

Carrot Production Guide



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Foreword



Zambia has the potential to produce sufficient food for its citizens and for export.

In order to ensure that good agricultural practices are employed by farmers, crop specific production information should be made available to them.

Due to technological advances and the changing environmental and socio-economic conditions it became necessary to revise the first edition of the Carrot Production Guide, which was published in 2002. This revised edition is meant to provide farmers and other stakeholders crop specific information in order to promote good agricultural practices and enhance productivity and production.

The information contained in this booklet has been generated over a number of years of research and is appropriate for all categories of farmers. The information is meant for extension officers, agricultural training institutions and other development partners.

It is my sincere hope that this information will go a long way in stimulating Carrot production in Zambia.

The Zambia Agriculture Research Institute (ZARI) is committed to alleviating poverty and enhancing food security by contributing to increased and sustainable food production.

A handwritten signature in blue ink, consisting of stylized initials and a surname, likely 'M. Mwale'.

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Acknowledgements

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1.0 Introduction

Carrot (*Daucus carota*) is a crop of the Umbelliferae family. It is a nutritious vegetable particularly rich in vitamin A, which is critical for better health. The roots are used as vegetables and for putting in soups, stews, curries and other dishes. The grated root is used in salads while tender roots are pickled. Carrots may also be canned or dehydrated. Roots may be pressed for juice, which is sometimes blended with orange juice. The seeds contain an essential oil which is used for flavouring and in perfumery.

Carrot is a biennial plant, producing vegetative growth in the first growing season and completing the life cycle by producing seeds during the second growing season. Carrot varieties with a smooth, tender, bright red or orange flesh, with a minimum of core are preferred.

Carrots are cultivated throughout the country for their roots and can be grown throughout the year.

2. Climatic and Soil Requirements

2.1 Climate

In Zambia carrots can be grown throughout the year. The crop is, however, best adapted to cool weather with the best crop being the one planted from March to July. The optimum temperature for growth is about 20°C. The crop requires a steady supply of moisture throughout its growth period to avoid forking in root development. For flowering the carrot plant requires long days and vernalisation of roots.

2.2 Soil Types

Carrots grow best in a well-drained, light loam soils which are not subject to capping with a pH of 6.0 to 6.5. Saline soils should be avoided because the crop is very sensitive to salinity.

3. Recommended Varieties

Carrot cultivars recommended for Zambia are Cape Market, Nantes, Chantenay and Nantes Fancy. These and their main agronomic attributes are given in the table below:

VARIETY	DAYS TO MATURITY	YIELD (kg/ha)
Cape Market	80	35
Nantes	75	20
Chantenay	80	20
Nantes Fancy	75	20

4. Recommended Management Practices

4.1 Land Preparation

The soil should be well tilled and levelled in order to obtain a good crop stand. This is achieved through deep ploughing to loosen the soil to a depth of at least 30 cm.

4.2 Planting

Sow directly in rows on well prepared land. The land should be irrigated two to three days so as to have adequate moisture before sowing. To assist in even sowing, use a seed-sand mix of 1 part seed to 6 parts sand. Seeding depth is between 1-2 cm in finely prepared seedbed.

For the root crop the spacing is 30 to 45 cm between rows and intra row spacing is 5 to 10 cm. Seed rate can be up to 8Kg/ha depending on spacing.

4.3 Weed Control

Weed control can be done mechanically by hand or using a hoe, or using recommended herbicides. Carrots are adversely affected by competition from weeds especially during the early growth stage.

4.4 Fertiliser Application

Apply 800 kg/ha 'D' compound fertiliser and incorporate it into the soil before sowing. Top dress with 100 kg/ha ammonium nitrate when plants are about 10 cm tall. Use locally available sources of

nutrients such as well- decomposed compost or livestock manure at 1.5 kg/m².

4.5 Crop Rotation Practices

The land should not have been planted with carrots, okra, tomato, dill or celery for at least two seasons.

4.6 Irrigation

The seedbed requires to be pre-irrigated and should have sufficient moisture before sowing. Irrigate frequently during cropping cycle to keep the soil moist. The actual irrigation intervals depend on climatic conditions, soil type and growth stage. In general the irrigation interval increases on heavier soils and in the initial stage of plant growth. The amount to irrigate is 20 min pumping with a treadle pump on a 100m² plot or 1 bucket of 15 litres per m².

5. Crop Protection

Carrots do not have serious pests and diseases except for nematodes and fungal diseases which may affect the rainy season crop. It is however susceptible to a number of pests and diseases that reduce the yield and quality of the produce. There are measures that can be taken to minimize the damage.

5.1 Major Diseases and Control Measures

5.1.1 Leaf blight (*Alternaria dauci*)

This is a fungal disease causing up to 90 % defoliation and yield losses of up to 82 % recorded. The symptoms appear on the leaves and petioles as elongated, irregular lesions, dark brown or black in colour, sometimes with a narrow yellow margin. Infected leaves blacken and desiccate thereby reducing root development.

Control Measures

The use of tolerant or resistant varieties, crop rotation and use of an appropriate fungicide is recommended.

5.1.2 Cercospora leaf spot (*Cercospora spp.*)

The symptoms appear along the margins of the leaves causing the

leaves to curl. The spots inside the leaf edges are small, roughly circular and tan or grey to brown with a dirty centre. As the lesions increase in number the entire leaflet withers and dies.

Control Measures

The use of clean disease free seed and tolerant or resistant varieties, crop rotation and use of an appropriate fungicide is recommended.

5.2 Major Insect Pests and Control Measures

5.2.1 Nematodes

Root-knot nematodes are most damaging to carrots. Common symptoms include forked, distorted or stunted tap roots, which result into reduced stand and yield.

Control Measures

Control measures that can be employed include avoiding growing carrots on land previously grown to nematode susceptible crops such as tomatoes, okra, dill or celery, applying kraal manure or compost to suppress nematodes and maintaining adequate plant nutrition in accordance with fertiliser recommendations to increase the ability of the plant to withstand any nematode attack.

6. Harvesting

Harvesting takes place about 100 days after sowing and can last up to about 6 weeks by harvesting the roots as they mature. Based on research conducted at National Irrigation Research Station, Nanga, yields of 30 to 40 tons per hectare can be achieved.

7. Post-Harvest Handling and Processing

Once harvested, carrots should be carefully handled to cause as little damage as possible to the root surface. Carrots are sorted by hand to remove broken or split roots. In commercial carrot production the crop undergo thorough washing and sorting, and packed in pre-pack containers. There are various materials used for packaging such as perforated plastic bags, mesh pockets, or cartons. Uniformity of root size is very important when packing carrots because it enhances the presentation during marketing.

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After harvesting, if necessary, carrots can be put in cold storage for several months without loss in quality.

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