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

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

CAPSICUM 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

• Capsicum belongs to *solanaceae* family.
• It has a *mild flavor*, not hot
• It is rich in *Vitamin A* and *C*
• It also has *nutritive elements* such as *Potassium* and *Phosphorus*
• Its fruits are consumed *fresh*, *dried* or in *processed* form as *table vegetable* or *spice*
• Is eaten raw in *salads* or cooked in *food seasonings*
1.2 Some Common Varieties

There are two main types: determinate (open field) and Indeterminate (greenhouse) varieties.

- **Determinate** varieties: are bushy with defined growth and development period. Examples include *Yolo Wonder* and *California Wonder*

- **Indeterminate** varieties: achieve growth through single apical stem with few secondary branches. Examples *Commandant F1, Admiral F1, Nemalite F1, Green Bell F1*
1.2 Some Common Varieties Cont’

- The following are the common varieties grown in Kenya

  "California Wonder”:
  - Suitable for home and market gardening
  - Fruits are **thick walled**, 4 lobed, blocky and **compact**
  - Yield: 6,000kg per acre

  "California Wonder”

  "Yolo Wonder”:
  - A popular variety for **export** and **local market**
  - Fruits are **shiny dark green**, 3 – 4 lobed, **firm** and blocky
  - It is **vigorous**, **compact** and **high yielding**
  - Yield: 6,000kg per acre

  "Yolo Wonder”
1.2 Some Common Varieties Cont’

“Commandant F1”:
- Can be grown in open field and greenhouse
- Has resistance to Potato virus, Tomato mosaic and Tobacco mosaic, pepper mild mottle and bacterial spot
- Has long harvesting period: 10 weeks and 4-6 months for open field & greenhouse, respectively
- Fruits can be harvested green (75 days) or red (90 days)
- Yield: 25,000kg-30,000kg per acre (open field), 50,000-60,000kg per acre (greenhouse)

“Admiral F1”:
- Can be grown in open field and greenhouse
- Has similar characteristics to Commandant F1
- Fruits can be harvested green (75 days) or yellow (90 days)
- Yield: 25,000-30,000kg per acre (open field), 50,000-60,000kg per acre (greenhouse)
1.3 Optimal Ecological Requirements

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<tr>
<td><strong>Altitude</strong></td>
<td>0 – 2,000 metres above sea level</td>
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<tr>
<td><strong>Rainfall</strong></td>
<td>600 – 1,200 mm of rainfall annually</td>
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<td><strong>Growing Temperature</strong></td>
<td>18 – 30 °C</td>
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<td><strong>Soils</strong></td>
<td>• Well-drained loamy soils</td>
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<td>• pH 5.5 – 6.8</td>
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<td>• High organic matter</td>
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2. Pre-Cultivation Preparation:

2.1 Market Survey

Carrying out a market survey on Capsicum
2.2 Crop Planting Calendar

A Sample of a Capsicum Planting Calendar

May | Jun | Jul | Aug | Sep | Oct

<table>
<thead>
<tr>
<th>Seedrate @ 100g/acre</th>
<th>1st top-dress 40 kg CAN per acre (5 g/hole = 1 bottle top/hole)</th>
<th>2nd top-dress 80 kg CAN per acre (10 g/hole = 2 bottle tops/hole)</th>
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<tr>
<td>Seedlings in nursery for 6 – 8 weeks Plough land thoroughly &amp; make beds</td>
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<td>Plough land thorough &amp; make beds</td>
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<td>Transplant at 60 x 45 cm</td>
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<td>Fertilizer NPK at 10gm/hole or 100kg TSP/DAP</td>
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<td>Weeding</td>
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<td>Pest &amp; disease control</td>
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<td>Harvesting begins 75 – 90 days after transplanting</td>
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<td>Sorting &amp; Grading</td>
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<tr>
<td>Yields: 25,000 – 30,000 Kg per acre (F1 Open field)</td>
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<td>Marketing</td>
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Peak demand for Capsicum
Pre-Cultivation Preparation Techniques

2.3 Soil sampling & analysis
2.4 Composting
2.5 Quality seed/planting materials
3.0 Cultural Practices

3.1 Land preparation
3.2 Incorporation of crops residues
3.3 Basal application
3.4 Raising Seedlings

Raising seedlings in nursery beds

Photo: SHEP PLUS
3.4 Raising Seedlings

• Capsicum is normally raised in nursery & transplanted but it can also be directly sown
• It can also be raised on seed trays for improved germination
• Seed Rate: 100g per acre

Nursery Site Selection:
• The nursery should be sited in a plot that has not been planted with a member of Solanaceae family for the last 3 years
• The nursery site should be well drained

Nursery Establishment:
• Prepare a nursery bed of 1 m width and of a convenient length
• Make drills on the seedbed at a spacing of 10 – 20 cm apart
• Thinly sow the seeds in the drills and cover lightly with soil
• Water the nursery regularly
• Prepare shade and cover with organic materials such as dry grass
• The shade protects young seedlings from exposure to sun
3.4 Raising Seedlings

Management of Nursery:

• Water the nursery regularly
• Harden the seedlings *1 – 2 weeks before transplanting* by reducing the frequency of watering and gradually exposing the seedlings to direct sunlight
• Control of whiteflies is important since they transmit viruses to young Capsicum plants
• These insects can be blocked from reaching the seedlings by using an insect proof net
3.5 Transplanting

Photo: SHEP PLUS

Transplanted Capsicum plants in the field
3.5 Transplanting

3.5.1 Appropriate Time
- Seedlings are transplanted out in the field at the 4 – 6 true leaf stage, usually 6 – 8 weeks after sowing.
- Hardy transplants can be produced by restricting water and removing shade protection 1 week before transplanting.
- It is recommended that transplanting should be done either early in the morning or late in the evening.

3.5.2 Recommended Spacing (GHCP&PHHT20: Q10)
- Plant Spacing: 60 cm × 45 cm or 70 cm × 30 cm depending on the variety.
- Plant Population per Acre: range from 14,814 to 19,047.
- Appropriate spacing produces short sturdy plants with good root system.

3.5.3 Fertilizer Application Rates (GHCP&PHHT20: Q11)
- The type of fertilizer and amount needed depend on soil analysis results.
- Apply 100 kg per acre of DSP/TSP during transplanting.
- The fertilizer should be mixed thoroughly with the soil.
3.6 Water Requirement

Photo: SHEP PLUS

Drip Irrigation
3.7 Managing Weeds

Mulching done to control weeds

Photo: SHEP PLUS
3.8 Top-dressing

(GHCP&PHHT20: Q14)

• Capsicum crop should be top-dressed with organic and inorganic/chemical fertilizers to produce high yields
• The type and quantity of fertilizer depend on soil analysis

[General recommendation]
• 1\textsuperscript{st} top-dressing is done with 40 kg per acre of CAN 2 – 3 weeks after transplanting
• 2\textsuperscript{nd} top-dressing is done with 80 kg per acre of CAN 4 – 6 weeks after transplanting
• During flowering high amounts of nitrogenous fertilizer should be avoided
3.9 Crop Management
3.9.1 Training & Staking

Well trained & staked Capsicum field

Photo: Darbie Granberry, University of Georgia, Bugwood.org (CC BY 3.0 US)
3.9 Crop Management
3.9.1 Training & Staking

- **Staking** keeps the plants upright and also keep the fruit away from the soil
- Staking materials: *Wood stakes, bamboo* or any *sturdy material*
- **Strings, plastic strips** or other material can be used for **training** the plant to the stake
- It keeps the canopy intact, thus preventing sunscald on the fruit
- It also prevents the plant from splitting during a heavy fruit load
- Staking can help minimize lodging
3.10.3 Major Pests

- Pest damages cause a reduction in quality and quantity of produce

- The following are the major pests of Capsicum in Kenya:

  A. White Fly
  B. Root-Knot Nematode
  C. Aphid
  D. Cutworm
  E. Spider Mite
  F. Fruit Borer
  G. Leaf Miner
  H. Thrips
3.10.3.A: White Fly

Photo: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org (CC BY 3.0 US)

White Flies on a leaf
3.10.3.A: White Fly

Identification:
- Whiteflies are soft-bodied, winged insects closely related to aphids
- They can be as small as 1/12 of an inch, and are often found in clusters on the undersides of leaves
- They are active during daytime
- Whiteflies are capable of overwintering and reproducing throughout the year in warmer climates

Damages:
- Whitefly immature stages (nymphs) and adults suck sap from leaves producing chlorotic spots on infested leaves
- Nymphs excrete a clear sugary liquid known as honeydew, which proliferates the growth of a black sooty mould affecting photosynthesis
- Whiteflies are vectors of important viral diseases, such as Chili Leaf Curl
3.10.3.A: White Fly

Control:

• Keep the seedlings protected under a fine meshed insect netting until they are ready for transplanting
• Make sure the netting is always properly closed
• Use of traps: Yellow sticky traps
• Conserve natural enemies: Parasitic Wasps, Predatory Mites, Ladybird & Lacewings
• Spray with insecticides, such as:
  - Lambdacyhalothrin 106g/L + Thiamethoxam 141g/L (LEXUS 247 SC)
3.10.3.A: Root-knot Nematode

Symptom of “Root-knot Nematode” on roots

Photo: David L. Clement, University of Maryland, Bugwood.org (CC BY 3.0 US)
3.10.3.A: Root-knot Nematode

- Nematodes are soil inhabitants easily spread by infested seedlings, soil washed down the slopes or by implements
- Root–knot Nematodes are most serious on light sandy soils

Identification:
- Small lumps or galls develop on the infested roots
- The galls on Capsicum are much smaller than those on cucurbits or Tomato

Damages:
- Wilting of plants
- The plant roots can be seen to be distorted, swollen and bearing galls (knots)
- The infested roots eventually rot and affected plants die

Control:
- Crop rotation
- Mixed cropping with African Marigold
- Maintaining high levels of organic matter in the soil
- Use some bio products e.g.) Neem extracts (Nimbecidine®, Achook EC®)
3.10.3.B: Aphid

Aphids on a leaf

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

Identification:
- Aphids occur in **colonies** initially around tender plant parts and on the lower leaf surface
- When numerous, they can be found on all above ground parts of the plant

Damages:
- Aphids damage plants by sucking their sap, excreting a **sticky substance** (**honeydew**) that coats the plants, or/and by **transmitting** viral diseases
- Curling, wrinkling, or **cupping** of young leaves, **chlorotic spotting**, **mottling of older leaves**, **stunting** and **wilting** of plants
- Growth of sooty mould on honeydew excreted by aphids reduces photosynthesis and **affects fruit quality**

Control:
- **Naturally controlled by predators**, such as ladybird beetles, hoverflies, anthocorid bugs, spiders, lacewings and fungal diseases
- Indigenous natural enemy
  - Parasitic wasp (**Aphitech®**)
- **Spray with insecticides**, such as **Acetamiprid (Presento 200SP®)**
3.10.3.C: Cutworm

A Cutworm larva

Photo: John C. French Sr., Retired, Universities: Auburn, GA, Clemson and U of MO, Bugwood.org (CC BY 3.0 US)
3.10.3.C: Cutworm

- Cutworms are the caterpillars of various moths
- They drop to the soil where they live until pupation
- They hide during the day in the soil around the base of the plants and climb into plants at night

Damages:
- Young caterpillars feed on leaves making small holes
- Cutting stems of young seedlings at the level of the soil

Control:
- Eliminate weeds early well before transplanting
- Plough and harrow the field to expose Cutworms to natural enemies and desiccation 3 – 4 weeks before transplanting is done
- Dig near damaged seedlings and destroy them
- Conserve natural enemies: Parasitic wasps and ants are important in natural control of Cutworms
- Application of Azadirachtin 0.03% (NIMBECIDINE EC) and Imidacloprid 17.8% (TATA MIDA 200SL)
3.10.3.E: Spider Mite

Spider mites on a leaf

Photo: O.P. Sharma, Bugwood.org (CC BY 3.0 US)
3.10.3.E: Spider Mite

Identification:
- Adults are **oval** and have **eight legs**
- They are **very tiny** (0.5 mm) resembling **tiny moving dots**
- They **vary in colour** depending on the species
- Many of the species are bright red in colour, others are yellowish, greenish, pinkish, orangish or reddish
- The Two-spotted Spider Mite has a **large dark blotch** on each side of the body

Damages:
- Spider Mites suck the sap of the plants, **causing mottling of the upper leaf surface**
- Infested leaves first show a **white to yellowing speckling**, and then eventually **turn bronze** and **fall off** as the infestation becomes heavy
- Spider Mites prefer the **lower surface of the leaves**, but in severe infestations occur on both leaf surfaces as well as on stems and fruits
- High infestations cause **defoliation**
3.10.3.E: Spider Mite

Control:

- **Field hygiene** is important for the management of Spider Mites
- **Conserve natural enemies**, such as **Predatory Mites**
- Chemical sprays using **miticides**, such as
  - Oxydemeton-Methyl (Hattrick EC®)
  - Predatory mite (AMBLYTECH®, PHYTOTECH®)
3.10.3.F: Fruit Borer

Fruit Borer larvae in a capsicum fruit

Photo: Phil Sloderbeck, Kansas State University, Bugwood.org (CC BY 3.0 US)
3.10.3.F: Fruit Borer

Identification:
• Fruits Borers (Bollworms) are about 2 – 3.5 cm long
• Moths are active at dusk and at night
• Moths of Fruit Borers, feed on nectar and lay eggs on leaves

Damages:
• Some species feed on leaves causing defoliation and slow plant growth
• Attack on flower buds results in flower abortion
• Caterpillars usually bore holes in fruits, causing extensive damage and promoting decay from secondary infection by diseases
3.10.3.F: Fruit Borer

Control:
• Check the crop regularly (scouting)
• Plough the soil before planting
• Handpick and destroy damaged fruits, eggs and caterpillars
• Conserve natural enemies: Parasitic wasps, ants, pirate bugs etc.
• Scouting the crop in order to detect eggs or larvae before they bore into the fruit
• Use trap crops, such as tasseling maize for oviposition by adult females
• Use bio-pesticides, such as Bacillus thuringinesis (Bt), neem products or other plant extracts
• Spray insecticides, such as
  – Lambda Cyhalothrin (Karate 2.5 WG®)
3.10.3.G: Leaf Miner

Leaves infested by Leaf Miner

Photo: David Riley, University of Georgia, Bugwood.org (CC BY 3.0 US)
3.10.3.G: Leaf Miner

Identification:

- Female flies make numerous small, whitish tunnels (mines) on the foliage when feeding and depositing eggs.
- Full-grown maggots come out of the mines to pupate in the soil beneath the plants or on the foliage, and maggots are the most destructive stage.

Damages:

- The females lay eggs that hatch into tiny yellow maggots which feed on leaf tissues leaving a wandering track (whitish tunnels) known as mines.
- The mines may reduce photosynthetic activity, affecting development of flowers and fruits.
- These tunnels can serve as entry points for disease-causing organisms.
- Completely mined leaves might dry up and fall off prematurely.
- Wilting of plants leading to fruit sunscald, death of the young plants and yield loss.
3.10.3.G: Leaf Miner

Control:

- **Ploughing and solarization** can help in exposing pupae to desiccation and natural enemies.
- Conserve **natural enemies**.
- **Neem products** are effective for controlling Leafminers.
- Use of Systemic chemicals and observe PHI.
- **Spray insecticides**, such as:
  - Thiocyclam (EVISECT S®)
  - Spinosad (TRACER 480SC®)
3.10.3.H: Thrips

Thrips and damage on Capsicum leaves

Photo: Andrew Derksen, USDA-APHIS, Bugwood.org (CC BY 3.0 US)

Photo: Bruce Watt, University of Maine, Bugwood.org (CC BY 3.0 US)
3.10.3.H: Thrips

Identification:
• Often concealed under the calyx
• Thrips usually feed on all above ground parts of plants preferring the underside of young leaves, flowers and fruits

Damages:
• Thrips puncture leaves and suck the exuding sap
• At the initial stage of infestation, leaves have a silvery sheen and show small, dark spots of faecal material on the underside
• Later leaves curl upward, wrinkle and finally dry up leading to fruit sunscald
• Damaged leaves, buds and fruits turn rusty in colour
• Wilting, retardation of leaf development and distortion of young shoots resulting in stunted plants
• Attack on fruits causes deformation and scarring of the fruits
• Thrips transmit the Tomato Spotted Wilt virus and Leaf Curl disease
3.10.3.H: Thrips

Control:

- Conserve natural enemies, such as Anthocorid Bugs, Predatory Mites and Spiders
- Spray insecticides, such as
  - Spinosad (Tracer 480 SC®)
  - Thiocyclam (EVISECT S®)
3.10.4 Major Diseases

- Disease infection leads to reduction in quality and quantity of produce

- The following are the major diseases of Capsicum in Kenya:
  a. Damping-off
  b. Anthracnose
  c. Leaf Spot
  d. Fusarium Wilt
  e. Powdery Mildew
  f. Viral Diseases
  g. Bacterial Soft Rot
  h. Bacterial Wilt
  i. Blossom End Rot
3.10.4.a: Damping-off

Capsicum seedlings showing symptoms of Damping-off

Photo: © A. A. Seif & B. Nyambo, icipe (CC BY-NC-SA 3.0)
http://www.infonet-biovision.org/PlantHealth/Pests/Damping-diseases
3.10.4.a: Damping-off

General Descriptions:
• This disease is soil borne caused by fungi
• There are 2 two types of Damping-off:
  – Seedlings fail to emerge (Pre-emergence Damping-off)
  – Small seedlings collapse (Post-emergence Damping-off)

Symptoms:
• Seedlings are stunted through root rot and/or collar rot
• Nursery beds show irregular patches
• Leaves: lesions, abnormal colours, abnormal forms, wilting, fungal growth
• Roots: lesions
• Seeds: rot, discolorations
• Stems: external discoloration, canker, abnormal growth, mycelium visible
• Whole plant: plant death, dieback, damping-off
3.10.4.a: Damping-off

Control:

- Growing certified disease-free seed
- Nursery beds be located on **well drained sites**, not previously under vegetable production
- **Proper watering regime**
- Use of **appropriate fungicides** as spray or soil drench, such as Metalaxyl + Mancozeb (AMIDIL 68WG®)
3.10.4.b: Anthracnose

Capsicum fruit affected by Anthracnose

Photo: Seth Dale, 127103, Bugwood.org (CC BY 3.0 US)
3.10.4.b: Anthracnose

General Descriptions:
• Anthracnose is caused by *Colletotrichum spp.*
• Spores dispersed by water-splash, air currents, insects or other forms of contact
• Transmitted through seed, but also through infected plant parts
• Persists on and in the seed, crop residues, and weed hosts

Symptoms:
• Dark, sunken spots up to 2.5 cm across on Capsicum
• The spots on green and ripe fruit surface may be covered with salmon-pink mass of spores in moist weather

Control:
• Use certified disease-free seeds
• Practice field sanitation (removal of crop debris after harvest)
• Application of registered fungicides, such as
  – Propineb (ANTRACOL WP 70®)
3.10.4.c: Leaf Spot

Cercospora Leaf Spot symptoms on a leaf

Photo: Florida Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Bugwood.org (CC BY 3.0 US)
3.10.4.c: Leaf Spot

General Descriptions:
• The fungus survives on seeds and in crop debris
• The disease is favoured by prolonged periods of wetness

Symptoms:
• Spots on leaves are brown and circular with small to large light grey centres and dark brown margins
• Spots on stems, petioles and peduncles are typically elliptical with same characteristic colour

Control:
• Use certified seeds
• Maintain adequate soil moisture, especially at fruit development stages
• Carry out soil liming in calcium deficient soils
• Top-dress with Calcium Nitrate (CN) and ensure adequate soil moisture
• Practice field sanitation
• Spray the crop with calcium chloride, Mancozeb (Dithane M45WP®)
3.10.4.d: Fusarium Wilt

Fusarium Wilt on plants in the field

Photo: © A. A. Seif & B. Nyamido, icipe (CC BY-NC-SA 3.0) http://www.infonet-biovision.org/PlantHealth/Crops/Peppers#simple-table-of-contents-3
3.10.4.d: Fusarium Wilt

General Descriptions:
• The fungus lives **indefinitely in the soil**
• It is spread by **irrigation water**
• It is very susceptible to changes in temperature and soil moisture
• It is serious **in poorly drained fields**

Symptoms:
• **Dropping** and **yellowing** of lower leaves followed by **wilting** of the entire plant
• Leaves on infected plants remain attached and the vascular system of the plant is discoloured, particularly in the lower stem and roots

Control:
• Crop rotation
• **Lime the soil** (soil pH 7.0 – 7.5 reduces Fusarium wilt disease)
• Ensure the soil has a **good drainage**
3.10.4.e: Powdery Mildew

Leaves showing the initial sporulation

Photo: © A. A. Seif & B. Nyamido, icipe (CC BY-NC-SA 3.0)
http://www.infonet-biovision.org/PlantHealth/Crops/Peppers#simple-table-of-contents-3
3.10.4.e: Powdery Mildew

General Descriptions:
• The disease is caused by a fungus
• It is favoured by warm, humid and dry weather

Symptoms:
• Yellowish blotches or spots appear on the lower leaf surface, and a white to grey powdery fungal growth on underside of the leaves
• The disease progresses from the older to younger leaves shedding the foliage
• Leaf defoliation leads to reduction in size and number of fruits

Control:
• Remove and destroy crop debris after harvest
• Apply preventive fungicides, such as
  – Sulphur (Cosavet DF®)
3.10.4.f: Viral Diseases

Cucumber Mosaic Virus infection

Alfalfa Mosaic virus infection
3.10.4.f: Viral Diseases

General Descriptions:
- **Cucumber Mosaic Virus (CMV)** is the most important worldwide.
- Other viral diseases include Alfalfa Mosaic Virus (AMV), Tobacco Mosaic Virus (TMV), Tomato Spotted Wilt Virus (TSWV), Pepper Mottle Virus (PeMV), Potato Virus Y (PVY), Tobacco Etch Virus (TEV).
- Most of these viruses are transmitted by insects such as aphids, infected seed, and a few mechanically.

Symptoms:
- Difficult to firmly diagnose by symptoms as they can be altered by factors like cultivar, age of host plant, environmental conditions, host plant nutrition, and viral strains, not to mention the occurrence of virus mixtures.
- Some symptoms are mosaic patterns on leaves, yellowing, ring spots, leaf deformation or distortion, curling of leaves, and/or stunting of plants.
- Also, reduction of fruit size, distortion, and/or ring patterns could be seen.
3.10.4.f: Viral Diseases

Control:

- Rogue out and burn affected plant (including alternative hosts) immediately
- Use barrier crops to minimize virus spread
- Use oil sprays to reduce virus transmission by Aphids
- Use reflective mulches (silver colored) to repel Aphids and Thrips
- Field hygiene & Crop rotation
- Control the insect vectors
- Use certified seeds
3.10.4.g: Bacterial Soft Rot

Bacterial Soft Rot on a Capsicum fruits

3.10.4.g: Bacterial Soft Rot

General Descriptions:
• The bacteria are soil-borne
• Soft Rot is primarily a post-harvest problem
• The disease is serious during rainy periods because the bacteria are splashed from the soil onto the fruit, which are more susceptible due to their high moisture content
• The disease begins in the peduncle and calyx tissues of harvested fruit

Symptoms:
• Fruit infected on the plant collapses and hangs on the plant like a water-filled bag
• When the contents leak out, a dry shell of the fruit remains

Control:
• Crop rotation with pulses and cereals
• Control of insects that cause injury to fruits
• Post-harvest decay can be reduced by harvesting fruits when dry
• Minimize injury during handling
• Store at cool temperatures
3.10.4.h: Bacterial Wilt

Bacterial Wilt symptoms on Capsicum plants

Photo: © (c) A.M. Varela, icipe http://www.infonet-biovision.org/PlantHealth/Crops/Peppers#simple-table-of-contents-3
3.10.4.h: Bacterial Wilt

General Descriptions:
• The bacteria attack a wide range of crops, solanaceous weeds and can survive in the soil for long periods.
• It is favoured by wet, warm conditions.
• Cross sectional cut from roots and lower stems of diseased plants exude milky streams of bacteria from the vascular system when suspended in water.

Symptoms:
• Wilting of the entire plant with no leaf yellowing.

Control:
• Rogueing of infected plants.
• Control Root-knot Nematodes since they could facilitate infection and spread of Bacterial Wilt.
• Soil amendments (organic manures).
• Crop rotation to avoid continuous planting of Solanaceous crops.
• Proper irrigation management.
3.10.4.i: Blossom End Rot

Advanced Blossom End Rot symptoms on Capsicum fruits

Photo: Paul Bachi, University of Kentucky Research and Education Center, Bugwood.org (CC BY 3.0 US)
3.10.4.i: Blossom End Rot

Symptoms:

- The end of the fruit becomes off-whitish to brown in colour and takes on a “sunken” appearance
- As the fruit matures, these symptoms become more pronounced and the colour of the rot becomes dark brown to almost black

Control:

- Boost the soil with calcium by adding lime, Calcium Nitrate, dolomite, gypsum or composted animal manures before planting the seedlings
- Water regularly: Capsicums continue to flower and bear fruit for prolonged periods of time, so ensure the soil around their roots is kept moist
- Avoid fertilizers with a high nitrogen content: Nitrogen fertilizers will promote leaf growth at the expense of fruit, allocating calcium to the leaves instead of to the fruit
4. Harvest

4.1 Harvesting Indices (GHCP&PHHT20: Q17)

- Maturity period ranges between 2 – 3 months after transplanting
- Capsicum fruits can be harvested when they are harvestable-green or when they have developed full color
- Green fruits are incapable of ripening after removal from the plant
- The right stage for coloured fruit is when they have reached full colour, filled out, still firm, sticky and thick walled

Harvesting Method:
- Since Capsicums have soft pliable thin flesh, care should be taken during harvesting
- Use clean knife or scissors to harvest the fruits
- Fruits should be harvested early in the morning when it is cool since the fruit temperature is low
- Harvested fruits should be kept in a cool, shaded and ventilated area in order to minimize heat gain
- Yield: 6,000kg per acre (OPV), 25,000–30,000kg per acre (F1) open field and 50,000–60,000 per acre (F1) greenhouse depending on the variety and crop husbandry
5. Post-Harvest Handling

![Harvested Capsicums](image)

Photo: SHEP PLUS

Harvested Capsicums
5. Post-Harvest Handling

5.1 Containers & Packaging Materials *(GHCP&PHHT20: Q18)*

- Harvested Capsicum peppers are packed into plastic crates then transported to markets
- Peppers are sensitive to ethylene and should not be stored with fruits that produce ethylene such as bananas and avocados

5.2 Value Addition Techniques: Cleaning, Sorting, Grading, & Processing *(GHCP&PHHT20: Q19)*

**Sorting:**
- Eliminate all fruits harvested with defects

**Grading:**
- Grade Capsicum based on its *uniform colour, maturity, shape and size*
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 CD
- Sweet and Hot Peepers Production Guideline by Starke Ayres
- Fruits and vegetables technical handbook, 2003, Ministry of Agriculture and Rural Development
- CROPS EXTENSION POCKET HANDBOOK Vol. 1 - FIELD CROPS, 2012 Ministry of Agriculture
THANK YOU

ASANTE SANA

DOMO ARIGATO

GOZAIMASU

Contact: SHEP PLUS Office (4th Floor, N.H.I.F. Building, Upper Hill, Nairobi)
Tel. No: 0737-293867/0712-504095
E-mail: info.shepunit@gmail.com