



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””

BULB ONION PRODUCTION



Prepared by SHEP PLUS

Training Title: Bulb Onion Production**Objective:** To provide a guideline on production of Bulb Onions**Specific Objective:**

- To provide basic information on production, post-harvest handling, and marketing of Bulb Onion

Contents:

1. **Introduction: Background, Common Varieties and Optimal Ecological Requirements**
2. **Pre-Cultivation Preparation 1 – 5**
3. **Cultural Practices 1- 9**
4. **Harvest**
5. **Post-Harvest Handling**
6. **Cost & Income Analysis**
7. **Post-Training Evaluation Exercise**

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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.

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.

1. Introduction:

1.1 Background



Bulb Onion (Kitunguu Maji)

1. Introduction:

1.1 Background



Bulb Onion (Kitunguu Maji)

1. Introduction:

1.1 Background

- Bulb Onion is one of the **most widely grown & consumed vegetables** in Kenya
- It is a biennial plant but considered an annual because it is harvested in its first growing stage
- It is a profitable crop. However, it requires a lot of labour during transplanting and weeding
- It is an important spice for foods when cooked or served raw
- Used to make pickles or chutneys
- It is rich in **Calcium, Iron, Potassium, Vitamin B6 & B9, Vitamin E** and has **medicinal properties**

1.2 Some Common Varieties



Photo: SHEP PLUS

“Bombay Red”



Photo: SHEP PLUS

“Red Creole”

1.2 Some Common Varieties



“Bombay Red”



“Red Creole”

1.2 Some Common Varieties

- **“Bombay Red”** and **“Red Creole”** are the most common varieties in Kenya

“Red Creole”:

- A popular variety which produces **red, flat-round, globular bulbs**
- It has **very pungent taste**
- **Maturity: 150 days** after transplanting
- Excellent in **storage**
- **Yield Potential: 16,000kg** per acre

“Bombay Red”:

- Variety for dry and warmer conditions
- Produces **small to medium** sized bulbs, which are **globe shaped, Deep purple red** colour and very pungent
- **Maturity: 150 days** from transplanting
- **Yield Potential: 16,000kg** per acre

1.2 Some Common Varieties

1-4



Photo: <https://www.easeed.com/2015-07-16-12-56-29/vegetables/vegetables-6-137>

“Red Star F1”

1-5



Photo: Amiran seed catalogue

“Neptune F1”

1.2 Some Common Varieties

1-4



Photo: <https://www.easeed.com/2015-07-16-12-56-29/vegetables/vegetables-6-137>

“Red Star F1”

1-5



Photo: Amiran seed catalogue

“Neptune F1”

1.2 Some Common Varieties

- “**Bombay Red**” and “**Red Creole**” are the most common varieties in Kenya

“Red Star F1”

- Matures in **110-120 days** after transplanting
- Very high yielding **25,000kg** per acre
- **Globe shape, uniform medium to big bulbs**
- Excellent bulb colour; **deep dark red**
- **Good field holding capacity**
- Stores up to **5 months**
- Tolerant to **neck rot** and **purple blotch** diseases

“Neptune F1”

- **High yielding**
- Firm **shinning red bulbs**, **good pungency**
- Good for salads, red-skin, **flattened globe-shape**
- **Mid-late maturing**, (110 -120 days)
- , **5-6 months** storage period
- **Pink root resistant**

1.2 Some Common Varieties Cont'



Information Source: <http://www.royalseed.biz/onions.php>

“Texas Grano”



Source: <http://www.easeed.com/index.php/2015-07-16-12-56-29/vegetables/onion-red-tropicana-f1>

“Tropicana F1”

1.2 Some Common Varieties Cont'



Information Source: <http://www.royalseed.biz/onions.php>

“Texas Grano”

1-7



Source: <http://www.easeeed.com/index.php/2015-07-16-12-56-29/vegetables/onion-red-tropicana-f1>

“Tropicana F1”

1.2 Some Common Varieties Cont'

“Texas Grano”:

- **White colour** with golden exterior
- **Bulbs large**
- Maturity **120 days** from transplanting
- **Does Not store well.**
- It has **mild pungency**, which is good for salad
- **Yield: 21,000kg per acre**

“Tropicana F1”:

- **Very productive** and produces **large red, thick flat bulbs** with firm pungent taste
- **Yield Potential: 25 tons per acre**
- Maturity **90 -100days** after transplanting

Other varieties grown in Kenya:

“Jambar F1”:

- **Dark red globe bulbs easy to cure**
- Can be grown in **open field** and **greenhouses**
- **Yield: 23,000kg per acre**

“Red Passion F1”:

- **Deep red**
- Stores up to 5 months
- Tolerant to **Pink Root** and **Purple Blotch**
- **Yield Potential: 23,000kg per acre**

“Red Pinoy F1”

- **Deep red** attractive bulbs
- Maturity only **90 days** from transplanting
- **Strong pungency**
- Long shelf life of up to **6 months** at room temp
- Tolerant to **Downy Mildew** and **Purple Blotch**
- **Yield: 30 tones per acre**

1.3 Optimal Ecological Requirements

Altitude	0 – 1,900 metres above sea level
Rainfall	500 – 700 mm of rainfall annually
Growing Temperature	15 – 30 °C
Soils	<ul style="list-style-type: none">• Fertile and well drained soil• pH range 6.0 – 6.8

1.3 Optimal Ecological Requirements

Altitude	0 – 1,900 metres above sea level
Rainfall	500 – 700 mm of rainfall annually
Growing Temperature	15 – 30 °C
Soils	<ul style="list-style-type: none"> • Fertile and well drained soil • pH range 6.0 – 6.8

1.3 Optimal Ecological Requirements

- **Altitude:** Onion can be cultivated up to **1,900 m** above sea level
- **Rainfall:** Onions require **well-distributed rainfall** of between **500** and **700 mm** during the growing period. Dry spell is needed at maturity.
- **Temperature:** The optimum temperature for growth is **15 – 30 °C**. If the temperature exceeds **30 °C**, maturity is hastened & small bulbs are produced, consequently lowering the yields. When the temperature is low, growth is slowed or the plant may result to **flowering**. **Cold weather** is also associated with increased leaf diseases.
- **Soil:** Onions require **fertile** and **well-drained soil**. The optimum pH range is **6.0 – 6.8**. Sandy to silty loams with **fine tilth** are adequate.

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

2. G20 technologies

2. G20 technologies

- | | |
|---|--|
| 10. Recommended spacing | 16. Safe and effective use of pesticides |
| 11. Recommended fertilizer application rate | 17. Use of harvesting indices |
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| 13. Timely weeding | 19. Value addition techniques |
| 14. Top-dressing | 20. Keeping farm records |
| 15. IPM practices | |

[G20 Technologies]

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

2.1 Crop Planting Calendar

A Sample of a Bulb Onion Planting Calendar

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
<p>Land preparation</p> <p>Sowing in nursery bed: 0.8 – 1.2 kg of seed/acre</p> <p>Control of damping-off diseases & cutworms</p>	<p>Transplant 40 – 50 days after seed Sowing</p> <p>Spacing 30 cm x 10 cm (133,000 plants/acre)</p> <p>Fertilizer (DAP/ TSP) Application 80 kg/acre (15 g/m of a row=3 bottle tops/m)</p>	<p>Weed, pests & diseases control</p> <p>Unearthing of bulbs</p>	<p>Stem bending</p>	<p>Harvesting starts 90-150 days after transplanting</p> <p>Bulb curing</p> <p>Sorting & grading</p> <p>Yields 16,000-23,000kg Per acre</p> <p>Marketing</p>	<p>Peak demand for Bulb Onion</p>		

2.1 Crop Planting Calendar

A Sample of a Bulb Onion Planting Calendar

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Land preparation	Transplant 40 – 50 days after seed Sowing	Weed, pests & diseases control	Stem bending	Harvesting starts 90-150 days after transplanting	Peak demand for Bulb Onion		
Sowing in nursery bed: 0.8 – 1.2 kg of seed/acre	Spacing 30 cm x 10 cm (133,000 plants/acre)	Unearthing of bulbs		Bulb curing			
Control of damping-off diseases & cutworms	Fertilizer (DAP/ TSP) Application 80 kg/acre (15 g/m of a row=3 bottle tops/m)			Sorting & grading			
				Yields 16 tons/acre			
				Marketing			

7/25

**A Sample of a Bulb Onion Planting Calendar:
Targeting a peak market demand beginning
just after the beginning of 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:

- Determine from the market survey results (2.1) when there is peak demand for Bulb Onion
- Work backwards from the month when there is peak demand to prepare a monthly farm activities preceding the peak period
- 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 of 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
- Bulb Onion 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 ranges from **10 – 16 tons per acre** for Bulb Onion

3.1 Basal Application



Manure incorporation as a basal application

3.1 Basal Application



3.1 Basal Application: (GHCP&PHHT20: Q8)

- The manure/compost should be broadcasted (**10 – 16 tons per acre**) then worked into the soil (incorporated) preferably using a hoe
- Manure/compost should be applied at least **1 – 2 weeks before transplanting** the Bulb Onions
- Onions respond very well to well decomposed organic manure

Manure incorporation as a basal application

3.2 Raising Seedlings



Photo: SHEP PLUS

A Bulb Onion nursery

3.2 Raising Seedlings



Photo: SHEP PLUS

A Bulb Onion nursery

3.2 Raising Seedlings (GHCP&PHHT20: Q9)

- Onion is **propagated by seed (fresh)**
- Seed rate is **0.8 – 1.2 kg per acre** and is sown in a nursery under a mulch cover

Nursery Establishment:

- Prepare beds maximum **1 m wide** and incorporate well-decomposed compost /FYM **20 kg/m²** and add **DAP/TSP 20 g/m²**
- Make rows about **15 cm apart**, drill the seed thinly in **1cm** furrows and cover **lightly with soil and mulch**
- **Germination takes 7-10days**

Nursery Management:

- Irrigate the nursery bed regularly
- After the seed emerges, remove the **mulch**
- Prepare a **raised cover**
- Manage weeds, pests and diseases

3.3 Transplanting



Recently transplanted Bulb Onion seedlings

3.3 Transplanting



Photo: SHEP PLUS

Recently Transplanted Bulb Onion seedlings

3.3 Transplanting

3.3.1 Appropriate Time

- Seedlings are transplanted **6 – 8 weeks** after sowing or at 3-5 well formed leaves when **base** is pencil thick

3.3.2 Recommended Spacing (**GHCP&PHHT20: Q10**)

- The seedlings are transplanted in **2.5 – 3 cm** deep trenches at a spacing of **30 cm** between rows and **8 – 10 cm** between plants (when using furrow irrigation)

3.3.2 Transplanting Method

- Soil analysis results should be used to determine the nutrient requirements of the soil prior to planting
- Irrigate the seedbed prior to pulling out the seedlings
- Apply **80 kg/acre of TSP**
- Irrigate field well a day before transplanting
- Carefully pull out the seedlings to avoid damage
- Cut off 50 per cent of the green tops to hasten take off
- When planting onion sets, don't bury them more than one inch under the soil

3.4 Water Requirement



Bulb Onion Seedlings Under Irrigation

3.4 Water Requirement



**Bulb Onion Seedlings
Under Irrigation**

3.4 Water Requirement (GHCP&PHHT20: Q12)

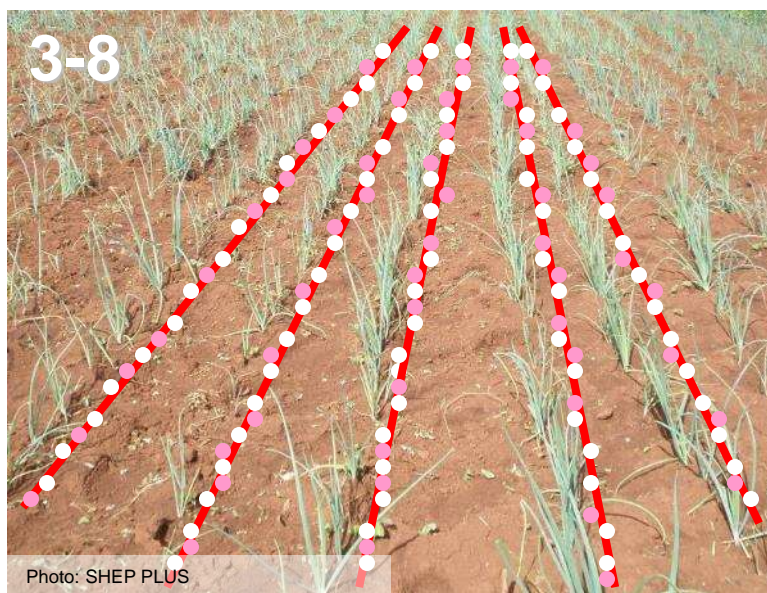
- Onions require light and frequent irrigation:
 - **At the growing stage: excessive moisture** must be avoided
 - **At the bulbing stage:** need a substantial amount of water
 - Watering should be **reduced**/discontinued towards bulb maturity
- Lighter soils need more frequent water applications, but less water applied per application
- Increase the water application as plants and roots increase in size
- Proper moisture management is important in
 - Alleviating “**Pink Root**” problems (Refer to the [page No. 21/26](#))
 - General root health
 - Vigorous bulb growth
- Drought stress will cause splitting or formation of double/ multiple bulbs

3.5 Top-dressing



Strip/banding top-dressing of Bulb Onions

3.5 Top-dressing



Strip/banding top-dressing of Bulb Onions

3.5 Top-dressing (GHCP&PHHT20: Q14)

- Soil analysis results should be used to know the nutrient requirements of the soil prior to planting
- Top-dressing can be done in 2 splits
 - 1st Top-dressing: **30 days** after transplanting at **40 kg/acre of CAN**
 - 2nd Top-dressing: **45 days** after transplanting at **80 kg/acre of CAN**
- Strip/banding method is preferred over broadcasting as it is more effective
- Too much nitrogen results in thick necks
- Top-dressing should be completed before initiation of bulbing

Unearthing:

- **Unearthing** is removal of excess soil around the bulb/loosening soil **to allow the bulb to expand or develop well**
- **Unearthing** can also facilitate the **colouring and curing**
- If the soil is hard during bulb formation, loosen the soil to allow bulbs to develop well
- Unearthing is carried out **during 2nd** and **subsequent weeding** and is done by removal of the soil from the bulbs by hand
- Watch out not to damage or expose the roots

3.6.1 Major Pests



Photo: © A. M. Varela, icipe
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Photo: © Jarmo Holopainen
<http://infonet-biovision.org/PlantHealth/Crops/Onion> (CC BY-NC-SA 3.0)

3.6.1 Major Pests



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Photo: © Jarmo Holopainen
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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 Bulb Onion in Kenya:

A. Onion Thrips

B. Onion Fly

3.6.1.A: Onion Thrips



Photo: © A. M. Varela, icipe
<http://infonet-biovision.org/PlantHealth/Crops/Onion>(CC BY-NC-SA 3.0)

Damage by Onion Thrips on Bulb Onion leaves

3.6.1.A: Onion Thrips



Photo: © A. M. Varela, icipe
<http://infonet-biovision.org/PlantHealth/Crops/Onion> (CC BY-NC-SA 3.0)

Onion Thrips on Bulb Onion leaves

3.6.1.A: Onion Thrips

Identification:

- Adult thrips are **small (0.5 – 2.0 mm)**, **slender** and **winged**
- Wings are long, narrow and fringed with long hairs
- Nymphs are **white or yellow**
- Both adults and nymphs feed on the base of the plant within the leaf sheaths

Damages:

- Attacked leaves have **sunken silvery patches**
- Under severe attack, the entire plant appears **silvery** and later the leaves **wither, dry up** and **die**
- The pest excreta appears as **black spots** on the silvery leaves

Control:

- Keep plants well irrigated since water stressed plants are more susceptible to thrips damage
- Maintain weed-free plots
- Rogue heavily infested plants
- Neem extracts can be sprayed on attacked plants
- Spray with insecticide, such as **Spinosad (Tracer®)**, Abamectin + Acetamiprid (**AMAZING TOP 100 WDG® PHI:21days**), Acephate (ASATAF SP® PHI: 3-7days)

3.6.1.B: Onion Flies



Photo: © Jarmo Holopainen <http://infonyet-biovision.org/PlantHealth/Crops/Onion> (CC BY-NC-SA 3.0)

Damage by an onion fly larva

3.6.1.B: Onion Flies



Photo: © Jarmo Holopainen
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Damage by an onion fly larva

3.6.1.B: Onion Flies

Identification:

- The onion fly maggots measure **8 mm long** and are **white cream in color**
- They are the most destructive stage of the fly

Damages:

- They eat the lateral roots causing tunnels into the taproot, plants become **shriveled** or eventually **die**
- They are also found inside developing onion bulbs and their feeding exposes the plant to infection by diseases like **Bacterial Soft Rot**

Control:

- Practice crop rotation
- Use well decomposed manure/compost
- Practice field sanitation: remove and destroy infested plants
- Carefully plough in crop residues immediately after harvest

3.6.2 Major Diseases



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



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



Photo: © A. M. Varela, icipe <http://infonet-biovision.org/PlantHealth/Crops/Onion> (CC BY-NC-SA 3.0)



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Photo: Howard F. Schwartz, Colorado State University, 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 Bulb Onion in Kenya:

- Onion Downy Mildew**
- Purple Blotch**
- Rust**
- Pink Root**
- Neck Rot**

3.6.2.a: Onion Downy Mildew



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

**Symptoms of “Onion Downy Mildew”
infection on a Bulb Onion leaf**

3.6.2.a: Onion Downey Mildew



Symptoms of “Onion Downy Mildew” infection on a Bulb Onion leaf

3.6.2.a: Onion Downey Mildew

General Descriptions:

- The disease is caused by a **fungus**
- It is prevalent in **cool, humid and poor drainage conditions**

Symptoms:

- **Formation of lesions** near the tips of the older leaves,
- **Yellow patches covered with grey wet fields**
- **Leaf tips shrink, turn pale brown and later die**

Control:

- Field hygiene
- Crop rotation
- Use tolerant varieties e.g. Red Pinoy F1
- Use of fungicides e.g.) **Mancozeb (Cadilac®, Dithane M45® etc.)**

3.6.2.b: Purple Blotch



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

**Symptoms of “Purple Blotch”
infection on a Bulb Onion leaf**

3.6.2.b: Purple Blotch



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

Symptoms of “Purple Blotch” infection on a Bulb Onion leaf

3.6.2.b: Purple Blotch

General Description:

- The disease is caused by a **fungus**

Symptoms:

- **Small white spots** on the foliage
- Under moist condition, the spots rapidly increase to **large purplish blotches** often surrounded by a **yellow to orange border**
- Lesions extend to girdle the leaf which leads to its collapse
- Infection may spread to the **bulb**, where it may cause a **wet, orange rot** starting at the neck

Control:

- Use resistant varieties e.g. **Red Passion F1** and **Red Pinoy F1**
- Crop rotation
- **Field Sanitation:** remove crop remains after harvest, do not leave volunteer plants in the field
- Avoid over fertilization
- Recommended spacing and good drainage to decrease humidity in the plant stand
- Use of fungicides such as **Mancozeb (Dithane M45®)**, **Difenoconazole (Domain 25% EC®)**,
- **Propineb + Cymoxanil (Milraz WP 76®)**
- **Eugenol** (e.g. **Explorer 0.3 SL®**)

3.6.2.c: Rust



Photo: © A. M. Varela, icipe <http://infonet-biovision.org/PlantHealth/Crops/Onion> (CC BY-NC-SA 3.0)

**Symptoms of “Rust” infection on
a leaf of Bulb Onion**

3.6.2.c: Rust



Photo: © A. M. Varela, <http://infonet.sesion.org/PlantHealth/Crops/Onion> (CC BY-NC-SA 3.0)

Symptoms of “Rust” infection on a leaf of Bulb Onion

3.6.2.c: Rust

General Description:

- The disease is caused by a **fungus**
- **High humidity, high temperatures** and **dense plant population** favor the disease development

Symptoms:

- Small reddish dusty spots (pustules) on leaves
- Heavily infected leaves **turn yellow** and **die** prematurely

Control:

- Crop rotation
- Application of proper agronomic practices: proper nutrition and spacing
- **Use of fungicides:**
 - **Mancozeb (Dithane M45)**
 - **Difenoconazole (Domain 25% EC®)**
 - **Eugenol (Explorer 0.3 SL®)**

3.6.2.d: Pink Root



**Symptoms of “Pink Rot” infection
on Bulb Onion roots**

3.6.2.d: Pink Rot



Symptoms of “Pink Rot” infection on a Bulb Onion roots & leaves

3.6.2.d: Pink Rot

Symptoms:

- Similar to **nutrient deficiencies** or **stress** associated with extremely **dry conditions**
- Light pink to **yellowish-brown** discoloration on **roots** that becomes **dark pink** then red and eventually **purple**
- Under advanced stages, **roots** eventually **shriveled**, become **brittle** and **die**

Control:

- Good management practices that **reduce** plant **stress**
- Crop rotation
- Use tolerant cultivars e.g. **Red Passion F1** (Refer to [page No. 3/26](#))

3.6.2.e: Neck Rot



**Symptoms of “Neck Rot” infection
on Bulb Onion**

3.6.2.e: Neck Rot

3-16

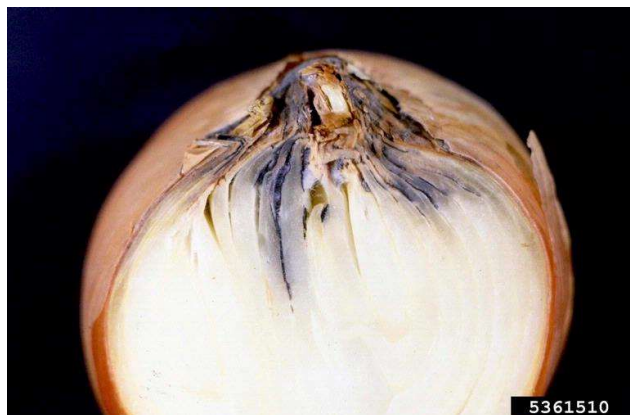


Photo: Howard F. Schwartz, Colorado State University, Bugwood.org
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Symptoms of “Neck Rot” infection on a Bulb Onion

3.6.2.e: Neck Rot

General Descriptions:

- Disease visible when onions are in store
- Caused by a **fungus** which enters the onions through wounds or cracks in the fleshy neck part of the bulb.

Symptoms:

- Top part of the bulb will turn browner and the skin will be darker brown.
- Top of the bulb will be softer than the lower parts.
- Grey mold and sometimes speckled with small black spots will appear, and the bulbs will deteriorate even further.

Control:

- Use fungicide treated seeds or sets
- Avoid damaging onion bulbs at or during harvest
- Don't bend over foliage to hasten drying out
- Only harvest onions when the necks have ripened and fallen over on their own accord.
- Avoid using high nitrogen fertilizers
- Crop rotation at least 3 years
- Dry the bulbs out thoroughly after harvest
- Good ventilation is important in the drying process than sun.
- Store only bulbs with dried out thin necks
- Store bulbs in a cool and dry place
- Sort out bulbs which show signs of rot.

4. Harvest



Harvested Bulb Onions

4. Harvest



Harvested Bulb Onions

4. Harvest

4.1 Harvesting Indices (GHCP&PHHT20: Q17)

- Harvesting can be done **90 – 150 days** after transplanting depending on the variety
- Bulb Onions are ready for harvesting when **the leaves collapse** or when **75 % of the tops of the crop have dried and fallen over**
- Leaf tops begin to **discolor, bend** and **dry** towards the ground
- **Reduced thickness of sheath leaves** surrounding the bulbs (**papery membranous cover**)

5. Post-Harvest Handling

5.1 Curing



Photos: SHEP PLUS

Field Curing

5. Post-Harvest Handling

5.1 Curing



Photos: SHEP PLUS

Field Curing

5. Post-Harvest Handling

5.1 Curing

What is "Curing"?

- Curing is a **process** intended to **dry** off the **necks** and **outer leaves** of bulbs
- The main objective is to **prolong shelf life** by **preventing moisture loss** and **attack by diseases**
- It can be done **in the field** or **in a protected environment** away from adverse weather conditions, such as rain or direct sunlight

5.1.1 Field Curing

- Curing can be done in the field if the maturity and harvesting coincides with dry months
- Harvested onions are placed in rows with leaves partially covering the bulbs to prevent **sunburn** or **greening**
- Onions are then left in the field **until the outer leaves and neck are completely dry and papery**
- Field curing can take **2 – 3 weeks** depending on the environmental condition

5.1.2 Protected Curing

Drying of Onions in a protected environment

- Curing is done in a **warm, dry** and **well ventilated location** protected from **direct sunlight and rain**
- The process involves the following:
 - Removal of excess soil
 - Trimming of foliage leaving 2.5cm of section of stem at neck
 - Placing onions in single layer in large flat tray
- Onions can also be cured by **tying tops** of bulbs in bunches and **hanging** on a **horizontal pole** in well **ventilated** shade

5.2 Value Addition Techniques



Bulb Onions packed in the nets

5.2 Value Addition Techniques



Photo: SHEP PLUS

Bulb Onions packed in the nets

5.2 Value Addition Techniques (GHCP&PHHT20: Q19)

5.2.1 Sorting

- Before storage, Bulb Onions are sorted to remove the following:
 - Onions with thick necks
 - Onions which have bolted
 - Injured onions
 - Decayed onions
 - Doubles and small bulbs

5.2.2 Grading

- Grading should be done **before & after storage**
- For domestic market onions are put into **3 Grades: large, medium and small**
- Bulbs must be:
 - Intact with firm flesh which is not exposed
 - Clean and free from visible foreign matter
 - Sufficiently dry with the first two outer skin and stem fully dry
 - Free from abnormal external moisture
 - Free from foul smell

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

- **Store/package Bulb Onions** in well ventilated containers such as **onion nets**