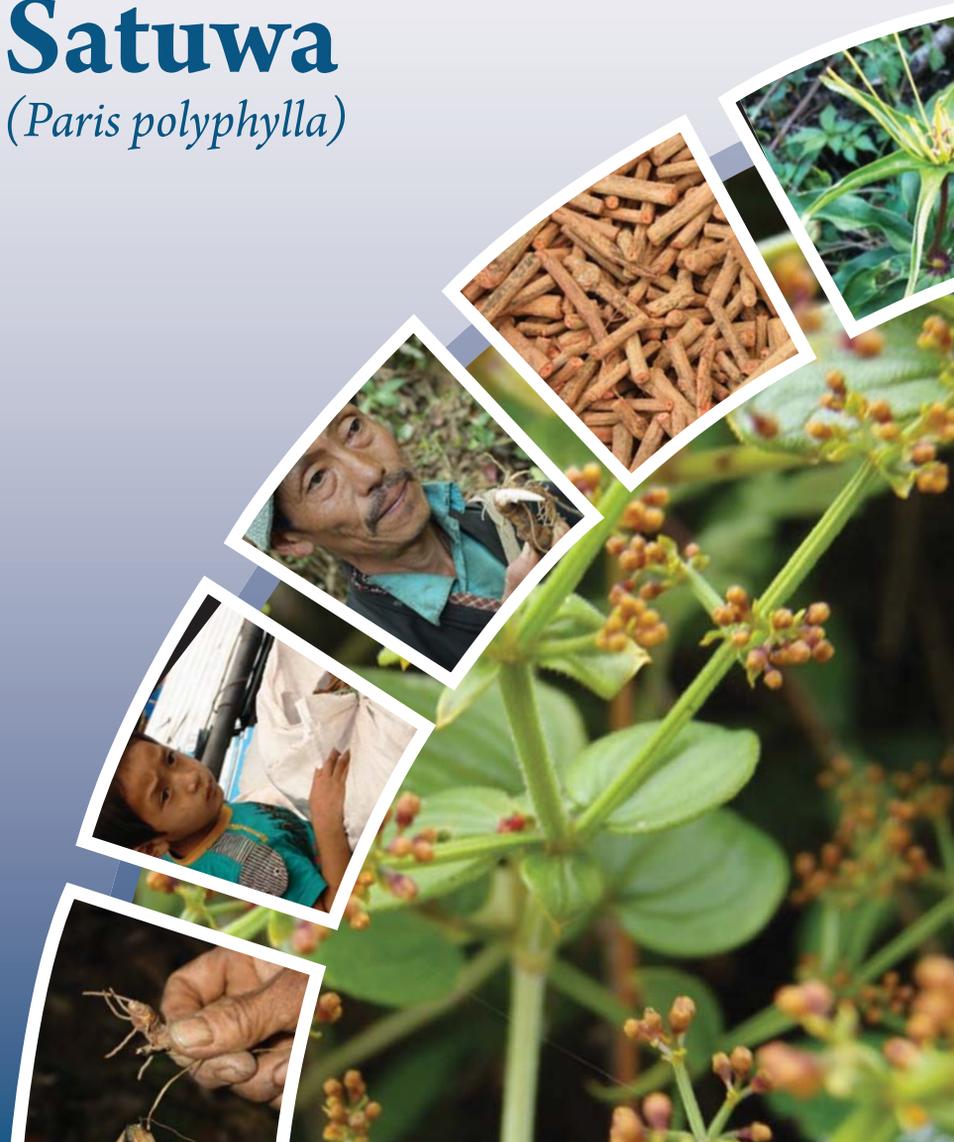




# A Field Manual on Nursery Management and Cultivation of **Satuwa** (*Paris polyphylla*)



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**Nabin Raj Joshi**  
ANSAB

## ABBREVIATIONS

ANSAB	Asia Network for Sustainable Agriculture and Bioresources
CFUGs	Community Forest User Groups
DzFO	Dzongkhag Forest Officer
FIMS	Forest Information Management System
GOs	Government Organizations
FYM	Farm Yard Manure
IFAD	International Fund for Agricultural Development
MAGIP	Market Access and Growth Intensification Project
MoAF	Ministry of Agriculture and Forests
NWFP	Non Wood Forest Products
SNV	Netherlands Development Organisation

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## About this Manual

This manual provides guidance and instructions for the nursery development, cultivation and domestication of *Paris polyphylla* (Satuwa). Since the focused species is depleting at a faster rate from its natural habitat due to incorrect harvesting pattern by collectors and the changing global climatic factors, this manual provides a basis for the sustainable production and management of Satuwa.

This manual is a bridge that fills the gap for Satuwa development experienced by the local farmers, NWFP group, forestry field officials and conservation organisations. This manual has been developed primarily based on the experience gained during the hands-on training at the field level in Gomdar block of eastern Bhutan and the extensive experience of ANSAB over the past two decades. Hence it is expected that the manual should be useful to those who want to conserve and manage the NWFP as a part of their conservation and development tasks.

## Objectives of the manual

This manual is an outcome of both theoretical and practical experience at ANSAB, and the three days of hands-on training. Hence, it provides a practical path and tool for the establishment, development, management and care for the nursery of Satuwa.

The major objectives of the manual are to:

- Provide and disseminate the practical method of development and management of nursery, transplanting and cultivation techniques of Satuwa.
- Promote the local farmers, NWFP groups and forestry field officials toward the domestication of Satuwa.

## Who is this manual for?

Although this manual has been proposed for local farmers, NWFP groups, forestry field officials and local level facilitators and forest technicians involved in supporting, promoting and managing the NWFP at different levels, this manual may be useful for researchers,

local resource persons, community level farmers, leaders, traders of NWFP, and community-based organisations.

It is also expected that forestry field officials can be efficiently trained so that they can work with the local NWFP group, farmers and the community as facilitators who will be able to carry out the activities mentioned in this manual.

## **What does this manual contains?**

The manual is divided into three sections. The first section includes the background information, biology, taxonomy, habitat range, ecology, regeneration, lifecycle, harvesting and uses of Satuwa, whereas the next two sections include management and nursery development techniques of Satuwa.

# Section 1: Background information on Satuwa (*Paris polyphylla*)

## 1. Taxonomy

Scientific name: *Paris polyphylla* (Sm.)

Family: Melanthiaceae

Local name: Satuwa, Thoksampa etc.

English Name: Love apple

*Paris polyphylla* (Sm.), known by the local and trade name Satuwa, is also known as Thoksampa in Sharchopkha and Satuwa in Lhotshampkha. It belongs to the Melanthiaceae family. It is a plant that usually grows about 10–100 cm tall from a rhizome 1–2.5 cm thick (Liang et. al., 2012) Satuwa is a perennial herbaceous plant. The leaves grow in a single whorl below a flower growing in two whorls. The name “Paris” comes from “Par,” meaning equal, and it refers to the symmetry of the flower. The rhizome is made up of modified stems of plants that usually grow underground and contains roots and shoots from their nodes, and it grows in a creeping manner.



## 2. Habitat and range

*Paris polyphylla* is found throughout the Asiatic countries, especially in the South Eastern hemisphere. It can also be found in Eurasian countries and can be grown in a variety of gardens throughout the world. It grows at an altitude of 3300 meters and blooms well in places with moist and humus rich soil under a forest canopy of full shade to partial shade.

### 3. Ecology of Satuwa

Satuwa is a perennial herb, each year the parts of above ground plant die during winter and regenerate again in spring. This plant flowers from April to May and fruits from June to August.

### 4. Regeneration

Satuwa can be propagated through seed and also from underground rhizomes. The aerial part of the plant dries out but underground rhizomes remain dormant during the snowy winter. As soon as the snow melts or winter is over, the rhizome will give a new plant.

### 5. Lifecycle

Satuwa is a monocious plant with male and female reproductive organs present in the same flower. The life cycle is completed in two or more years. It is a slow-germinating plant and takes about seven months to germinate from the seed.

### 6. Uses of Satuwa

*Paris polyphylla* has been used in traditional Chinese medicines for many years. All parts of the plant can be used as a pain reliever, antiphlogistic (removing heat), antispasmodic, diphtheria, and epidemic Japanese B encephalitis. A mixture of its roots and rhizomes can be used in treating poisonous snakebites, insect bites, and boils. The roots have also been observed to provide antibacterial action against bacteria, such as *Bacillus dysenteriae*, *B. typhi*, *B. paratyphi*, *E. coli*, *Staphylococcus aureus*, hemolytic streptococci, meningococci. In Nepal, Satuwa is locally used for curing fever, headache, wounds and burns. It is also used as a tonic. Rhizomes are used as a cure for stomachaches, or as an antispasmodic, digestive, vermifuge, anthelmintic, expectorant. The root's paste is applied as an antidote to poisonous insect and snakebites, while also to alleviate narcotic effects. Chewing a root piece is believed to heal internal wounds below the throat (Rajbhandari 2001). The root paste is also applied to cuts and wounds. Root pieces are fed to cattle suffering from Diarrhoea or dysentery. The juice of the root or the powder is taken as anthelmintic (Pohle 1990, Manandhar 2002, Shrestha et al. 1995).

## Section 2: Management System

Satuwa can be managed through the following ways:

- 1.1 Naturally occurring Satuwa managed by local community
- 1.2 Farming/Cultivation of Satuwa.

### 1. Naturally occurring Satuwa managed by community

Generally, natural growth of Satuwa occurs in the forest in a wild state. The bulk of the Satuwa grows on government-managed forests that are not been handed over to forest user groups.

There is an over-exploitation of wild Satuwa. Seeds and rhizomes are the medium of the propagation of this plant. So, if the plant is collected before the maturation of seeds, there will be no future regeneration. Unhealthy competition between the collectors has led to the over-harvesting of Satuwa without the consideration of sustainable regeneration. Not only the premature harvesting has a negative impact on regeneration, the immature plants decrease the active ingredient quality of the final product. Therefore, if the community is managing a forest there must be a Satuwa management plan prepared by the community and should be implemented effectively as like other forest products, so that the sustainable management of the Satuwa can be assured.

### 2. Cultivation /farming of Satuwa

The commercial cultivation of Satuwa has yet to commence. However, it has been practiced in other parts of the world. It grows well in soils with pH ranges from 5.6-7.5, i.e. slightly acidic to neutral soils. The plant prefers light (sandy) and medium (loamy) soils. It can grow well in full shade (deep woodlands). The plant requires moist humus-rich soil and therefore, regular watering is essential (Grey 1938, Philips and Rix 1989, Huxley 1992, Thomas 1990).

# Section 3: Nursery Development

## 1. Seed Collection and Storage Methods

### Step 1: Seed Collection

- Collect the seeds from healthy plants during July-August.
- Clean the seed by removing the outer coat of the seed.
- Dry the seeds properly before storing.



Mature Satuwa seeds  
ready for collection

### Step 2: Seed Storage

- Dry the seeds in sunlight for 2-3 days.
- Remove the wrinkled seeds and store only the viable seeds.
- Seeds must be stored in the air tight vessels but the vessels should not be kept in the sunlight.

### Step 3: Seed viability

- Satuwa is a slow germinating plant.
- Seeds take about 6-7 months to germinate.
- Seeds remain viable for a year; therefore, seeds collected the previous year are sown in the following season of the next year.

## 2. Nursery Development:

### Step 1: Site Selection

- Select a site with light (sandy) and medium (loamy) soils.
- It can grow well in full shades (deep woodlands).
- Select a site with moist humus-rich soil.
- Select a site with North-facing slopes.
- Select a well-drained site.
- Select a site with acidic soil conditions (a pH of 5.6-7.5 i.e. slightly acidic to neutral soils).
- Select a nursery site that has a gentle slope that allows excess water to run off without causing soil erosion.



### Step 2: Soil and nursery bed preparation

- Remove any trees, shrubs and other unwanted weeds from the nursery site.
- Dig the soil by removing the first 5cm of topsoil, and mix the soil with organic fertilizer.
- The nursery bed should be 5 cm from the ground level.
- Outline the bed with bamboo pole or wooden flakes or brick.
- Mix one part of forest soil,



2 parts of sand and 1 part of farm manure on the sieve net and shake it properly. Keep the mixture on the bed.

- Raise the bed about 5-10 cm from the ground with the homogeneously mixed soil.
- Make a 50 cm wide path in between the two beds.
- The size of the bed for Satuwa 10×1 i.e. 10 meters length and 1 meters width.



- Divide the bed into sub blocks 1 m<sup>2</sup> in the nursery.

### Step 3: Seed sowing

- Make a small hole or harrow not more than 1.25 cm deep on the bed.
- Put the seed in the hole or harrow gently.
- Maintain seed-to-seed distance about 2-5cm and the harrow-to-harrow distance about 10 cm.
- Sow the seeds in September and/or in January and February.
- Mulch the seedbed with paddy straw or pine needle.
- Mulch should not be more than 5 cm thick.
- Watering should be done twice or thrice a day. It depends upon the moisture content of the bed.



## Step 4: Shading

- Provide shade to the seed bed as soon as the seeds are sown and mulching is complete.
- As Satuwa is shade-loving plant, shading is required for growth and also to protect the seedbed from the heavy rain, direct sunlight, hailstorms and frost etc.
- Prepare shade using locally available material like bamboo, straw or plastic sheet or other shading materials.
- The shade should be made at a sufficient height (5-6 ft) that one can move and work properly beneath the shade on the bed.



## Step 5: Seed germination

- It takes about six to seven months to produce a primary root.
- As weeds compete with the Satuwa plant, weeding should be done in a timely manner.
- Weeding is done for a year in the nursery bed.

## Step 6: Watering

- Watering should be done thrice a day in the hot season in the nursery bed.
- Regular watering is recommended for the better growth of the seedlings.
- Make well-drained channels in the nursery beds to avoid damping.

## Step 7: Fencing

- Use available materials such as bamboo for fencing.
- Live fences may be grown around the nursery, raising some fodder species or grasses like napier.



## Step 8: Hardening off

- ‘Hardening off’ to seedlings is required, It refers to the progressive withdrawal of the favorable growing conditions of seedlings in the nursery.
- The main treatment involves the reduction of water and full exposure to sunlight. Note that the reduction in the amount and frequency of watering changes gradually from two or three applications per week, depending on the humidity of the area.
- Start the treatment no later than halfway (after the six months of seed sowing) through the life of the seedling in the nursery.
- Hardening is recommended in the mother bed only.
- Pricking is not recommended.
- Transfer the seedlings to the plantation site carefully by putting them in the gunny bags.

# Section 4: Cultivation and Harvesting

## 1. Field preparation, Transplanting and Planting Rhizomes

### Field Preparation

- Prepare the plantation site by ploughing the field twice. All the weeds, shrubs, stones should be removed from the field.
- Control burning of the planting site is recommended.
- The slope of the planting field should face north as far as possible.
- Add one ton of compost manure to one hectare of plantation area.

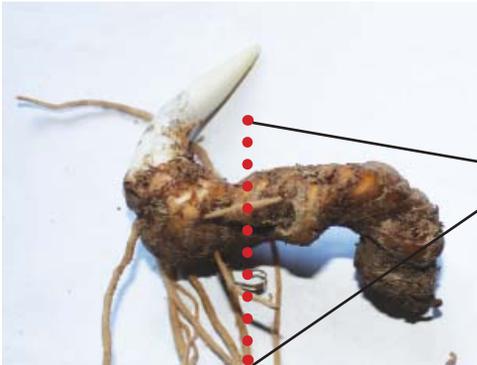


### Transplanting

- After a year of seed sowing, seedlings are ready for transplanting in the field.
- Plant the seedlings on the 5-10 cm raised soil in the field.
- Plant to plant distance must be about 20-30 cm, while row-to-row distance must be 60 cm.
- The best time for transplanting is May and June.

## Planting Rhizomes

- Satuwa propagates efficiently with underground rhizomes and this process is more prolific than propagation from seeds.
- Cut the rhizomes into small pieces ensuring that growing bulbs



*Place to cut Satuwa: the left part with the roots and shoot is replanted, while the right part is collected*

are present in each piece.

- These rhizomes are then planted directly on the prepared field or grown in polybags during the rainy season.
- Keep rhizome-to-rhizome distance about 20cm and row-to-row distance 30-60cm.
- Leaves will come out after three to four months.

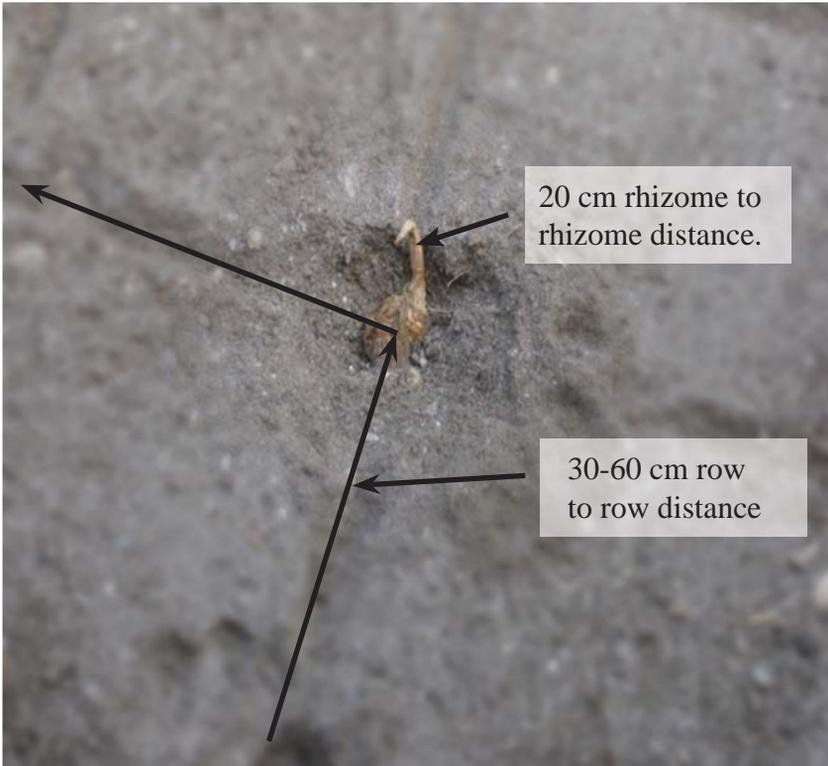
## 2. Harvesting and Marketing

### Step 1: Harvesting method and time

- Collect the underground rhizomes during September-October after fruits are fully ripened.
- Dig out the underground parts carefully by pick-axes or by hand.
- Leave some rhizomes in the field to facilitate natural regeneration.

## Step 2: Marketing

- Rhizomes of *Paris polyphylla* are traded raw to India and Tibet.
- The market price of rhizomes has increased in the past few years due to overwhelming demand from Tibet.



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