- **Vegetative Propagation:** Vegetative propagation through tuber division is quite successful. Small slices of tuber, even of 4 mm size, with meristematic tissues are reported to develop plantlets when transplanted at 5-7 cm depth 15x15 cm apart. The plants raised from tuber cuttings give about 4-8 cm tall plants with well-established tubers and roots after one year.
- **Transplanting:** The plants should be grown in a nursery for the initial year. In the beginning of the second year the plants are transplanted in the field when the tubers become well developed. The soil is prepared at least 10-15 days before transplantation with application of manure in required quantities. Care must be taken regarding an appropriate water source near the site. The transplanted plants should have a distance of 30 cm between each other so that approximately 42,000-45,000 plants can be accommodated per acre land area.
- **Water management:** *Dactylorhiza* has been found to perform well under moderately moist to moist conditions. At the early stage of plant development

(for rooting and leaf initiation from cuttings), 80-90% humidity is required. Irrigation is needed every twelve hours. The frequency can be extended to once in 2-6 days after the crop attains a 2 months growth stage with leaf differentiation. Light irrigation should be followed in the post-sowing phase to avoid the erosion of nutrients and seeds. In areas with greater slopes and steeper gradients, controlled irrigation once every 10-14 days is advisable depending on the erosion of nutrients from the beds. The number of irrigations given to the crop should ideally depend on the stage of growth, soil texture and availability of irrigation. Alternate and improved systems of irrigation should be adopted in case of water scarcity. This can include sprinkler, pot and wick and drip irrigation methods, as it will help in increased water use efficiency and minimal wastage.

- **Maturity and harvesting:** Regular weeding in the initial stages of crop-establishment is necessary. Frequent weeding (every 7-10 days) especially during the rainy season is required. As the crop grows, the leaf expanse of the species prevents the growth of weed plants in the vicinity. However, deep-rooted sedges should be removed as and when they appear. The weed population should not be allowed to attain flowering and fruit setting stages. Weeding once in 25 days is ideal, as it helps to check the regeneration of weed growth. In the later stages of weed growth, weeding operations can be done at extended intervals depending on the agronomic conditions of the locality. Weeding should be done after a light irrigation in the field, as it would help in easy uprooting of the weeds. A pre-winter weeding (September-October) and a pre-season weeding (March-April) can effectively help in the regeneration of the crop in the post winter period. Tubers are harvested after five years for high yields though they can be harvested 2-3 years also. The tubers should be collected after seed maturity in late September.
- **Post harvest technique:** Old tubers are separated from young tubers and steeped in hot water for 1 hour. The outer membranes of the tubers are removed through this process and the tubers turn light yellow in colour. These are then sun dried and can be preserved for a long time. In Garhwal, the tubers are boiled with buffalo milk before drying in the sun, which is considered to keep its contents active for long time.