Basic Information of Bottle Gourd :

- **Name** :

Bottle gourd, scientifically known as *Lagenaria siceraria*, is a popular warm-season vegetable belonging to the Cucurbitaceae family. It is commonly referred to as Lauki, Ghiya, or Doodhi in various Indian languages, and is also known internationally as calabash, white-flowered gourd, or long melon. Native to Africa, the crop has spread widely and is now extensively cultivated in tropical and subtropical regions, especially across India and Asia. Bottle gourd is a fast-growing, climbing vine with soft, tender fruits that are harvested when young and used in a variety of dishes.

- **Best Season for Growing :**

Bottle gourd is a warm-season crop, ideally suited for tropical and subtropical climates. It can be grown in three main seasons:

- Summer: Sown in January–March and harvested from April–June.
- Kharif: Sown in June–July with harvests in August–October.
- Zaid (Post-Monsoon): Sown in October–November in regions with irrigation or mild winters.

The crop requires temperatures between 25°C to 35°C for optimal growth and does not tolerate frost or waterlogging.

- **Best soil Type :**

  - **Soil Type:** Bottle gourd prefers well-drained, fertile, sandy loam soil with a slightly acidic to neutral pH (around 6.0 to 7.0).

    Bottle gourd grows best in well-drained loamy or sandy loam soils rich in organic matter. The ideal soil pH is between 6.0 and 7.5. Soils should retain moisture but not become waterlogged. Adding well-decomposed FYM (farmyard manure) or compost during land preparation improves soil fertility and structure.

- **Time period :**
    - **Germination Time:** Seeds germinate in about 7 to 10 days under proper conditions.
    - **Planting to Harvesting:** Typically, bottle gourd takes about 3 to 4 months (90 to 120 days) to reach maturity, depending on the variety and environmental factors.

    The crop takes around **90 to 120 days** to mature fully.

• Estimated cost per acre :

1.Seed Selection & Cost

- Recommended Varieties (based on need):
    - For Long Fruits (Fresh Market): Pusa Naveen, Arka Bahar, NS-585
    - For Round Fruits (Processing/Home Use): Punjab Komal, Narendra Shishir
    - For Hybrid High Yielding: Seminis SGH-1, US Agriseeds Varieties
- Seed Rate: 2–2.5 kg per acre
- Cost: ₹1,200 – ₹2,500 (Hybrids can be costlier)

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2. Land Preparation

- Operations: 2–3 ploughings, leveling, and formation of ridges & furrows or beds
- Cost: ₹3,000 – ₹4,500 (includes tractor/labor charges)

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3. Fertilization & Manuring

- Organic Inputs: 8–10 tons of FYM or compost
- Chemical Fertilizers (per acre):
    - Basal Dose: Urea (40–50 kg), DAP (50–60 kg), MOP (40–50 kg)
    - Top Dressing: Split doses of urea at 30 and 60 days
- Cost: ₹4,000 – ₹6,000

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4. Irrigation

- Method: Drip or furrow irrigation (every 3–4 days in summer)
- Requirement: Depends on season; summer requires more frequent watering
- Cost: ₹1,500 – ₹3,000 (higher for diesel pumps)

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5. Planting & Spacing

- Spacing: 2.5 m x 1 m (or based on trellis system)
- Support System: Trellis (bamboo/iron wire) improves yield and fruit quality
- Cost of planting & staking: ₹4,000 – ₹6,000

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6. Pest & Disease Management

- Common Pests: Aphids, Fruit Fly, Red Pumpkin Beetle, Spider Mites
- Diseases: Fusarium Wilt, Powdery Mildew, Downy Mildew, Gummy Stem Blight
- Control Measures:
    - Neem oil, Imidacloprid, Spinosad, Chlorpyrifos for pests
    - Carbendazim, Mancozeb, Sulfur-based fungicides for diseases
- Cost: ₹2,000 – ₹3,000

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7. Labor Charges

- Activities: Sowing, weeding, staking, spraying, harvesting (multiple rounds)
- Cost: ₹4,000 – ₹5,000 (may vary based on local wage rates)

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8. Harvesting

- Duration: Starts 55–65 days after sowing; continues every 3–4 days
- Number of Harvests: 10–15 over 2–2.5 months
- Cost: ₹2,000 – ₹3,000 (includes labor for repeated picking)

9. Post-Harvest Handling

- Activities: Grading, cleaning, packing (gunny bags/crates), transport
- Cost: ₹1,500 – ₹2,000

- **Varieties According to Need**:
  - ***High-Yielding/Commercial Varieties:***
  - **Pusa Naveen –** Cylindrical, straight fruits; good for long-distance transport
  - **Kashi Bahar –** High-yielding, suitable for all seasons
  - **Arka Bahar –** Resistant to downy mildew; long fruiting period
  - **Pusa Summer Prolific Long –** Long fruits, early maturity
  - ***Round Varieties / Table Use:***
  - **Pusa Sandesh –** Round, tender fruits; ideal for home gardens
  - **Narendra Lauki-2 –** Early maturing round variety
  - ***Hybrid/Disease Resistant Varieties:***
  - **Swarna Sneha –** Vigorously growing and disease tolerant
  - **NS-401 (Namdhari) –** Uniform long fruits, high yield
  - **Mahyco MBG-123 –** Firm fruits, suitable for distant markets

2) Common Diseases Affecting Bottle Gourd:

a. Powdery Mildew (Erysiphe cichoracearum)

1) Information

- **Powdery mildew is a fungal disease caused by *Erysiphe cichoracearum*.**

- **It is one of the most common and damaging diseases of bottle gourd and other cucurbits.**
- **It appears during the late growth stage of the plant, especially in dry and humid weather conditions.**
- **The disease spreads quickly and reduces the photosynthetic area, affecting fruit size, quality, and yield.**

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2) Symptoms

- **White, flour-like powdery growth appears on the upper side of leaves, stems, and sometimes on young fruits.**
- **Affected leaves turn yellow, curl, dry out, and fall off prematurely.**
- **Infected plants may look stunted and weak.**
- **If not treated early, it can lead to severe defoliation and reduced fruit yield.**
- **Unlike other fungal diseases, powdery mildew does not require free water on the leaf surface to infect—it thrives even in dry conditions.**

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3) Cure – Fertilizers & Fungicides

🔸 **Fungicide Control (Recommended Sprays):**

- Wettable Sulfur (0.2%) – most effective, low-cost option.
- Carbendazim (0.1%) – systemic fungicide with curative effect.
- Hexaconazole (0.1%) or Myclobutanil (0.1%) – for heavy infections.
- Neem Oil (1–2%) – organic option; repeat every 7–10 days.
- Potassium Bicarbonate (1%) – disrupts fungal spores; safe for organic systems.

🔸 **Fertilizer Support:**

- Avoid excess nitrogen fertilizers (promotes soft, susceptible tissues).
- Apply balanced NPK with higher potassium (MOP) to strengthen plant cell walls.
- Use bio-fertilizers like Trichoderma viride or Pseudomonas fluorescens via soil or foliar spray for natural suppression.

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4) Preventions

- Use resistant/tolerant varieties like Arka Bahar or Punjab Komal if available.
- Practice proper crop spacing to ensure good airflow.
- Regularly remove infected leaves and debris from the field.
- Avoid planting bottle gourd during late monsoon or overly humid months.
- Ensure adequate drainage and avoid overcrowding.
- Spray neem-based prophylactic sprays weekly during risk periods.
- Rotate crops—do not grow gourds repeatedly on the same land.
- After the season, plow under or burn crop residues.

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5) Causes

- Caused by the fungal pathogen *Erysiphe cichoracearum*.
- Favors dry days with humid nights (RH 60–80%, temp 20–30°C).
- Rapid spread occurs through airborne spores.
- Promoted by:
    - Excess nitrogen fertilization
    - Shady, overcrowded conditions

- Poor air circulation
- Repeated cropping without rotation

b. Downy Mildew (Pseudoperonospora cubensis)

1) Information

- Downy Mildew is caused by an **oomycete pathogen** (*Pseudoperonospora cubensis*).
- It affects many cucurbits, including bottle gourd.
- This disease is **favored by cool, humid, and wet conditions**, especially during the **monsoon.**
- It attacks the **leaves**, reducing photosynthesis and severely impacting **fruit yield.**

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2) Symptoms

- **Yellow angular spots** on upper leaf surface between veins.
- Underside of leaves shows **grayish-purple fuzzy growth.**
- Infected leaves **wilt, turn brown**, and die early.
- Fruits may appear small and underdeveloped due to reduced plant vigor.
- It spreads quickly under **wet and cloudy weather.**

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3) Cure – Fertilizers & Fungicides

- **Fungicides:**

- **Metalaxyl + Mancozeb (0.25%) –** very effective in early stages.
- **Dimethomorph**, **Chlorothalonil**, or **Azoxystrobin** can also be used.
- Alternate sprays to prevent resistance.
- Spray **Neem oil or garlic extract** as organic protection.

🔹 **Fertilizer Support:**

- Avoid **excess nitrogen** which increases susceptibility.
- Apply **balanced NPK**, especially **more potassium** for cell strength.
- Use **bio-fungicides**: *Trichoderma viride* as foliar spray and in compost.

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4) Preventions

- **Use resistant varieties** (if available).
- **Avoid overhead irrigation**; prefer drip to keep foliage dry.
- Ensure **good air circulation** with proper spacing.
- Remove infected plant parts immediately.
- Do not plant in **low-lying or waterlogged areas**.
- Apply **prophylactic fungicide sprays** during wet seasons.

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5) Causes

- Caused by *Pseudoperonospora cubensis*, a **water mold**.
- Thrives in **cool (15–25°C), wet and humid conditions**.
- Spreads through **wind-blown spores** and water splash.

- Poor drainage, overcrowding, and prolonged leaf wetness increase risk.

c. Bacterial Wilt (Erwinia tracheiphila)

1) Information

- **Bacterial Wilt is caused by *Erwinia tracheiphila*.**
- **It's a bacterial disease transmitted by cucumber beetles.**
- **Once infected, the bacteria clog the plant's vascular system, causing sudden wilting.**
- **Highly destructive – plants may collapse quickly.**

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2) Symptoms

- **Sudden wilting of individual leaves, progressing to entire vines.**
- **No yellowing or spotting—leaves stay green and wilt.**
- **Cutting infected stems shows sticky bacterial ooze.**
- **If you cut the stem and touch both cut ends, threads of bacterial slime stretch between them.**

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3) Cure – Fertilizers & Control

- **There is no chemical cure once the plant is infected.**
  - **Remove and destroy affected plants immediately.**
  - **Control the vector (cucumber beetles) using insecticides.**

- **Fertilizer Support:**

- **Apply organic compost + Trichoderma to improve root zone health.**
- **Use balanced NPK, especially potassium-rich fertilizers.**
- **Avoid over-irrigation and excessive nitrogen.**

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4) Preventions

- **Use insect netting or row covers to block beetles early in season.**
- **Apply insecticides like Imidacloprid or Thiamethoxam to control beetles.**
- **Remove weeds and crop residues that may harbor beetles or bacteria.**
- **Rotate crops – avoid cucurbits in the same area for 2–3 seasons.**
- **Use yellow sticky traps to monitor and reduce beetle populations.**

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5) Causes

- Caused by *Erwinia tracheiphila* bacteria.
- Transmitted by cucumber beetles (spotted or striped).
- Beetles carry the bacteria in their mouthparts or excreta and infect plants during feeding.
- Disease spreads more rapidly in warm, humid climates with high beetle populations.

3) Pest and insect for Bottle Gourd (Lauki) :

1. Red Pumpkin Beetle (Aulacophora foveicollis)

- Symptoms:

- Beetles feed on leaves, flowers, and cotyledons.
- Holes in leaves and damaged seedlings.
- Grubs feed on roots and underground stems.

◆ Control:

- Handpick and destroy adult beetles early morning.
- Apply Neem-based sprays (Neem oil 2%).
- Spray Malathion 50 EC @ 1.5 ml/litre or Carbaryl 50 WP @ 2 g/litre.

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2. Fruit Fly (Bactrocera cucurbitae)

◆ **Symptoms:**

- Female lays eggs inside fruit; larvae feed internally.
- Causes premature fruit drop and rotting.
- Oozing from the puncture site and internal maggots visible.

◆ Control:

- Use cue-lure traps or methyl eugenol traps to monitor and control.
- Destroy infested fruits.
- Apply Neem cake (100 kg/acre) to reduce egg laying.

- Spray Spinosad 45 SC @ 0.5 ml/litre or Malathion + jaggery bait.

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3. Aphids (Aphis gossypii)

- **Symptoms:**
  - **Colonies on young leaves, buds, and stems.**
  - **Leaves become curled and distorted.**
  - **Secrete honeydew, encouraging sooty mold growth.**
- **Control:**
  - **Spray Neem oil (1.5%) or Verticillium lecanii (bio-agent).**
  - **Use Imidacloprid 17.8 SL @ 0.3 ml/litre or Thiamethoxam 25 WG @ 0.2 g/litre.**

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4. Whiteflies (Bemisia tabaci)

- **Symptoms:**
  - Suck sap from underside of leaves.
  - Cause leaf yellowing, curling, and stunt plant growth.
  - Also transmit viral diseases like mosaic virus.

- **Control:**
  - Spray Neem oil (1–2%) as early prevention.
  - Use yellow sticky traps to trap adults.
  - Apply Buprofezin 25 SC @ 1 ml/litre or Imidacloprid.

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5. Spider Mites (Tetranychus urticae)

- **Symptoms:**
  - Tiny red mites on undersides of leaves.
  - Leaves show yellow specks, then turn bronze and dry up.
  - Fine webbing may be visible.

- **Control:**
  - Maintain field humidity; mites prefer dry conditions.
  - Spray Dicofol 18.5 EC @ 2.5 ml/litre or Abamectin 1.9 EC @ 0.5 ml/litre.
  - Use Sulfur dusting in dry conditions.

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6. Epilachna Beetle (Henosepilachna vigintioctopunctata)

- **Symptoms:**

- Adult beetles and larvae scrape chlorophyll off the leaf surface.
- Leaves appear skeletonized and eventually dry out.

◆ **Control:**

- Collect and destroy beetles and egg masses.
- Spray Carbaryl 50 WP @ 2 g/litre or Lambda-cyhalothrin @ 0.5 ml/litre

4) Nutrient Deficiencies in Bottle Gourd (Lauki)

1. Nitrogen (N) Deficiency

◆ Symptoms:

- Pale yellowing of older leaves starting from the base.
- Stunted growth and thin vines.
- Reduced leaf size and lower fruit yield.

◆ Cure – Fertilizers & Compost:

- Apply Urea @ 40–50 kg/acre or Ammonium sulfate.
- Use well-rotted FYM (Farmyard Manure) or vermicompost for gradual nitrogen release.
- Foliar spray: Urea 1% (10 g/litre water) once a week until recovery.

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2. Phosphorus (P) Deficiency

◆ Symptoms:

- Leaves turn dark green with purplish veins.
- Delayed flowering and poor root development.
- Stunted and weak plant structure.

🔸 Cure – Fertilizers & Compost:

- Apply Single Super Phosphate (SSP) @ 100 kg/acre or DAP.
- Add bone meal or rock phosphate in organic systems.
- Use phospho-compost during land preparation.

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3. Potassium (K) Deficiency

🔸 **Symptoms**:

- Leaf edges turn yellow or brown (scorching effect).
- Older leaves show marginal chlorosis and necrosis.
- Fruits are misshapen or small with poor keeping quality.

🔸 **Cure – Fertilizers & Compost**:

- Apply Muriate of Potash (MOP) @ 40–50 kg/acre.
- Use banana peel compost or wood ash as organic sources.
- Foliar spray: 1% Potassium sulfate for quick results.

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4. Calcium (Ca) Deficiency

🔸 **Symptoms:**

- New leaves curl, turn light green, and show signs of tip burn.
- Blossom end rot on young fruits (common in cucurbits).
- Poor fruit quality and short shelf-life.

🔸 **Cure – Fertilizers & Compost:**

- Apply Gypsum @ 100–150 kg/acre or calcium nitrate.
- Foliar spray: Calcium nitrate 0.5% (5 g/litre) during flowering and fruit setting.
- Use egg shell compost, lime, or bone meal in organic practices.

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5. Magnesium (Mg) Deficiency

🔸 **Symptoms:**

- **Yellowing between veins** of older leaves (interveinal chlorosis).
- Leaves may curl or dry from edges.
- Poor photosynthesis efficiency.

🔸 **Cure – Fertilizers & Compost:**

- Apply **Magnesium sulfate @ 10–15 kg/acre**.
- Foliar spray: **Epsom salt ($MgSO_4$) @ 1%** weekly.
- Add **composted green manure** like legume residues to enrich soil.

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6. Iron (Fe) Deficiency

🔸 **Symptoms:**

- **Young leaves turn pale yellow** with green veins (interveinal chlorosis).
- Affects top growth and slows plant development.
- Common in **alkaline soils** or over-irrigated fields.

🔸 **Cure – Fertilizers & Compost:**

- Apply **Ferrous sulfate @ 10–15 kg/acre.**
- Foliar spray: **Ferrous sulfate 0.5% solution.**
- Improve **soil pH** by adding **organic compost or sulfur.**

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7. Zinc (Zn) Deficiency

🔸 **Symptoms:**

- **Short internodes** and **small, distorted leaves.**
- Pale yellowing and poor flowering.
- Common in sandy or over-limed soils.

🔸 **Cure – Fertilizers & Compost:**

- Apply **Zinc sulfate @ 10–15 kg/acre** with compost.
- Foliar spray: **Zinc sulfate 0.5% + 0.25% lime.**
- Use **bio-compost enriched with micronutrients.**