Soil and climate requirements
Although the crop adapts well to a variety of soil types, the best results are obtained on a loamy soil that is fairly deep and well-drained to a depth of about 120cm. Onions grow best in soils with a pH of 5.5 — 6.5. Rotate onions with crops that are not the same family. Legumes, e.g. beans and peas, are recommended, because these crops also help increase soil fertility.

Temperature
The optimum temperature for onion growth is 18 — 22°C. Higher temperatures (25 — 27°C) speed up bulbing and bolting (flowering) is triggered by low temperatures (8 — 13°C).

Day length
Onions are sensitive to photo periods.

Bulbing is initiated once the period of light exceeds a certain minimum requirement. Short-day onions have a fairly short day length requirement. Intermediate day cultivars require longer day lengths for bulbing. They are grown south of Welkom.

Cultivars
Short day: Granex 2000, Texas Grano 502 PRR, Early Copper Intermediate day: Australian Brown, Python, Semal, Caledon Globe

Sowing times
Sow onion seeds directly into the soil, or grow seedlings to transplant later. The best way for beginner farmers is to transplant seedlings; sowing onions directly requires some experience.
The soil in the seedbed should be fine in texture. Sow seeds in rows to ensure enough ventilation and easier weed control.

**Seedbed**

It is important that the soil in the seedbed be fine in texture. Sow seeds in rows to ensure enough ventilation and make weed control easier. Make furrows 15cm apart and sow seed at a depth of about 10 — 15mm. Do not sow too thickly, as this results in spindly plants which transplant poorly. Sowing densities should be between 1 500 and 2 500 seeds per 1m² (about 7g of seed per 1m²). If the days are very hot, a thin layer of grass should be sprinkled on the soil as mulch. Remove the grass when the plants start to emerge, 7 — 14 days after sowing. If left too long, the plants will become leggy and get sunburn. Seedlings 8 — 9mm in diameter (the thickness of a pencil) and 12 — 20cm high are ready for transplanting. Short-day onions will be ready to transplant within 6 — 8 weeks. Do not trim the leaves before transplanting. Make furrows 2 — 4cm deep and lay the white part of the seedling in the furrow. Use a rake or spade to cover the roots and compact the soil around them with the back of the rake, or by hand. Take care not to plant the seedlings too deep, as this tends to produce elongated bulbs.

**Transplanting**

After transplanting in the field, keep the soil moist for the first five days to allow the plants to overcome the shock of transplanting and the root systems to settle properly. Prepare beds 1 — 1.2m wide in the field, with 0.5 — 0.7m paths between beds. Remove soil from the path to build the up the beds to 8 — 10cm high. Plant onions 7 — 10cm apart in rows that are 20 — 25cm apart (50 — 60 plants per 1m²).

**Fertilising**

During soil preparation, work in 100g of 2:3:2 (22) or 2:3:4 (30) per 1m². The crop is a heavy feeder, and needs nitrogen and potassium. But remember that too much nitrogen (N) late in the season can cause too vigorous leaf growth, delayed bulb development and thicknecked plants. Phosphorus (P) and potassium (K) are required throughout the growing season. Use 10g LAN per 1m², as well as 10g potassium chloride (KCl) per 1m², three weeks after transplanting and again at six weeks after planting, especially if the soil is sandy. Apply them 5 — 15cm from the plants. Carefully work in the top dressing with a fork or a ghrop, but be careful not to damage the roots. Water immediately after applying the top dressing; this will allow the fertiliser to start working immediately.

**Irrigating**

Onions require approximately 400 — 600mm of water during the growing season. Onion roots are concentrated in the upper 30mm of the soil and for this reason the soil must be kept moist. Do not water onions for the three weeks before harvesting.

**Harvesting**

In home gardens, onions can be harvested when 100% of the leaves have lodged. For commercial plantings, onions are usually harvested once 50% of the leaves have lodged. Do not leave onion plants in the soil for too long. Onions are lifted by loosening the soil with a fork or a harvester. Collect onions, make bundles and tie the leaves together. Hang from the ceiling of a storeroom to dry. Plants can be dried on the field by placing them in wind-rows in such a way that the leaves protect the bulbs against sunburn. If it rains, turn the plants over. Once the neck of the bulb has dried completely, the leaves can be cut and the bulbs stored. For fresh marketing of short-day onions, the onions are partially dried and then marketed immediately in order to realise high prices. The preference of the South African market is for small to medium bulbs with a mass of 80 — 100g.
Storage
After drying and cleaning, onions must be stored in a dry place. Onions for storage should be mature, thoroughly dried and not damaged. The storeroom should be well-ventilated and have a low temperature and a dry atmosphere.

Turn the bulbs often, so that all sides of the entire bulb are exposed to air and light at regular intervals. Store in layers no thicker than 10cm. Rotten bulbs must be removed immediately.

Yield
Under favourable conditions, yields of 30 — 40t/ha can be achieved. Top farmers can harvest up to 60t/ha. In South Africa the average yield is 25t/ha. Factors such as planting density, cultivar, planting date and growing period influence yield.

Crop management
Onion plants, particularly seedlings, do not offer much resistance to weeds, so weeds must be controlled to avoid competition for nutrients and water, particularly when the onion plants are small. Weed carefully to avoid damaging the roots.

Stop working between the rows when the foliage becomes dense.

PESTS, DISEASES
Thrips are very small insect pests, which feed on the leaves by sucking plant sap. Attacked plants become silvery and flecked. Farmers should practice crop rotation to combat this. Nematodes attack the roots, but can be controlled.

The most important diseases are:

- **Downy mildew**: Grey to purplish mounds on the leaves. Leaves turn pale green, then yellow and die off. Downy mildew is favoured by low temperatures and high humidity.
- **Pink root** appears on the roots of seedlings and older plants. The root turns pink, shrivels and dies. More tolerant cultivars are available.
- **Purple leaf spot** or Alternaria blotch. Large brown lesions appear on the leaves and eventually kill the leaves.
- **White bulb rot**: White fluffy fungal growth occurs on the bottom of the bulb. The bulb becomes rotten.
- **Basal rot**: The leaves die from the tips and if you cut through the bulb you will see brown rot.

**Storage disease:**

- **Black mould**: The bulb shows blackening just below the skin and later becomes rotten.

**Control**: Do not store damaged onions and those showing disease symptoms. Inspect bulbs in storage and remove infected ones and clean containers with a bleach solution.