



## Turmeric Intercropping in Arjun Plantation: A Sustainable and Profitable Agroforestry Model for Tasar Rearers

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The present study was conducted to evaluate the sustainability and economic profitability of turmeric intercropping in Arjun-based tasar rearing fields. Turmeric (*Curcuma longa*) was cultivated as an intercrop under Arjun (*Terminalia arjuna*) plantations used for tropical tasar silkworm rearing. The study focused on soil improvement, moisture conservation, weed suppression, additional farmer income, and compatibility with tasar host plant growth. Observations were recorded on turmeric yield, host plant leaf productivity, soil quality improvement, and economic return after turmeric shelling and processing. Results revealed that turmeric intercropping improved soil moisture retention, reduced weed infestation, and increased overall plantation profitability without negatively affecting tasar host plants. Economic analysis showed significant additional income generation for tasar rearers through sale of processed turmeric rhizomes. The benefit-cost ratio indicated that turmeric intercropping is economically viable and environmentally sustainable for tropical tasar agroforestry systems.

**Keywords:** Tasar plantation, intercropping, Arjun plantation, Sustainable agroforestry, Tropical tasar culture, Additional farmer income, Soil fertility, Moisture conservation, Organic farming, Profitability analysis, *Curcuma longa*, Tasar rearers

### Introduction

Tropical tasar sericulture is an important forest-based livelihood activity practiced in many rural and tribal regions of India. The tropical tasar silkworm, , mainly depends on Arjun (*Terminalia arjuna*) and Asan (*Terminalia tomentosa*) host plants for feeding and cocoon production. However, seasonal income fluctuation and poor utilization of plantation interspaces often reduce profitability for tasar rearers. Intercropping is an important agroforestry practice that increases land-use efficiency and provides additional economic return without affecting the main crop. Among different intercrops, turmeric (*Curcuma longa*) is highly suitable for tropical tasar plantations because of its shade tolerance, medicinal value, and compatibility with Arjun plantations. Turmeric improves soil structure, suppresses weeds, conserves soil moisture, and enhances microbial activity. The crop also generates significant additional income after harvesting and shelling of rhizomes. Since turmeric possesses high market demand and medicinal importance, it can strengthen economic sustainability of tasar rearers. The present investigation was therefore undertaken to study the sustainability and profitability of turmeric intercropping in Arjun-based tasar rearing fields.

### Objectives

1. To evaluate the suitability of turmeric as an intercrop in Arjun plantations.
2. To study the effect of turmeric intercropping on soil quality and moisture conservation.
3. To assess the profitability of turmeric cultivation for tasar rearers.
4. To analyze cost of cultivation, processing expenses, and benefit-cost ratio.

## Materials and Methods

### Experimental Site

The study was conducted in tropical tasar host plant plantations containing Arjun (*Terminalia arjuna*) trees under lateritic soil conditions and tropical climate.

### Main Crop

- Arjun (*Terminalia arjuna*)

### Intercrop Used

- Turmeric (*Curcuma longa*)

### Experimental Procedure

#### Land Preparation

Interspaces between Arjun plantation rows were cleaned and shallow ploughing was carried out before turmeric sowing.

#### Turmeric Plantation

Healthy turmeric rhizomes were selected and planted during pre-monsoon season.

#### Spacing

- Row-to-row: 45 cm
- Plant-to-plant: 25 cm

Organic manure and vermicompost were applied during planting.

#### Crop Management

- Periodic weeding
- Earthing up
- Organic nutrient application
- Irrigation during dry periods

No harmful chemical pesticides were used to maintain compatibility with tasar rearing.

#### Observations Recorded

##### 1. Soil Moisture Conservation

Comparative soil moisture was observed under intercropped and non-intercropped plantations.

##### 2. Weed Suppression

Weed density was recorded periodically.

##### 3. Host Plant Growth

Leaf production and general vigor of Arjun host plants were observed.

##### 4. Turmeric Yield

Fresh and processed turmeric rhizome yield per acre was recorded.

##### 5. Economic Analysis

The following parameters were calculated:

- Cost of cultivation
- Processing expenses after shelling
- Gross income
- Net profit
- Benefit-cost ratio



**Fig:- Turmeric Plantation as Intercropping**



Fig :- Turmeric Intercropping work at Ranchi, Jharkhand

## Results

Effect on Soil and Plantation Condition

Turmeric intercropping improved:

- Soil moisture retention
- Organic matter accumulation
- Weed suppression
- Microclimatic stability

The broad turmeric canopy reduced soil evaporation and maintained suitable humidity around host plants.

Effect on Arjun Plantation

No negative effect on Arjun host plant growth was observed. Moderate shade under Arjun canopy supported healthy turmeric growth.

Turmeric Yield

Average fresh turmeric yield recorded:

- 72–85 quintals per acre

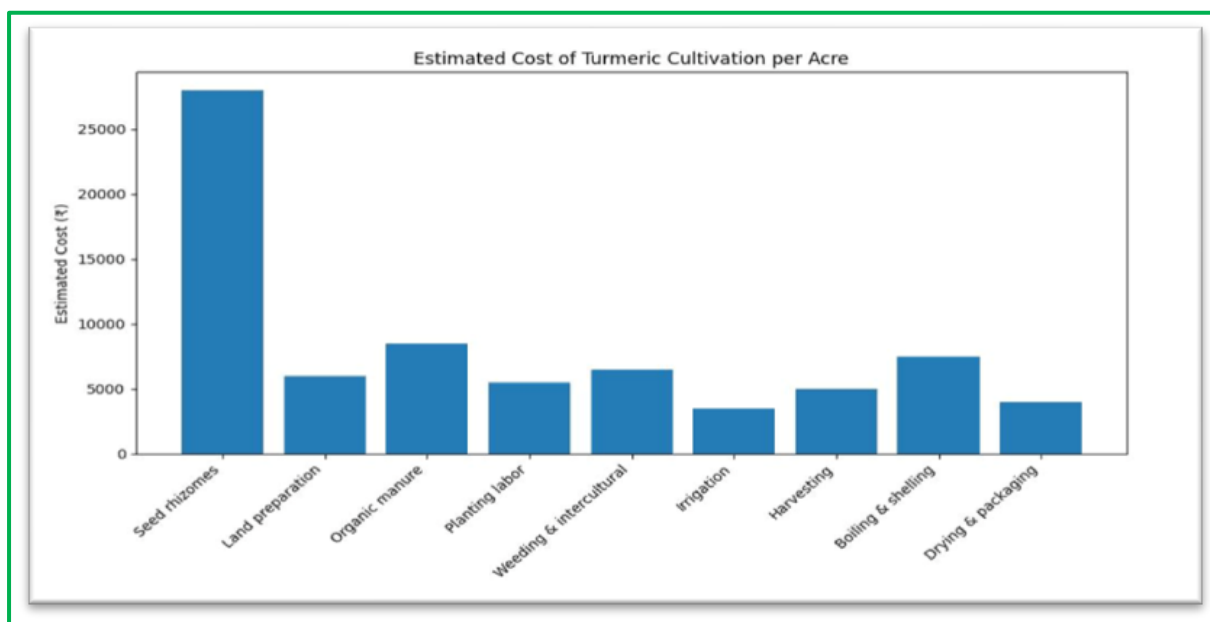
Processed dry turmeric yield after shelling:

- 16–20 quintals per acre

Cost and Profitability Analysis of Turmeric Intercropping

**Table 1. Estimated Cost of Turmeric Cultivation per Acre**

Particulars	Estimated Cost (₹)
Seed rhizomes	28,000
Land preparation	6,000
Organic manure	8,500
Planting labor	5,500
Weeding and intercultural operations	6,500
Irrigation	3,500
Harvesting	5,000
Boiling and shelling processing	7,500
Drying and packaging	4,000
<b>Total Cost</b>	<b>74,000</b>



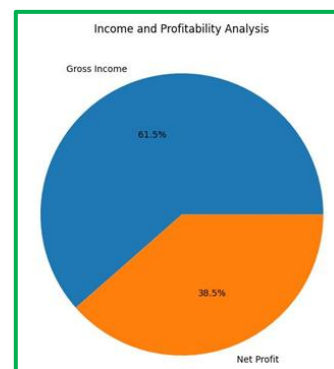
**Fig 1 :- Estimation cost of Turmeric Cultivation**

**Table 2. Income and Profitability Analysis**

Parameter	Value
Average Dry Turmeric Yield	18 quintals
Average Market Price/quintal	₹11,000
Gross Income	₹1,98,000
Net Profit	₹1,24,000
Profit Increase in Tasar Plantation	42–55%
Benefit-Cost Ratio	1:2.67

**Discussion**

The present study demonstrated that turmeric is a highly suitable intercrop for Arjun-based tasar plantations. The crop effectively utilized vacant plantation spaces and generated additional income without affecting tasar host plants. Turmeric improved soil moisture conservation because of its dense canopy structure which reduced evaporation losses. Organic residues from turmeric cultivation also improved soil organic matter and microbial activity. The profitability analysis revealed that turmeric intercropping significantly increased farmer income after processing and shelling of rhizomes. High market demand and medicinal importance of turmeric contributed to favorable



**Fig:- Income and Profit Ratio Analysis**

economic return. Since turmeric cultivation required limited chemical input, it remained compatible with eco-friendly tasar rearing practices. Intercropping also improved land-use efficiency and reduced weed infestation within plantations. The benefit-cost ratio of 1:2.67 indicated that turmeric intercropping is economically viable and suitable for sustainable tasar agroforestry systems.

### **Conclusion**

The study concluded that turmeric intercropping in Arjun-based tasar plantations is both sustainable and profitable for tasar rearers. The system improves soil quality, conserves moisture, suppresses weeds, and generates substantial additional income through turmeric production and processing. Turmeric can therefore be recommended as an ideal intercrop for sustainable tropical tasar agroforestry and rural livelihood improvement.