

Hot Pepper & Paprika Production Guide



Table of Contents

Foreword	ii
Acknowledgements	iii
1. Introduction	1
2. Climatic and Soil Requirements	1
3. Recommended Varieties	2
4. Recommended Management Practices	2
5. Crop Protection	4
6. Harvesting	7
7. Post-Harvest Technology	7

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 Hot Pepper and Paprika 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 Hot Pepper and Paprika productivity and 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, appearing to be 'J.S.' with a stylized flourish.

Mwale, Director
Zambia Agricultural Research Institute
Ministry of Agriculture,

2018

Acknowledgments

The Editorial Committee wishes to express its gratitude to the Vegetable Research Team of Zambia Agriculture Research Institute for providing the technical information and invaluable advice.

The Zambia Agriculture Research Institute wishes to recognize the support provided by World Bank through the Agricultural Productivity Programme for Southern Africa- Zambia Project (APPSA-Zambia) for financing the publication of this production guide.

1.0 Introduction

Chillies (*Capsicum spp*) are members of the Solanaceae family and are grown for their fruits that are consumed either green or ripe. Sweet varieties are used for salads, pickles and stuffing. Paprika is a sweet pepper grown for food colouring and flavouring.

Hot pepper varieties are used for seasoning and sauces. Peppers are nutritionally rich in vitamin A and C. They are also rich in phosphorus and calcium. Many medicinal preparations for various ailments are made from pepper. Several varieties of paprika and hot chillies are commercially available in Zambia.

Peppers can be produced in all three agro-ecological regions of Zambia.

2. Climatic and Soil Requirements

2.1 Climate

Optimum day temperatures for peppers growth range from 20 to 30°C. When the temperature falls below 15°C for extended periods, growth and yield are usually reduced and when frost occurs the crop is killed. When temperatures exceed 32°C the growth and yield are equally reduced. Peppers can be grown under different day lengths but are less tolerant to excessive rain as this leads to poor fruit set and rotting.

2.2 Soil Types

Peppers do well in light loamy soils which are fertile and well drained. The ideal soil pH range for the production of peppers and paprika is 5.5–7.0.

3. Recommended Varieties

The varieties given in the table below are commercially available in Zambia.

Variety	Days to Maturity	Plant Height (cm)	Yield (t/ha)
Green Pepper			
California Wonder	100	450	24
Hot Chillies (Dry)			
Mufulira Market	150	90	3.5
Long Red Cayenne	150	90	4.0

4.1 Recommended Management Practices

4.1 Land Preparation

Thoroughly plough the land and disk to a fine tilth without clods and crusts.

4.2 Planting

Nursery Preparation

For rain-fed paprika, start preparing the nursery at the beginning of August. Sow seeds in a well-prepared nursery bed. Topsoil may be mixed with decomposed manure at the rate of 2-3 kg/m² for the seedbed. Seeds are sown 1.5 cm deep and at a distance of 5-8 cm from each other and between furrows. To raise seedlings required to plant 1 hectare, 500g of seed s

Pepper should be planted in January to March then July to December. Transplanting should be done when seedlings are 4-6 weeks after emergence.

For hot pepper, prepare beds 1.2m wide and 30 cm high. Inter-row spacing should be 90 cm apart with 30 - 45 cm within rows.

Transplant in the late afternoon or on a cloudy day to minimize transplant shock.

Rain-fed paprika should be planted in the month of December when the seedlings have attained a height of 15 cm (4-6 Weeks). The nursery should be irrigated a night before transplanting to ensure easy lifting of seedlings and care should be taken not to damage the root system. Transplant when soils are still wet either early in the morning or late afternoon. For rain-fed crop of paprika planted on ridges 25 cm high, the spacing of 90 cm between ridges and 15 cm between plants is recommended. Re-ridging should be done 3-6 weeks after transplanting of paprika. Fallen-over plants may require staking with sticks to avoid fruits touching the ground.

4.3 Weed Control

Peppers are delicate and less competitive against weeds, therefore, there is need to keep the fields weed free. When weeding, care should be taken to avoid breaking the stems and damage to roots.

4.4 Fertilizer Use

For pepper, apply 800 kg/ha 'D' compound and 90 kg/ha Potassium chloride as basal dressing. At the onset of flowering, apply the first top dressing of 125 kg/ha ammonium nitrate or 100 kg/ha urea in addition to 150 kg/ha potassium chloride. After a month, the second application of 125 kg/ha ammonium nitrate or 100 kg/ha of urea should be applied.

For paprika, basal dressing should be applied at a rate of 400 kg/ha of D Compound. This can be done by broadcasting the fertilizer on the soil before making ridges or by applying it 3-5 cm from the transplanted plant.

Alternatively, four tins (200 kg/ha) of compost or manure can be applied 3 weeks after transplanting. Top dressing should be applied at 50kg/ha of urea or calcium ammonium nitrate (CAN) 3 weeks after transplanting and later at 7 weeks after transplanting. Apply the fertilizer mid-way between planting stations.

4.5 Crop Rotation Practices

Land should not have been planted with other Solanaceae crops such as tomatoes, eggplant, potatoes or tobacco in the previous season.

4.6 Irrigation

The dry season crop should be irrigated according to the visible needs of the crop. Supply adequate moisture during flowering and fruiting through observing recommended irrigation intervals given in the table as days in between irrigations. The frequency of irrigation will depend on soil type, climatic conditions and growth stage of the crop. The amount to irrigate is 20 min pumping with a treadle pump on a 100 m² plot or 1 bucket of 15 litres/ m².

5.0 Crop Protection

5.1 Major Diseases and Control Measures

Peppers and Paprika are affected by a number of fungal and viral diseases among them being Fusarium wilt, Powdery mildew and Leaf spots.

5.1.1 Fusarium wilt (*Fusarium oxysporum*)

This is a fungal disease characterised by upward yellowing of leaves. Yellowing may be on one side or both sides of the leaf midrib. The affected leaves wilt before they die. The stem tissue becomes discoloured throughout the plant leading to death of the whole plant. The disease normally persists in the soil for many years.

Control Measures

Measures that should be employed to control this disease include observing field hygiene such as removal of infected plants and avoiding mechanical injury to plants and use of clean disease free seed. Others are rotating with crops other than with tomatoes, pepper, and eggplant for at least 3 growing seasons where the disease is known to occur. Application of an appropriate fungicide on a 7 – 10 day schedule is recommended.

5.1.2 Powdery mildew (*Oidiopsis taurica*)

Powdery mildew appears as white patches on the underside of the leaves whilst the upper side of the leaves remain normal or may have yellow patches turning brown overtime. In severe infections, the leaves wither and drop off, leading to death of whole plants.

Control Measures

Use of tolerant or resistant varieties and spraying with an appropriate systemic fungicide is recommended.

5.1.3 Bacterial Leaf spots (*Xanthomonas campestris*)

The first symptoms usually are small, dark, greasy-looking spots on leaves and stems of young plants. These enlarge, become drier-looking and greyish-brown. In severe cases, leaf tissues, especially tips and margins shrivel and die. Bacterial ooze may form and dries up to a glistening cream-coloured film. Lesions on stems are elongated, greyish and scab-like. Flowers show dark spots and infected floral parts and young fruits often wither and fall. On fruit, which is attacked only when it is green, the first symptoms are dark, water-soaked spots surrounded by a whitish halo which is sometimes confused with the fruit spots of bacterial canker. As the lesions enlarge, they become rougher and scabby-looking with disappearance of the halos.

Control Measures

Rotation of fields in an attempt to avoid carryover of the bacterium on volunteers and crop residues, use of clean and disease free seed and transplants and application of an appropriate fungicide are some of measures that can be employed to control the disease.

5.1.4 Fungal Leaf Spots (*Alternaria solani*)

Fungal leaf spots are dark brown to black and often angular lesions with usually concentric rings. Small lesions may merge in a large necrotic area with the leaves turning yellow and wilting. Defoliation eventually sets in thereby exposing the fruits to sun burn.

Control Measures

Use of clean and preferably disinfected seeds, early removal of plant debris.

Avoiding planting new plots alongside old ones.

Use of appropriate fungicides at time of appearance of first symptoms.

5.1.5 Viral Diseases

Infected plants develop localized patches of light green and become chlorotic. They later develop necrotic rings on the leaves and fruits leading to stuntedness of plants. Other symptoms of viral infection include leaf curling and leaf twisting.

Control Measures

Control of viral diseases include use of resistant varieties, roguing out infected plants and spraying insect vectors such as aphids, thrips, whiteflies using appropriate insecticides according to manufacturer's instructions.

5.2 Major Pests and Control Measures

With the exception of white flies and aphids, most pests do not attack pepper. A few sprays with a selective aphicide such as Primicarb (Pirimor) are often adequate to suppress the aphids.

5.2.1 Whiteflies (*Bemisa tabaci*)

These are small white coloured winged insects covered in waxy bloom. They are typically found on the underside of the leaves where they suck fluids from the plant tissue resulting in low plant vigour or wilting.



white flies, *Bemisa tabaci*

Control Measures

White flies may be controlled by spraying with Fastac at 1 ml/Lt if infestation is high. To minimise infestation seedlings should be drenched with Imidacropid before transplanting.



5.2.3 Nematodes

The typical nematode symptoms infestation involve both below and above ground damage. These will be stunting, premature wilting, leaf yellowing and patchy crop stand. Below ground damage include short and deformed roots and tumor-like growths (galls) on the roots.

Control Measures

To control nematodes, avoid growing the crop in fields where crops such as tobacco, tomato, potato or eggplant were previously grown. Other measures include fumigation of nursery bed and drenching the seed bed before transplanting.

6. Harvesting

Harvesting of peppers should start when fruits are fully-grown. They may be picked green if meant for export or fresh market or may be picked when they ripe (yellow, red). Paprika is picked when they are ripe and dry.

7. Post-Harvest Handling and Processing

Good quality clean, maroon paprika pods should be separated from those that are red or have spots. Dry the two separately on dry racks. Pods that are very dirty should be washed in water mixed with an appropriate disinfectant before drying. Paprika should only be packed in poly-propylene bags as use of hessian maize bags results in fibres sticking to the oily paprika.

Normally, chillies are sun dried and ground. The ground product should be stored in a cool, dark and dry place.

Editorial Committee



Mr. G. Mwila



Mr. H. Tembo



Dr. M. Mukanga



Mr. M. Tembo



Mr. J. Siwale



Mr. J. Malama

For Inquiries contact:

The Director

Zambia Agriculture Research Institute

Mt. Makulu Central Research Station

P/Bag 7 Chilanga

Tel:260 211 278380

Fax:260 211 278130

Email:zaridirector@zari.gov.zm