KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION

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# FACTSHEET FOR TECHNOLOGY INNOVATORS WORKING WITH SMALL HOLDER FARMERS IN KENYA

# ONION

## INTRODUCTION

- Onion is a member of the **Amaryllidaceae** family, Genus- **Allium,** Species ***Allium cepa.***
- 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 requires a lot of labour during transplanting and weeding.
- An important spice for foods when cooked or served raw, it is used to make pickles or chutneys.
- Onion is rich in Calcium, Iron, Potassium, Vitamin B6 & B9, Vitamin E and has therapeutic properties.
- In tropical climate onion can be grown all year-round where irrigation is possible.

**Varieties include;**

Jambar F1, Red creole, Red Pinoy F1, Red passion F1 and Red comet F1.

## SITE SELECTION

### Altitude range

Onion requires altitudes of 500-2000m above sea level.

### Soil type and conditions

Well-drained, deep, fertile, clayey loam and sandy loam soils with good water holding capacity, away from shade.

### Temperature range

The temperatures should be 15 – 30 °C.

### Rainfall

The rainfall should be 500 – 700 mm p.a.
Well distributed and with a dry season prior to harvesting.

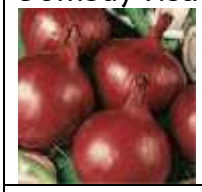
## LAND PREPARATION

### Steps during land preparation

- Deep plough and rip the land to give room for bulbing and to break hardpan.
- Harrow to appropriate tilth just before planting.
- Apply well-decomposed manure and mix with the soil, based on soil analysis results.

## PLANTING

### Varieties

| Variety | Attributes |
|---|---|
| Tropicana F1  Photos: Safal Seeds & Biotech LTD | -Very productive and produces large red, thick flat bulbs with firm pungent taste.<br>-Maturity 90 -100 days after transplanting.<br>-Yield: 25 tons per acre. |
| Red creole  | -A popular variety which produces red,flat-round, globular bulbs.<br>-Maturity; 150 days from transplanting.<br>-It has very pungent taste.<br>-Excellent in storage.<br>-Yield: 16 tons per acre. |
| Bombay Red  | -Variety for dry and warmer conditions.<br>- Produces small to medium sized bulbs,which are globe shaped, Deep purple red colour and very pungent.<br>-Maturity 150 days from transplanting.<br>-Yield: 16 tons per acre. |
| Jambar F1  | -Dark red globe bulbs easy to cure.<br>-Can be grown in open field and greenhouses.<br>-Matures in 80-120 days.<br>-Yield: 23 tons per acre. |

Use clean, disease-free seedlings or sets for planting, from registered agro -input outlets.

## Nursery Establishment:

- Prepare beds maximum 1m wide and incorporate well-decomposed manure at a rate of 20kg per square metre. Apply DAP/TSP fertilizer at a rate of 20grams per square metre.
- Make rows about 15cm apart, drill the seed thinly in 1cm furrows and cover lightly with soil and mulch.

## Nursery Management:

- Irrigate the nursery bed regularly.
- Germination takes 7-10 days.After the seed emerges, remove the mulch.
- Prepare a raised cover.
- Manage weeds, pests and diseases.


Onion seeds and seedlings

## Direct sowing

- Direct sowing gives excellent results where the season is sufficiently long to provide early pre-bulbing growth.
- Direct sowing at rate of 2-4 kg per ha at 30 cm apart.

## Planting using setts

- Bury the onion setts 2.5 cm under the soil.
- Thin after 4-6 weeks (1-1.5 months) to 8-10 cm x 30 cm spacing.

## Depending on the use

- When smaller onions for use in pickling or boiling are desired, spacing can be reduced to 2.5 cm in the row.
- Medium sized onions, planting can be spaced at 7.5-8 cm within row.
- Larger bulb size is promoted by spacing of 10 cm or more.

## Transplanting

- Transplant seedlings at 3-5 true leaves or pencil thickness and 10-15 cm tall, at a spacing 30cm between rows and 2.5 - 10 cm between plants depending on the desired size and usage.
- Cut off 50 per cent of the green tops to harden the transplant and hasten take off.
- Water or irrigate immediately after transplanting and regularly until the seedlings get established.

## SOIL AND WATER CONSERVATION MEASURES

- Lighter soils need more frequent water applications but less water applied per application.
- Increase amount of water at the bulbing stage reduce and discontinue watering towards bulb maturity.
- Stop irrigation 15-20 days prior to harvesting.

## SOIL FERTILITY REQUIREMENTS AND MANAGEMENT

- Top-dress with 300kg N per ha (N based fertilizer) 3-4 weeks after transplanting and same quantity 6 weeks after transplanting based on soil analysis report.
- Watering should be done immediately after topdressing.
- Strip or 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.

## ROUTINE CROP MANAGEMENT PRACTICES

### Weed control

- Hand weeding done 2-3 times depending on the condition of the field.
- Use inorganic mulch polythene and organic grass mulch or selective herbicides to conserve moisture and supress weeds.
- If the soil is hard, loosen or remove excess soil around the bulbing point to allow bulbs to expand/ develop well.
- Take care not to damage or expose the roots as this may cause disease infection.

### 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.

## DISEASE AND PEST MANAGEMENT

### Pest management

Onion thrips (*Thripstabaci*) and Onion fly (*Delia antiqua*), Cut worms, Aphids, Leaf miners (*Liriomyza*spp)

### Onion thrips

### Damages:

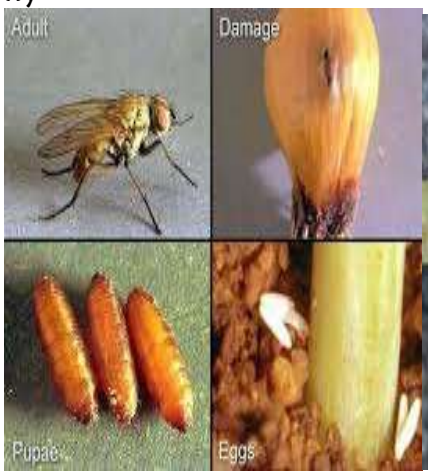
- Attacked leaves have sunken silvery patches.
- Under severe attack, the entire plant appears silvery and later the leaves wither, dry up and die.
- The pest excreta appears as black spots on the silvery leaves.

### Control

- Keep plants well irrigated since water stressed plants are more susceptible to thrips damage.
- Maintain weed-free plot.
- Rogue heavily infested plants.
- Neem extracts can be sprayed on attacked plants.
- Spray with insecticide containing Abamectin + Acetamiprid.

### Onion fly maggots

These measure 8 mm long and are white cream in color; They are the most destructive stage of the fly




### Damage:

- They eat the lateral roots causing tunnels into the stem then the plants become shriveled and /or eventually die.

- They are also found inside developing onion bulbs and their feeding exposes the plant to infection by diseases, such as 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.

## Disease and pest management

## Major diseases include;

Purple blotch (*Alternariaporri*), Downy mildew (*Peronspora destructor*), Rust (*Pucciniaporri*) Onion smuts and Soft rots.

## Purple blotch

The disease is caused by a fungus *Alternaria porri*

## Control:

- Use tolerant 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®).

## Downy mildew

## 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:

• Crop rotation.
• Field hygiene.
• Use of tolerant varieties e.g.) Red Pinoy F1.

Rust

Symptoms:

• Reddish to dusty orange spots (pustules) on leaves.
• Heavily infected leaves turn yellow and die prematurely.

Control:

• Application of Good Agronomic Practices i.e. Crop rotation, proper nutrition and spacing.
• Use of fungicides such as Mancozeb (e.g. Dithane M45), Difenoconazole (e.g. Domain 25% EC®), Eugenol (e.g. Explorer 0.3 SL®).

Soft rots Disease control strategies

- IPM and Good agronomic practices e. g. right spacing.
- Use clean seed or planting materials and varieties tolerant to major diseases.
- Timely harvest and crop rotation.
- Spray with suitable fungicides, as recommended/instructed.
- Field hygiene e.g. destroy infected crop residues.

HARVESTING

Maturity

- Bulb onions are ready for harvest when: they are 3 months old after transplanting 75% of the tops have turned brown or yellow, fall over and dry.
- Leaves start to turn yellow and the skin becomes papery around the bulb, foliage wither and form a shiny membrane cover around the bulb, the neck of the onion is dry and tight.
- The silver skin peels off easily, 50% of the bulb is exposed out of the soil neck falls.
- The green onions can be harvested during thinning after 45-60 days and used as salads.
- Harvesting is done when leaves begin to turn yellow and bulbs are firm.

Harvesting

- Harvesting is done manually in Kenya during hot and sunny days by levering the bulbs with a fork to loosen them and pulling the tops gently by hand to avoid bruises.
- To prevent sun scald the bulbs are laid in such a way that the tops of one row is over the bulbs of another, but if the rain occurs, the bulbs should be brought to the curing house immediately.

- Late harvesting causes excessive sprouting during prolonged storage.
- Onion will produce 7-10 tons per acre.

## POST-HARVEST HANDLING

- Cleaning is done by removing the soil, foreign matter and badly affected onions manually or by using air.
- Curing process of drying the necks and leaves of the bulb to ensure maximum quality and increased shelf-life.

- Cure naturally sun-drying in the field or artificially.
- Artificial curing is better because of better process control. Spread the onions on a wire rack in a well-ventilated and shaded area. Put a covering on top of the onions to prevent them from rain.
- The onions are considered well-dried once the neck is tight the outer skin is dry, makes a rustling sound when handled and the skin colour is uniform. This takes 2 to 3 weeks.
- Sort to remove the onions with thick necks, the bolted, injured, decayed onions, doubles, small bulbs, bruised, damaged by pests, diseases and sun-scald and sprouted.
- Trim the onion roots and leaves using a sharp knife and cut 4-6 cm from the bulb.
- Grade according to colour and size as follows; Grade 1: Big sized onions, Grade 2: Small sized onions and Grade 3: Bulb-lets.
- Store in a clean, dry, cool and well-aerated place. Controlled atmosphere storage is practiced increasingly to extend the marketing period.

## MARKETS

- The producer needs to focus on agribusiness and commercially-oriented production (for instance gross margin analysis including marketing channels and production costs - to derive mark-up).

SokoYetu - Twiga Foods Marketplace, Revolutionizing African Retail
https://www.mkulimayoung.com/market
KAMIS is the source of market data (prices and volumes) in the Kenyan regionAMIS
Kilimo Call Centre 0800 724 891
Sauti Trade and Market Information Platform Dial *384*35#.

## REFERENCES


- 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

- National Agricultural Commodities Market Information (NAFIS) http://www.nafis.go.ke/category/market-info/
- Taimba https://taimba.co.ke/ 254-709-790-000

## CONTACTS

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