GROWING COWPEAS FOR LEAF (VEGETABLE) PRODUCTION

INTRODUCTION

Cowpea is an annual legume crop which is grown for its seeds and leaves.
It matures within a short period and it is the first harvested crop, before the other cereal crops. For this reason, it is called the "hungry-season crop".

Cowpeas can be used as a source of food at all stages of growth.
The tender green leaves and immature pods are used as vegetables.
Green cowpea seeds can be boiled, canned or frozen. Dry mature seeds contain protein and carbohydrates and are stored as grain. They are also suitable for boiling and canning.

The crop helps the soil to get better by improving the soil fertility in that cowpea, like other legumes, can pull Nitrogen from the air for its growth. Any Nitrogen not used is stored in the soil and can be used by the following crop. This process is called nitrogen fixation. Their quick growth and rapid ground cover also prevents soil erosion.

The plant is a very good source of soft tender, dark green vegetables. The leaves contain significant levels of micronutrients and are a good source of Vitamins A, B and C and are rich in calcium, phosphorus, carbohydrates, proteins and fibre - all good things for us!

In some areas, cowpeas are grown for pasture, hay, silage, as a cover crop and green manure.

Varieties

As indicated above, the cowpea crop can be grown to produce seed or leaves (vegetables). Some varieties produce more seed and less vegetables while others produce more leaves and less seeds.

It is therefore important to select the right variety for leaves (vegetable) production. Below are some common varieties and their characteristics.

Main product	**Variety**	**Remarks**
Dual purpose (balanced amounts of leaves and grains)	Machakos 66 (M66)	▪ A bushy semi-spreading variety ▪ Flowers 55 - 60 days after germination ▪ Grown at a higher altitude of 1200 - 1500 m. ▪ Tolerant to yellow mottle virus and scab and partly to aphid and thrips damage. ▪ Moderately tolerant to Septoria Leaf Spot and Powdery mildew.
	Katumani 80 (K 80)	▪ Has a spreading growth habit. ▪ Flowers 50 days after emergence. ▪ Tolerant to Aphids, Thrips, Pod borers and leafhoppers. ▪ Susceptible to Cowpea Yellow Mosaic Virus (CYMV).

	Kunde Tumaini	▪ Has a semi-erect growth habit. ▪ Grain colour: Deep brown ▪ Large sized grain. ▪ Early maturing. ▪ Tolerant to Alectra vogelii
	Ken Kunde 3	
	KVU 27-1	▪ Has a semi-spreading habit. ▪ Moderately tolerant to Aphids, Thrips, Pod borers and leafhoppers. ▪ Moderately resistant to fungal diseases and mosaic virus.
More grain than leaves	Zebra, Randa	
	KVU	Tolerant to cold and recovers very fast from drought
More leaves, less grain	KVU HB	48E10 More vegetable type than grain typeTolerant to virus diseases
	KCP 022	Drought tolerant
	MTW 63", ICV	Pest tolerant
	Ngombe	Good for green leaf production, sweet taste of grain

Requirements for proper growth of cowpea

Altitude

- The crop grows best from sea level to 1500 metres above sea level.
- It can grow at higher, cooler temperatures but it will produce more leaves than grain.
- Also above 1500m, it is likely to suffer frost damage.

Rainfall:

- Cowpea is a warm weather crop that requires less rainfall as compared to most crops.
- Most varieties require a minimum rainfall of 200 mm per growing season.
- However, the crop will do well in rainfall up to 700 mm.
- The rainfall should be well distributed throughout the growing period.
- Cowpea does not tolerate extended flooding.

Temperature:

- Cowpea grows well in warm areas with temperatures ranging from 25 - 35°C.

Soils:

- Cowpeas like soils where water can flow through easily. It helps them grow nicely.
- Cowpeas can grow in many types of soils from sands to heavy,, as long as they drain well.
- Best soil pH range is 5.5 - 6.5. It will not tolerate salinity (high salt levels).

Cultural practices for growing Cowpea

Land preparation:

- Land preparation should be done early enough so that the field is free of weeds and ready for planting at the onset of rains. Get your land ready before the rainy season starts. Clear weeds and prepare the field so you can plant when the rains come.

- Land can be manually prepared using conventional hand tools like hoes. You can get your land ready for planting using simple tools like hoes.
- In most places, settings where cowpea is grown on old plots, field preparations start immediately with cultivation/tilling of the land. In many places where cowpeas are planted on existing land, preparation begins with tilling the soil.
- When starting on new land, clear the bushes using axes and machetes. Remove trees and shrubs that block sunlight, as they can limit crop growth.
- Next, dig up the field to prepare the soil for planting.

- Two weeks before planting spread 2 tons of manure or compost per acre on the field. Then, mix with the soil.
- Prepare the field for planting by breaking up large soil clumps to make the soil surface smooth and even.

Time of planting:

- Plant cowpea at the beginning of the rainy season for rainfed farming.

- If you have irrigation, you can plant at any time.

Seed Selection

Why is use of good seed very important in cowpea production?

- This is because the quality of a seed planted determines the quality and quantity of the harvest.
- Low-quality seed causes poor and uneven stand, resulting in uneven maturity, harvesting problems and yield losses.
- Using good seeds is really important in cowpea farming. The kind of seeds you plant affects how much and how good your harvest will be. Bad seeds make the plants grow unevenly and produce less. It's therefore recommended to use certified seeds for better results.

These are the benefits of using certified seed:

- They have a high germination percentage.
- They are true to the type/variety indicated.
- They are free of weed seeds and foreign matter.
- They are pest and disease free.
- They are not rotten, moldy or discoloured.

Certified seeds are better: they grow well and are disease-free. They're the right kind with no dirt or pests.

Sometimes the farmer may not have access to certified seed and may have to plant their own seed.

Using own seed

- If you have seeds that were harvested from your farm or a fellow farmer, make sure you select seeds that are not damaged, diseased, or wrinkled.
- The selected seeds should be treated with insecticides/fungicides, for example ACTARA/RIDOMIL, against early pests and fungal diseases. Some companies offer pre-mixed chemicals for treating the seed.
- It is also recommended that the seed be treated with Rhizobium culture. The Rhizobium helps the cowpea seed to fix Nitrogen from the air for its growth. Rhizobium can be bought from some agricultural companies.
- Treated seed is unfit for human consumption and should be planted immediately.
- When you don't have certified seeds, you can use your own seeds. Make sure the seeds are healthy, not damaged or sick. Treat them with insecticides and fungicides to protect against pests and diseases. You can also use Rhizobium to help the seeds grow better. Remember, treated seeds are not safe to eat and should be planted right away.

Fertilizer:

- Soil test is required to determine the soil nutrient levels. Test your soil to know its nutrients and which fertilizer to buy for your cowpeas.
- Cowpeas require Nitrogen and Phosphate fertilizer application.
- Since Cowpea crops can fix its own Nitrogen from the air, the crop would need more Phosphorus than Nitrogen.
- Apply manure/compost 1 – 2 weeks before planting and mixed into the soil
- The manure/compost should be broadcasted (2 tons per acre) then worked into the soil (incorporated) preferably using a hoe.
- At planting apply 17 – 22 kg per acre of a phosphatic fertiliser such as Single or Triple Super Phosphate.

Crop husbandry and Field management

Weeding:

- Weeds harm cowpeas by competing for light, water, and soil nutrients and may also attract pests and diseases. Cowpea suffers most from weeds in the early stages of growth.
- The first weeding should be done 2 weeks after germination and second weeding is done by the end of the 4th or 5th week when the crop is establishing ground cover.
- In high rainfall areas a third weeding may be required.
- During the first weeding, thinning is also done. Remove weaker, off-type, and sickly plants to promote growth of healthy crops.

Pest and Disease Control

Pests:

- Pests are some of the things that contribute to low yields in cowpeas. You can lose over 90% of your leaves to these harmful organisms.
- Cowpea is susceptible to a wide range of diseases and pests.
- Before flowering (which is the main period when we harvest our leaves) the most disturbing pests of Cowpea are Cutworms, Aphids, Thrips and Leafhoppers.
- After flowering the important pests are Aphids, Pod borers, Pod sucking bugs and Bruchid insects in storage.

- We shall discuss in details the insect pest that attack the crop before flowering:

Cut worms

- Cutworms are greyish smooth-skinned and somewhat shiny caterpillars of night-flying moths.
- They damage young seedlings by cutting them at or below the level of the soil at night. They hide inside the soil during the day.

Control

They can be controlled by wetting the area around the seedlings insecticides such Alpha Cypermethrin (Tata Alpha 10 EC-5 ml/20 litres water, Lambda-cyhalothrin (Dududthrin, 1.7- EC Rate-60ml per 20L or 0.4 litres per acre).

Aphids

- Aphids are small soft-bodied insects which pierce the plant tissue and suck sap from the attacked plants.
- They feed on undersurface of young leaves, young shoots and pods of mature plants
- By sucking sap, they weaken the plants which produce small leaves.
- Under heavy attack, the leaves curl and become discoloured.
- They excrete honeydew as they feed, on which black sooty mold grows and covers the leaf surface leading to reduced photosynthesis.
- Aphids are also carriers of disease-causing viruses such as the mosaic virus.
- Aphids also transmit Cowpea aphid borne mosaic virus.

Control

Aphids can be controlled using insecticides such as Thiamethoxam based products e.g. ACTARA.

Whiteflies

- They are small, yellow bodied insects with 4 white wings which are covered with a waxy powder.
- They pierce and suck the sap from leaves, which may cause reduced plant growth, yellowing of leaves, and wilting of the plant when present in large numbers.
- They produce honeydew, which may lead to growth of sooty mold on leaves and pods. Heavy growth of sooty mold reduces photosynthesis affecting plant growth.
- Leaves covered with sooty mold cannot be sold which is a loss to the farmer.

Control

- Use insecticides such as Confidor, Tata Mida, Duduthrin. Observe PHI(preHarvest Interval)

PLANT DISEASES:

The cowpea crop is affected by a number of diseases. Diseases that infect the cowpea crop can be fungal, bacterial or viral. The most important of these include:

- Damping-off.
- Powdery mildew.
- Anthracnose
- Root Rot and Leaf Blight.
- Yellow mosaic virus Disease.

The following are the symptoms and ways to control and manage these diseases.

Damping-off

- Damping off is the rotting of stem and root tissues at and below the soil surface.
- It is caused by a number of fungi that are found in the seed or in the soil.
- Long periods of wet weather before the first true leaf develops and also the crowding of seedlings due to poor seed spacing can also increase damping off.
- In addition, cool, wet or water logged soils conditions increase chances of the disease.

Symptoms:

- The emerging seedlings collapse, often submerged in a mass of white fungal growth 3 weeks after sowing.

Control:

- Use disease-free certified seeds.
- If using your own seed, treat it with fungicides such as Carbendazim or Thiram.
- Give adequate nutrients to your crop: Although these nutrients do not always reduce seedling infection, they often speed germination and increase seedling vigour. Higher seedling vigour allows seedlings to rapidly escape from the soil surface even in the presence of a high soil population density of the pathogen.
- Avoid overwatering, especially on cool sunless days when water does not evaporate quickly.
- Observe crop rotation with non-legume crops such as cereals (maize, sorghum etc).
- Avoid the field being water logged. You can dig drains if it is likely to flood.
- After germination, spray affected seedlings with fungicides such as MATCO (PHI: 5days)

Powdery mildew

Symptoms:

- White powdery spots which merge to form a powdery coating on leaves, stems and pods.
- Under heavy attack, the colour of the powdery mass turns dirty white.
- Infected leaves show necrotic (yellowing) symptoms.
- Leaves later dry up and the plant dies.
- Diseased plants are stunted, mature late and produce very few flowers and pods.
- Pods of infected plants are reduced in size and turn yellow.

Control:

- Practise early planting, crop rotation with non-legumes for 2 - 3 seasons.
- Observe high field hygiene, uproot and destroy severely infected plants to reduce inoculum in the field.
- Avoid overhead irrigation to reduce humidity which promotes disease spread.
- Apply sulphur based protective fungicides such AS COSAVET DF, WETSULF WP or curative fungicides such as ORTIVA, DOMAIN, RAMSON.

Anthracnose

- It is a disease caused by fungus.
- It is also known as ‘coal disease’ because it produces dark spots on leaves, stems and pods.
- The disease is favoured by wet and warm weather (moderate rainfall and temperatures of 20 - 24°C).
- The disease is at first found in seed but later spread from plant to plant.

- Seedlings from infected seeds show dark brown to black sunken spots on the stems and the first leaves.
- Severely infected seedlings are stunted. If the spots surround the stems, the seedlings die soon after seed germination.
- Lower leaves are infected first, then those higher up the plant.
- Symptoms include circular, black, sunken spots with dark centres and bright red orange margins on leaves and pods.
- In severe infections, the affected parts wither off.

Management:

- Use certified seed and practise crop rotation with non-legumes.
- If using your own seed, treat with Carbendazim-based fungicide (e.g. Carbendazim base) before planting.
- Work in uninfected parts of the field first before the infected area.
- Avoid unnecessary movement in the infected areas to minimise spread of the disease.
- Disinfect farm implements after working from one field before proceeding to the other with disinfectant like JIK solution (50 ml/l).
- After harvest, collect and burn plant trash, or plough the remains into the soil
- Do not plant cowpeas for at least 2 years in land that has carried an infected crop.
- Chemicals used to control the disease include fungicides such as Mancozeb (e.g. ORTIVA), Copper compounds (e.g. ARMISTAR) or Chlorothalonil (e.g. DACONIL).

<u>Root Rot and Leaf Blight</u>

Initial symptoms appear as mild scattered yellow spots on young leaves. The spots gradually increase in size and ultimately some leaves turn completely yellow. Infected leaves also show necrotic symptoms. Diseased plants are stunted, mature late and produce very few flowers and pods.

Management:

- Seed treatment with Trichoderma viride at the rate of 4 g/kg or Pseudomonas fluorescens 10 g/kg.
- Spot drench with Carbendazim based products such as Rodazim SC or Saaf WP and spray plants according to manufacturers' recommendations.

<u>Yellow mosaic</u>

- This is a virus disease which is transmitted by whiteflies.
- Initial symptoms are mild scattered yellow spots on young leaves which gradually enlarge on some leaves turning them completely yellow.
- Infected plants may be dwarfed and become bushy with reduced yields.
- Infected leaves are smaller than healthy ones

Management:

- Use certified/disease free seeds.
- Uproot infected plants and destroy by burying or burning to reduce inoculation on the farm.
- Control insects such as whiteflies that transmit the virus with insecticides such as ACTARA, KARATE.
- Clear the bushes and weeds around the farm that act as alternate hosts for the whitefly vectors.
- Crop rotation with non-legumes such as cereals (Maize, sorghum etc).

HARVESTING

- In cowpeas are grown for vegetable purposes, picking of the leaves starts 3 - 4 weeks after planting, and this continues until the plants start to flower.
- Continuously pluck the tender leaves before they get tough and stringy. The younger leaves are more tender, succulent and nutritional compared to the older leaves.
- Pick the young leaves (but not the ones next to the tip of the stem), always leave 3-4 leaves and buds to prevent the plant from dying.

YIELD

Leaf Yields: 2,400kg per acre can be achieved.

POST-HARVEST HANDLING

Nearly 50% of harvested African indigenous leafy vegetables do not reach the market or the consumer's table. Sometimes those that reach the market are not in good condition. In order to reduce these losses, they need to be stored and processed well after harvest to ensure freshness and quality.

The following tips will help you ensure the freshness of your cowpea leaves:

- Harvest as quickly as possible in the morning or late in the evening.
- As you harvest, keep harvested leaves in the shade.
- Before delivering the leaves, store them in a cool place.

Extending Keeping time of Leafy Vegetables

<u>Fresh vegetables</u>

- Keep in a refrigerator if available.
- Keep them in the coolest are in your house

<u>Preserving through drying</u>

Drying is one of the oldest methods of food preservation. Drying preserves foods by removing enough moisture from food to prevent decay and spoilage. The common methods are:

(i) Drying in direct sun

Although this is relatively cheap and does not require any equipment, when vegetables are dried in the direct sun, they lose many of their nutrients. In addition, the vegetables are likely to be contaminated by dust particles and germs as drying is done in the open.

(ii) Drying using solar dryers

- Solar drying helps to retain the nutrients, taste, colour and smell of produce being preserved.
- It also will prevent infection of the produce for dust and germs.
- Solar energy is a free and clean source of energy.

Marketing

Small-scale growers use 2 methods of selling their crops. These are:

(i) Direct marketing channels – where the farmer sells his/her cowpeas leaves individually on the roadside, local markets, to hotels and other institutions like schools.

(ii) Collective marketing channels – where farmers join together and market as a group.

Where opportunities exist for selling as a group, this is recommended. Collective marketing has been shown to have the following advantages:

- It increases the bargaining power of the farmers.

- By improving quality and accessing high end markets, farmers are able to get better profits.
- It reduces the cost of marketing to individual farmer, and
- It reduces the cost of transport and packaging etc.