Basic Information of Chili :

- **Name :**

Chili, also known as *Mirchi* in Hindi, belongs to the botanical species *Capsicum annuum* and is part of the Solanaceae family. It is cultivated widely for both green (fresh vegetable use) and red (dry spice use) purposes, depending on the variety and stage of harvesting.

• Best Season for growing :

Chili can be grown in different seasons depending on the region.
The Kharif season (monsoon crop) begins with sowing in June–July and harvesting around October–December.

The Rabi season is sown in October–November and harvested during February–April. Additionally,

Zaid or summer crops are planted in January–February, particularly under irrigated conditions.
The ideal temperature for chili cultivation ranges between 20°C and 30°C, and extreme cold or frost can severely affect growth and yield.

- **Best soil Type :**

Chili grows best in **well-drained sandy loam or loamy soils** enriched with organic matter. The optimum soil pH should be between **6.0 and 7.5**. Avoid heavy clay or water-logged soils, as poor drainage can lead to root rot and stunted growth. Proper soil preparation with adequate compost or farmyard manure improves soil structure and nutrient availability.

- **Time Period (Crop Duration):**

The total crop duration of chili varies depending on the variety and purpose (green or dry). Seedlings are usually ready for transplanting after 25–30 days of sowing in the nursery.

After transplanting, the first harvest can begin within 60–70 days. The total crop duration can range from 150 to 180 days for dry chili varieties. Green chili can be harvested every **7–10 days** once the plants start fruiting, while dry chili is picked once the fruits mature and turn red.

- **Estimated cost per acre :**

A. Seeds

- Seed rate: 200–250 grams/acre (for hybrids)
- Seed cost: ₹1,000 – ₹4,000 per acre (hybrid seeds are costlier)
- Nursery raising: Seedlings are raised in a separate bed for 25–30 days.

B. Land Preparation

- Operations: 2–3 ploughings + bed formation
- FYM/Compost: 8–10 tons/acre
- Cost: ₹5,000 – ₹7,000 per acre (including labor and compost)
- Objective: To ensure proper soil tilth, aeration, and nutrient availability

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C. Fertilization

- Basal Dose:
    - Nitrogen (N): 40–50 kg/acre

    - Phosphorus (P): 25–30 kg/acre
    - Potash (K): 25–30 kg/acre
- Split Application: Apply Nitrogen in 2–3 splits
- Micronutrients: Zinc, Boron, and Calcium as foliar sprays during flowering
- Cost: ₹4,000 – ₹6,000 per acre

D. Irrigation

- Schedule: Every 7–10 days during dry periods
- Drip irrigation: Highly recommended for saving water and enhancing yield
- Cost: ₹2,000 – ₹5,000 (or more if drip system is installed)

E. Planting

- Spacing: 45 cm × 45 cm or 60 cm × 60 cm (variety dependent)
- Plants per acre: Around 12,000–15,000
- Transplanting Cost: ₹1,500 – ₹2,000 (includes labor)

F. Pest & Disease Management

- Common Pests: Thrips, aphids, fruit borers, mites
- Diseases: Powdery mildew, damping-off, leaf curl virus

- Control Measures:
    - Insecticides: Spinosad, Imidacloprid, Emamectin benzoate
    - Fungicides: Mancozeb, Hexaconazole, Copper oxychloride
    - Neem oil/Trichoderma for biocontrol
- Cost: ₹5,000 – ₹8,000 per acre

G. Labor

- Activities: Transplanting, weeding, spraying, harvesting
- Labor cost: ₹8,000 – ₹12,000 per acre depending on location

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H. Harvesting

- Green chili: Start 60–70 days after transplanting, harvest every 7–10 days
- Dry chili: Harvest once fruits turn red and mature
- Yield:
    - Green chili: 80–100 quintals/acre
    - Dry chili: 15–25 quintals/acre (variety & season dependent)
- Cost of harvesting: ₹2,000 – ₹3,000

I. Post-Harvest Handling

- Drying (for red chili): Requires sun drying for 8–10 days
- Cleaning, grading, and packing
- Packaging cost: ₹1,000 – ₹2,000 per acre

K. Total Estimated cost

The total estimated cost of cultivating chili on one acre is around ₹45,000 to ₹60,000. This includes expenses for seeds (₹1,000–₹4,000), land preparation and manure (₹5,000–₹7,000), fertilizers and micronutrients (₹4,000–₹6,000), irrigation (₹2,000–₹5,000), transplanting and labor (₹3,500–₹5,000), pest and disease control (₹5,000–₹8,000), harvesting (₹2,000–₹3,000), and post-harvest handling (₹1,000–₹2,000).

- ## Varieties According to Need:

1) **For Green Chili (Fresh Market Use):**

- *Pusa Jwala* is a highly popular open-pollinated variety known for its slender, long, moderately pungent green fruits. It is early maturing and ideal for home use and fresh markets.
- *Pant C-1* is a semi-spreading plant type that produces dark green fruits, offers good yield, and is suitable for frequent harvesting.
- *Arka Lohit* serves dual purposes—used as green chili and also suitable for drying. It is moderately pungent and performs well under open field conditions.
- *Kashi Anmol* is a hybrid variety with disease resistance, high yield potential, and suitable for fresh green chili consumption.

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2) For Dry Red Chili (Processing, Storage & Spice Use):

- *Byadgi* is known for its low pungency and high ASTA color value, making it suitable for color extraction and dry spice preparation. It produces wrinkled, deep red fruits.

- *Teja* and *Guntur 334* are highly pungent varieties grown for dry chili powder and used in pickles and masala products. These are widely cultivated in Andhra Pradesh and Telangana.

- *Sankeshwari*, commonly grown in Maharashtra, is moderately pungent and used for both local spice use and trade.

- *LCA 334* and *LCA 625* are improved varieties that yield well and are widely used for producing quality dry red chili.

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3) For High Pungency (Hot and Spicy Chilis):

- *Teja* is one of the most pungent varieties and is a top choice for the production of chili powder with intense heat.

- *Guntur 273* is another very hot variety used for extremely spicy cooking and processing industries.

- *Bhaskar* is a hybrid type known for its strong pungency and suitability for both green and dry uses.

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4) For Low Pungency and High Color (Color Extraction & Export):

- *Byadgi* is the most preferred variety in this category for its deep red color and low heat content—used widely in oleoresin and pigment extraction.

- *KDL (Kaddi)* is a wrinkled type with high color value and low pungency, making it suitable for international export and spice blends.

- *Sindhur* is also a low-pungency variety with good pigment content used for natural food coloring.

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5) For Hybrid/High-Yielding Purpose:

- *Indam 5 (Syngenta)* is a popular hybrid offering good resistance to leaf curl and mosaic viruses, suitable for high-yield commercial cultivation.
- *Mahyco Jwalamukhi* is another hybrid known for its productivity, disease tolerance, and uniform fruit shape.
- *Seminis Abhinav* is a trusted hybrid that performs well under various conditions and produces quality green fruits.
- *Nunhems Super Hyt 37* is a high-yielding hybrid ideal for both green and dry markets.

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6) For Disease Resistance (For Low-Input Farming or Risk-Prone Areas):

- *Kashi Anmol* is tolerant to common viral diseases like leaf curl and die-back and performs well in humid areas.
- *Arka Meghana* offers tolerance to powdery mildew and is recommended for sustainable farming practices.
- *Arka Abhir* is a variety resistant to damping-off and moderately resistant to wilt, making it reliable for disease-prone soils.

2) Common Disease in Chili :

a. Powdery Mildew (Caused by *Erysiphe cichoracearum*)

1. Information:

A common fungal disease that appears during dry weather with high

humidity, often affecting older leaves first.

2. **Symptoms:**
   White, powdery patches on the upper and lower surfaces of leaves, stems, and sometimes fruits. Infected leaves turn yellow, curl, dry up, and fall off prematurely.

3. **Cure – Fertilizers/Fungicides:**
   Apply sulfur-based fungicides, or systemic fungicides like hexaconazole or karathane. Biofungicides like Trichoderma harzianum can also be effective.

4. **Preventions:**

- Use resistant varieties if available.

- Ensure proper spacing for air circulation.

- Avoid excess nitrogen fertilizer, which promotes soft tissue susceptible to infection.

- Remove and destroy infected leaves.

5. **Causes:**
   Favorable weather (dry conditions + high humidity), poor air circulation, and overcrowded planting.

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b. Damping-Off (Seedling Disease – *Pythium*, *Rhizoctonia*, *Fusarium*)

1. **Information:**
   Affects seedlings in the nursery or early growth stages, causing death before or just after emergence.

2 .Symptoms:

seedlings rot at the base, collapse, and die. Stem base becomes thin, soft, and water-soaked.

2. **Cure – Fertilizers/Fungicides:**
   Use soil drenches of Captan, Thiram, or Trichoderma viride. Apply bio-fungicides or neem cake to reduce fungal buildup.

3. **Preventions:**

- Use raised beds for nurseries.
- Treat seeds with fungicide or bioagents.
- Avoid overwatering and ensure good drainage.
- Sterilize soil before sowing.

5. **Causes:**
   High soil moisture, poor drainage, contaminated seeds or soil, and overcrowding in nurseries.

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c. Anthracnose (Fruit Rot/Die-Back – *Colletotrichum lagenarium*)

1. **Information:**
   A fungal disease mainly attacking fruits and sometimes leaves and stems**.**

2. **Symptoms:**
   Sunken, dark brown to black circular spots on fruits that may ooze orange-colored fungal spores. Lesions can spread rapidly under humid conditions.

3. **Cure – Fertilizers/Fungicides:**
   Spray with mancozeb, carbendazim, or chlorothalonil at early symptom appearance. Ensure balanced nutrition to strengthen plant resistance.

4. **Preventions:**

- Use certified, disease-free seeds.
- Avoid overhead irrigation.
- Rotate crops and destroy plant residues.
- Apply biofungicides preventively in nursery and field.

5. **Causes:**
   High humidity, splashing water, use of infected seeds, and previous crop residue harboring the fungus.

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d. Leaf Curl Virus (Transmitted by Whiteflies – *Bemisia tabaci*)

1. **Information:**
   A viral disease that causes curling and distortion of leaves, leading to stunted growth and reduced yield.

2. **Symptoms:**
   Leaves curl inward or downward, become thick and brittle. Plants are generally stunted with fewer flowers and fruits.

3. **Cure – Fertilizers/Insecticides:**
   There's no direct cure, but controlling the whitefly vector is key. Use imidacloprid, thiamethoxam, or azadirachtin (neem-based) to manage whitefly population. Supplement with balanced **fertilizers to support**

plant recovery.

4. **Preventions:**

- Use yellow sticky traps to monitor and reduce whitefly.
- Plant barrier crops (e.g., maize) around bottle gourd field.
- Grow resistant or tolerant varieties if available.
- Remove and destroy infected plants early.

5. **Causes:**
   Whitefly infestation, planting near infected crops, and lack of crop rotation.

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e. Wilt (Fusarium or Verticillium Wilt)

1. **Information:**
   Wilt diseases are caused by soil-borne fungi that infect the roots and vascular tissues, disrupting water transport.

2. **Symptoms:**
   Initial yellowing of lower leaves, followed by wilting and drooping. Vascular tissues show brown discoloration. Plants often die prematurely.

3. **Cure – Fertilizers/Fungicides:**
   Drench the soil with carbendazim or apply Trichoderma viride. Add compost rich in microbial activity (like vermicompost). Use Neem cake to suppress fungal spores.

4. **Preventions:**

- Rotate crops with non-cucurbits.
- Avoid waterlogging and improve drainage.
- Use resistant varieties and apply organic matter to maintain healthy soil flora.
- Solarize nursery beds before sowing.

5. **Causes:**
   Soil-borne fungal pathogens, poor drainage, repeated cropping in the same area, and weakened plants due to poor nutrition.

3) Pest and insect for Chili :

1. Aphids (Aphis gossypii, Myzus persicae)

1. **Symptoms:**

- Small, soft-bodied insects cluster on the undersides of young leaves and stems.
- Leaves curl, become sticky with honeydew, and may develop black sooty mold.
- Plant growth is stunted; fruit setting reduces.

2. **Cure:**

- Spray neem-based insecticides (Azadirachtin 1500 ppm or higher).
- For severe infestations, apply Imidacloprid 17.8% SL @ 0.3 ml/liter of water.
- Use yellow sticky traps to monitor and control.

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2. Thrips (Scirtothrips dorsalis)

1. **Symptoms:**

- Silvery streaks and patches on the upper surface of leaves.
- Leaf curling and drying of flower buds.
- Reduced fruit development and scarring of pods.

2. **Cure:**

- Spray Spinosad 45% SC @ 1 ml/liter or Fipronil 5% SC.
- Introduce predatory insects like lacewings or minute pirate bugs.
- Avoid excess nitrogen fertilizers that attract thrips.

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3. Whiteflies (Bemisia tabaci)

1. **Symptoms:**

- Tiny white insects fly up when the plant is disturbed.
- Leaves curl and turn yellow.
- Act as vectors for Chili Leaf Curl Virus (serious damage).

2. **Cure:**

- Use Imidacloprid 17.8% SL @ 0.3 ml/liter or Thiamethoxam 25% WG @ 0.25 g/liter.

- Apply neem oil (3-5 ml/liter) weekly as a preventive spray.
- Install yellow sticky traps in fields.

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4. Fruit Borer (Helicoverpa armigera)

1. **Symptoms:**

- Larvae bore into green or red fruits, making holes and feeding on the pulp.
- Affected fruits rot and drop early.
- Yield loss can be severe if unmanaged.

2. **Cure:**

- Spray Emamectin benzoate 5% SG @ 0.4 g/liter or Spinosad 45% SC @ 0.3 ml/liter.
- Install pheromone traps (5 per acre) for monitoring.
- Release Trichogramma parasitoids (biocontrol).

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5. Mites (Polyphagotarsonemus latus)

1. **Symptoms:**

- Leaf margins curl inward, turn bronze or dark green.
- Plants appear scorched, and fruit production is poor.

- Mites are too small to see easily without magnification.

2. **Cure:**

- Spray Abamectin 1.8% EC @ 0.5 ml/liter or Dicofol 18.5% EC.
- Use sulfur dust (2–3 kg/acre) if conditions are dry.
- Maintain weed-free fields to avoid habitat for mites.

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6. Cutworms (Agrotis spp.)

1. **Symptoms:**

- Young seedlings are cut at the base during nighttime.
- Damaged plants are wilted or dead the next morning.
- Soil near the base may show the pest curled underground.

2. **Cure:**

- Apply chlorpyrifos 20% EC @ 2.5 ml/liter as a soil drench.
- Dust Carbaryl 10% DP around the base of the plant.
- Use light traps to attract adult moths.

4) Nutrient Deficiencies in Chili :

1. Nitrogen (N) Deficiency

1. **Symptoms:**

- Pale green or yellowing (chlorosis) of older leaves.
- Stunted plant growth, poor fruit set, and fewer branches.
- Thin stems and small leaves.

2. **Cure:**

- Apply Urea (46% N) @ 50-60 kg/acre, or Ammonium Sulfate.
- For organic farming: Use well-decomposed farmyard manure (FYM), vermicompost, or fish emulsion.
- Neem cake can improve N availability while keeping soil healthy.

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2. Phosphorus (P) Deficiency

1. **Symptoms:**

- Purplish or reddish discoloration of older leaves and stems.
- Delayed flowering and fruit development.
- Weak root growth and stunted plants.

2. **Cure:**

- Apply Single Super Phosphate (SSP) @ 100-125 kg/acre.
- For organic: Use bone meal, rock phosphate, or poultry manure for slow-release phosphorus.

- Compost enriched with banana peels or wood ash helps too.

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3. Potassium (K) Deficiency

1. **Symptoms:**

- Marginal scorching or browning of older leaves.
- Fruits are small, deformed, and have poor shelf life.
- Plants are more prone to diseases.

2. **Cure:**

- Apply Muriate of Potash (MOP) @ 40-50 kg/acre.
- For organic: Use banana peel compost, wood ash, or potassium-rich compost tea.
- Sulphate of Potash (SOP) is recommended in chloride-sensitive soils.

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4. Calcium (Ca) Deficiency

1. **Symptoms:**

- Blossom end rot in fruits (dark, sunken spots at fruit tip).
- Young leaves appear distorted or hooked.
- Fruit wall may be thin and weak.

2. **Cure:**

- Apply Calcium Nitrate @ 10-15 kg/acre as foliar spray.
- Use dolomite lime or gypsum to enrich soil with calcium.
- Organic options: Crushed eggshells, bone meal, or liquid seaweed spray.

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5. Magnesium (Mg) Deficiency

1. **Symptoms:**

- Interveinal yellowing on older leaves while veins remain green.
- Leaves curl upward, and leaf drop increases.
- Weak stems and poor fruit development.

2. **Cure:**

- Apply Magnesium Sulfate (Epsom Salt) @ 10 kg/acre or spray 2% solution on leaves.
- Compost using green leaves, banana stems, or seaweed.

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6. Sulfur (S) Deficiency

1. **Symptoms:**

- Uniform yellowing (similar to nitrogen) but first seen in young leaves.
- Slowed plant growth and delayed flowering.

2. **Cure:**

- Apply Ammonium Sulfate or Gypsum.
- Organic sources include mustard cake, cow dung compost, and composted onion/garlic skins.

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7. Micronutrient Deficiencies

a) Zinc (Zn) Deficiency

- **Symptoms:** Short internodes, small leaves, and chlorosis in younger leaves.
- **Cure:** Apply Zinc Sulfate @ 10 kg/acre or foliar spray 0.5%. Use vermicompost + poultry manure.

b) Boron (B) Deficiency

- **Symptoms:** Cracked fruits, hollow fruit cavities, malformed young leaves.
- **Cure:** Apply Borax @ 1-2 kg/acre, or foliar spray with 0.2% solution.

c) Iron (Fe) Deficiency

- **Symptoms:** Interveinal chlorosis on young leaves.
- **Cure:** Foliar spray of ferrous sulfate (0.5%). Add compost tea from leafy greens.