



Japan International Cooperation Agency



Agriculture and Food Authority  
Horticultural Crops Directorate



Ministry of Agriculture, Livestock and Fisheries  
State Department for Crop Development & Agricultural Research

## Smallholder Horticulture Empowerment & Promotion Project for Local and Up-Scaling (SHEP PLUS)

“Changing Farmers’ Mindset from “Grow and Sell” to **“Grow to Sell”**”

# POTATO PRODUCTION

Presented to the County & AFA (HCD) Staff in charge of the  
SHEP PLUS Model Farmer Groups during the FT-FaDDE

Prepared by SHEP PLUS

# 1. Introduction:

## 1.1 Background



Photo: SHEP PLUS

## Potato (Viazi)

# 1. Introduction:

## 1.1 Background

- Herbaceous perennial cultivated as an **annual crop**
- The crop is grown for its **tuber**, an underground stem
- **Rich in starch** (8 – 28 %) but **low in protein** (1 – 4 %)
- It is also **rich in Vitamin C**
- **2<sup>nd</sup> most important food crop** after maize and a valuable cash crop to many smallholders
- Can be utilized **boiled, baked, mashed** or **fried** into chips or crisps

# 1.2 Common Varieties

1-2



1-3



Photo: © A.A. Seif (CC BY-NC-SA 3.0)

<http://www.infonet-biovision.org/PlantHealth/Crops/Potato-Seed-Production>

**“Tigoni”**

**“Asante”**

# 1.2 Common Varieties

## Released varieties (1998 by KARI-Tigoni):

### “Tigoni”:

- Tall variety with upright stem
- Produces white flowers and tubers are long oval with white smooth skin
- Has poor tuber storage and short tuber dormancy
- Optimal production altitude: **1,800 – 2,600 m**
- Maturity Period: **3 – 4 month**
- Tolerant to **Late Blight**
- **Has high dry matter content**
- Yield: **14,000 – 18,000kg per acre**
- Use: chips, mashing, boiling, baking, roasting

# 1.2 Common Varieties

## “Asante”:

- Stems are upright to semi-upright, medium height
- Tubers are round and have pink smooth skin
- Tuber dormancy is short
- Optimal production altitude: **1,800 – 2,600 m**
- Maturity Period: **3 – 4 month**
- Has high dry matter content
- Fairly tolerant to **Late Blight**
- Yield: **14,000 – 18,000kg per acre**
- Use: chips, mashing, roasting, baking

# 1.2 Common Varieties

1-4



Photo: © International Potato Centre Sub Saharan Africa (CC BY-NC-SA 2.0)

## “Shangi”

# 1.2 Common Varieties

## ‘Shangi’

- Highly prolific, versatile use
- About **1m** high, upright growth
- Broad leaves, light in color
- Abundant flowers,
- Oval tubers, uniform in grading, white flesh
- Medium to deep eye with pink pigmentation
- Very short dormancy
- Matures in **3-4** months
- Yield **30,000-40,000kg per acre**
- Moderately susceptible to late blight
- Good for mashing, boiling, Roasting, chips
- Altitude range **1500-2800m** asl



# 1.2 Common Varieties Cont'

Released varieties (2010 by KARI-Tigoni):

“Kenya Mpya”:

- Tall plant (about 1 m) with good ground cover
- Flowers are white
- Tubers have Cream white skin color with pink shallow eyes
- Optimal production altitude: **1,400 – 3,000 m**
- Resistant to **Late Blight**
- **Early tuberization**: large size, oval/round tubers
- Good storability
- Short dormancy
- Maturity Period: **3 – 3.5 month**
- Yield: **14,000 – 18,000kg per acre**
- Use: boiling, roasting, mashing, chips

# 1.2 Common Varieties Cont'

## Released varieties (2010 by KARI-Tigoni) Cont':

### “Sherekea”:

- Medium sized plant which produces abundant light purple flowers
- Tubers are oblong/round and have red skin
- High number of tubers per plant
- Good storability
- Long tuber dormancy
- Optimal production altitude: **1,800 – 3,000 m**
- Maturity Period: **3.5 – 4 month**
- Yield: **16,000 – 20,000kg per acre**
- High resistance to **Late Blight** and viruses (PVY and PLRV)
- Use: boiling, roasting, mashing, chips, crisps

# 1.2 Common Varieties Cont'

## Released varieties (2010 by KARI-Tigoni) Cont':

### “Purple Gold”:

- Medium sized plant with purples flowers
- Tubers are round and have dark purple skin with white flesh eyes
- Has long tuber dormancy
- Has excellent crisping quality
- It is predominantly grown in Narok but can be grown in other areas
- Moderate resistance to late blight, PLRV but susceptible to PVY
- Tolerant to most soil borne diseases
- It is resistant to greening and has good storability
- Yields **10,000 – 14,000kg per acre**
- Uses: mashing, boiling, roasting and chips

# 1.2 Common Varieties Cont'

**Other varieties grown in Kenya:**

**“Kerr’s Pink”** (also known as **“Mew Pink”**)

- Tall plant with white flowers
- Tubers have oval shape with red skin
- Tolerant to drought but susceptible to late blight
- Maturity: **2-3** months
- Yields: **10,000-12,000kg** per **acre**

**“Dutch Robijn”**

- Medium plant height with upright stem which produces white flowers
- Tubers are round and red skin in color with good storage and long dormancy
- Yield: **14,000-16,000kg** per **acre**

**“Nyayo”, “Roslin Tana”**

# 1.2 Common Varieties Cont'

## Other varieties grown in Kenya Cont':

- Varieties released in **2002** with yield potential of **14,000–18,000kg per acre** include Kenya **Sifa**, Kenya **Karibu**, Kenya **Faulu** and Kenya **Mavuno**
- Other varieties: **Ambition**, **Annet**, **Arizona**, **Arnova**, **Caruso**, **Desire**, **Destiny**, **Mayan Gold**, **Saviola**, **Toluca**

## Note:

- Maturity period is dependent on the **cultivar** and **climatic conditions**
- The national average yield is **3,100kg per acre**
- With use of **disease-free seed** and **good management**, yield potential can rise to **8,000 per acre**

# 1.3 Optimal Ecological Requirements

<b>Altitude</b>	<b>1,500 – 2,800 Meters Above Sea Level</b>
<b>Rainfall</b>	<b>850 – 1,200 mm of rainfall</b>
<b>Growing Temperature</b>	<b>15 – 20<sup>0</sup>C</b>
<b>Soils</b>	<ul style="list-style-type: none"><li>• <b>Well drained medium loams</b></li><li>• <b>pH range 5.5 – 7.5</b></li></ul>

## 2. G20 technologies

### ➤ **Make sure to support farmers carry out G20 techniques for any crop**

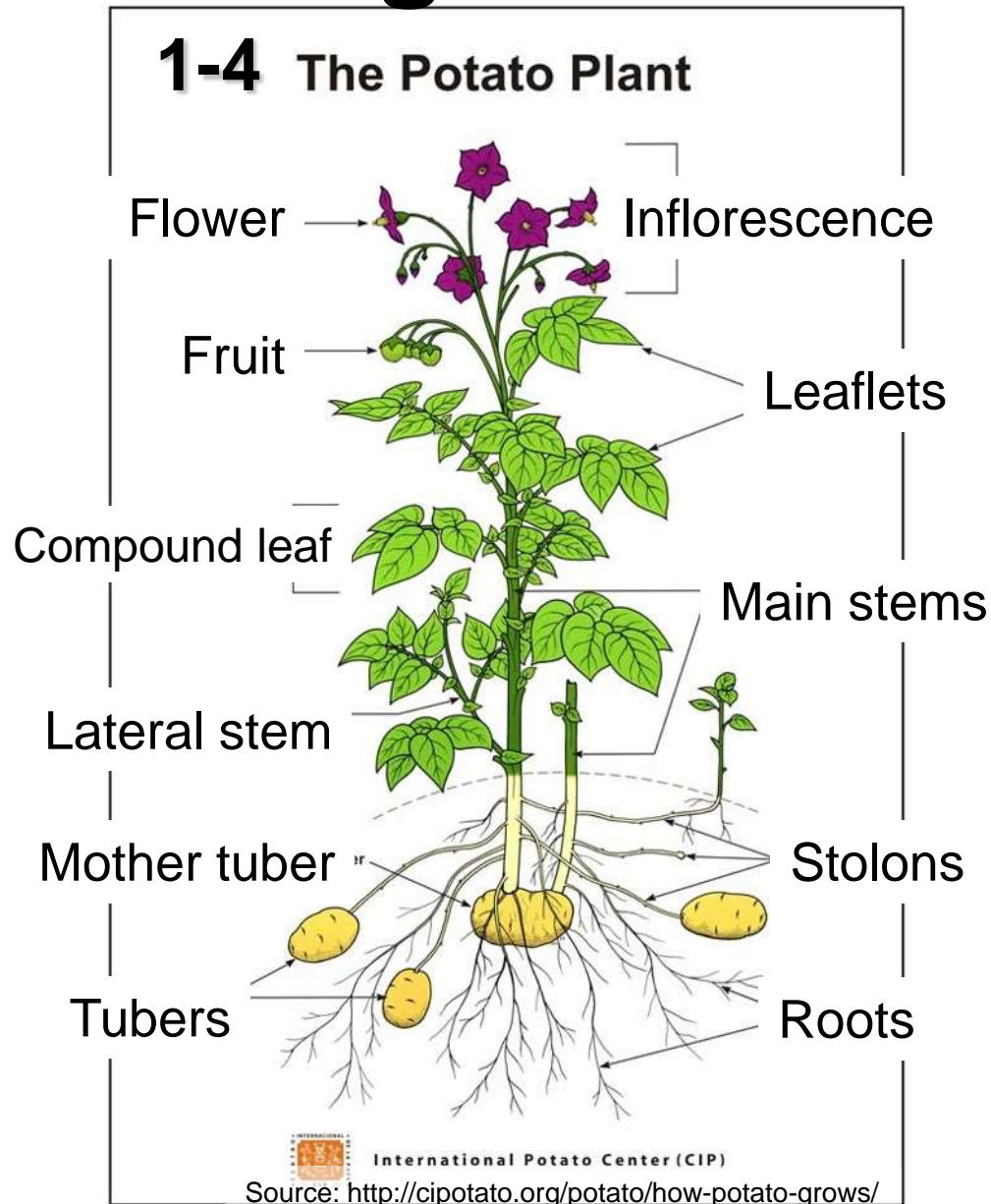
1. Market survey
2. Crop planting calendar
3. Soil testing
4. Composting
5. Use of quality planting materials
6. Recommended land preparation practices
7. Incorporating crop residues
8. Basal application of compost/ manure
9. Recommended practices of seedling preparation/ seedlings from registered nursery

## 2. G20 technologies

10. Recommended spacing
11. Recommended fertilizer application rate
12. Supplementing water
13. Timely weeding
14. Top-dressing
15. IPM practices
16. Safe and effective use of pesticides
17. Use of harvesting indices
18. Appropriate post harvest handling containers
19. Value addition techniques
20. Keeping farm records



# 3 Growth Stage



# 3. Growth Stage

## Growth Stage 1:

- **Sprout development:** Sprout develop from the eyes using energy from the seed tuber

## Growth Stage 2:

- **Vegetative growth:** Development of leaves, branches and stolons
- Growth stage 1 and 2 takes roughly **4 – 10 weeks** depending on environmental conditions, physiological age of the tubers & kind of variety

## Note:

- Stages **1 – 2** takes **4 – 10** weeks

# 3. Growth Stage Cont'

## Growth Stage 3:

- **Tuber set (initiation):** Tubers begin to form at the stolon tips but with little enlargement
- Flowering starts at the end of this stage and takes **2 weeks**

## Growth Stage 4:

- **Tuber bulking:** Tuber enlargement caused by accumulation of water, nutrients & carbohydrates
- Critical stage for yield & quality
- This stage is the longest and can last **up to 3 months**

# 3. Growth Stage Cont'

## Growth stage 5:

- **Maturation:** Vines turn yellow & tuber growth slows down
- Decline in photosynthesis
- Dry matter content is at maximum

# 4.1 Crop Planting Calendar

## CROP PLANTING CALENDER – MERU

Oct	Nov	Dec	Jan	Feb	Mar	Apr	
<p>Bed Preparation: Plough land thoroughly &amp; make furrows Fertilizer (DSP): 200 kg/acre</p> <p>Planting: 800-1,000kg of seed tubers /acre</p> <p>Spacing:75x30cm Depth: 10cm</p> <p>Sprouts should face upwards</p>	<p>Weeding done after germination</p> <p>Ridge or earth up the rows as the potato grows</p>	<p>Weed, pests &amp; diseases control</p>	<p>Harvesting starts 105 – 130 days after planting (depending on variety)</p> <p>Sorting &amp; grading</p> <p>Yields 3,000- 16,000kg per acre</p> <p>Marketing</p>	<p><b>Peak demand for Potato</b></p>			

## A Sample of a Potato Planting Calendar

# 4.2 Quality Seed/Planting Materials

**2-5**

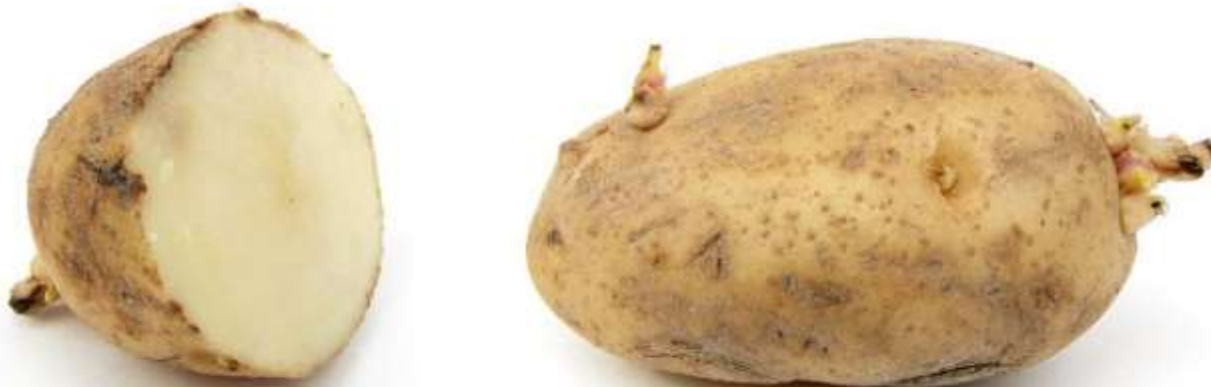


Photo: By ZooFari - Own work, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=8870305>

**A sprouting seed potato**

# 4.2 Quality Seed/Planting Materials (GHCP&PHHT20: Q5)

- Use **disease-free** or **certified seed**
- Certified seed potatoes have 2 grades:
  - **Size I:** Small sized seed potatoes (**28 – 45 mm** diameter)
  - **Size II:** Medium sized seed potatoes (**45 – 55 mm** diameter)
- Production of basic seed is undertaken by **KALRO Tigoni**
- Bulking of basic seed is done by various organizations such as **ADC Farm in Molo, Kisima Farm in Meru, ATCs** and **selected individual farmers**
- Seed tubers are kept in diffuse light to allow short strong sprouts to grow: this is to ensure a uniform stand

# 4.3 Planting



Photos: SHEP PLUS

## Planting of seed potatoes



# 4.3 Planting

## 4.3.1 Appropriate Time:

- Planting is done **at the onset of the rains** (long & short) since most production in the country is rain fed and is done **twice a year**
- **Seeding rate: 800 – 1,000 kg/acre**

## 4.3.2 Recommended Spacing (**GHCP&PHHT20: Q10**):

- **20 – 30 cm** (intra row) and **60 – 90 cm** (inter row)
- Plant population: **14,800-33,333 tubers** per acre
- Planting depth is **10 cm** and the sprouts should be placed facing upwards & the seed covered by a layer of soil

# 4.3 Planting Cont'

## 4.3.3 Fertilizer Application Rates

**(GHCP&PHHT20: Q11):**

- DAP at **200kg/acre** (about **1 kg** of **DAP** for **25m** of furrow)
- On acidic soils, **DSP/TSP 80kg/acre** & **CAN 120kg/acre** should be used, depending on the result of soil analysis

# 4.4 Water Requirement



**Vigorous potato crop**

# 4.4 Water Requirement

## (GHCP&PHHT20: Q12)

- Potatoes require **850 – 1,200 mm** rainfall during the growing period
- Low and fluctuating moisture contribute to **scab, hollow heart, low dry matter & low tuber set**
- Production in Kenya is mainly rainfed and is timed to coincide with **the 2 rainy seasons** (long & short rains)
- Some farmers use **furrow irrigation** while others **use sprinkler irrigation** in their Irish Potato crop

# 4.5 Crop Management

## 4.5.1 Ridging

- **Ridge** or **earth-up** the rows as the potatoes grow (1<sup>st</sup> at 15-20cm tall while weeding, then every after 2 weeks 3 times), with the final ridging done **before plant starts to bloom**
- **Do Not** earth-up **when the soil is wet** to avoid compaction
- A well built hill helps to **control weeds**, **prevents greening of tubers** and **reduces attack** by the potato tuber moth

# 4.6 Pests & Diseases Control:

## (GHCP&PHHT20: Q15 & 16)

### 4.6.1 Major Pests

- The following are the major pests of Potato in Kenya:
  - A. Potato Tuber Moth
  - B. Aphids
  - C. Potato Cyst Nematode
  - D. Spider Mites
  - E. Millipedes
  - F. Mealybugs
  - G. Cutworms

# 4.6.1.A: Potato Tuber Moth

3-8



Photo: By Caroline Harding, MAF - This image is found here at PaDIL, a source of images designed for Biosecurity and Biodiversity. This tag does not indicate the copyright status of the attached work. A normal copyright tag is still required. See Commons:Licensing for more information. PaDIL, CC BY 3.0 au, <https://commons.wikimedia.org/w/index.php?curid=16228830>

## Adult Potato Tuber Moth

3-9



Photo: Merle Shepard, Gerald R. Carner, and P.A.C Ooi, Insects and their Natural Enemies Associated with Vegetables and Soybean in Southeast Asia, Bugwood.org (CC BY-NC 3.0 US)

## Potato tuber moth larva and pupa

# 4.6.1.A: Potato Tuber Moth

## Identification:

- The moth is **small, brownish grey** in colour with **narrow fringed wings**
- The moths are active mainly at dusk
- The female lays eggs **singly** or **in batches** on **leaves, stems & near eye buds** on exposed tubers in the **field** or in the **store**
- The caterpillars are up to **12 mm long, whitish** to **pale greenish** in color



# 4.6.1.A: Potato Tuber Moth Cont'

## Symptoms:

- Caterpillars burrow in the tubers causing major damage by making **long irregular tunnels** filled with excreta where disease-causing microorganism grows
- These tunnels provide an **entry point** for **various plant pathogens** and make the potatoes unfit for human consumption
- The pest is transferred with **the harvested tubers** to the potato store, where it can reproduce and infest other tubers

# 4.6.1.A: Potato Tuber Moth

## Cont'

### Control:

- Use **healthy & clean seed**, since infested seed tubers are the main cause of **re-infestation in the field**
- Plant as deeply as possible (**10cm deep**) and ridge at least **3 times** during the growing season
- Ensure **compact hilling**: very important to prevent moths reaching the tubers to lay eggs
- Store all harvested tubers **before** dusk to avoid moths laying eggs on them
- **Don't leave** harvested tubers in the **field overnight** during dry season
- Spray using appropriate insecticides:
  - Dimethoate (AGROTHOATE 40 EC)

# 4.6.1.B: Aphids



Source: © Magnus Gammegaad (CC BY-NC-SA 3.0) <http://www.infonet-biovision.org/PlantHealth/Crops/Potato>

## Aphid on a leaf

# 4.6.1.B: Aphids

## Identification:

- Many aphid species attack the potato including the **green peach aphid, potato aphid & cotton aphid**
- Aphids are mainly found on **young shoots** on the underside of leaves

## 4.6.1.B: Aphids Cont'

### Symptoms:

- Feeding by aphids causes **irregular curling of young potato leaflets** and **hinders growth of the leaflets**
- Direct damage caused by aphids sucking sap from the plant is usually of little importance
- Most damage is caused by **honeydew production on foliage** and **virus transmission**
- Aphids are important pests as **vectors of potato viruses**, such as the **Potato Leaf Roll Virus (PLRV)**, a serious disease affecting potatoes

# 4.6.1.B: Aphids Cont'

## Control:

- Use appropriate pesticides e.g. Thiamethoxam (**ACTARA®**) incorporate a sticker/spreader e.g. **Zipper®** or **Agral 90®**, Imidacloprid 200g/L(**NUPRID 200SC**)
- Control aphids in potato planted for **seed production**
- Keep seed production areas **separated from** commercial potato production

# 4.6.1.C: Potato Cyst Nematode



Photo: Christopher Hogger, Swiss Federal Research Station for Agroecology and Agriculture, Bugwood.org Licensed under a Creative Commons Attribution-Noncommercial 3.0 License

## Potato cyst nematode damage on potato tuber

## 4.6.1.C: Potato Cyst Nematode

### Identification:

Potato Cyst Nematodes (PCN) or potato root nematodes (*Globodera rostochiensis*) are 1-mm long roundworms belonging to the genus *Globodera*.

They live on the roots of plants of the *Solanaceae* family, such as **potatoes** and **tomatoes**



5393019

Photo: Bonsak Hammeraas, NIBIO - The Norwegian Institute of Bioeconomy Research, Bugwood.org

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## 4.6.1.C: Potato Cyst Nematode

### Symptoms:

- PCN causes **growth retardation** and at very high population densities, damage to the roots and early **senescence** of plants.
- Reflect those of plants with an inefficient root system i.e. poor growth, **wilting** during periods of **water stress**, early **senescence**, **reduced tuber size** and reduced tuber **yields** up to levels in excess of **80%**.

# 4.6.1.C: Potato Cyst Nematode Cont'

## Control:

- Plant certified seed purchased from recognized, certified-seed producers.
- Avoid sharing **equipment** with other growers. The most common way of spreading PCN is in **soil** or on **equipment**.
- Thoroughly **clean** all equipment.
- Practice crop **rotation**.
- Regularly **examine** your crops for **patches** of poor or yellow potato plants.

# 4.6.1.D: Spider Mites



Photo: By CSIRO, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=35432982>

**Two spotted spider mites & eggs on leaf**

## 4.6.1.D: Spider Mites

### Identification:

- To the naked eye, spider mites look like tiny moving dots but can be seen using a hand lens
- They live in colonies, mostly on the **undersurface of the leaves** and spin a silk-like web
- Adults have 8 legs and an oval body with two eye spots on the head end of the body
- Immatures are similar to adults except that newly hatched larvae have 6 legs
- Eggs are spherical & translucent becoming **cream colored** before hatching
- The pest is destructive **during dry weather**

## 4.6.1.D: Spider Mites Cont'

### Symptoms:

- Mites cause damage by sucking cell content from leaves
- At first, the damage shows up as **light dots** on the leaves which at times take a **bronze colour**
- As the feeding continues, the leaves turn **yellow** and **drop off**
- Often, leaves and stems are covered by **a large amount of webbing**
- Damage is usually worse when compounded by **water stress**

# 4.6.1.D: Spider Mites Cont'

## Control:

- **Grow healthy crops**; avoid water and nutrient stress. Apply mulch and incorporate organic matter into the soil to improve the water holding capacity and reduce evaporation.
- **Keep perennial hedges** such as pigeon peas, they are said to encourage predatory mites, which predate on spider mites.
- Uproot and **burn** infested plants. This can be successful during the early stages of infestation when the mites concentrate on a few plants.
- Keep the field free of weeds.
- Spray Sulphur 80% w/w (KUMULUS DF®)

## 4.6.1.E: Millipedes

**Damages:** They tunnel into potato tubers

**Control:**

- Clear hiding places
- Remove volunteer plants, crop residues, decaying vegetation, dead leaves, grass, compost piles, excess mulch or other similar debris.
- Avoid planting wet areas



Photo: © A.M. Varela, icipe

Potato tubers damaged by millipedes

## 4.6.1.F: Mealybugs

### Damages:

- Mealybugs suck sap from plant phloem, reducing plant vigor
- They excrete sticky honeydew and wax, which reduces plant and fruit quality, especially when black sooty mould grows on the honeydew.

### Control:

- Pruning and destroying affected parts.
- Removing and destroying heavily infested plants.
- Ensuring **soil fertility**. In most cases, healthy plants are able to withstand some mealybug attack



Photo: © Whitney Cranshaw, Colorado State University, Bugwood.org (CC BY 3.0 US)

### Mealybugs on a potato plant



# 4.6.1.G: Cutworms



Source: © A.M. Valera, icipe (CC BY-NC-SA 3.0)  
<http://www.infonet-biovision.org/PlantHealth/Pests/Cutworms#>

## A Cutworm larva

# 4.6.1.E: Cutworms

## Identification:

- The larvae of cutworms are **buried in the soil and cut stems during the night**
- The pest is **destructive during dry weather**

## Symptoms:

- Cutworms feed on **tubers and roots**, boring a **wide shallow hole**
- They are also serious pests of **newly sprouted potato plants**, and can leave great empty patches in a potato field

# 4.6.1.E: Cutworms Cont'

## Control:

- Prepare field and **destroy vegetation and weeds 10 – 14 days** before planting
- **Ploughing** exposes caterpillars to predators and desiccation by the sun
- **Flooding of the field for a few days before planting** can help kill cutworm caterpillars in the soil
- Use appropriate **insecticide** e.g. Thiamethoxam (**Actara®**): drench when damage by cutworm is evident

## 4.6.2 Major Diseases

- The following are the major diseases of Potato in Kenya:
  - a. Late Blight**
  - b. Early Blight**
  - c. Bacterial Wilt**
  - d. Bacterial Soft Rot**
  - e. Potato Leaf Roll Virus (PLRV)**
  - f. Common scab**

## 4.6.2.a: Late Blight



**Leaves of potato plant infected by  
Late Blight**

## 4.6.2.a: Late Blight

- This is a **fungal disease** which is favored by **cool, cloudy wet conditions**
- It is one of the most destructive disease of potato
- Caused by *Phytophthora infestans*

### Symptoms:

- **Water soaked spots on leaves** which enlarge and **turn brown**
- Below the leaf, the fungus produces **white mouldy growth** seen clearly at the edge of the spot
- The affected leaves wither, yet frequently remain attached to the stem

## 4.6.2.a: Late Blight Cont'

### Control:

- **Tolerant varieties** are “**Tigoni**”, “**Kenya Baraka**”, “**Roslin Eburu**”, “**Annet**” & “**Asante**”
- Practice **Crop Rotation** with **non-*solanaceous* crops**
- Practice **good field hygiene**: pull up and discard infected plants
- Select only **certified, disease-free** seed potatoes
- Spray with appropriate fungicides:
  - Propineb (**Antracol®**)
  - Mancozeb (**Dithane M45®**)
  - Metalaxyl-M + Mancozeb (**Ridomil Gold®, Victory 72WP®**),
  - Propineb + Cymoxanil (**Milraz®**)

# 4.6.2.b: Early Blight



Photo: Howard F. Schwartz, Colorado State University, Bugwood.org (CC BY 3.0 US)

## Early Blight on Potato Leaf



## 4.6.2.b: Early Blight

- This is caused by a fungus: *Altenaria solani*
- The fungus persist in debris of affected plants **for several years**
- Early Blight thrives best under **warm wet conditions**

### Symptoms:

- First, **oval or angular dark brown to black “target” spots** appear on leaflets
- Usually, a **narrow chlorotic zone** is around the spot which fades into **the normal green**
- Lowest, oldest leaves are infected first, and they **droop and dry** as the disease progresses and eventually fall off

## 4.6.2.b: Early Blight Cont'

### Control:

- Use **certified disease-free seeds**
- When using own seed, carry out **hot water treatment**
- Practice **Crop Rotation**
- Destroy all infected crop residue
- Spray with appropriate fungicides e.g. Propineb (**Antracol®**), Mancozeb (**Dithane M45®**) (protective) and Metalaxyl-M + Mancozeb (**Ridomil Gold®, Victory 72WP®**), Propineb + Cymoxanil (**Milraz®**)(curative)

## 4.6.2.c: Bacterial Wilt



Photo: © Musah S.M., Nakuru County, 2019

**Potato leaves wilting due to Bacterial Wilt**

## 4.6.2.c: Bacterial Wilt

- The disease is caused by a bacteria known as ***Ralstonia solanacearum***
- It is **soil borne** and **the most serious disease** which can destroy an entire field
- The bacteria survives in the soil for a long time and enters into the host plant through **wounds on the roots** and **the base of stems**

### **Symptoms:**

- **Affected plants wilt** even when there is adequate moisture in the soil
- **Wilting is rapid** and **wipe out** the entire fields in few days
- Slimy continuous white discharge emanate from the eyes of the affected tubers

## 4.6.2.c: Bacterial Wilt Cont'

### Control:

- Use of **certified seed** raised in a wilt-free field
- Practice **Crop Rotation**
- Destruction of infected plant debris by burning
- Avoid contaminating the field with soil from an affected field
- Avoid cutting of seeds as a way of multiplying seeds when having insufficient seed potato
- Ensure good drainage

# 4.6.2.d: Bacterial Soft Rot

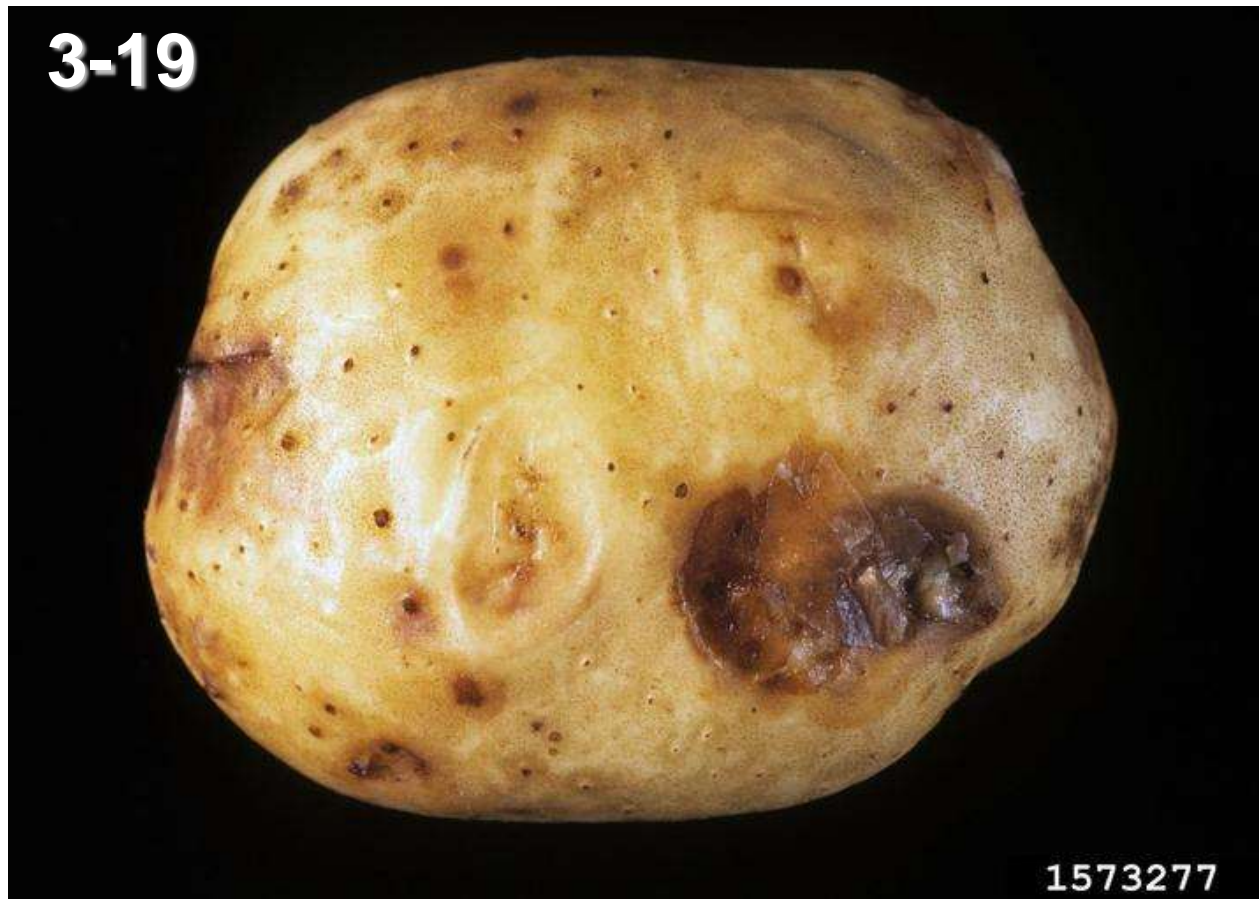


Photo: Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org  
(CC BY 3.0 US)

## Potato tubers infected with Bacterial Soft Rot

## 4.6.2.d: Bacterial Soft Rot

- The disease is caused by the bacteria: *Erwinia spp.*
- It enters the plant through **wounds** on leaves or **stems** near the soil surface and **young tubers**
- The disease development is favoured by **high temperatures and humidity**
- The bacteria is spread by **rain splash**
- **In poorly drained fields**, tubers decay
- The infected tubers and soils acts as a **source of inoculum in subsequent years**

# 4.6.2.d: Bacterial Soft Rot

## Cont'

### Symptoms:

- Stems and leaves develop lesions which are **water soaked, dark green** and eventually develops to **a soft rot with a foul odour**
- On tubers, **reddish brown spots** form at the lenticels
- The inner parts of the tubers show **a soft rot** and **a creamy exudate** is seen and may decay during transportation or storage in **poorly ventilated, high temperature and humidity**



# 4.6.2.d: Bacterial Soft Rot Cont'

## Control:

- Use of **healthy seed tubers**
- Improved **field drainage**
- Store and transport tubers in **dry, well ventilated conditions**
- Field hygiene
- Crop rotation

## 4.6.2.e: Potato Leaf Roll Virus (PLRV)



**PLRV affected on Potato Leaf**

## 4.6.2.e: Potato Leaf Roll Virus (PLRV)

- This is an important potato disease which occurs in **all potato growing areas**
- It is transmitted by **aphids** and by **infected seed tubers**

### Symptoms:

- In plants infected through aphid transmission, **the apical leaves roll upwards** and occasionally become **pinkish in colour**
- In plants infected through use of infected seed tubers, **the lower leaves roll upwards** (after sprouting) and becomes **spoon-like**

## 4.6.2.e: Potato Leaf Roll Virus (PLRV)

### Cont'

- Severely affected leaves develop a **tubular shape**
- Plants are **stunted** and production of tubers is **very low**

### Control:

- Control of aphids
- Use of **virus-free seed tubers (TC)** or **certified seed tubers**

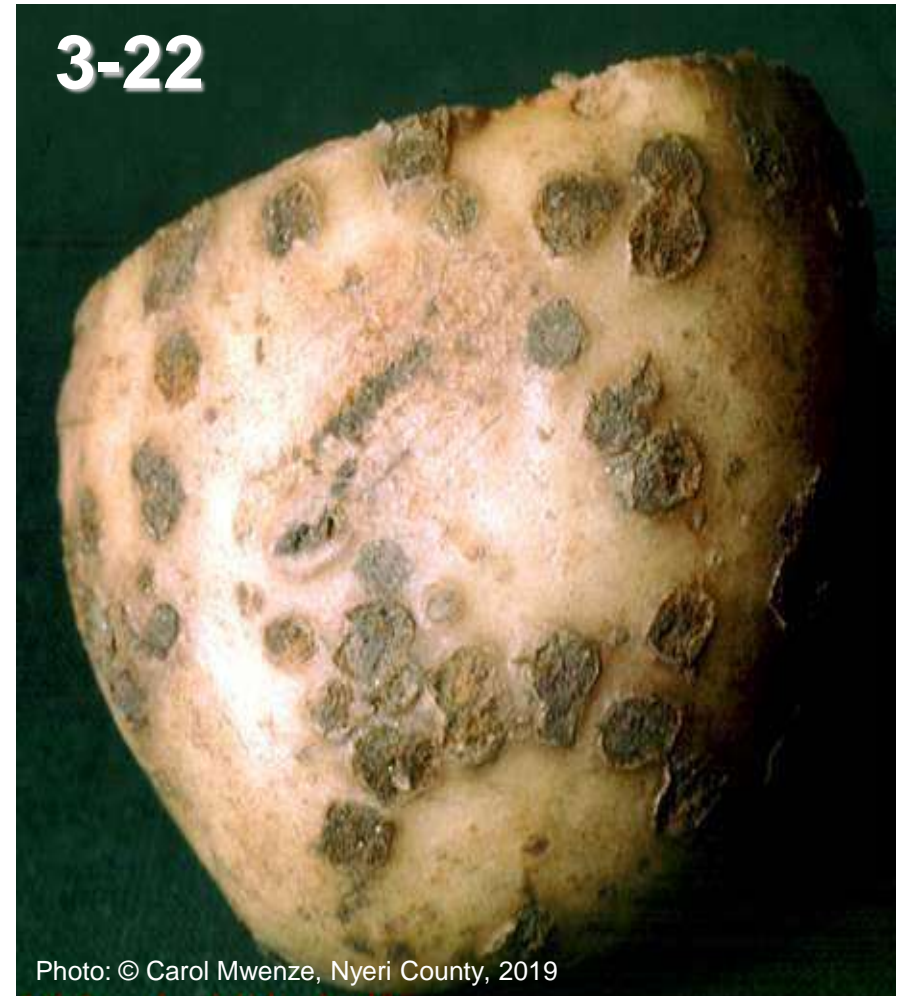


Photo: © Carol Mwenze, Nyeri County, 2019

**TC Seedlings**

## 4.6.2.f: Common scab

- Affects the potato skin with pimple-like lesions.
- It may not quantitatively affect yield but the quality of tubers which make them less attractive in the market and their storability.



**Common scab on a tuber**

## 4.6.2.f: Common scab

### Symptoms:

- Lesions are a superficial cork-like layer (russet scab)
- They may be erumpent or cushion-like (raised scab)
- The lesions may extend deep into the tubers (pitted scab)
- Lesions may be circular or irregular in shape - Affected potato skin tissue may be tan or brown

### Control:

- Avoid planting scab-infected seed tubers
- Increase the rotation period (2 years or more) for potato planting
- High moisture levels at tuber formation and bulking reduces scab incidence
- Do not reduce the acidity of the soil too much by liming as scab is reduced in acidic soils.

# 5. Harvest



**Farmers harvesting and bagging Potatoes**

# 5. Harvest

## 4.1 Harvesting Indices (GHCP&PHHT20: Q17)

- **Maturity Period:** Range between **3 – 4 months** after planting depending on the variety
- Tubers harvested while still immature tend to have **low dry matter content** and suffer **more skin damage**, resulting in easier infection by **fungal and bacterial pathogens**
- However, **seed potatoes are often harvested early**, to avoid virus infection that may occur during the latter part of the growing season



# 5. Harvest Cont'

## Important Notes:

- Tubers should be **completely covered with soil** to **reduce greening** and **entry of potato tuber moth**
- Cutting vegetative material **2 weeks before harvesting** hardens the skin of tubers **(dehaulming)**
- Hardening of skin tuber reduces **damage of tubers** during harvesting & post-harvest handling
- Harvested potato tubers should be stored **clean, dry** with mature skins free from **wounds, insect pests** and **diseases**

# 5. Harvest Cont'

- **Yields:** Average yield in Kenya: **3,200kg per acre** (Yields potential: **16,000kg per acre**)
- **Proper husbandry and use of clean planting material** can increase yields to **6,000 – 8,000kg per acre**
- Depending on **variety** and **degree of maturity at harvesting**, potatoes can keep for **1 – 2 months** before sprouting at room temperature
- Mature Potato can be **dehualmed** and left in soil for **1 – 2 months**

# 6. Post-Harvest Handling



Photo: Brochure/G.O.K. STRATEGY ON POTATO DEVELOPMENT INDUSTRY

## Sorting potatoes

# 6. Post-Harvest Handling

## 6.1 Containers & Packaging Materials (GHCP&PHHT20: Q18)

- Potatoes are supposed to be sold in the standard **50kg units** in the markets

## 6.2 Value Addition Techniques: Sorting, Cleaning & Grading (GHCP&PHHT20: Q19)

### Sorting:

- **Diseased** and **cut tubers** are sorted out to avoid losses in storage due to rotting

# 6. Post-Harvest Handling

## Cont'

### Grading:

- Potatoes are graded depending on **size** and **shape of tuber**
- Malformed tubers are removed
- Tubers are graded into:
  - **Ware:** beyond **60 mm** gauge
  - **Seed:** **28 – 60 mm** gauge
  - **Chatts:** Less than **28 mm** gauge

(SEED POTATO PRODUCTION AND CERTIFICATION GUIDELINES, KEPHIS 2016)

# 5. Post-Harvest Handling

## Cont'

### Storage:

- **Ware Potatoes**
  - Ware tubers should be kept in a **dark store** to prevent greening
  - The store should be **cool** and **well ventilated**
- **Seed Potatoes**
  - **Seed potatoes** are kept in a **cool store with diffuse light** for **coloured, short sprouts** to develop. However, avoid **direct sunlight**

# Reference

- The proposed agrochemicals are in accordance with “Products Registered for Use on Crops Version 1\_2018”. The registered agrochemicals are subject to change. Please refer to the latest registered agrochemicals by Pest Control Product Board.
- Infonet Biovision: Potato seed production  
<http://www.infonet-biovision.org/PlantHealth/Crops/Potato-Seed-Production>  
<https://www.infonet-biovision.org/PlantHealth/Crops/Potato>
- International Potato Center  
<http://cipotato.org/potato/how-potato-grows/>
- IFAD AFRICA  
<http://www.fidafrique.net/article2807.html>
- Wikipedia: Potato  
<https://en.wikipedia.org/wiki/Potato>
- Agroiculturesnetwork  
<http://www.agroiculturesnetwork.org/magazines/global/securing-seed-supply/selecting-the-best-plants-to-improve-seed-potato>

*THANK YOU*

**ASANTE SANA**

*DOMO ARIGATO*

*GOZAIMASU*

**Contact: SHEP PLUS Office (4<sup>th</sup> Floor, N.H.I.F.  
Building, Upper Hill, Nairobi)**

**Tel. No: 0737-293867/0712-504095**

**E-mail: [info.shepunit@gmail.com](mailto:info.shepunit@gmail.com)**