

# *Production guidelines for Beetroot*



agriculture,  
forestry & fisheries

Department:  
Agriculture, Forestry and Fisheries  
REPUBLIC OF SOUTH AFRICA



*Production guidelines  
for Beetroot*

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES

Directorate Plant Production

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## ***Part i: General aspects***

### **1. Classification**

Scientific name: *Beta vulgaris*

Common names: Beetroot, table beets, garden or common beet

Family: *Chenopodiaceae*

### **2. Origin and distribution**

The beetroot is indigenous to Asia Minor and Europe. They were first used for food about the third century AD although they had been grown for thousands of years for medicinal purposes. Beetroot has been regarded as a laxative, a cure for bad breath, coughs and headaches, and even as an aphrodisiac. It is grown widely in Germany and France and in lesser amounts in other European countries, Africa, Asia, and South America. Beetroot is now a popular salad vegetable.

### **3. Major production levels and areas in South Africa**

#### **3.1 South Africa**

Beetroots are widely grown in home gardens throughout the country. Commercial production is concentrated near big towns and cities. Stellenbosch, Johannesburg and Pretoria are major production areas.

#### **3.2 Internationally**

Beetroot is grown all over the world in temperate areas. World production was 241 985 317 Mt in the year 2005.

### **4. Description of the plant**

#### **4.1 Roots**

The beetroot is a true biennial, producing thickened root and a rosette of leaves during the first year and flowers and seeds the second year. Beetroots are mainly grown for their swollen roots but the leaves can also be eaten as spinach.

## 4.2 Stem

The stem is short and plate, producing simple leaves that are arranged in a closed spiral.

## 4.3 Leaves

The leaves are heart shaped.

## 4.4 Flower

Flowers are very small with a diameter of 3 to 5 mm and are produced in dense spikes. They are green or tinged reddish, with five petals.

## 4.5 Fruits

The fruit is a cluster of hard nutlets.

## 5. Cultivars

The choice of cultivar is influenced by days to maturity, root size and shape, foliage size, exterior surface smoothness, interior colour and degree of zoning. The hybrid (F1) cultivars available for summer production offer many advantages. Although these beets are expensive, they are worth growing because they are better quality, more adaptable to extreme high temperatures and so are more uniform in shape, produce greater yields and have better internal colour. Hybrids also taste better, especially out of season.

## 6. Climatic requirements

### 6.1 Temperature

Beetroot is a cool-weather crop that is hardy and tolerates some freezing. It grows best in spring and autumn, but does well in summer on the Highveld and in winter in the Lowveld. Excessively hot weather causes the appearance of alternating light and dark red concentric circles in the root known as zoning. On the other hand, very cold weather results in slow or no growth of the plant. Prolonged periods of low temperatures during winter can induce bolting. Beetroot seeds germinate at soil temperatures from 4,5 to 30 °C, with the optimum being 18 to 24 °C.



## 6.2 Rainfall

Beetroot needs a lot of water for fast growth. The volume needed could vary from 2 mm on a cold winter day to 8 mm on a hot summer day.

## 7. Soil requirements

Beetroot does best on deep and well-drained, loose, loamy to sandy soils. Heavy clay soils or soils which crust after rain or irrigation may cause establishment problems and the production of misshapen roots. Beetroot prefers a soil pH of 5.8 to 7.0, but can tolerate a pH of up to 7.6. Acid soils are likely to create nutrient deficiency problems and should be avoided or limed to raise the pH. Mature beets are fairly tolerant to salinity, whereas seedlings are relatively sensitive.

## *Part ii: Cultivation practices*

### 1. Propagation

Beetroot is propagated by seed.

### 2. Soil preparation

The seedbed should be well prepared by ploughing 15 to 20 cm deep to break up clods. The soil should also be as level as possible, have a good crumb structure and enough moisture, and be free of unrotted plant material.

### 3. Planting

The seedbed should be well prepared by ploughing 15 to 20 cm deep to break up clods. The soil should also be as level as possible, have a good crumb structure and enough moisture, and be free of unrotted plant material.

The sowing times differ with production areas. In winter rainfall areas, seed may be sown from August to end of March and from end of August to middle of March in areas with cool summer. However, seed is sown from March to August in the Lowveld regions of the Mpumalanga and KwaZulu-Natal. Sowing in the Transvaal Middleveld takes place from August to middle of April.

## 4. Fertilisation

A continuous supply of nitrogen, phosphate and potassium is essential throughout the season to obtain high yields and good quality. Nitrogen fertilising is important and 300 to 400 kg/ha of limestone, ammonium nitrate or ammonium sulphate, depending on soil analyses, are applied in 2 or 3 dressings during the growing season. About 150 kg/ha of nitrogen is usually applied at planting time and the rest when the plants are about 10 to 15 cm high. A total of 500 to 600 kg/ha of superphosphate and 200 to 300 kg/ha of potassium chloride are applied just before sowing. Alternatively, a fertiliser mixture of 2:3:2 (22) at 1000 to 1200 kg/ha may be applied. It should be noted that these are general recommendations and actual amounts of fertilizers should be based on soil analyses.

Soils heavily fertilised with coarse compost and kraal manure encourage the formation of side roots, making the crop unattractive.

## 5. Irrigation

The soil should never be allowed to become dry and it should be kept moist to a depth of 20 to 25 cm. The plantings should receive light water applications daily until the young seedlings come up. About 30 mm of water should be supplied per irrigation. Large fluctuations in soil moisture content will result in poor quality roots that are malformed and have many small hairs or side roots.

## 6. Weed control

Weeds must be controlled before they can compete with beet seedlings and interfere with their growth. All weeds between the rows must be removed by hand to avoid damaging the roots. Weed control can also be achieved chemically by applying herbicides and instructions on the container should be thoroughly followed.

## 7. Pest control

### 7.1 Aphids (*Aphis fabae*)

Aphids are dark brown or green insects about 2 mm in length. They suck on the lower surface of the leaves and damage is only done when the numbers increase substantially. Infested leaves are curly and rolled.

## CONTROL

Use registered chemicals. Crop rotation can also assist.

### 7.2 Red spider (*Tetranychus cinnabarinus*)

These are small dark red or dark brown spiders about 1 mm long. They suck on the lower surface of the leaves. Their numbers are usually low but can increase rapidly during warm weather.

## CONTROL

### 7.3 Leaf-eating insects

Leaves are mainly eaten in summer and in the crop grown for seed

## 8. Disease control

### 8.1 *Cercospora* leaf spot (*Cercospora beticola*)

This is a common disease in beetroots caused by a fungus which enters the leaves and causes small round spots of about 3 mm in diameter. These spots are also found on the flowers and seed on plants grown for seed production. The spots are at first brown with a dark purple border and later turn grey in the center. The tissue in the centre falls as the spots age.

## CONTROL

- Crop rotation
- Seed treatment with registered chemicals
- Avoiding over watering

### 8.2 Downy mildew (*Peronospora schachtii*)

The disease is seed-borne and it can affect the crop early in the season. Leaves of infected plants partly or completely turn yellow and curl downwards. The diseased patches later turn brown. A grey fungal growth can be seen on the underside of the leaves. Flowers and the crown can also be infected.

### 8.3 Brown rust (*Uromyces betae*)

Infected plants are recognised by large numbers of orange or red-brown pustules on the leaves.

## CONTROL

Control measures are not necessary since the disease seldom causes any damage.

### 8.4 Brown rust (*Uromyces betae*)

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## CONTROL

Control measures are not necessary since the disease seldom causes any damage.

### 8.5 Scab (*Actinomyces scabies*)

The beetroots infected with scab develop rough, irregular, surface scabs. The disease is prevalent in soils containing too much lime.

## CONTROL

- Soil analysis to determine level of lime and get advice on that.

### 8.6 Root rot, damping-off (*Phoma betae*)

The disease is common on compact soil. Germination of infected plants is weak. Young seedlings grow poorly, turn yellow, wilt, topple over and die and the roots turn black. Seedlings that are not severely affected produce small, malformed beetroots.

## CONTROL

- Seed should only be sown in soils with a good structure.
- Seed should be treated with thiram.
- Practice crop rotation.
- The crop should not lack sufficient boron.
- Planting should be at the right time and not too deep.

### 8.7 Heart rot

This is caused by boron deficiency. Heart rot is characterised by black marks on the root surface and cracks. Black blotches are visible in the flesh if the beetroot is cut open.

## CONTROL

It is advisable to plant resistant cultivars.

## 9. Other cultivation practices

### 9.1 Thinning

Thinning is carried out when the seedlings are still small to about 5 to 7 cm apart in the rows and it is carried out if plant emergence is good.

### 9.2 Seed treatment

Beetroot seed should be treated before sowing to improve germination. Germination is affected by the high nitrate content of the dry seed and is also suppressed by the ammonia formed by the bacteria. All seed to be planted should therefore be washed in running water for at least 2 hours. The seed is soaked in a 0.5 % Aretan solution for 20 minutes after washing and dried for at least 6 hours at room temperature before sowing.

## 10. Harvesting

### 10.1 Harvest maturity

Beetroot is usually harvested when the roots reach 3 to 5 cm in diameter, but most roots are lifted when they are 5 to 7.5 cm in diameter.

### 10.2 Harvesting methods

The crop is lifted by hand or mechanically when grown on a large scale, by using a machine which lifts the crop from the soil and cuts off the leaves. For the crop which is to be marketed fresh, the leaves are not removed. Care should be taken in pulling roots from the soil and in their handling so that damage from bruising can be minimised.

## *Part iii: Post-harvest handling*

Roots may be washed immediately if necessary.

### 1. Sorting and grading

All diseased roots and those showing mechanical injury are removed during sorting. Old, dead or damaged leaves should be removed if the crop is to be marketed with tops. Beetroot is graded according to size.

## 2. Packing

After washing, the crop is packed in crates or cartons and kept in a cool and dry environment. Beetroot is sometimes packed in pockets.

## 3. Storage

The environment must be dry to avoid fungal attack, and the temperature must be kept at 0°C and the relative humidity at 90%.

## 4. Transport

Beetroots should be transported in a well ventilated vehicle and at cool temperatures to avoid fungal infestation. The temperatures should never go below 0°C because the crop will experience cold-wilting.

## 5. Marketing

### ***PART IV: Production schedule***

| ACTIVITIES       | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|------------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Soil sampling    |         |          |       |       |     |      |      |        |           |         |          |          |
| Soil preparation |         | X        | X     | X     | X   | X    | X    | X      | X         |         |          |          |
| Planting         |         |          | X     | X     | X   | X    | X    | X      | X         |         |          |          |
| Fertilisation    |         | X        | X     |       | X   |      |      |        |           |         |          |          |
| Irrigation       |         |          | X     | X     | X   | X    |      |        |           |         |          |          |
| Pest control     | X       | X        | X     | X     | X   | X    | X    | X      | X         | X       |          |          |
| Disease control  | X       | X        | X     | X     | X   | X    | X    | X      | X         | X       |          |          |
| Weed control     |         |          | X     | X     | X   | X    |      |        |           |         |          |          |
| Leaf sampling    |         | X        | X     | X     |     |      |      |        |           |         |          |          |

## **Part v: Utilisation**

The roots are boiled and eaten as a cooked vegetable, either plain, fried or served with sauces. They may also be hollowed out and stuffed with savoury mixtures. Wine is made from beetroot in some countries. The leaves are sometimes cooked as spinach. The roots reportedly contain significant quantities of vitamin C while the tops are rich in vitamin A. Beetroot is also high in folate, dietary fiber and several antioxidants.

## **REFERENCES**

- Gilbert, Z. & Hadfield, J. 1996. *Down to Earth Fruit & Vegetable Gardening in South Africa*. 2nd Impression. Struik Publishers (Pty) Ltd. Cape Town.
- Hartmann, H.T., Kofranek, A.M., Rubatzky, V.E. & Flocker, W.J. 1988. *Plant Science: Growth, Development and Utilisation of Cultivated Plants*. 2nd Edition. Regents / Prentice Hall. New Jersey.
- [Http://en.wikipedia.org/wiki/Beetroot](http://en.wikipedia.org/wiki/Beetroot)
- [Http://www.elsenburg.com/info/els/035/0353.html](http://www.elsenburg.com/info/els/035/0353.html)
- Joubert, G. 1974. *The cultivation of vegetables in South Africa, the cultivation of root crops: the cultivation of beetroot*. Root Crops Series No.A.1/1974. Horticultural Research Institute, Pretoria.
- Kochhar, S.L. 1986. *Tropical Crops: a Textbook of Economic Botany*. Macmillan Publishers.
- KwaZulu-Natal Department of Agriculture and Environmental Affairs. 2001. *Vegetable production guidelines for KwaZulu-Natal*. Pietermaritzburg.
- Trench, T.N., Wilkinson, D.J. & Esterhuysen, S.P. 1992. *South African Plant Disease Control Handbook*. Farmer Support Group, University of Natal. Pietermaritzburg.
- Farming SA & ARC, January 2009. *Vegetable Growing, Supplement to Farming SA*.



