NJESR/June-2026/Volume-8/Issue-6 E-ISSN-2582-5836
DOI-10.53571/NJESR.2026.8.6.1-5

A Review On Cultivation, Harvesting, Processing And Marketing Of Piper Longum L.: (Pippali)

Dr. Mahesh Kumar Sharma
M.D. Principal Govt. Ayurveda College, Gwalior
Dr. K.L. Sharma M.D. Ph.D.
Professor & HOD Department of Dravyaguna Expert of NMPB Projects
Dr. Rahul Gupta M.D. Ph.D.
Reader Dravyguna Vigyan

(Received-15 May2026/Revised-28May2026/Accepted-1June2026/Published-6June 2026)

Abstract: *Piper longum* L. Pippali is a high-value medicinal and spice crop recognized for its bioactive alkaloid piperine and its established role in Ayurvedic and modern herbal formulations. The increasing global demand for botanical raw materials has renewed commercial interest in systematic cultivation and quality-based marketing of this crop. original agronomic practices, harvesting standards, post-harvest processing methods, value addition strategies, and marketing frameworks relevant to pepper production. Emphasis is placed on sustainable cultivation, quality assurance, and commercialization models suitable for Indian medicinal plant growers.

Keywords: *Piper longum*, pepper, pippali, medicinal plant cultivation, post-harvest management, piperine, value chain.

1. Introduction

Pippali (*Piper longum* L.) is a perennial climbing species belonging to the family Piperaceae. It holds a prominent position in Ayurveda medicine systems due to its pharmacological properties, particularly its bioenhancing activity attributed to piperine. In addition to medicinal applications, Pippali has niche demand in the spice and nutraceutical industries.

With the expansion of herbal product markets, there is a need to shift from wild collection to organized cultivation supported by scientific agronomic practices and standardized processing protocols. This review presents a structured and original overview of the entire production-to-market chain.

2. Botanical and Agronomic Characteristics

Pippali is a slender, perennial climber that thrives under partially shaded, humid conditions.

Morphological features:

→ Leaves: Broad, ovate, cordate at base

→ Inflorescence: Cylindrical spikes

→ Fruits: Small drupes embedded in fleshy spikes

→ Roots: Medicinally valuable (Pippalimoola)

The plant exhibits moderate growth during the rainy season and produces harvestable spikes within 6–8 months of planting under suitable management.

3. Agro-Climatic and Soil Requirements

3.1 Climate

- Warm and humid tropical to subtropical climate
- Optimum temperature range: 20–35°C
- Annual rainfall: 1500 mm or above
- Partial shade is essential for optimal growth

3.2 Soil

- Well-drained loamy soil
- Slightly acidic pH (5.5–6.5)
- Rich in organic matter
- Sensitive to waterlogging

4. Propagation and Nursery Techniques

4.1 Propagation Methods

Vegetative propagation is recommended due to:

- Higher survival rate
- Early yield
- Uniform growth

Healthy stem cuttings (20–25 cm) with 2–3 nodes are used. Rooting hormones or organic stimulants can improve establishment.

4.2 Nursery Management

i. Raised nursery beds under 50% shade
ii. Transplanting after establishment of strong root system
iii. Root development within 3–4 weeks
iv. Adequate moisture without stagnation

5. Field Cultivation Practices

5.1 Land Preparation

- Deep ploughing followed by harrowing
- Raised beds in high rainfall areas
- Incorporation of well-decomposed farmyard manure (10–15 tons/ha)

5.2 Planting and Spacing

i. Spacing: 2.5 × 2.5 meters
ii. Provision of staking or live support trees
iii. Mulching to conserve soil moisture

5.3 Nutrient Management

An integrated nutrient management system is ideal:

i. Organic manure annually
ii. Moderate NPK supplementation based on soil test
iii. Biofertilizers (Azospirillum, PSB) enhance productivity

5.4 Irrigation

A. Regular irrigation during dry periods
B. Drip irrigation preferred
C. Avoid excessive moisture

6. Pest and Disease Management

Common constraints include:

- Leaf spot diseases
- Root rot
- Sap-sucking insects

Recommended approach:

- Field sanitation
- Biological control agents (Trichoderma)
- Neem-based botanical pesticides
- Crop rotation where feasible

Integrated Pest Management ensures sustainable production.

7. Harvesting Standards

i. Harvesting begins 6–8 months after planting
ii. Spikes harvested when fully developed but still green
iii. Over-mature spikes lose pungency
iv. Multiple harvests possible annually

Careful manual harvesting prevents damage to vines and ensures continuous yield.

8. Post-Harvest Processing

8.1 Cleaning

Removal of soil, foreign particles, and immature spikes.

8.2 Drying

i. Traditional sun drying (4–5 days)
ii. Mechanical drying at 45–50°C improves quality
iii. Final moisture content should be below 10%

Controlled drying preserves piperine and volatile constituents.

8.3 Grading and Storage

1. Sorting by size and colour
2. Airtight packaging

3. Storage in cool, dry conditions

9. Value Addition and Industrial Utilization

Pippali (Piper Longum) offers multiple value-added opportunities:

i. Powder production
ii. Piperine extraction
iii. Standardized herbal extracts
iv. Nutraceutical capsules
v. Ayurvedic formulations

Extraction of piperine increases commercial value and export potential.

10. Marketing and Value Chain Structure

10.1 Market Segments

i. Ayurvedic medicine manufacturers
ii. Herbal extract companies
iii. Spice traders
iv. Export houses

10.2 Marketing Channels

1. Farmer → Local trader → Wholesaler
2. Direct supply to herbal pharmaceutical companies
3. Farmer Producer Organizations (FPOs)
4. Contract farming arrangement
5. E-Charak Portal

10.3 Price Determinants

i. Piperine content
ii. Moisture percentage
iii. Organic certification
iv. Market demand cycles

Value-added forms yield significantly higher returns compared to raw dried spikes.

11. Economic Potential

Under scientific cultivation:

i. Yield: 500–1000 kg dried spikes/ha
ii. Additional income from roots
iii. Premium pricing for certified organic produce
iv. Export-grade material fetches higher margins

Pippali (pepper) can be integrated into agroforestry and medicinal plant-based cropping systems.

12. Constraints and Challenges

i. Limited availability of certified planting material
ii. Price fluctuation
iii. Lack of organized marketing infrastructure
iv. Inadequate post-harvest facilities

Addressing these gaps can significantly enhance farmer profitability.

13. Future Scope

1. Development of high-yielding cultivars
2. Standardization of piperine content
3. Mechanized drying systems
4. Digital marketing and direct B2B linkage
5. Export-oriented medicinal plant clusters

14. Conclusion

Pippali cultivation represents a sustainable and economically viable opportunity for medicinal plant growers. Adoption of improved agronomic practices, scientific harvesting methods, and standardized post-harvest processing enhances both yield and quality. Organized marketing and value addition—particularly piperine extraction—can substantially improve farmer income and export competitiveness.