MOALF/SHEP PLUS

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""

WATERMELON PRODUCTION

Prepared by SHEP PLUS

Photo: SHEP PLUS

Training Title: **Watermelon Production**

Objective: **To provide a guideline on production of Watermelon**

Specific Objective:

- **To provide basic information on production, post-harvest handling, and marketing of Watermelon**

Contents:

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Preface

- This training material applies the fundamental practices essential for crop production and successful marketing to put into perspective the case of horticultural crop production.
- The fundamental practices are categorized into seven (7) broad topics and twenty (20) sub-topics; the twenty sub-topics are referred to as the General Horticulture Crop Production and Post-Harvest Handling Techniques (GHCP&PHHT20). This categorization is based on the Smallholder Horticulture Empowerment & Promotion Unit Project (SHEP UP) experience in mitigating production and marketing challenges facing smallholder horticultural farmers.
- The seven (7) broad topics are: Pre-Cultivation Preparation; Land Preparation; Crop Establishment (Planting/Transplanting); Crop Management; Harvest; Post-Harvest Handling: and Cost and Income Analysis.
- The sub-topics under each topic are as follows: **Pre-Cultivation Preparation** (market survey, crop planting calendar(s), soil sampling & analysis, composting, and quality seed/planting material(s)); **Land Preparation** (land preparation practices, incorporation of crop residues, and basal application); **Crop Establishment** (raising seedlings, planting/transplanting, fertilizer application); **Crop Management** (water requirement, managing of weeds, top-dressing, pests & diseases management practices, and safe & effective use of pesticides); **Harvest** (harvesting indices); **Post-Harvest Handling** (appropriate containers/standard packaging materials, and value addition techniques); and **Cost and Income Analysis** (cost and income analysis).
- The issues outlined in the twenty (20) sub-topics might not necessarily be applicable in all cases. But where applicable, it is recommended that the instructions issued be given due consideration.

Disclaimer

Watermelon Production, First published by SHEP in 2009, revised by SHEP PLUS in 2019 (Ver.6)

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The cited agrochemicals are in accordance with “Pest Control Product Registered for Use in Kenya 11th Edition, 2018”. The registered agrochemicals are subject to change. Please refer to the latest registered agrochemicals by Pest Control Product Board.

1. Introduction:
1.1 Background

Watermelon (Tikiti Maji)

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1.1 Background

- Watermelon is a **warm season crop**
- Popular fruit for **fresh consumption** and **agro-processing**, such as juice making
- It contains about **6 % sugar** and **92 % water** by weight
- It is a source of **Potassium, Vitamin A, Vitamin C, Folate and Amino acid.**
- **It contains some of the most important antioxidants in nature- e.g. Lycopene**

1.2 Common Varieties

“Sugar Baby”

“Sukari F1”

1.2 Common Varieties

“Sugar Baby”

“Sukari F1”

1.2 Some Common Varieties

- The following are the common varieties grown in Kenya

“Sugar Baby”

- Round dark green to black fruit with deep red flesh
- Very sweet and juicy
- **Maturity Period: 120 days**
- **Average fruit weight: 4 kg**
- **Yield potential: 20 – 30 tons/acre**

“Sukari F1”

- Early to medium maturing
- Good fruit setting ability
- Fruits are oblong in shape
- Rind color: light green with dark green stripes
- **Maturity Period: 90 days**
- **Average fruit weight:** 7 – 8 kg
- **Yield Potential**: **25 – 35 tons/acre**
- Has good transport and keeping qualities

1.2 Common Varieties Cont’

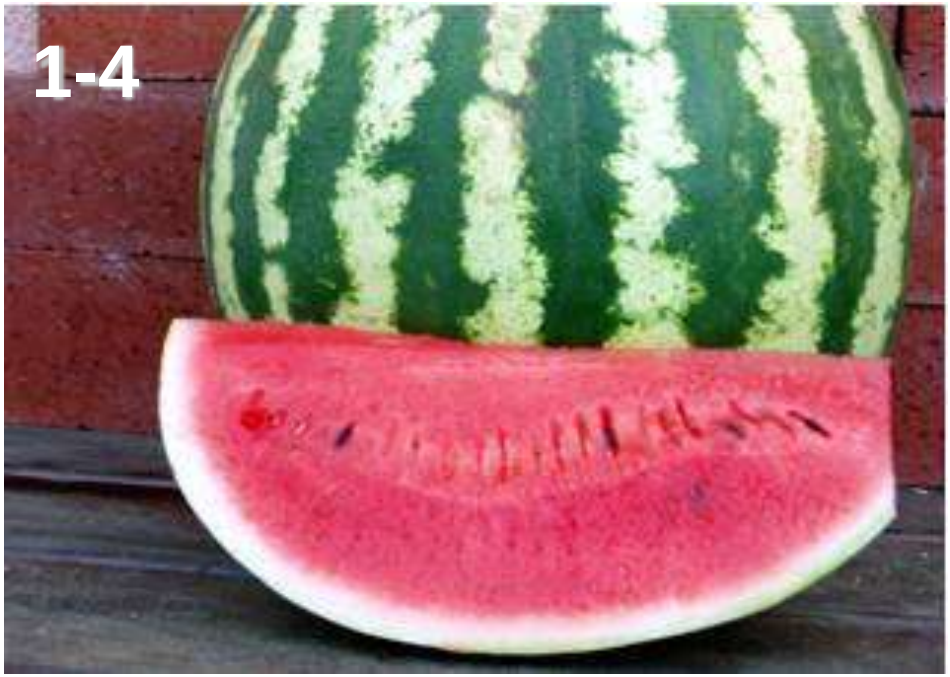

Photo: https://www.royalseed.biz/water-melon.php

“Crimson Sweet”

Photo: https://awhaley.com/seeds/vegetables/watermelon/sweet-dakota-rose-usda-organic

“Sweet Rose”

1.2 Common Varieties Cont’

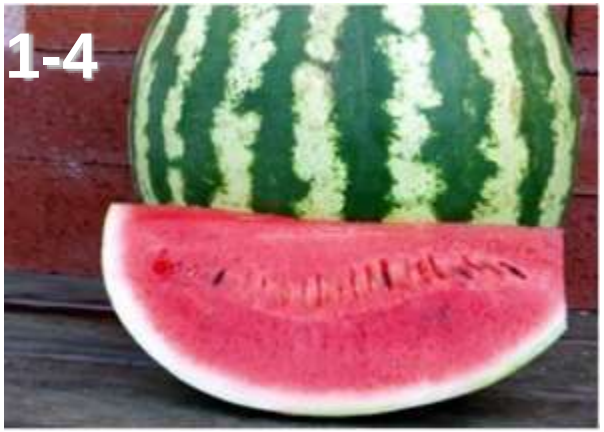

Photo: https://www.royalseed.biz/water-melon.php

“Crimson Sweet”

Photo: https://eatwhatsy.com/seeds/vegetables/watermelon/sweet-delicio-rose-usda-organic

“Sweet Rose”

1.2 Some Common Varieties Cont’

“Crimson Sweet”

- Has a light green rind with broad dark green stripes
- Has blocky oval shaped with brilliant red flesh
- **Maturity Period: 90 – 120 days**
- **Average fruit weight: 7 – 9 kg**
- **Yield potential: 25 – 30 tons/acre**
- Good shipping quality and resistant to extreme heat and Root-knot Nematodes

“Sweet Rose F1”

- Vigorous with good adaptability
- Fruits are oval to round
- Good keeping quality
- Flesh is deep crimson red with good texture
- **Maturity Period: 80 – 90 days** after transplanting
- **Average fruit weight:** 10 – 12 kg

1.2 Common Varieties Cont’

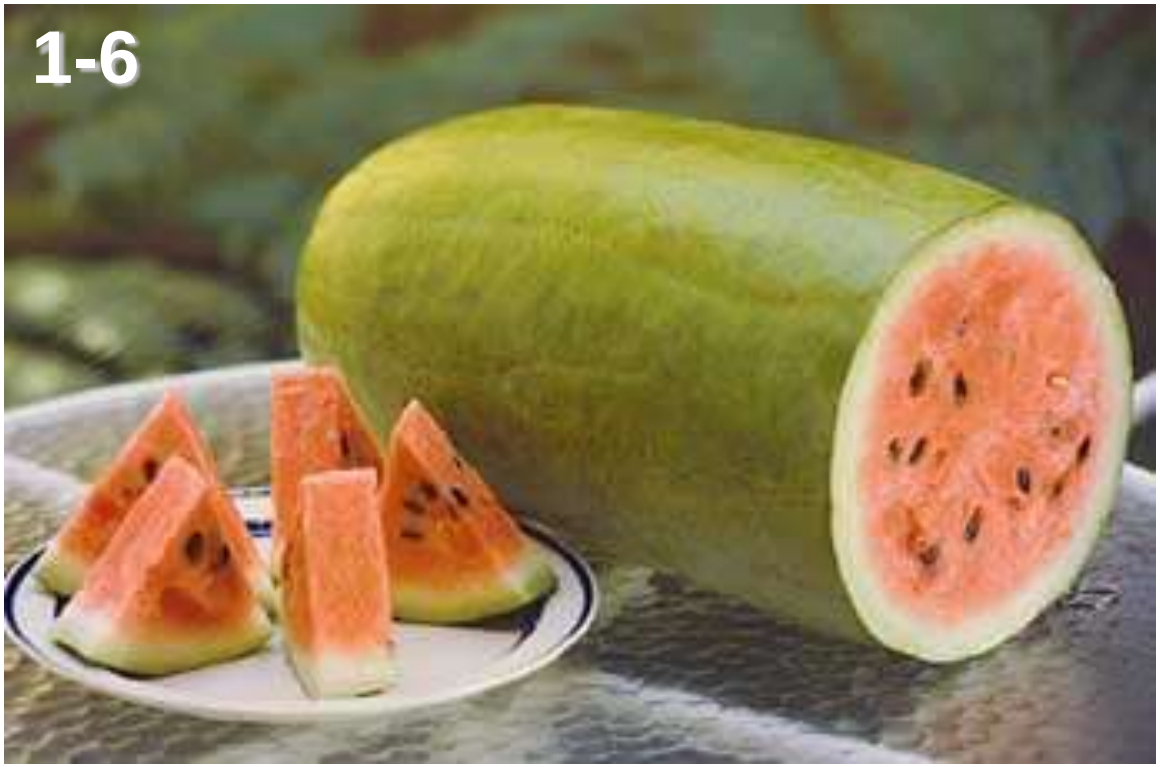

Photo: http://www.farmfreshseeds.com/heirloom-watermelon-seeds-charleston-grey.html

“Charleston Gray”

1.2 Common Varieties Cont’

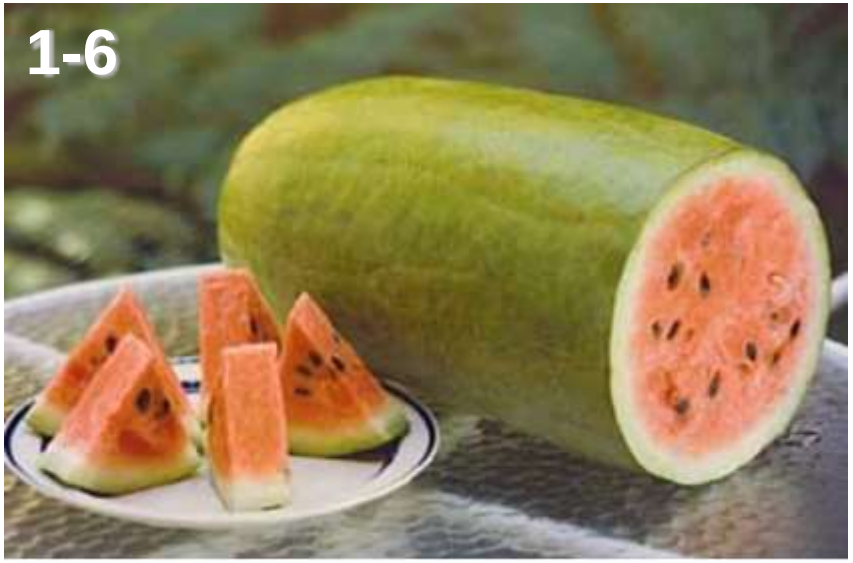

Photo: http://www.farmfreshseeds.com/heirloom-watermelon-seeds-charleston-grey.html

“Charleston Gray”

1.2 Some Common Varieties Cont’

“Charleston Grey”

- Very elongated and oblong
- Light green striped variety with red flesh and hard rind
- At maturity, rind color turns to light green
- Fruits are sweet, juicy and crunchy
- Ideal for fresh market
- Tolerant to ***Fusarium*** and ***Anthracnose***
- **Drought resistant**
- **Maturity Period: 80 – 85 days**
- **Average fruit weight: 8 – 10 kg**
- Able to withstand long transportation

1.3 Optimal Ecological Requirements

Altitude	**0 – 1,500 metres above sea level**
Rainfall	**400 – 600 mm of rainfall annually**
Growing Temperature	**22 – 28 ^{0}C (day)**
Soils	**•Sandy loam** **•Well drained and slightly acidic** **•pH range 6.0 – 6.8**

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1.3 Optimal Ecological Requirements

- **Altitude:** Watermelon can be grown in altitudes up to **1,500 m** above sea level
- **Rainfall:** Watermelon has a **high water requirement** and **400 – 600 mm** of rainfall well distributed throughout the growing period is required
- **Temperature:** Watermelon performs better under **warm temperatures** and the **optimum temperature** range for production is **22 – 28 ^{0}C**
- **Soil:** Watermelon requires **well drained sandy loams** with high organic matter content. The optimal soil pH range is **6.0 – 6.8**.

2. G20 technologies

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

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[G20 Technologies]
Make sure to support farmers carry out G20 techniques for any crop

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

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[G20 Technologies]
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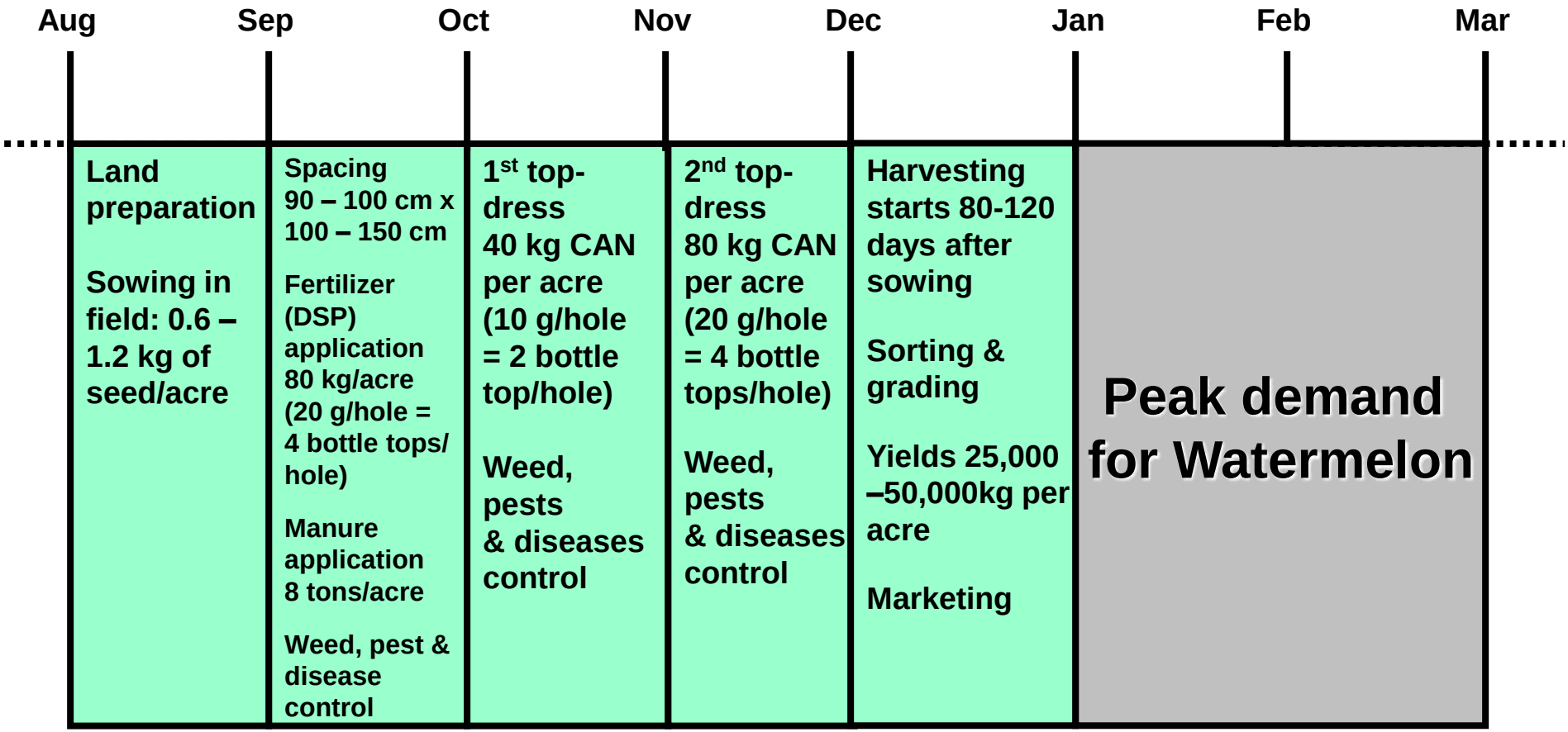
2.1 Crop Planting Calendar

A Sample of a Watermelon Planting Calendar



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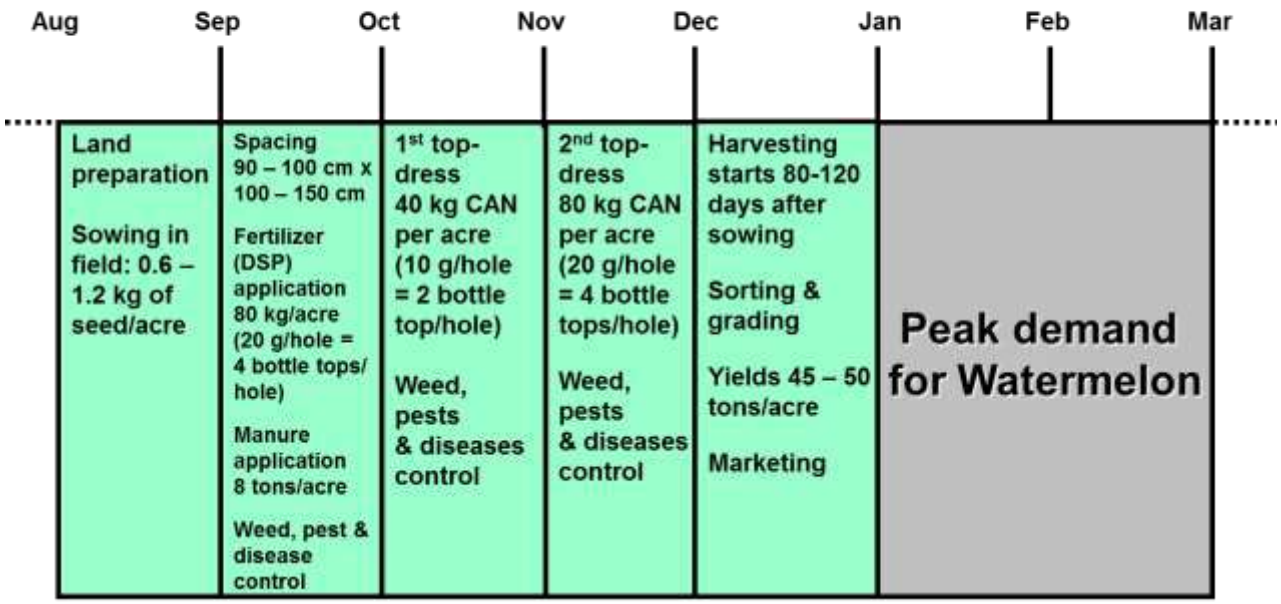


A Sample of a Watermelon Planting Calendar: Targeting a peak market demand beginning just after January

2.1 Crop Planting Calendar
(GHCP&PHHT20: Q2)

- A tool used by farmers to plan for production to ensure that marketing coincides with the period of the year when the market price of a produce is highest

Procedure:

1. Determine from the market survey results (2.1) when there is peak demand for Watermelon
2. Work backwards from the month when there is peak demand to prepare a monthly farm activities preceding the peak period
3. Use the monthly activities preceding the peak as a procurement plan for farm inputs and a guide for farm operations

Notes:

- To meet the peak demand period of the market, there may be need for supplemental irrigation

2.2 Composting

Manure preparation through composting

2.2 Composting

Manure preparation through composting

2.2 Composting (GHCP&PHHT20: Q4)

- During compost making, the organic matter need to be covered to prevent leaching of nutrients
- Watermelon is a heavy feeder and does well in soils with high organic content (manure)
- Based on the results of the soil analysis, prepare adequate compost for application
- The recommended rate of application is **8 tons per acre**

3.1 Basal Application

Manure incorporation as a basal application

3.1 Basal Application

Manure incorporation as a basal application

3.1 Basal Application (GHCP&PHHT20: Q8)

- Well composted manure should be broadcasted **(8 tons per acre)** then worked into the soil (incorporated) preferably using a hoe
- Alternatively, apply a **handful per planting hole** before sowing
- Manure/compost should be applied **1 – 2 weeks before sowing** the watermelon and incorporate into the soil

3.2 Planting

Young Watermelon seedlings

3.2 Planting

Photo: SHEP PLUS

Young Watermelon seedlings

3.2 Sowing

Seed Rate:

- About **0.6 – 1.2 kg per acre** depending on variety and spacing
- Soak seeds overnight to hasten germination

3.4.1 Recommended Spacing (GHCP&PHHT20: Q10):

- **100 – 150 cm** between rows
- **90 – 100 cm** between plants
- **Population**: 2,666 - 4,444 per acre

3.4.2 Fertilizer Application Rates (GHCP&PHHT20: Q11):

- **80 kg** per acre of TSP or DSP

3.2 Water Requirement

Photo: SHEP PLUS

Drip Irrigation

3.2 Water Requirement

Drip Irrigation

(GHCP&PHHT20: Q12)

- Water deficit during flowering and fruit development causes serious yield reduction
- Irrigation is important to ensure consistent moisture availability
- Excessive irrigation makes mature fruits to split / crack, tasteless and watery

3.3 Managing of Weeds

3-6

3-7

Photos: SHEP PLUS

A watermelon field with good weed management (left) and field with weeds (right)

3.3 Managing of Weeds

A watermelon field with good weed management

A watermelon field with weeds (right)

3.3 Managing of Weeds (GHCP&PHHT20: Q13)

- Watermelon has a shallow root system therefore care should be taken to avoid bruising the roots during weeding
- The frequency of weeding depends on weed infestation; generally keep the field weed-free as much as possible to avoid competition for **nutrients**, **sunlight** and **moisture**
- This can be done through use of appropriate weeding tools
- Weeding watermelon field when the soil is wet can increase the spread of some bacterial (**Bacterial Wilt**) and fungal (**Fusarium Wilt**) diseases

Photos: SHEP PLUS

3.4 Top-dressing

Top-dressing using the placement method

3.4 Top-dressing

Top-dressing using the placement method

3.4 Top-dressing (GHCP&PHHT20: Q14)

- **CAN** top dressing fertilizer is applied in **2 splits**:
  - **1st split application:** when the plants start to run (**40 kg per acre**)
  - **2nd split application:** when plants are about to flower (**80 kg per acre**)

3.5 Crop Management:
3.5.1 Mulching

Photo: © Victor Omari, HCD 2019

Mulching underneath fruit using organic materials

3.5 Crop Management:
3.5.1 Mulching

Mulching underneath fruit using organic materials

3.5 Crop Management
3.5.1 Mulching

- **Mulching** is a recommended crop management practice for Watermelon production
- Mulching could be done using straw or dry leaves
- Its advantages include:
  - **Moisture conservation**
  - **Weeds suppression**
  - **Prevents fruits** from being in contact with soil and thus prevents pest & disease attack
  - The fruits need to be turned regularly to ensure uniform fruit color development

3.5.2 Pruning

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

Control the number of fruits per plants if market demands larger fruits

3.5.2 Pruning

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

Control the number of fruits per plants if market demands larger fruits

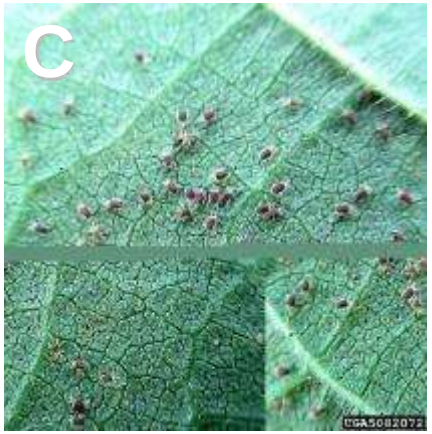
3.5.2 Pruning

- Remove any dead, diseased, yellowing or infested leaves or shoots at the joint where they are connect to the main stem
- Remove **deformed** and **blossom-end rot fruits**
- Maintain 2-3 vines and remove extra vines
- If market demands larger melons leave 3-4 well shaped melons per plant
- **Do not** prune when vines are wet

3.6.1 Major Pests

Photo: SHEP PLUS

Photos: SHEP PLUS



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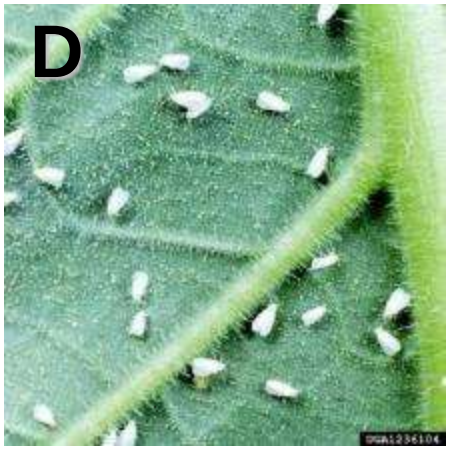
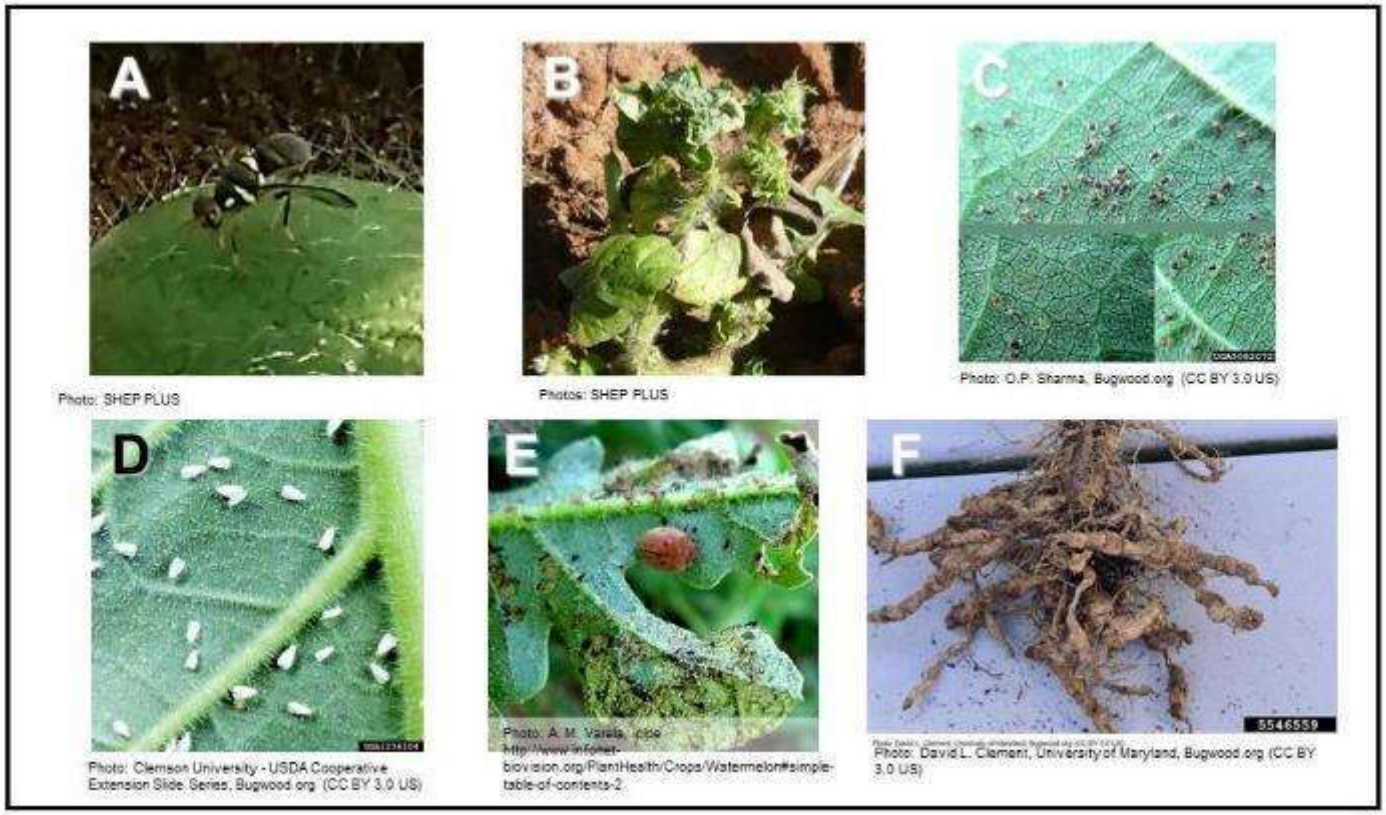


Photo: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org (CC BY 3.0 US)

Photo: A. M. Varela, icipe
http://www.infonet-biovision.org/PlantHealth/Crops/Watermelon#simple-table-of-contents-2

Photo: David L. Clement, University of Maryland, Bugwood.org (CC BY 3.0 US)

3.6.1 Major Pests



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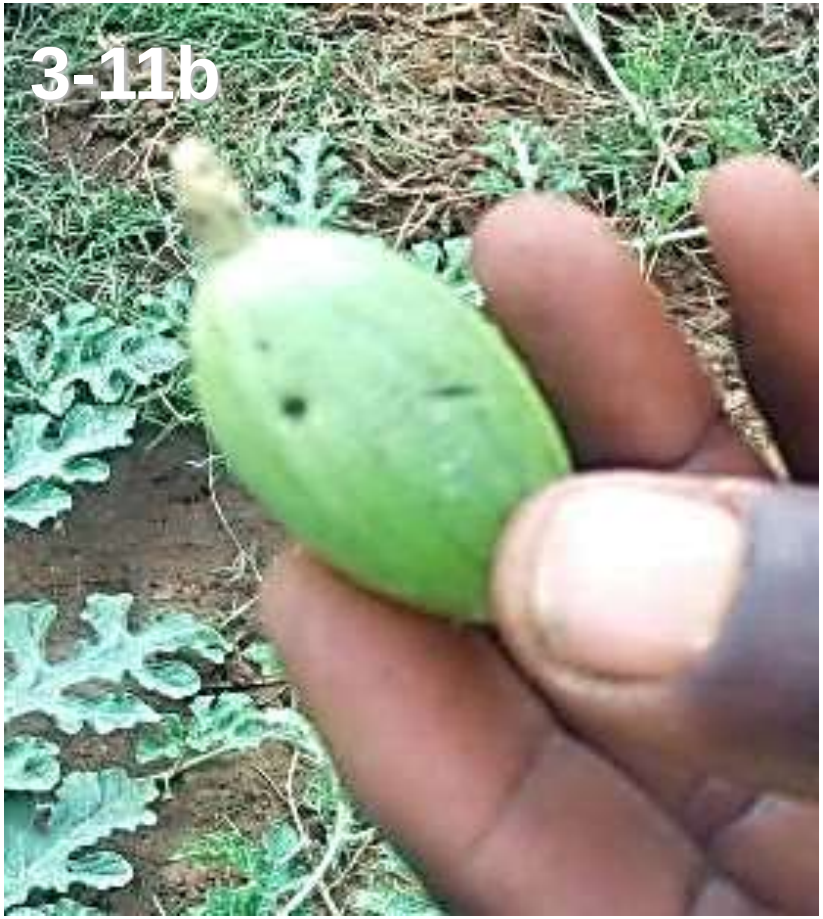
3.6.1 Major Pests

- Pest damage causes a reduction in quality and quantity of produce
- The following are the major pests of Watermelon in Kenya:
  - **A. Melon Fly**
  - **B. Aphids**
  - **C. Spider Mites**
  - **D. White Flies**
  - **E. Epilachna Beetles**
  - **F. Root-knot Nematode**

3.6.1.A: Melon Fly



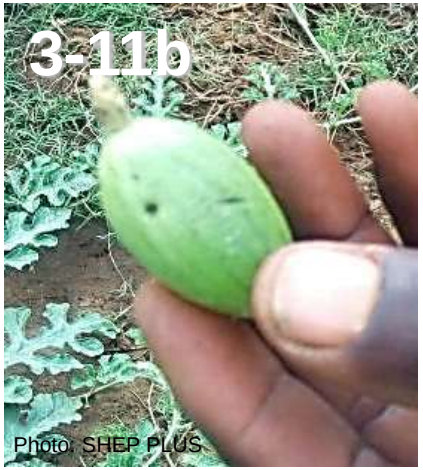
Adult Melon Fly on a fruit

Damage on Fruit

Photos: SHEP PLUS

3.6.1.A: Melon Fly

Adult Melon Fly on fruit



Damage on Fruit

3.6.1.A: Melon Fly

Identification:

- Adult has a yellow stripe in the middle of the thorax between the wings
- A black (often incomplete) T-shaped marking on the abdomen (the rear body section)
- Additional dark patches towards the outer edge of the wings
- Head yellowish with black spots

Damages:

- Larvae usually tunnel into the fruit causing a watery ooze to form on the surface that can later turn brown and resinous
- Exit holes by the larvae (**2 – 3 holes**) are visible on fruit surface
- Affected fruit will rot and often fall from the plant prematurely
- Larvae can also feed on flowers and plant stems

Control:

- **Field Monitoring/ Biological control:**
  - Use of pheromone traps e.g.) **cue lure** baited traps, and **Bactrolure L**® (a.i. **Methyl Eugenol**) used together with **Malathion**
- **Cultural Control:**
  - Wrap fruits with a eco-bags
  - Remove fruits with dimples and oozing clear sap
  - Kill the maggots by burning, burying or tying collected fruits in black plastic bags
- **Chemical Control:**
  - Difficult since larvae feed inside the fruit
  - **Use of pesticides**, such as
    - **Deltamethrin (Decis 2.5 EC**®)
    - **Trichlofon (Dipterex 95 SP**®)

3.6.1.B: Aphids

Photos: SHEP PLUS

Aphids on Watermelon leaves (Left) and damaged leaves (Right)

3.6.1.B: Aphids

Aphids on Watermelon leaves and damaged leaves

3.6.1.B: Aphids

Identification:

- Colonies of **green to blackish** aphids are found on tender shoots
- **Excretion of honeydew**

Damages:

- Attacked leaves are **curled** and **twisted**
- Sooty mould

Control:

- Ensure plants are not water stressed
  - **Use of pesticides**, such as
  - **Azadirachtin (Nimbecidine®)**
  - **Deltamethrin (Decis 2.5EC®)**

Photos: SHEP PLUS

3.6.1.C: Spider Mites

Photo: O.P. Sharma, Bugwood.org (CC BY 3.0 US)

Spider mites on a leaf

3.6.1.C: Spider Mites

Spider mites on a leaf

3.6.1.C: Spider Mites

Identification:

- Mites are tiny spider like pests which spin silk threads for anchoring to the plant
- Their bodies are **yellow-green** to **reddish brown in color**
- They flourish at **low humidity** and **high temperature** (**hot dry conditions**)

Damage:

- Attacked leaves show **white to yellow speckling**
- Where there is high infestation, plant is covered with **orange cloud of mites** and **webs**

Control:

- **Adequate irrigation**
- **Mulching** to conserve water
- **Predatory mite (Phytotech®)**

- Spray with **miticides**, such as:
  - **Bifenthrin (Brigade 25EC®)**

3.6.1.D: White Flies

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

White Fly adults on a leaf

3.6.1.D: White Flies

White Fly adults on a leaf

3.6.1.D: White Flies

Identification:

- **Small soft bodied** insects with wings covered with **white powdery wax**
- Presence of **honeydew** and **sooty mould**

Damage:

- Sucking sap
- Vector of viral diseases (Cucurbit Yellow Stunting Disorder)

Control:

- Use of pesticides such as:
  - **Lamba-cyhalothrin (Karate 2.5WG®)**
  - **Thiamethoxam (Actara 25WG®)**

3.6.1.E: Epilachna Beetles

Photo: A. M. Varela, icipe
http://www.infonet-biovision.org/PlantHealth/Crops/Watermelon#simple-table-of-contents-2

Epilachna Beetles on a leaf

3.6.1.E: Epilachna Beetles

Photo: A. M. Varela, icipe
http://www.infonet-biovision.org/PlantHealth/Crops/Watermelon#simple-table-of-contents-2

Epilachna Beetles on a leaf

3.6.1.E: Epilachna Beetles

Identification:

- Adults resemble lady bird beetles

Damages:

- Feed on leaves leaving fine net of leaves
- Damaged leaves **shrivel** and **dry up**

Control:

- **Spray with insecticides**, such as
  - **Deltamethrin (Decis 2.5EC®)**
  - **Lambda-cyhalothrin (Duduthrin Super EC®)**

3.6.1.F: Root-knot Nematode

Photo: David L. Clement, University of Maryland, Bugwood.org (CC BY 3.0 US)

Root-knot Nematode (*Meloidogyne* sp.) induced galling of Watermelon roots

3.6.1.F: Root-knot Nematode

Root-knot Nematode (Meloidogyne sp.) induced galling of Watermelon roots

3.6.2.g: Root-knot Nematode

General Description:

- Most cucurbits are extremely susceptible to Root-knot Nematodes

Symptoms:

- **Stunting**, **general unthriftiness (**Weak/unhealthy), **premature wilting**, and slow recovery to improved soil moisture conditions
- Root symptoms cause **swollen areas** (**galls**) on the roots of infected plants which result from exposure to multiple and repeated infections
- Leaf **chlorosis** (**yellowing**)

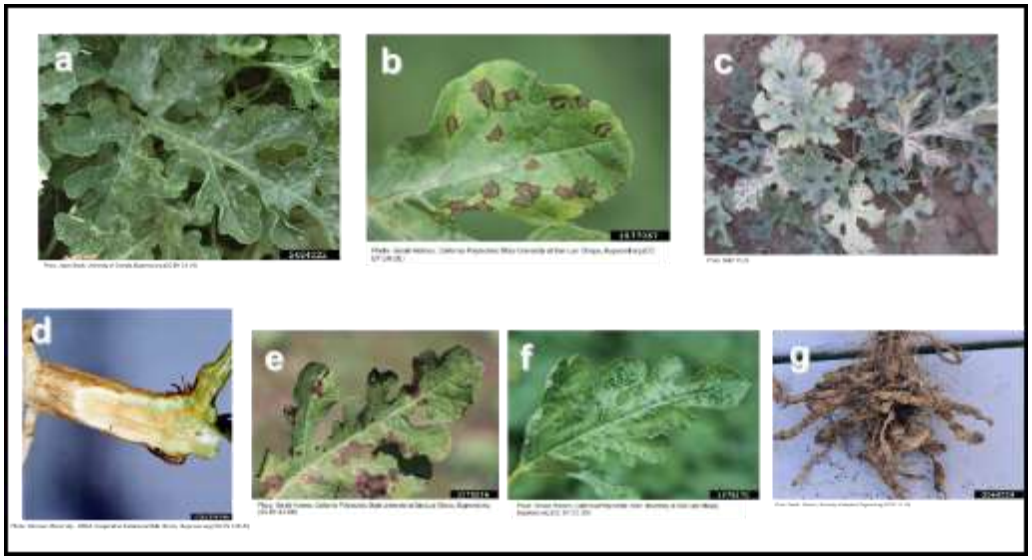
Control:

- **Cultural Control:**
  - **Crop rotation** of less susceptible crops or resistant varieties
  - **Use of resistant varieties** e.g.) **Crimson Sweet**
  - **Use adequate amount of manure**
- **Chemical Control:**
  - Use of Ethoprophos (MOCAP GR10®), Azadirachtin (NIMBECIDINE EC®)

3.6.2 Major Diseases

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

3.6.2 Major Diseases



3.6.2 Major Diseases

- Disease infection leads to reduction in quality and quantity of produce
- The following are the major diseases of Watermelon in Kenya:

a. Powdery Mildew
b. Anthracnose
c. Downy Mildew
d. Fusarium Wilt
e. Gummy Stem Blight (Black Rot)
f. Watermelon Mosaic Virus (WMV)
g. Root-knot Nematode

3.6.2.a: Powdery Mildew

Photo: Jason Brock, University of Georgia, Bugwood.org (CC BY 3.0 US)

Powdery Mildew disease on Watermelon leaves

3.6.2.a: Powdery Mildew

Powdery Mildew disease on Watermelon leaves

3.6.2.a: Powdery Mildew

General Descriptions:

- It is a fungal disease which is favoured by dry condition

Symptoms:

- White powdery growth start on lower leaf surface and later on the upper surface
- At advanced stage necrotic areas develop on the leaves

Control:

- **Use of fungicides**, such as
  - **Sulphur (COSAVET DF®)**
  - **Famoxadime+Cymoxanil (EQUATION PRO®)**
  - **Azoxystrobin + Difenoconazole (AZOXY TOP 325 SC®)**

3.6.2.b: Anthracnose

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

Affected Watermelon leaf

Photo: Jason Brock, University of Georgia, Bugwood.org (CC BY 3.0 US)

Affected Watermelon fruit

3.6.2.b: Anthracnose

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

Affected Watermelon leaf

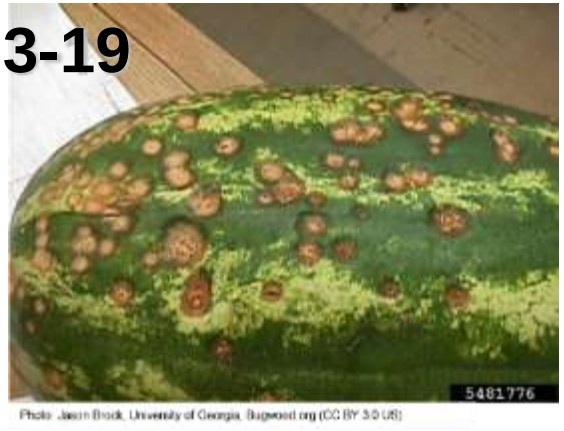


Photo: Jason Brock, University of Georgia, Bugwood.org (CC BY 3.0 US)

Affected Watermelon fruit

3.6.2.b: Anthracnose

General Descriptions:

- This disease is caused by **fungus** and affects **leaves**, **vines** and **fruits**
- Plants can be infected at **any stage**

Symptoms:

- **Round to angular reddish brown spots** on older leaves
- Spots may **dry**, **turn black** and **tear out**
- **Sunken spots** on the rind of fruits which may produce pinkish colored ooze

Control:

- **Cultural Control:**
  - Crop rotation
  - Plant clean seeds
- **Chemical Control:**
  - Use of fungicides, such as
    - **Copper Oxychloride (Samaya Kop 50WP®)** when vines start to run
    - **Mancozeb (Dithane M 45®)**
    - **Azoxystrobin + Difenoconazole (AZOXY TOP 325 SC®)**

3.6.2.c: Downy Mildew

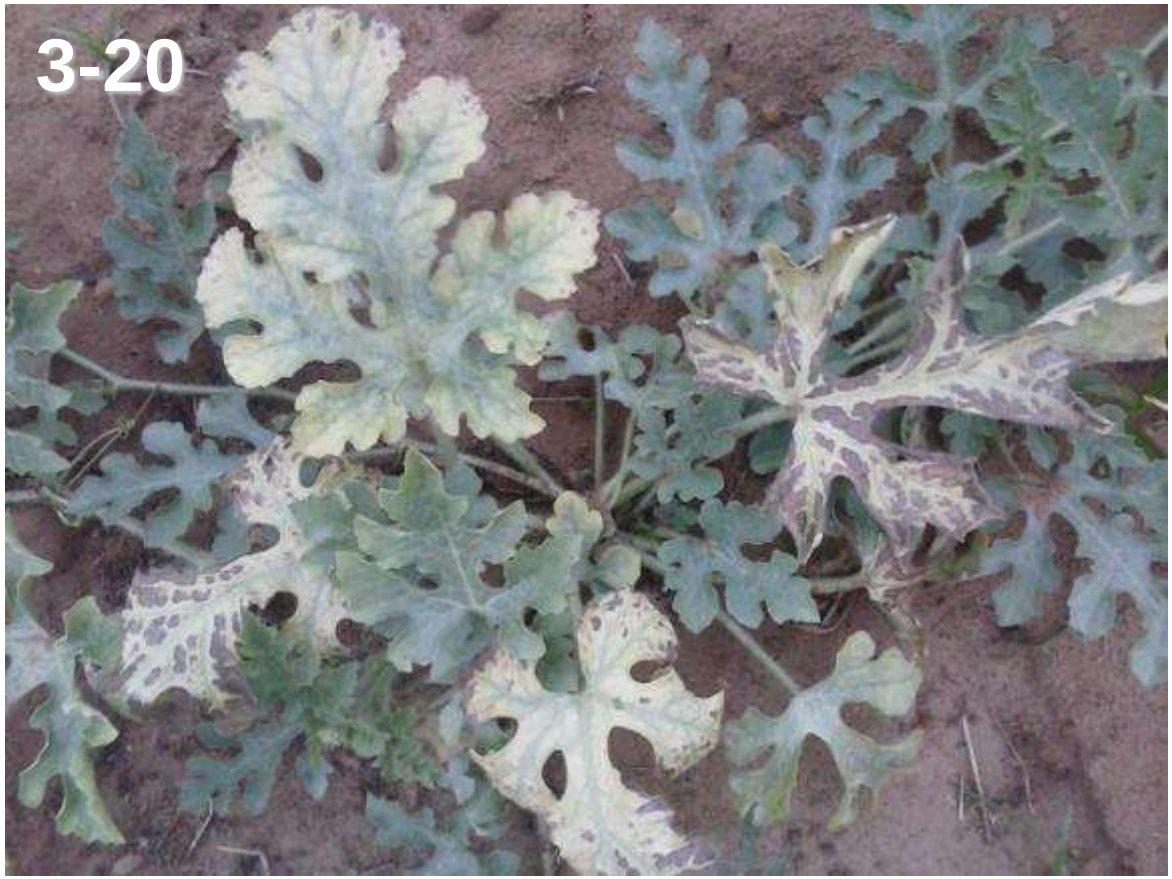


Photo: SHEP PLUS

Downy Mildew on upper leaf surface

3.6.2.c: Downy Mildew

Photo: SHEP PLUS

Downy Mildew on upper leaf surface

3.6.2.c: Downy Mildew

General Descriptions:

- Fungal disease which attacks leaves of Watermelon
- The pathogen is **air borne**

Symptoms:

- Small, irregular, chlorotic spots on upper leaf surface becoming brown and necrotic; entire leaf may become blighted
- Infected leaves tend to curl upward from the margins
- Gray to purple downy growth may be visible on underside

Control:

- **Cultural Control:**
  - Reduce canopy density
- **Chemical Control:**
  - **Mancozeb (Milthane Super®, Penncozeb WP®)**
  - **Propineb + Cymoxanil (Milraz WP®)**
  - **Dimethomorph + Mancozeb (MILLIONAIRE 69% WDG®)**

3.6.2.d: Fusarium Wilt

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

Stem section showing effect of Fusarium Wilt

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

Watermelon plant showing wilting of a few runners

3.6.2.d: Fusarium Wilt

Stem section showing effect of Fusarium Wilt

Watermelon plant showing wilting by few runner

3.6.2.d: Fusarium Wilt

General Descriptions:

- It is **a fungal disease** which can infect crop at any stage of growth
- Pathogen can be spread by **seed**, **soil** or **drainage water**

Symptoms:

- Wilt symptoms develop from **one** or **few runners**
- Vascular tissue of lower stem and roots **brown colouration**

Control:

- **Crop rotation**
- Rouging/removal and destruction of diseased plants
- Plant in well drained soils and avoid water logging
- **Use of certified seed**
- Use of **well decomposed manure** and **compost**

3.6.2.e: Gummy Stem Blight (Black Rot)

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

Brown irregular lesion on leaf

Photo: Rebecca A. Melanson, Mississippi State University Extension, Bugwood.org (CC BY 3.0 US)

A stem showing the gummy exudate symptoms

3.6.2.e: Gummy Stem Blight (Black Rot)

Brown irregular lesion on leaf

A stem showing the gummy exudate symptoms

3.6.2.e: Gummy Stem Blight (Black Rot)

General Description:

- The disease affects **leaves**, **stem** and **fruits**

Symptoms:

- **Brown round** or **irregular lesions** on leaves
- Lesions on stem are **brown** and later **turn white**
- Gum oozes from stem cracks
- Affected fruits are **soft** and **discolored**

Control:

Use of chemical, such as Copper Oxychloride (SAMAYA KOP 50WP®, COBOX 50WP®, ISACOP®)

3.6.2.f: Watermelon Mosaic Virus (WMV)

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

WMV symptoms on the leaf

Photo: By Source (WP:NFCC#4), Fair use, https://en.wikipedia.org/w/index.php?curid=37441924

Fruit affected by WMV

3.6.2.f: Watermelon Mosaic Virus (WMV)

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

WMV symptoms on the leaf

Photo: By Source (WP:NFCC#4), Fair use, https://en.wikipedia.org/w/index.php?curid=37441024

Fruit affected by WMV

3.6.2.f: Watermelon Mosaic Virus (WMV)

General Descriptions:

- This disease is transmitted by **aphids**
- It infects **only cucurbit crops**

Symptoms:

- **Mottling of leaves**
- Stunted growth, shortened internodes with bushy erect growth for some runner tips
- **Mottled appearance** on fruit surface

Control:

- **Field sanitation:** removal of weeds (they are potential hosts)
- Control aphids

4. Harvest

Photo: SHEP PLUS

A farmer and his harvested watermelon

4. Harvest

Photo: SHEP PLUS

A farmer and his harvested watermelon

4. Harvest

4.1 Harvesting Indices (GHCP&PHHT20: Q17)

- Tendrils near fruit stem have changed color **from green to brown**
- Ground spot on the belly of the melon has changed **from white to yellow**
- The fruits when thumped with the hand produce **muffled dull tone** (immature fruits produce **clear metallic ringing tone**)
- Leave the stalk attached to the fruit
- Mature fruits have **sweet flavor**, **crisp texture** and **deep red color**
- Sugar content (measured as soluble solids by use of hand held refractometer) of **10 %** or more in the flesh near the center of the melon
- **Yields: 25,000 – 50,000kg per acre**

Main harvesting stages:

- Mature but before full ripeness for **distant markets**
- Mature and ripe for **nearby markets**

Notes:

- Watermelons don't ripen after they are picked so harvest time is important
- If harvested immature, red color will develop but sugar content does not increase after harvest
- Harvesting should be done by **cutting the vine** and **NOT pulling**, **twisting** or **breaking off the vines**

5. Post-Harvest Handling

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

Photo: SHEP PLUS

Choose appropriate post harvest handling methods

5. Post-Harvest Handling

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

Photo: SHEP PLUS

Choose appropriate post harvest handling methods

5. Post-Harvest Handling

- **Handling** should **minimize fruit injury** which may be caused by impact or abrasion
- **Shading** is necessary in order **to protect Watermelon from direct sunlight** which causes sunburn

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

- Watermelons are handled as **bulk shipment** or **packed into cartons**
- For bulk shipments in trucks a layer of straw on the floor and between melons and the side walls of the truck needs to be put in place
- Can store for 2 weeks beyond which they lose crispness and colour

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

Sorting:

- Watermelons are sorted to remove insect-damaged, blossom-end rot, cracked, discolored, without stalk attached

Grading:

- Watermelons are graded according to size (small, medium & large) for each variety