

## ONION

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### INTRODUCTION

The climate of most of KZN is not really suitable for large-scale commercial production of onions. Production for own use, or for limited local sales, is, however, viable. The relatively high humidity and rainfall which prevails in much of KZN militates against the production of good-quality bulbs, which have poorer keeping qualities and more bulb rots. Diseases are more prevalent in KZN than in other provinces.

In the coastal belt, the higher autumn to spring temperatures suggest that the seed should be sown relatively later, that bulbing would start earlier and that the period of active vegetative growth would be shorter. This would contribute to smaller bulb sizes and lower yields. The moist climate would favour the development of diseases such as downy mildew and *Alternaria* blotch. Apart from the high moisture levels, much of the interior of KZN is also subject to hail, and many areas have cool spring seasons, both of which can detrimentally affect the crop. Most of the cultivars available for planting would mature from about October onward, after the rainy season has commenced. Rainfall within about one month of bulb maturity will tend to reduce quality.

Some commercial onion production has been successfully practised in relatively dry areas, such as Weenen, but even here the bulb quality is often not quite as desired.

### Climatic Requirements

Onions require cool conditions during the early months, with an optimum between 12°C and 24 °C for good vegetative growth. Generally, the longer this period and the better the vegetative growth before bulbing, the better the yield. The plants can tolerate much heat during the later stages of development, when higher temperatures are more favourable. High temperatures - daily means of 25 °C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing onward. Low temperatures of 8 °C to 13°C near bulbing time retard development of the bulbs and can trigger bolting (premature seeding). The last month or so before bulb maturity (drying) should be dry.

Onions are sensitive to photoperiod, i.e. to length of daylight. In onions bulbing is initiated only when the light period exceeds a certain minimum, which varies from one cultivar to the next. Cultivars such as Texas Grano, Granex 33 and Pyramid have a fairly short day length requirement and are referred to as early or short-day cultivars. For these types the daylight hours in all areas of South Africa become long enough to initiate bulbing. Others, such as Australian Brown and Caledon Globe, have a longer day-length requirement which can be met only in areas south of latitude 28°S. These are known as late or intermediate-day cultivars, and are grown commercially, mainly in the Eastern and Western Provinces. While they can theoretically be grown in KZN for maturity in mid-summer, quality would tend to be poor because of the normal summer rains.

While day-length provides the stimulus for bulbing in onions, temperatures play an important role. The warmer the conditions, the faster bulbing takes place. Bulbing of any specific cultivar will begin earlier under warmer conditions. Therefore, short-day cultivars, especially, are more suited to districts where temperatures rise more sharply in spring. Where day-length is sufficient to stimulate bulbing but temperatures are too low, a high percentage of bolting can be expected.

### Soils

Onions have a relatively shallow root system, with most of the feeding roots occurring in the top 200 mm of the soil. Although the crop is sensitive to waterlogging, the shallow roots

allow it to be grown successfully on most soils. Heavy clay soils are less suitable to work and can cause serious problems at harvest from their physical state. Soils prone to capping should be avoided.

### **Cultivars**

Late cultivars such as Australian Brown and Caledon Globe are not generally recommended. They have inherently better keeping-quality than most early cultivars, but rains in November to January, when they would be maturing, or being harvested or cured, would detrimentally affect this. One advantage of possibly growing them for a producer's own use in certain areas is that the total harvesting season can be extended because they mature in December to January, rather than the September to early November harvest of early cultivars. KZN remains a marginal area for production of these onion types.

Early cultivars are preferred for planting in KZN. Texas Grano 502 PPR, Granex 33 and Pyramid are the most popular cultivars, with the latter two possibly the most important for potential commercial growers.

### **Production practices**

There are four main methods of producing onions, namely:

- producing seedlings in open seedbeds for later transplanting
- producing seedlings in seedtrays ("multi-plugs") for later transplanting
- seeding directly into the main field
- producing "sets" (small bulbs) for later replanting

In all cases the desired field population is between about 50 and 60 plants per square metre of planted area, generally planted in rows drawn 200 to 300 mm apart.

### **Seedbeds**

Sowing in open seedbeds is probably the most common method. Sowing is done from early February to about mid-April, with transplanting from May to late June - and for harvesting from early September to early November. The most favourable time may vary with cultivar and climate. It is thus recommended that growers test this for themselves. Note that the earlier the sowing, the larger the mature bulbs, but the greater the number of split-bulbs and bolters that occur, which detrimentally affects marketable yield. Late sowings, on the other hand, produce smaller bulbs, but fewer split-bulbs and bolters. The best sowing time for any cultivar is thus a compromise between potential bulb size (total yield) and amount of split-bulbs and bolters.

Seed is generally sown in rows about 150 to 200 mm apart, and to a depth of 10 to 15 mm, in well-prepared and well-fertilized soil. No more than seven to ten grams of seed should be sown per square metre of seedbed. Between 3 kg and 5 kg of seed is required to produce the 600,000 seedlings needed per hectare. Seedlings are transplanted when they are about pencil-thickness, usually after about 8 to 10 weeks in the seedbed.

### **Seedtrays**

The sowing time is similar to that for seedbeds, but transplanting usually takes place after only about five or six weeks. Seedlings are often only about 3 mm in diameter. Normally, five to seven seeds are sown into each cell. Most growers separate the resultant seedlings at transplanting and set the plants individually. Some growers plant each plug containing several seedlings without disturbing them, but at wider spacings than with single plants, to still achieve the desired plant population. Sometimes a few seedlings in these clusters do not develop sufficiently and other bulbs may be slightly malformed, with flattened sides where neighbouring bulbs have pressed against them. Usually 2,0 kg to 2,5 kg seed is sufficient to plant out one hectare.

### **Direct seeding**

Sowing directly in the field produces an earlier marketable crop (up to 6 weeks sooner) and

avoids the labour-intensive practice of transplanting.

However, it has the disadvantage that the entire large field needs to be cared for from a much earlier age, when the seedlings are still small, weak and very vulnerable. As there is no appropriate herbicide which can be applied immediately after sowing to control broad leaved weeds, this method can be considered only where weed competition is likely to be light, and also where the irrigation system is able to apply small quantities of water evenly and frequently over the whole area. Normally, 6 kg to 8 kg of seed is needed per hectare.

### **Onion Sets**

The cultivar Pyramid is often used for this purpose, although other cultivars may be suitable. Seed is sown in the normal fashion in open seedbeds, but in August or September rather than the February to March period. The best sowing time needs to be determined for each locality and cultivar. The onions are left to mature in the seedbed. They generally do so by about December. Ideal bulbs are about 20 to 25 mm in diameter. These bulbs are dried and stored in a dry place, and are replanted in February at normal spacings. The smaller bulbs tend simply to enlarge, while large bulbs - greater than about 35 mm - often split. The percentage of bolters, thick-necked bulbs and split-bulbs is often high, with only about 50 % of the crop being of good quality. An advantage to this method is that the bulbs start maturing, unfortunately rather unevenly, from about June onwards, well before the normal sowings mature, and when prices tend to be high.

Pickle onions are grown in exactly the same way as sets. Large pickles are formed from July sowings, while smaller bulbs are produced when sown in September. Roughly 30 to 40 kg of seed is sown per hectare.

### **Fertilizer**

As the seedlings occupy the seedbeds from two to three months before transplanting, it is essential that the beds be well-fertilized. Generally, between 500 kg and 1000 kg of 2:3:4 (30) fertilizer mixture per hectare, depending on soil fertility status, is required. Possibly a further 100 kg or 200 kg of LAN per hectare may be required at about 4 weeks if growth is not satisfactory. However, take care not to over-apply nitrogen, because any excess leads to tender seedlings that transplant poorly and are more susceptible to diseases. It also favours the development of large seedlings which are more inclined to bolt. Excess nitrogen results in delayed maturity, softer bulbs and bulb rots; N deficiency results in smaller bulbs. The production field would probably require a similar dressing of fertilizer mixture, followed by one or two dressings of LAN, as above, at four to six weeks after planting out, with a total application of about 80 to 100 kg nitrogen per hectare, including the basal application.

### **Irrigation**

Most of the onion roots occur in the top 300 mm of soil. It is important to keep this rooting zone fairly moist throughout growth. Moisture stress during bulb formation and development may seriously reduce yields.

However, no irrigation should be applied for the final three or four weeks before maturity, to allow the bulbs to cure properly.

### **Weed control**

The onion is a slow-growing small plant which is easily overgrown by weeds. Good weed control practices are thus important. For seedbeds or direct seeded lands, select fields which are relatively weed-free, possibly making use of the stale-seedbed technique - using paraquat or glyphosate to kill emerged weeds on lands ready prepared for planting. The use of herbicides is the most efficient weed control measure. Weed competition with the newly emerged or transplanted onion seedlings, for the first two months of growth, can have a very deleterious effect on the crop's yield.

The following herbicides are registered for use on onions:

Chlorthal-dimethyl (sold as Dacthal W - 75 ) as a pre-emergent against mainly annual grasses on newly seeded and transplanted onions.

Cycloxdim (Focus Ultra ) , and fluazifop-P-butyl (Fusilade Super or Grasses), as post-emergents against annual and perennial grasses.

loxylnil (Totril) as a post-emergent against annual broad-leaved weeds sprayed on young plants or established transplants, and repeated later as needed.

Oxadiazon (Ronstar) as pre-emergent on planted fields against annual broad-leaved weed and some annual grasses.

Oxyfluorfen (Goal) as a pre-emergent in the Karoo region at the 3 to 4 leaf stage and a post-emergent in the summer-rainfall regions at the 2 leaf stage. Seedlings should be well-established.

Propachlor (Ramrod ) as a pre-emergent against annual grasses, applied after irrigating the seeded land.

### **Pests**

Thrips are the most common and troublesome ; rasping of the leaves shows up as silvery blotches. Nematodes and mites can cause problems. There are chemicals registered for the control of these pests.

### **Diseases**

Several chemicals are available for use against onion diseases. The most common leaf diseases are downy mildew and purple (or Alternaria ) blotch, both of which are favoured by moist conditions. Mancozeb, used with a spreader, is registered for downy mildew control. Fungicides registered for Alternaria control include tin compounds, iprodione (Rovral), procymidone (Sumisclex) and the systemic tebuconazole (Folicur). Several soil fungicides are registered for use against white bulb rot and pink root, a problem being cost of treatment. The former disease is promoted by cool wet soils, and infected seedlings spread the disease to new lands. Rotations do not help to eradicate the causal fungus. Pink root and Fusarium bulb rot are more prevalent in soils planted annually to onions crops. Various bulb rots can cause losses, especially during storage.

### **Yields**

Yields can vary from about 15 to over 40 tons per hectare.

### **Harvesting**

A small portion of the crop is sometimes harvested when the bulbs are sufficiently sized and are marketed as green onions, usually in bunches. They are normally sold only in the vicinity of the production unit.

Most growers, however, start harvesting when the foliage ("tops") on about half the bulbs has collapsed and fallen over, even though the leaves may still be green in colour. At this stage the entire field is lifted.

Even if the crop is not to be stored, the bulbs should be allowed to dry thoroughly before marketing. Usually the yield of several rows (about 10) is packed in a single windrow in the field with the leaves on top of the bulbs in order to prevent sunburn. They are left to dry for a few days before leaves and roots are cut off. Should rain fall during this period the windrows need to be opened and turned to dry better before being re-packed in windrows. They are then usually graded to size before being packed into 10 kg pockets for marketing. If onions are to be stored they must be well dried off. Plants may need to remain in windrows for 10 to 14 days. Roughly 200 small bulbs (35 to 50 mm diameter), 80 medium (40 to 70 mm) or 40 large bulbs (greater than 70 mm) will fill one pocket.

## Market prices

**Table 27.**

Total tonnages sold on the Durban National Market per year from 1993 to 1997, and mean annual prices (R per ton obtained).

	1993	1994	1995	1996	1997
Tons sold p.a.	32.102	30.746	37.056	31.467	34.040
Ave. R/ton	701	1076	626	1090	1033