

Guiding Note on Agro technology of *Paris polyphylla* Sm. (Nagchatri/Satua)

Selected species of *Paris polyphylla* is high in demand and collected from their natural habitats in Himalayan region for trade and industrial utilization. Long life cycle of this species ranging from 3-4 years is one of the major constraints to achieve their production through cultivation. NTFP collectors have seen this plant growing in nature only and no research and development organization and institute has demonstrated successful *ex situ* propagation of this species. However, in Nepal, where it is locally known as Satua, it is cultivated and rhizomes are consumed as vegetable. Sustainable harvesting can be achieved either through effective control on harvesting or large scale *ex-situ* propagation for commercial utilization. Therefore, efforts should include techniques for *ex-situ* propagation of this species involving harvesters in nursery and agriculture fields to augment supply of this species.

1. *Paris polyphylla* Sm. (Fig.1)

Common Name: Nagchatri, Satua

1.1. Habitat and Habitat

Found throughout the Asiatic countries, especially in the South Eastern hemisphere. It grows at an altitude of 2800 to 3300 m and blooms well in places with moist, humus rich soil under partial or full forest canopy.

1.2. Active ingredients and uses

Rhizome contains a glucoside, alpha-paristyphnin, which show depressant action on carotid pressure, myocardium, and respiratory movements.



Figure 1. *P. polyphylla* plant

1.3 Seed production

Seed setting starts during rainy season in July-August and mature in September. Clean the seed by removing the outer coat of the seed. Dry seed in defused sunlight for 2-3 days before storage. Immature seed will look wrinkled and separate them from viable seeds. Seeds must be stored in the air tight vials in dark away from sunlight. *Paris polyphylla* is slow germinating plant. Seeds take about 6-7 months to germinate. Seeds remain viable for a year.

1.4 Agro-Technology

1.4.1. Propagation

Multiplication is by seeds and through planting of rhizome with growing bud.

1.4.2 Soil requirements

The plant prefers sandy and loamy soils. The plant requires moist humus-rich soil and therefore, regular watering is essential to maintain soil moisture. Polyhouse and nursery raised beds, prepared with a mixture of forest soil, sand and vermicompost (1:1:1) are most suitable. Bulbs are fleshy and thick which require rich nutrient soil for development and growth.

1.4.3 Time of seed sowing

Seeds are sown in a small hole or harrow (deep line) not more than 1.25 cm deep on the raised nursery bed. Place overnight soaked seed in the hole or harrow gently. Keep seed-to-seed distance about 2-5cm and the row-to-row distance about 10 cm. Seed sowing is done either in September immediately after seed collection or in January and February. Mulching of the seedbed is done with thin layer of about 5 cm thick forest litter or dry grass. Seeds start germination in 6-7 months after sowing. Protect the seedbed from the heavy rain, direct sunlight, hailstorms and frost etc.

1.4.4. Rhizome planting

Propagates efficiently with underground rhizomes and this process is more prolific than propagation from seeds. Cut the rhizomes into small pieces ensuring that growing bud are present in each piece, These rhizomes are then planted directly on the prepared field at 20 cm and row to row distance 30-60cm. Leaves will come out after three to four months when temperature start rising in spring after snow melting.

1.4.5 Planting density

One year old seedlings are ready for transplanting in the fields if raised in nursery. April-June is the best time for planting in the field. Plant the seedlings on the 5-10 cm raised beds in the field. Plant to plant distance must be about 20-30 cm, while row-to-row distance must be 60 cm. Watering of the planted area should be done immediately after planting.

1.4.6 Nutrient requirement

Tuberous crop need high levels of nutrients for proper growth. Vermicompost or properly digested dung manure is applied in sufficient quantities to maintain soil fertility. 4000-5000 Kg vermicompost or manure is

applied at the time of field preparation for planting and annually 1000 Kg is applied during February- March to growing plants in trench to maintain plant growth and vigour.

1.4.7 Irrigation and weed control

Requires high moisture content which is maintained by watering 2-3 times after transplantation in summer season. Water logging for long duration caused yellowing of plants and can result in the plant mortality and hence proper drainage must be provided. High moisture encourages growth of weeds in the fields and during initial planting weeding is done with a gap of 15 days or as per requirement. After rainy season weeding is done once in a month.

1.4.8. Maturity and harvesting

Matures in September at the end of growing season. In most of the cases aerial parts of the plant dry till this time and in forests it is difficult to locate the underground rhizome. But conditions in cultivated fields or nursery is not so. Dig out the rhizomes after harvesting and collection of the fruit and seed. Remove the apical part of the rhizome with growing bud and plant in the nursery bed or polybags for further plantation. The remaining bulbs is kept for use as drug part. This plant has very limited use in human medicines but was very popular for ailments in livestock..

1.4.9. Crop production commercial viability

Cultivation is not available in Himachal Pradesh except for some experimental plots set up from time to time by the specific workers. It is reported that plant is cultivated in Nepal and is consumed as vegetable. At the same time there is limited demand of the plant as such in the market and is sold as mixture with the rhizomes of *Trillium govanianum*.



Figure 2. *P. polyphylla* rhizome

1.4.10 Post-harvest Management

Rhizomes are washed with clean water to remove soil and debris. Rhizomes are dried in shade for 4-5 days and stored in gunny or cotton bags for household use or sale in the market.