

1. Potato

The potato (*Solanum tuberosum*) is an annual plant in the nightshade family (Solanaceae), cultivated worldwide for its starchy edible underground tubers, which serve as a major staple food crop providing carbohydrates, vitamins, and minerals.

1. How to Prepare Land for Potato Farming

Potato farming requires well-prepared soil to ensure good tuber development and prevent issues like rot or poor yields. Here's a step-by-step guide based on standard practices:

- **Clear the land:** Remove weeds, stumps, debris, and any previous crop residues to prevent disease carryover. This can be done manually or with herbicides if needed.
- **Test and amend soil:** Aim for loose, well-draining sandy loam soil with a pH of 5.0-6.5 (slightly acidic to reduce scab risk). Test soil for nutrients and pH, then incorporate organic matter like compost or well-rotted manure (about 2-3 inches deep) to improve fertility and structure. Avoid fresh manure, as it can introduce diseases.
- **Till or plow the soil:** Loosen the soil to a depth of 8-12 inches using a plow, tiller, or rotovator to create a fine tilth (crumbly texture). This promotes root growth and aeration. In heavier clay soils, add sand or gypsum for better drainage.
- **Form rows or beds:** Create raised rows or ridges (about 8-12 inches high and 2-3 feet apart) for planting to improve drainage and warmth. In wet areas, use raised beds to prevent waterlogging.
- **Timing and final prep:** Prepare in fall or early spring, allowing soil to settle. Ensure the site gets full sun (at least 6-8 hours daily) and has access to irrigation.

Always use certified disease-free seed potatoes and rotate crops every 3-4 years to maintain soil health.

2. Main Difficulties Faced and Common Diseases

Potato farming involves several challenges that can impact yield, quality, and profitability. Key difficulties include:

- **Environmental and soil issues:** Poor soil conditions (e.g., cold, wet, or compacted clay), water scarcity or excess, and extreme weather like frost or drought can lead to low germination, stunted growth, or tuber defects. Rising input costs (fertilizers, labor) and labor shortages also strain operations.
- **Pests and market factors:** Insect pests (e.g., Colorado potato beetle, aphids), pesticide resistance, and regulations limit control options. Transportation damage, market volatility, and supply chain issues (e.g., bumpy roads causing bruising) add economic pressure.
- **Planting and management errors:** Improper planting depth/spacing, over-fertilization, or inadequate hilling can cause uneven emergence or exposed tubers turning green (toxic).

Common diseases, often fungal, bacterial, or viral, are a major hurdle:

- Late blight (*Phytophthora infestans*): Causes dark lesions on leaves/stems and tuber rot; thrives in cool, wet conditions.
- Early blight (*Alternaria solani*): Leads to brown spots/rings on leaves, reducing photosynthesis; common in warm, humid areas.
- Common scab (*Streptomyces scabies*): Results in rough, corky lesions on tubers; linked to high soil pH and dry conditions.
- Blackleg and soft rot (*Pectobacterium/Erwinia spp.*): Bacterial; causes stem wilting, blackening, and mushy tubers in wet soils.
- Verticillium wilt (*Verticillium dahliae*): Soilborne fungus causing yellowing, wilting, and yield loss.
- Leafroll virus: Viral; spread by aphids, leading to rolled leaves and reduced tuber size.

Other issues include black scurf (*Rhizoctonia solani*), dry rot (*Fusarium spp.*), and silver scurf.

3. Solutions for the Diseases

Effective management combines prevention, cultural practices, and targeted treatments. Always prioritize integrated pest management (IPM) to minimize chemical use.

- **General preventive measures:** Use certified disease-free seed potatoes and treat them with fungicides before planting. Practice crop rotation (3-4 years with non-Solanaceae crops like grains) to break disease cycles. Maintain field sanitation by removing infected debris and weeds.
- **For late blight:** Plant resistant varieties (e.g., 'Defender'). Apply protective fungicides like chlorothalonil or copper-based products preventively in wet weather. Irrigate in the morning to allow foliage to dry.
- **For early blight:** Use fungicides such as mancozeb. Ensure good air circulation by spacing plants 12-18 inches apart. Mulch to reduce soil splash.
- **For common scab:** Lower soil pH below 5.2 if needed, keep soil consistently moist during tuber formation, and avoid lime. Use resistant varieties like 'Russet Burbank'.
- **For blackleg/soft rot:** Improve drainage and avoid overwatering. Use bactericides if outbreaks occur, and harvest in dry conditions to prevent wounds.
- **For Verticillium wilt:** Soil fumigation or biofumigants (e.g., mustard cover crops). Choose resistant varieties and rotate with non-hosts.
- **For leafroll virus:** Control aphids with insecticidal soaps, neem oil, or systemic insecticides. Rogue (remove) infected plants early.

For biocontrol options, introduce beneficial microbes or use biopesticides like Bacillus-based products. Monitor fields regularly and consult local extension services for region-specific advice.

2.Tomato

The tomato (*Solanum lycopersicum* L., formerly *Lycopersicon esculentum*) is a warm-season annual plant belonging to the nightshade family (Solanaceae). It is one of the most widely grown vegetable crops in the world, valued for its juicy fruits that are rich in vitamins C and A, lycopene, and antioxidants.

1. How to Prepare Land for Tomato Farming

- Select the site: Choose a field with full sunlight (minimum 6–8 hours/day), good air circulation, and protection from strong winds.
- Soil type & pH: Well-drained sandy loam or loamy soil is ideal. Target pH 6.0–6.8 (slightly acidic to neutral).
- Clear the land: Remove weeds, stones, and all residues of previous crops (especially Solanaceae family crops) to avoid disease carry-over.
- Deep ploughing: Plough or till the soil 25–30 cm deep 2–3 times to achieve a fine tilth.
- Add organic matter: Incorporate 20–25 tons/ha of well-decomposed farmyard manure (FYM) or compost 2–3 weeks before planting.
- Basal fertilizers: Apply N:P:K at 50:100:100 kg/ha (e.g., 10 tons FYM + 500 kg DAP + 165 kg MOP) and mix well into the soil.
- Form raised beds or ridges: – In rainy/wet zones → raised beds 15–20 cm high, 1–1.2 m wide. – In dry zones → flat beds or ridges 75–90 cm apart.
- Install drip irrigation + black/silver mulch (highly recommended for commercial farming to control moisture and weeds).
- Fumigation (optional): In fields with history of soil-borne diseases, solarization (cover with plastic for 4–6 weeks in summer) or chemical fumigation can be done.

2. Main Difficulties Faced & Common Diseases in Tomato

Major farming difficulties

- Extreme temperatures (below 15 °C or above 35 °C → flower drop & poor fruit set)
- Heavy rain → fruit cracking, blossom-end rot, and fungal outbreaks
- Water stress → blossom-end rot and reduced yield
- High labour requirement for staking, pruning, and repeated spraying
- Rapid price fluctuation in the market
- Short shelf-life and transport damage

Most common and destructive diseases

1. Late blight – *Phytophthora infestans* (cool + wet weather)

2. Early blight – *Alternaria solani* (warm + humid)
3. Septoria leaf spot – *Septoria lycopersici*
4. Bacterial wilt – *Ralstonia solanacearum* (soil-borne, deadly in wet zones)
5. Fusarium wilt – *Fusarium oxysporum* f.sp. *lycopersici*
6. Verticillium wilt – *Verticillium dahliae*
7. Tomato leaf curl virus (ToLCV) – transmitted by whitefly (very serious in Sri Lanka & South Asia)
8. Blossom-end rot – physiological disorder (calcium deficiency due to irregular watering)
9. Bacterial spot – *Xanthomonas* spp.
10. Powdery mildew – *Leveillula taurica* (dry weather)

3. Solutions & Management for the Diseases

Disease	Key Preventive & Curative Measures
Late blight	Resistant hybrids (e.g., Ruchi, Lakshmi), weekly preventive spray of Mancozeb/Chlorothalonil + Metalaxyl or Ridomil Gold, remove lower leaves for ventilation
Early blight & Septoria	Mancozeb, Chlorothalonil, Azoxystrobin, Copper oxychloride sprays every 7–10 days; stake plants well
Bacterial wilt	Use resistant rootstocks (e.g., Hawaii 7996), crop rotation 3–4 years, soil solarization, bio-agent Trichoderma + Pseudomonas fluorescens
Fusarium & Verticillium wilt	Grafting on resistant rootstocks (Beaufort, Maxifort), soil application of Trichoderma viride, carbendazim drench
Tomato leaf curl virus (ToLCV)	Grow resistant/tolerant varieties (e.g., Tharindu, Rajitha, Lanka Cherry), install yellow sticky traps, spray Imidacloprid/Thiamethoxam for whitefly every 10 days, use 40–50 mesh insect net in nurseries
Blossom-end rot	Maintain even soil moisture (drip irrigation), foliar spray of Calcium nitrate or CaCl_2 (0.5 %) every 10–15 days
Bacterial spot	Copper-based sprays (Kocide, Cuprofix), avoid overhead irrigation, remove infected plants immediately
Powdery mildew	Sulphur-based fungicides or Hexaconazole sprays
General best practices	<ul style="list-style-type: none"> • Always start with healthy, certified seedlings (preferably raised in insect-proof nursery).

- 3–4 year crop rotation with non-Solanaceae crops (rice, maize, legumes).
- Regular scouting and early removal of infected plants/leaves.
- Mulching + drip irrigation = reduces almost 70 % of disease problems.
- Integrated approach: resistant varieties + cultural practices + need-based chemical sprays.