

# ONION PRODUCTION GUIDELINE



**Prepared By Thomson Zulu**  
MBA, BSc Prod Mgt, KCN

*Call Us on 0974847338 or 0965075873*

## Growing high density dry bulb onions for profit and sustainability 2020-2021 Season Guidelines

### 1. Introduction

There is consistent demand within the Zambian marketplace for high quality, locally produced onions. Premiums are paid for produce that meets the Zambian marketing standards, giving you access to sell through the ZAMBIAN Local Harvest Brand and take advantage of their minimum price guarantee.

This guide will show you the methods for profitable and sustainable production of these premium quality onions. Water efficient high technology irrigation systems and a high density planting method are used for producing crops over an extended period.

### 2. Growing season

Sowing: October to early-December

Transplanting: mid-November to mid-

February Harvest period: April to mid-June

Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Sowing											
Transplanting											
Harvest											




### 3. Growing period

Nursery sowing to field transplant: 7 to 8

weeks Transplant to start of harvest: 17 to

18 weeks Total crop cycle: 25 weeks

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Stage	S						T	T																	H	H

Key to colours and symbols:  Sowing     Transplanting     Harvesting

#### 4. Varieties

Varietal selection is important for the success of your crop. Varieties should be carefully selected to suit the local climatic conditions, local market timings and demands.

Farmers should select varieties that are appropriate for day lengths and winter temperatures encountered in Abu Dhabi. Under these conditions, the full yield potential of onions can be achieved and the risk of seed-stem formation and premature flowering can be minimised as a result of fluctuations in temperature. It is important that farmers purchase good quality seed for planting each year. Seeds saved from previous crops on the farm can reduce yield and quality.

ZAMBIAN experience and expertise can help select the most suitable varieties for your needs.

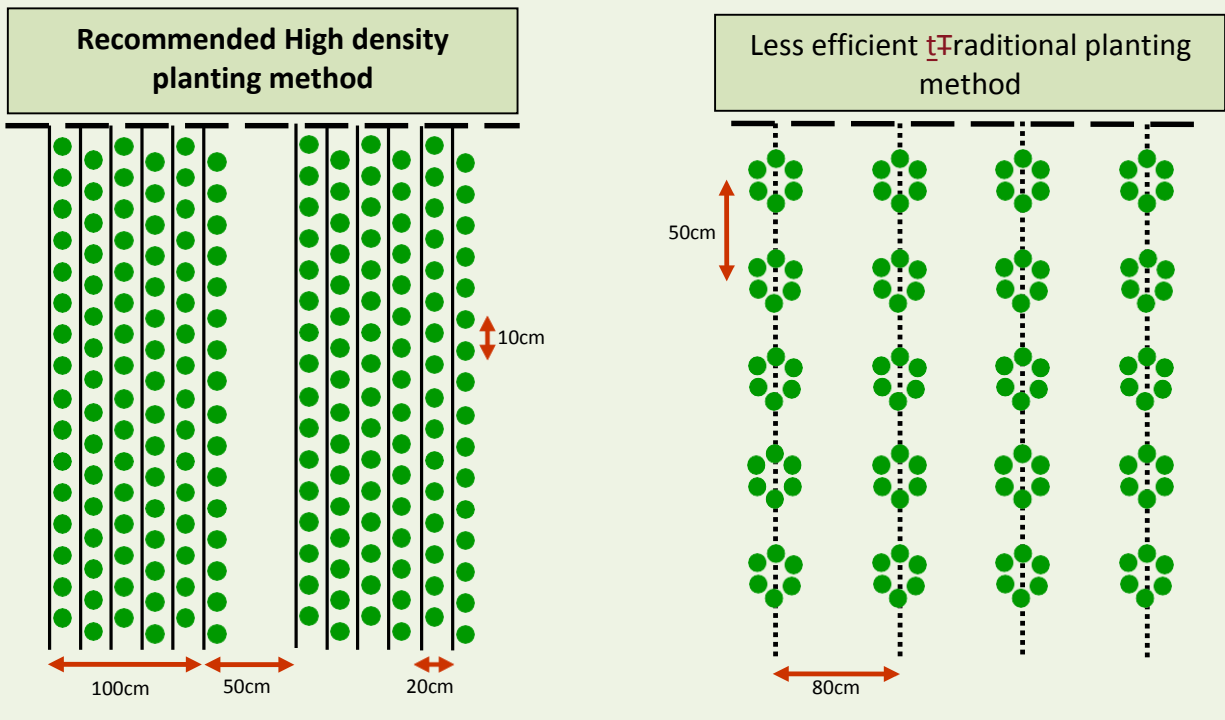
#### **Irrigation layout, plant density and expected yield**

Using new pressure compensated inline drip irrigation systems with a high planting density planting can provide a potential 140% increase in yield over the traditional practice of planting in onion circles around drippers. High density planting increases the plant density to 40,000 per donum with a typical yield of between 2,200 kg and 2,600 kg from the 900 kg and 1,100 kg expected from the traditional practice.

Six rows of seedlings are transplanted into 100 cm wide raised beds. The recommended plant spacing within the rows

is 10 cm and between the rows is 20 cm. A 50 cm access pathway is allowed between beds for farm workers to carry out crop management practices. (See Diagram 1 Figures 1,2&3)

Diagram 1: Comparison of planting density of traditional and new planting bed methods



**Key to symbols**

- Onion plant
- — — — — Underground irrigation pipe – sub-main or lateral
- Irrigation line with inline pressure compensated drippers and 20cm dripper spacing
- ..... Traditional irrigation line with adjustable emitters at 50cm spacing

Figure 1: High density onion seedlings



Figure 2: Growing high density onion crops



Figure 3: Maturing onion crop



## 5. Land preparation and pre-planting fertilising

Thoroughly cultivate the area to be planted 4 weeks prior to the transplanting date. Then apply pre-planting fertiliser and composted manure to the whole area and mix into the top 10 cm to 15 cm of the soil. Mark out 1 m wide beds to allow for the installation of irrigation lines. The fertilisers to be incorporated into the soil at least two weeks prior to transplanting are:

Fertiliser	Fully composted manure (kg/donum)	Triple super phosphate (kg/donum)	Urea (kg/donum)	Potassium sulphate (kg/donum)	Magnesium sulphate (kg/donum)	Comment
Total (kg/donum)	3,000	50	15	10	3	Mix thoroughly into top 10-15 cm of soil at least 2 weeks prior to transplanting

These recommendations are for a typical fine sandy soils in Abu Dhabi. Growers may achieve a similar result using N:P:K compound fertilisers that supply the same amounts of nitrogen (N), phosphorus (P), potassium (K) and magnesium (Mg) in the recommended ratios listed in the table.

The composted manure provides organic matter to the soil to help with the retention of irrigation water and nutrients for a strong healthy room system. Organic material must be thoroughly composted to avoid the introduction of weed seeds, pests, diseases and prevent seedling root burn from exposure to high temperatures in poorly composed manure.

Beds should be level and if possible raised 10 cm higher than the access pathways on either side.

## 6. Installation of new irrigation lines

Existing irrigation systems can be adapted to the new layout shown in Diagram 1 and Figures 4,5&6 by attaching new drip lines at the required spacing to the existing underground sub-mains or lateral water pipes. Existing outlets that do not align with the new spacing should be blocked off. In some situations farmers may choose to install new sub-mains or lateral pipes to facilitate the new drip line layout. Always test the irrigation system and dripper prior to transplanting to ensure no blocks are present. This should be done as part of the pre-planting weed control.



Figure 4: Old and new irrigation systems



Figure 5: New irrigation system



Figure 6: New irrigation system

## 7. Onion nursery

Sowing onions in a well-managed high density field nursery has the following advantages over direct seeding in the field:

- A more favourable germination and seedling environment in a protected location on the farm
- Improved irrigation control and crop monitoring during the sensitive germination and seedling stage
- Decreased irrigation water use and salt accumulation in the field for the nursery period (7 to 8 weeks). This effectively reduces irrigation water consumption and potential root zone salt build-up in the field by one third over the total crop period.
- Selection of healthy and strong seedlings for transplanting and avoid planting seedlings that have double growing points. Increasing the number of single head onions harvested is preferred in the market.

The following table shows the onion nursery requirements:

	Required weight of seed (g)	Number plants required	Sowing depth (mm)	Furrow spacing (cm)	Seedling density (cm <sup>2</sup> )	Total area required (m <sup>2</sup> )	Seedlings ready for transplanting (weeks)	Basal diameter at transplanting (mm)
Per donum	150-200	40,000	10-15	15-20	1	10-15	7-8	8

Cover nurseries with date palm fronds or hessian cloth to maintain an even temperature and moisture conditions. The cover should be removed after the first signs of seedling emergence are observed. The nursery should be observed daily to make sure that optimum conditions are maintained during the germination and seedling growing period. Early detection of problems allows a rapid response when extra water, nutrient or pesticide applications may be required.

Reduce nursery irrigation a few days prior to transplanting to harden the seedlings. On the day of transplanting cut the seedling leaves by approximately half the height to reduce stress on the plants.



Transplant the seedlings in the cooler part of the morning or evening. It is important to minimise stress on the seedlings by keeping them out of direct sunlight and do not let them dry out.

**8. ZAMBIAN Extension Engineers can provide advice about the best approach for nurseries on your farm**

**Growing stage**

**Transplanting**

Onion seedlings are planted into prepared beds at a spacing of 10 cm between seedlings along the rows. Seedlings should be transplanted with either in furrows or the direct placement method. Transplants must be placed in the furrows upright as possible and must have good contact with the soil. Roots must be placed downwards at the base of the planting position. Care should be taken not to tangle or fold them up onto the stem of the seedling. Irrigate soon after transplanting.

## 9. Crop nutrition and application of soluble fertilizers through irrigation (fertigation)

Weekly fertigation is recommended according to the following schedule.

Weeks after transplanting	Urea (kg/donum)	Potassium sulphate (kg/donum)	Magnesium sulphate (kg/donum)	Trace element mixture (kg/donum)	Comment
Week 2	3.0	1.0	0.4	0.1	Weekly applications can be delivered using fertigation. The four fertiliser types can be mixed together and applied at one time. Alternatively magnesium sulphate and/or trace element mix can be applied using foliar spray.
Week 3	3.0	1.0	0.4	0.1	
Week 4	3.0	1.0	0.4	0.1	
Week 5	4.0	1.5	0.4	0.1	
Week 6	4.0	1.5	0.4	0.1	
Week 7	4.0	1.5	0.4	0.1	
Week 8	2.0	1.0	0.4	0.1	
<b>Total</b>	<b>23.0</b>	<b>8.5</b>	<b>2.8</b>	<b>0.7</b>	

This schedule of weekly applications is recommended for the sandy soils typically found on Abu Dhabi farms. Weekly fertigation ensures that nutrient levels are maintained in the root zone of the crop throughout the growing period.

The final application is carried out eight weeks after transplanting i.e. Week 15 of the growing period when the bulb of the onion is expected to expand. If bulb formation is insufficient, further applications may be necessary to delay maturing the crop for extra weeks to achieve the required bulb size for the

market. The usual practice is to discontinue further fertiliser applications to allow bulbs to become firm with thin necks so that the crop has longer shelf life and is suitable for storage.

## **10. Irrigation**

Irrigation must be closely monitored to ensure soil moisture remains even in the beds during the whole cropping period. It is particularly important in the days following transplanting when seedlings are establishing new root systems. Excessive irrigation promotes root and basal rots and results in leaching of nutrients away from the plant.

Onions require even moisture availability to achieve continuous healthy growth and to avoid stress related problems such as double head formation. Water demand is highest during the bulb formation stage of the crop.

Application of soluble fertiliser as fertigation can be carried out during a normal irrigation. Continue irrigation for 5 minutes after fertigation to flush the system.

## **11. Weed control**

Onions do not compete well with weeds and yield can be severely impacted by excessive weed growth. Successful onion production requires good weed control. Irrigate the beds prior to transplanting to stimulate the germination of weed seeds.

Following planting, the field should be monitored regularly and weeds should be removed manually at the early growth stages before they start competing with the onion crop. Remove all weeds prior to transplanting.

## **12. Plant protection**

Many pest and disease problems can be avoided through integrated pest management procedures.

The following will help to ensure any pests in your onion crop remain below the economic threshold level and swift action is taken should any pest or disease become a problem:

**Use of pest resistant/tolerant varieties:** This ensures your crop has natural resistance to pests and diseases,

minimising the need for expensive chemical control.

**Nursery screening:** Entrance to onion nurseries should remain closed and nurseries should be screened to prevent pest entry such as thrips, aphids and the diseases they carry which include onion yellow dwarf virus.

**Crop rotation:** Do not plant onions more than once every four years in the same field. This will minimise the risk of fungal and bacterial diseases such as downy mildew, purple blotch and bacterial wilt.

**Soil solarisation:** This should be carried out each summer prior to planting and helps control soil borne pathogens and pests such as nematodes, *Fusarium* damping off, bulb mites and weeds.

**Companion crops:** Corn windbreaks need to be established by the time onions are transplanted as onion seedlings are sensitive to strong winds. Cabbage is a good companion crop and should be planted around the onion field perimeter to deter pests such as aphids.

**Traps:** Placing sticky traps around your onion crop will help control thrips and onion maggots.

**Removing and correctly destroying all crop residues immediately after harvest:** This helps prevent last season's pests and diseases re-infecting your new crop and will help control downy mildew.

**Crop monitoring:** Onion crops should be monitored for pests and diseases by scouting the field every week. This is especially important during the early stages of crop growth. Consistent monitoring enables a swift response should an outbreak occur, which will minimise expense and crop damage.

**Thorough composting of all manure and organic matter:** All manure and organic matter should be thoroughly composted to prevent pest and disease infestation, such as mole cricket.

**13. In the event of a pest or disease outbreak, please contact your nearest ZAMBIAN extension engineer to correctly identify the pest or disease and provide recommended control measures.**

### **Harvest stage and pre-harvest interval (PHI)**

Pre-harvest interval is the time between the last pesticide application and harvests of the treated crop. The PHI must be adhered to for all crops. Failure to adhere to the PHI will render the crop unfit for human consumption and for sale. It is illegal to sell crops where the PHI has not been adhered to.

#### **14. The PHI is written in all pesticide labels. If in doubt, contact your local**

##### **ZAMBIAN extension engineer. Crop maturity**

Onions are ready for harvest once the necks have shrunk and completely dried. Pre harvest management starts about two weeks prior to this when bulbs reach mature size and the foliage of the crop starts to fall over. This should occur approximately 12 weeks after transplanting or week 20 of the cropping period. Irrigation is reduced and then discontinued over this two week period. This is a vital part of the curing process that allows onions to be stored.

With high density production the dried foliage forms a mulch of leaves over the top of the onion bulbs which protects them from sunburn during the curing period. The hot dry Abu Dhabi weather conditions are ideal for curing onions in the field. Once the neck area is completely dried, the tops are clipped about 3-5 cm from the neck area and the onions are ready to be removed from the field. Curing generally takes 5-10 days under local conditions.



Figure 7: Curing onions in the field



Figure 8: Mature onions ready for harvest

Onions should be harvested during the cooler parts of the day to avoid heat damage and sunburn. Care should be taken as bulbs are prone to sunburn and rots during storage which will lead to downgrading.

### **15. Field Hygiene during harvest.**

Good field hygiene is required to ensure your crop is free of contaminants. This is essential for it to be sold in the market.

### **16. Handling and storage**

Onions are prone to mechanical bruising which reduces shelf life and saleability of the product. They must be handled with care. Onions must not be thrown or dropped.

Harvested onions (Figure9) should be removed from the field to a warm and dry location for short term storage. Onions should be packed as to avoid heat damage or sunburn. This is especially important during late season harvesting when air temperatures and intensity of the midday sun will significantly reduce quality.



Figure 9: Harvested onions

Onions should be free from rots, blemishes, cuts and physical damage and be of uniform shape.

To reduce risk of damage in transit onions should be packed carefully. Packages must be stacked safely and securely and packed so they are not resting on the product beneath. Damaged onions will be rejected at the packing centres.

### **17. Grading**

To ensure your onions get the best price grade them according to the current ZAMBIAN specifications. These can be obtained from your local procurement officer.