



Cowpea 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 Cowpea 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 cowpea 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, written over a white background.

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1.0 Introduction

Cowpea (*Vigna unguiculata* L.) is an important food legume crop grown by smallholder farmers in Zambia. It is an annual crop that is more tolerant to high temperatures and extended drought periods than most other legumes, such as groundnuts, soybeans and beans.

The cowpea is an important pulse crop for its dried grain in Zambia and other areas of the tropics and sub-tropics. The dried grain is used in a number of ways including cooking the whole grain and grinding into a meal. Fresh seeds and immature pods are also consumed. The young shoots and leaves are prepared as relish. This plant can also be used as fodder for hay, silage or pasture and as a green manure and cover crop.

In Zambia late maturing, spreading landraces are traditionally grown as an inter crop with cereals such as maize and sorghum or cassava. These local varieties are grown for both their leaves and grain which are used for relish.

The major constraints affecting cowpea production include insect pests, diseases, use of low yielding varieties and poor crop management.

Although cowpea is widely grown in Zambia, it is mainly grown in the drier areas of Agro-ecological Regions I and II.

2. Climatic and Soil Requirements

2.1 Climate

Cowpeas can be grown under a wide range of climatic conditions. They will tolerate heat and relatively dry conditions and can be grown with less rainfall. However, cowpeas are sensitive to cold and may be killed by frost.

2.2 Soil Types

Cowpeas are adapted to a wide range of soils, including soils that are acidic, but they are sensitive to water logging. Hence in high

rainfall areas, soil should have good drainage or the crop should be grown on ridges.

3. Recommended Varieties

Compared to local varieties, improved recommended varieties have an erect growth habit, are early maturing, show reasonable levels of resistance to some of the major diseases and are much higher in grain yield. The currently recommended varieties and their main agronomic attributes are given in the table below.

Variety	Maturity period (Days)	Growth habit	Seed size	Yield Potential (t/ha)
Lutembwe	100	Semi-erect	medium	2.5
Bubebe	60-65	erect	medium	2.5
Msandile	70	erect	medium	2.5
Namuseba	75	erect	large	2.5

Please note that there could be other varieties available in Zambia which have been developed by seed companies.

4. Recommended Management Practices

4.1 Land Preparation

Land should be free of clods and coarse trash. In high rainfall areas, ridging is recommended to avoid water logging.

4.2 Planting

It is generally recommended to plant cowpea in January. However, earlier planting in Region I where the growing season is shorter may be desirable. Seed should be sown in moist soil to ensure good germination.

When intercropped, cowpea should be planted with the main crop, or latest at the first weeding. Local varieties which are generally late maturing may be planted intercropped with cereal crops from late December to early January

Seed Rate

A seed rate of 20 kg/ha is recommended for sole planting. About two thirds or half of that rate is recommended when intercropped with maize or sorghum.

Spacing

If grown as a sole crop, plant in rows (flat or ridges), with 2 seeds per station or drill in a furrow. Plant seed not deeper than 3 cm (finger-tip). Interrow spacing varies between 50 cm to 75 cm depending on the variety. Generally, spreading type should be planted wider than erect types. Within the row use a spacing of 10-12 cm for erect forms and 20-30 cm for spreading types. Gapping through transplanting or re-sowing within the first week after emergence may fill un-even stands in the crop. Spreading types may not require gapping as they exhibit considerable compensatory growth.

4.3 Weed Control

Two weedings at 3 weeks and at 6 weeks after emergence are recommended. Hand pulling of weeds after pod establishment is desirable. Early weeding is important because weeds easily suppress young cowpeas.

4.4 Fertiliser Use

Cowpeas are leguminous crops which are able to fix nitrogen from the air. Therefore, fertiliser application is not economical and not recommended. Where soil is poor, grow cowpeas in rotation with cereals (maize or sorghum), and fertilise the cereal crop. However, for a seed crop, phosphorus is critical to cowpea yield and is supplied through basal dressing of 200-300 kg/ha compound D. Top dressing of about 100 kg/ha ammonium nitrate or 75 kg/ha urea may be necessary and can be applied if leaves turn yellow, an indication of nitrogen deficiency.

4.5 Crop Rotation Practices

In rotation with cereals cowpeas have beneficial effects on the latter, mainly due to suppression of weeds and the ability of cowpeas to improve the soil fertility in particular nitrogen status. On the other hand when grown following a well fertilized cereal crop, cowpea may

not need fertilizer application as it benefits from the residual fertility.

5. Crop Protection

Cowpea is susceptible to a number of insect 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

The common diseases include scab, blight, cercospora leaf spot, web blight, cowpea aphid borne mosaic virus (CABMV) and bacterial blight.

5.1.1 Bacterial blight (*Xanthomonas axonopodis*)

The disease is characterized by tiny, water soaked spots on the under surface of the leaves that constitute the primary symptoms of bacterial blight. These remain small, but the surrounding tissue becomes necrotic and is tan to orange with a yellow halo. Necrotic areas on heavily infected leaves join to form larger lesions which may lead to defoliation and death of entire plant. The pathogen also infects the stems, peduncle and pods leading to shortened pods and shriveled seeds.

Control Measures

Control measures include use of cultural practices and use of tolerant varieties.

The following cultural control practices should be employed:

- i) Crop rotation with crops such as maize and wheat.
- ii) Tillage to reduce the survival of pathogen.
- iii) Removing the crop residue.

Where, resistant varieties are available, it is recommended that these are used as a strategy to prevent disease occurrence.

5.1.2 Cercospora Leaf Spot (*Cercospora canescens*)

The leaf spots caused by *C. canescens* are subcircular to broadly irregular, generally brown, pale tan to grey centre surrounded by

dark brown or reddish margins. Characteristic lesions are round, brown and necrotic with dark, slightly depressed edges.

Control Measures

Use of appropriate foliar fungicides is recommended

5.1.3 Leaf and Pod Blight (*Ascochyta phaseolurum*)

This is a soil-borne weak pathogen or wound parasite. It is associated with stem and leaf lesions. The symptoms appear as elongate lesions on stems and circular lesions on leaves and pods.

Control Measures

Use of clean disease-free seed and removal of infested debris and volunteers from previous crop seasons.

5.1.4 Web Blight (*Rhizoctonia solani*)

The symptoms appear as small necrotic lesions (2-10 mm in diameter) with brown centers and olive green margins forming on leaves. Lesions become water-soaked, enlarge and coalesce (join) rapidly to take on a scalded appearance, and become covered by whitish to brown mycelium, with small sclerotia.

Control Measures

The following should be used to control the disease:

- i) Use of clean disease free seed
- ii) Removal of previously infested crop debris
- iii) Practice crop rotation
- iv) Use of appropriate fungicides is recommended.

5.1.5 Cowpea Aphid-borne Mosaic Virus (CABMV)

The major symptom caused by CABMV infection is the mosaic. The severity is dependent on the interactions between host cultivar and virus strain. Other symptoms include dark-green vein-banding, leaf distortion, blistering and stunting. CABMV is transmitted by aphids.

Control Measures

Control measures include removal of infected groundnut and volunteer plants as well as use of resistant cultivars and timely

application of appropriate aphicides to control the aphid vector.

5.2 Major Pests and Control Measures

The most common and apparent pests are the aphids, flower beetles, pod borer weevil, pod-sucking bugs and bruchids. The extent of yield losses caused by insect pests can reach up to 25%.

5.2.1 Aphids

Aphids primarily infest seedlings, although they also infest the pods. They cause direct damage to the plant leading to distortion of leaves, stunting of plants and poor nodulation. The damage may contribute to yield reduction and in extreme cases the plant dies. Aphids also cause the spread of cowpea aphid-borne mosaic virus (CABMV).



Aphids

Control Measures

Spraying with systemic insecticides is economical when infestation is high, but it is advisable to spray against aphids when first insects are observed.

5.2.2 Pod-sucking bugs

Normally, their populations are high because the adults constantly migrate from wild host plants to cultivated fields. They breed throughout the year if food is available and conditions are favourable. Adults and nymphs suck the sap from pods and can cause serious yield losses through premature drying leading to abnormal seed formation.



Damage by Pod-Sucking Bug

Control Measures

Insecticides, particularly those with some systemic action such as endosulfan and monocrotophos are effective. Synthetic pyrethroids such as alpha-cypermethrin and cypermethrin could also control the sucking bugs.

5.2.3 Bruchids

Bruchids (*Callosobruchus spp.*) are important primary pests of pulses. Infestation may start in the pods before harvest and carry over into storage where substantial losses may occur.

Eggs are laid on the pods, but weevils prefer to slip inside through holes made by the other pests and lay eggs directly on the seed harvested. Bruchids multiply quickly causing considerable losses. The damage is done by larvae feeding inside the seed.



Bruchid

Control Measures

Chemical control

These pests may be controlled by fumigating with phosphine. Mixtures of approved grain insecticides, especially organophosphates, will protect against this pest.

At farm level, the use of vegetable oil can offer some protection.

Cultural Control and Sanitary Methods

Good storage hygiene plays an important role in limiting infestation by these insect pests. This includes removal of infested residues from last season's harvest.

When small grain quantities are stored, sun-drying periodically in a thin layer for periods of up to 4 hours can give substantial protection.

5.2.4 Flower Beetles

These beetles lay their eggs in the soil where larvae and pupae are usually found. The adults are strong fliers and feed on flowers and pollen. These beetles are often difficult to control because the adults are found only on flowers, whereas the larvae are scattered in the soil.

6.0 Harvesting

Cowpeas should be harvested in dry weather when pods are dry and have changed to brown colour. If harvesting is delayed, loss due to pest attack will reduce yields considerably. Harvesting is traditionally done by hand plucking of mature pods especially the spreading varieties. For erect varieties where pod maturity is uniform, harvesting may be done by cutting or pulling out whole plants.

7.0 Post-Harvest Handling and Processing

After threshing, the seed is winnowed and cleaned taking care to prevent splitting the seed. All diseased and discoloured seed should be removed. If seed is to be stored, it should be treated with recommended seed dressing, e.g. captasan dust (125 g per 50 kg seed) and fumigated against storage pests.

7.1 Storage

In general farmers store sun dried unshelled cowpea at their home stead in mud granaries.

Treatment of shelled grain is very important. Blue cross or Actellic is very efficient but not always available. Coating with vegetable oil (1 tea spoon/kg seed) might offer some protection against bruchids. Plant extracts such as 'Ububa' or 'Mtetezya' (*Tephrosia vogelii*) can be used as seed dressing.

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