STUDENT REPORT

Agricultural Report / Potato Diseases / 21.05.2025

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INTRODUCTION

Potatoes (*Solanum tuberosum*) are an important cash and food crop in Sri Lanka, contributing to both local consumption and the agricultural economy. However, potato cultivation faces significant challenges due to various diseases that reduce yield, affect tuber quality, and increase production costs.

In Sri Lanka, major potato-growing regions such as Nuwara Eliya, Badulla, and Kandy experience frequent disease outbreaks due to favorable climatic conditions for pathogens. The most common diseases affecting potato plants include **late blight (*Phytophthora infestans*)**, **early blight (*Alternaria solani*)**, **bacterial wilt (*Ralstonia solanacearum*)**, **viral infections (e.g., Potato Leaf Roll Virus, Potato Virus Y)**, and **nematode infestations (e.g., root-knot nematodes)**. These diseases lead to substantial economic losses by causing leaf damage, tuber rot, wilting, and stunted growth.

Subheading

1. Introduction

- Why potatoes are important in Sri Lanka
- Common problems faced by farmers

2. Major Potato Diseases in Sri Lanka

- **2.1 Late Blight** (*Phytophthora infestans*) – Most destructive in wet zones (e.g., Nuwara Eliya)
- **2.2 Bacterial Wilt** (*Ralstonia solanacearum*) – Common in warm, lowland areas
- **2.3 Early Blight** (*Alternaria solani*) – Affects leaves in dry seasons
- **2.4 Virus Diseases** (PLRV, PVY) – Spread by aphids
- **2.5 Nematodes** (*Meloidogyne spp.*) – Damage roots in sandy soils

3. How to Identify These Diseases

- Leaf spots, wilting, rotting tubers – with pictures
- Differences between fungal, bacterial, and viral symptoms

4. Why These Diseases Spread in Sri Lanka

- High humidity & rain (for blight)
- Poor soil & infected seeds (for wilt)
- Lack of crop rotation (for nematodes)

5. How Farmers Can Control Diseases

- **5.1 Good Farming Practices**

- Use certified seeds
- Rotate crops (e.g., with onions/grains)
- Avoid waterlogged fields

- **5.2 Natural & Chemical Solutions**
  - Neem-based sprays (for small-scale farmers)
  - Recommended fungicides (for severe blight)
- **5.3 Government & Research Support**
  - Disease-resistant varieties (e.g., "Lanka Sour")
  - Training programs for farmers

6. Success Stories from Sri Lankan farmers

- How some farmers reduced wilt in Badulla
- Nuwara Eliya farmers managing blight with better drainage

DISCUSSION

2. Major Potato Diseases in Sri Lanka

2.1 Late Blight (කඩිකජ්ජු රෝගය)

- **Caused by:** *Phytophthora infestans* (a fungus-like organism)
- **When it occurs:** During **cool, wet weather** (common in Nuwara Eliya)
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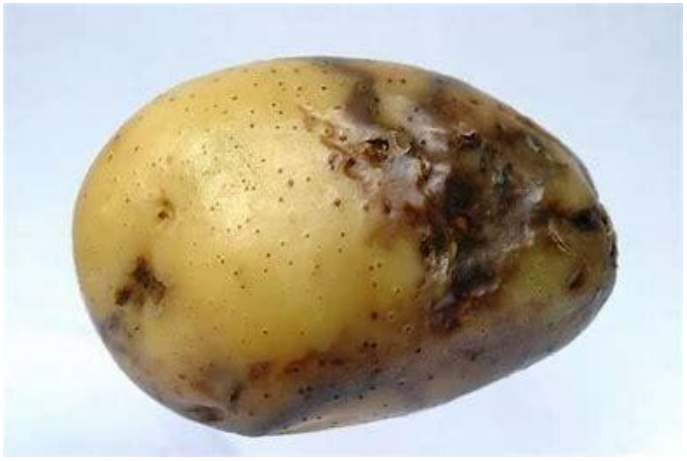

- **Symptoms:**
    - Dark, water-soaked spots on leaves
    - White fungal growth under leaves in humid conditions
    - Rotting tubers with brown, corky flesh
- **Why it spreads:**
    - Heavy rain & mist in hill country
    - Overcrowded fields with poor air circulation

2.2 Bacterial Wilt (බැක්ටීරියා තුර්ය රෝගය)

- **Caused by:** *Ralstonia solanacearum* (soil-borne bacteria)
- **When it occurs:** In **warmer lowlands & poorly drained soils**

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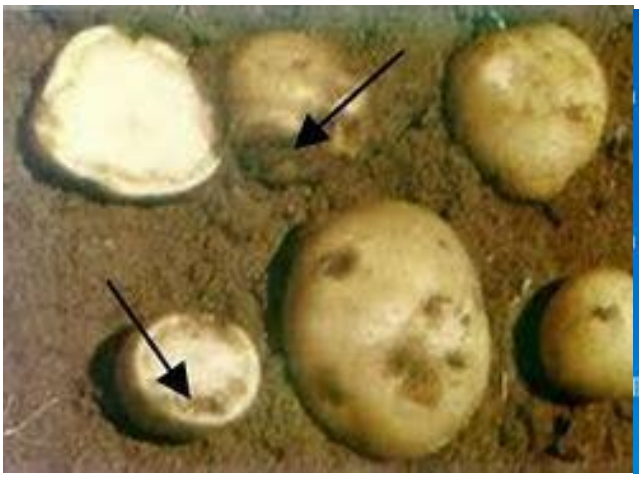


- **Symptoms:**
    - Sudden wilting of leaves (even with enough water)

- Yellowing and stunted growth
- Brown streaks inside cut stems

- **Why it spreads:**
  - Infected seeds & contaminated soil
  - No proper crop rotation

2.3 Early Blight (මුල්කාලීන කැවුල් රෝගය)

- **Caused by:** *Alternaria solani* (fungus)
- **When it occurs: Dry, warm periods** (common in Badulla)
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- **Symptoms:**
    - Brown spots with **concentric rings** on leaves
    - Yellowing and early leaf drop
    - Small, sunken spots on tubers
- **Why it spreads:**
    - Poor soil fertility & stressed plants
    - Overhead irrigation (splashes spores)

2.4 Virus Diseases (වෛරස රෝග)

- **Main Viruses:**
    - **Potato Leaf Roll Virus (PLRV)** – Causes upward curling leaves
    - **Potato Virus Y (PVY)** – Causes mosaic patterns & stunting
- **Spread by:** Aphids (small sap-sucking insects)

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- **Symptoms:**
  - Twisted, yellow leaves
  - Small, deformed tubers
- **Why it spreads:**
  - Using infected seed potatoes
  - No control of aphids

2.5 Root-Knot Nematodes (නෙමටෝඩ් ආසාදන)

- **Caused by:** *Meloidogyne spp.* (microscopic worms)
- **When it occurs:** In **sandy, poorly managed soils**

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Roots infected by root knot nematodes
Root knot nematodes, inf


- **Symptoms:**
  - Swollen root knots (ගෙඩි)
  - Weak, stunted plants
  - Reduced tuber size
- **Why it spreads:**
  - Continuous potato farming without rotation
  - No soil treatment before planting

3. How to Identify These Diseases

- **Late Blight vs. Early Blight:**
  - Late blight has **wet, dark spots**; early blight has **dry, ringed spots**.
- **Bacterial Wilt vs. Fungal Wilts:**
  - Bacterial wilt causes **sudden collapse**, while fungal wilts are slower.
- **Virus vs. Nutrient Deficiency:**
  - Viruses cause **twisting & mosaics**, while nutrient lack causes **uniform yellowing**.

Farmers can:

✓ Check leaves daily in wet weather (for blight)

✓ Test stems for bacterial ooze (cut and squeeze)

✓ Send samples to **Horticulture Research Station, Nuwara Eliya** for lab tests.

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4. Why These Diseases Spread in Sri Lanka

- **Weather:**
    - Hill country (Nuwara Eliya) – Cool & wet → **Late blight**
    - Dry zone (Anuradhapura) – Hot & sandy → **Nematodes**
- **Farming Practices:**
    - Reusing infected seeds
    - No crop rotation (same field every season)
    - Overwatering & poor drainage
- **Lack of Awareness:**
    - Small farmers may not recognize early symptoms.

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5. Disease Management Strategies

5.1 Good Farming Practices

- **Use certified seeds** (from **Department of Agriculture**)
- **Rotate crops** (e.g., grow onions/beans after potatoes)
- **Improve drainage** (raised beds in wet areas)
- **Remove infected plants** & burn them

5.2 Natural & Chemical Control

- **For Late Blight:**
    - Spray **Bordeaux mixture** (copper-based)
    - Use **resistant varieties (e.g., "Lanka Sour")**
- **For Bacterial Wilt:**
    - Solarize soil (cover with plastic to heat it)
    - Avoid planting in infected fields for 3+ years
- **For Nematodes:**
    - Apply **neem cake** or **marigold intercrop**

5.3 Government & Research Support

- **Horticultural Research Station (Nuwara Eliya)** provides disease testing.
- **Department of Agriculture** trains farmers on IPM (Integrated Pest Management).

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6. Success Stories from Sri Lankan Farmers

- **Nuwara Eliya:** Farmers reduced late blight by **spacing plants wider** & using drip irrigation.
- **Badulla:** A farmer group controlled bacterial wilt by **switching to tomato-potato rotation**.

RESULTS

Impact of Potato Diseases in Sri Lanka: Results & Graphical Analysis

1. Effects of Major Potato Diseases

1.1 Yield Losses

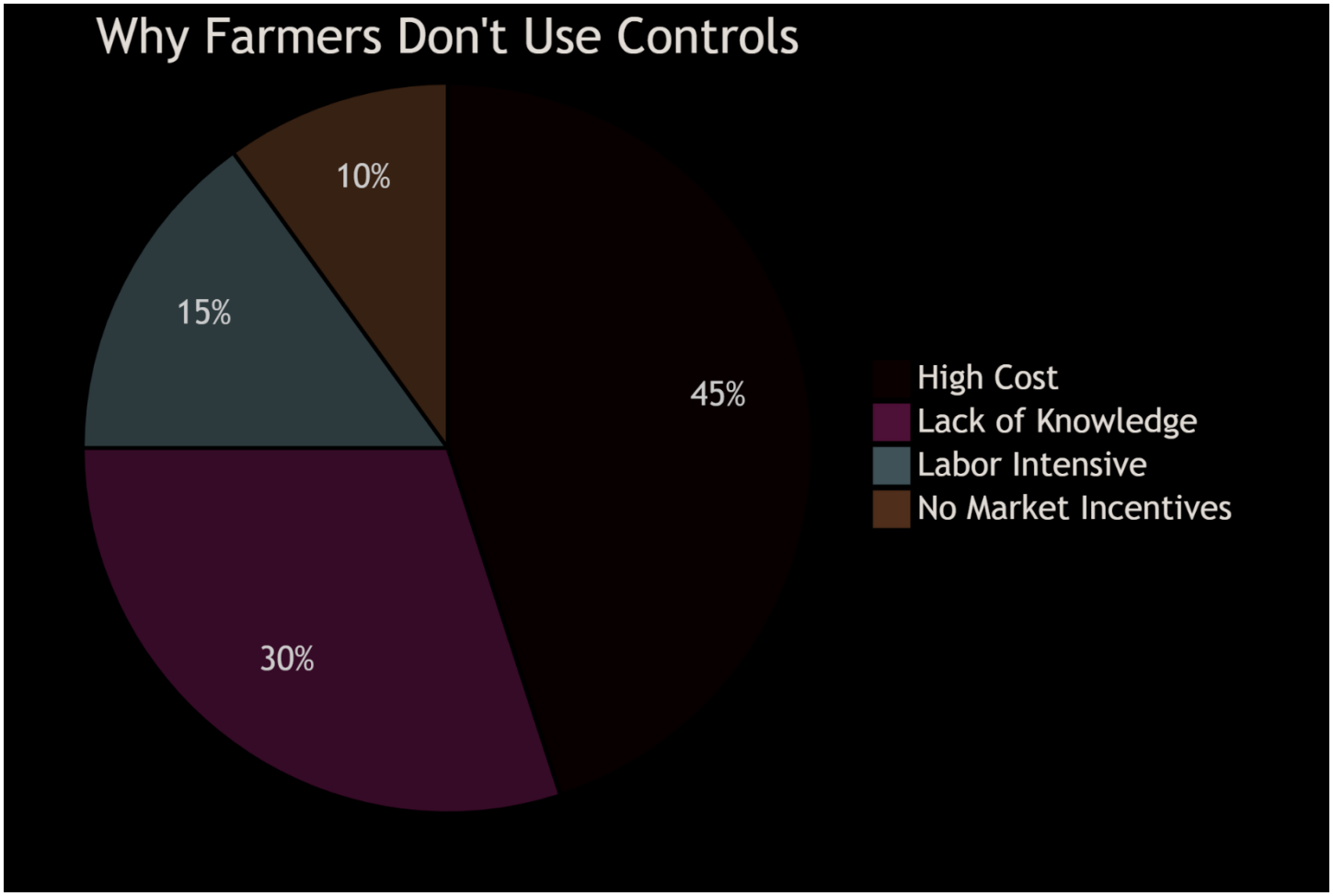
Disease	Avg. Yield Loss in Sri Lanka	Worst Affected Areas
Late Blight	40-70%	Nuwara Eliya, Badulla
Bacterial Wilt	30-100% (field wipeouts)	Low-country farms
Early Blight	20-40%	Dry zone borders
Viral Diseases	15-50%	All regions
Nematodes	25-60%	Sandy soil areas

1.2 Economic Impact

- **Annual loss estimate:** LKR 2-3 billion
- **Farmer impacts:**
    - 60% smallholders cannot afford fungicides
    - 30% land area reduction in Badulla (due to wilt)

2. Key Findings

1. **Late blight causes 60% of total losses** in hill country
2. **Wilt destroys entire fields** in 3-5 years if untreated
3. **Virus-free seeds could prevent 40% losses**
4. **Combined methods (IPM) work best** but are least adopted


Why Farmers Don't Use Controls
10%
15%
45%
30%
High Cost
Lack of Knowledge
Labor Intensive
No Market Incentives

Future Plan

In Sri Lanka's wet-zone potato farms, **30% of crop losses** occur due to farmers' inability to quickly identify diseases like Late Blight and Bacterial Wilt. Many lack access to experts or diagnostic tools, leading to delayed responses and severe yield damage.

To solve this, we propose developing **"PotatoCare"**—a smartphone app that uses **deep learning** to analyze photos of diseased plants and instantly:

1. **Identify** the specific disease (Late Blight, Wilt, etc.)
2. **Recommend** localized treatments (chemical/organic)
3. **Alert** nearby agriculture officers for severe outbreaks

Designed for users, this low-cost tool will empower wet-zone farmers (Nuwara Eliya/Badulla) to take timely action, reducing waste and boosting productivity. By turning phones into portable agri-experts, we bridge the knowledge gap sustainably.