

Better cowpea

through good agricultural practices



For farmers in Zimbabwe



Cowpea is a grain legume that grows throughout sub-Saharan Africa. The leaves, green pods, young and mature seeds are very nutritious and rich in protein. Also the crop residues are rich in protein and are good feed for livestock. Cowpea tolerates heat, drought and acid soils but not water logging.

With bacteria that live in the soil, cowpea forms root nodules. These bacteria are called rhizobia. In the root nodule, the bacteria can fix nitrogen from the air into a form that cowpea can use for growth. Part of the nitrogen is used to make protein in the grain, but some of the nitrogen is also left behind through falling leaves and roots. The nitrogen that is left behind improves soil fertility. This makes cowpea a good crop to grow as intercrop or in rotation with other crops, because these other crops then also benefit from the nitrogen. With good agronomic practices and the right varieties, cowpea can yield about 2500 kg/ha when grown in monocrop. Because cowpea is a short duration crop, it is a good choice for relay cropping. Cowpea can be grown at the start of the season with a cereal crop relayed into the cowpea several weeks after cowpea sowing. Alternatively, cowpea can be relayed into cereals in the second half of the growing season.

Step 1: Land selection and preparation

- Cowpea is well adapted to sandy and poor soils, but best yields are obtained in well-drained sandy loam to clay loam soils with a pH between 6 and 7.
- Cowpea can tolerate drought, but not waterlogging. Therefore, select land without water logging and avoid poorly drained soil.
- Think about the rotation scheme for the field you want to plant. Do not plant cowpea in the same field for two succeeding seasons, as this increases the chance for disease.
- Clear all vegetation and prepare the field manually with a hoe, or use animal power or a tractor. You can plant cowpea on ridges or on a flat seedbed.
- Well-prepared land ensures good germination, reduces weed infestation and prevents water-logging, which may damage the cowpea plants.

Step 2: Variety and seed selection



Select a good cowpea variety suited to your agro-ecological zone and cropping system. In Zimbabwe, Natural Region IV and V (the drier regions) are suitable for cultivating cowpea. When making a choice about a variety think about the maturity period, yield potential, drought tolerance, responsiveness to day length (for some varieties flowering is influenced by length of day), pests and disease resistance and preferred colour and size of the grains. Also think about whether cowpea is being grown for leaves, grain or both.

Variety	Grain characteristics	Attainable grain yield (kg/ha)	Maturity period (days)	Growth habits	Seed rate (kg/ha)
IT18	Pearl brown, small	2500	70-90	Determinate / Erect	20-40
CBC 1	Brownish, small				
CBC 2					

Use only high quality seed for planting.

- Make sure seed is not more than 12 months old to ensure good germination.
- Sort out the good seeds for planting to ensure that they are free from insects, disease infestation and weed seeds. Do not use damaged or wrinkled seeds or seeds with holes.
- Do a germination test at least 10 days before time of planting. Plant 50 seeds. If at least 40 emerge, the seed is good for planting. If 30-40 emerge, plant more seeds than recommended. Get new seeds if less than 30 seeds emerge.

Step 3: Applying fertilizer



Important points

- Cowpea can fix its own nitrogen, and therefore does not need to be fertilized with N-fertilizers like ammonium nitrate, urea or NPK.
- Cowpea needs phosphorus at planting. Good fertilizer types that supply phosphorus are SSP or Compound L.

Application

- Make a furrow of 5-7 cm deep. You will also use this furrow to plant cowpea. Place the fertilizer in the furrow and cover with 2 cm of soil.
- Use the fertilizer rates given in the table below for mono-cropped cowpea. You can use a teaspoon or soda bottle-cap to measure the amount of fertilizer and apply it in the furrows, according to the distances in the table.
- When manure has been applied recently, rates can be reduced.

Fertilizer type	Rate (kg/ha)	Row spacing: +/- 50 cm. In the furrow, spread 1	
		Teaspoon	Soda bottle-cap
SSP	225	Every 40 cm	Every 30 cm
Compound L	150	Every 65 cm	Every 40 cm

Step 4: Planting



Different varieties have different planting times and different planting requirements. Most of the semi-erect and creeping cowpea varieties are photosensitive. When those varieties are planted early, they will not flower but instead grow very leafy and grain yield may be reduced. Because erect varieties are planted closer to each other, more seeds are required for erect varieties than for creeping varieties. In general, the larger the seed, the more seeds in terms of kg/ha are needed.

- The time of planting cowpea depends on the duration of the growing season and the maturity period of the variety.
- Plant monocropped cowpea in rows 45-60 cm apart. Within rows, plant 8-15 cm apart (1 seed per stand). Generally, creeping varieties need wider spacing (about 30 cm).
- Planting in rows has many advantages; you use the correct plant density, weeding is easier and harvesting takes less time.
- Plant seed at 2.5 to 5 cm depth. Planting seeds more than 5 cm deep will delay emergence and seeds may rot.
- Fill plant gaps 1 to 2 weeks after planting where seedlings have not emerged.

Cowpea in intercrops

- A short-duration, determinate cowpea variety can be grown at the start of the season with a cereal crop relayed into the cowpea several weeks after cowpea sowing.
- A medium duration, semi-determinate cowpea variety can also be relayed into cereals in the second half of the growing season. Plant cowpea about 4-6 weeks after planting the first crop (maize, sorghum or millet).
- Plant the first crop in rows which are 90 cm apart. Plant the second crop in between those rows. The cowpea-cereal row spacing then becomes 45 cm. Use the recommended intra-row spacing for both crops.

- For strip intercropping, plant 2 rows of cereal, alternated with 4 rows of cowpea. This improves the productivity of especially erect and shade-sensitive varieties.
- Choose a variety suitable for intercropping. Spreading types may overgrow the other crops.

Step 5: Field management



Weeds

Weeds can harbour pests and reduce both yield and grain quality. Weeding is needed to minimize competition for nutrients, water, sunlight and space. Weed control can be manual or chemical, or both.

Manual weed control:

Weed about 2 weeks after planting and again 4-5 weeks after planting.

Chemical weed control:

Herbicides, if used properly, are safe and effective in controlling weeds. There are different types of herbicides. The choice of herbicide depends on the predominant weed species and the availability of the herbicide. Herbicides are available for control of weeds before they emerge (pre-emergence) or after they emerge (post-emergence). If pre-emergence herbicide is applied at or just before planting, one manual weeding may be required at 4-5 weeks after planting. Use herbicides as presented in the table below or seek advice from an extension agent or agrodealer.

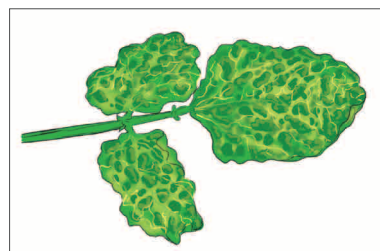
Product name	Active ingredient	Use rate/ha	Amount for one sprayer load (20 l knapsack)	For which type of weeds
Dual Magnum	Metalochlor	1.1 l	82 ml	Broad-leaved weeds and grasses
Sencor 480 SC	Metribuzin (triazine)	1.1 l	75 ml	
Lasso 48 EC	Alachlor	2.5 l	75 ml	
Fusilade Super	Fluaziflop-p-butyl	1.5 l	75 ml	Grasses and volunteer wheat
Classic	Chlorimuron ethyl	45 g	5 g	Nutsedge and broad-leaved weeds

* *Dual Magnum, Sencor 480 SC and Lasso 48 EC* are pre-emergence pesticides while *Fusilade Super and Classic* are post-emergence pesticides

Pests and diseases

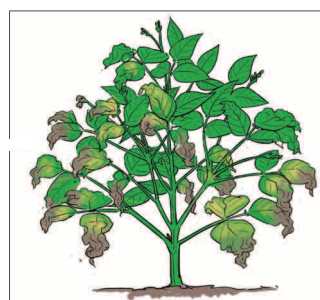
Diseases

Cowpea mosaic virus produces irregular light and dark green mosaic patterns on the leaves. In some cases the affected parts thicken. Affected plants may be stunted and will not produce normal pods. If the disease attacks plants at the early growth stage, no pods should be expected. Mosaic viruses are transmitted by aphids.



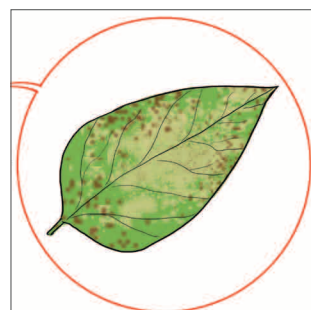
Cowpea mosaic virus

Fusarium wilt is a fungal disease which can cause yellowing of the lower leaves on one side of the plant. Infected plants usually are stunted and wilted. When the stem is split over its length, brick red tissue can be observed. Rootknot nematodes increase a plant's susceptibility to *Fusarium wilt*.



Fusarium Wilt

Leaf spots can be caused by various bacteria. Some bacteria cause yellowish spots, or spots with a yellow halo. Other bacteria cause brown to purplish spots. Usually, spots develop first on lower leaves. When plants are severely affected, defoliation can occur. Leafspot diseases are most serious on late plantings and during long, moist periods. To minimise the spread of the disease, avoid working in the field when the foliage is wet.



Leaf spots

To control diseases:

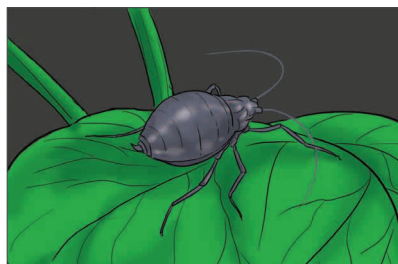
- Practice crop rotation
- Use clean seeds and avoid seeds from diseased plants
- Use disease resistant varieties
- Uproot and destroy infected plants
- Plant in a good seedbed and avoid poorly drained soils
- Fungicides can be used against fungal diseases. *Benomyl* or *Manconzeb* can be applied to leaves at the rate of one small matchbox in a 15 L sprayer. Seek advice from an extension worker before using fungicides.

Insect pests

Insect pests can be a major constraint to cowpea production. If not effectively controlled, insect pests can totally destroy a cowpea crop. Based on when they occur, cowpea pests can be classified into three major groups: pre-flowering, flowering/post-flowering and storage.

Pre-flowering pests

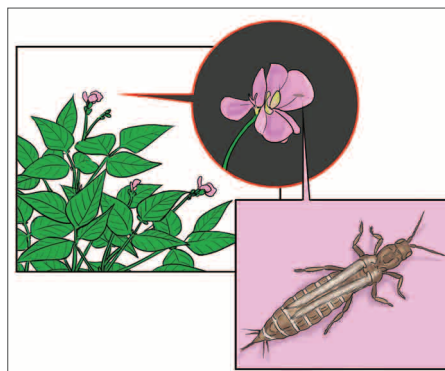
The cowpea aphid is a medium sized, shiny black insect. The aphid directly damages the cowpea plant by sucking its sap. The aphid also transmits the cowpea mosaic virus. Honeydew produced on plants is evidence of aphids feeding on the crop.



Cowpea aphid

Flowering/post-flowering pests

- Flower thrips are very tiny black insects, which feed on flower buds and flowers. When severely infested, plants do not produce any flowers, or flower buds and flowers fall prematurely without forming any pod. Flower thrips can cause total crop loss.



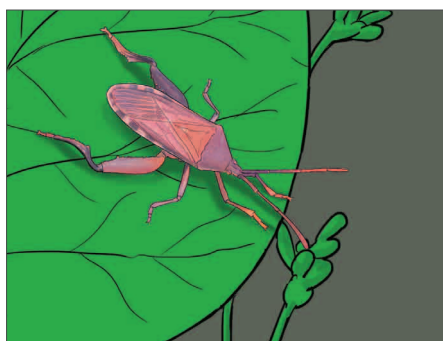
Flower thrip

- Blister beetles (CMR beetles) feed on flowers, leading to crop damage or total crop loss. The adult beetles are attracted to maize pollen. Therefore, this pest is mostly occurring in cowpea fields near to or intercropped with maize.



Blister beetle

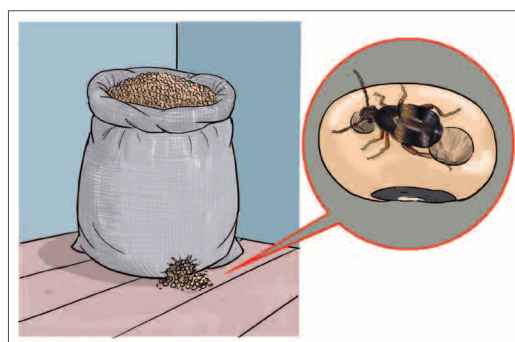
- Pod-sucking bugs such as the tip wilter, suck the sap from green pods. This causes shrivelling and premature drying of pods.



Tip wilter

Storage pests

The cowpea weevil (bruchid) can lay eggs on pods or grain. The larvae hatch and damage the grain, and emerge as adults through holes on grain.



Weevil

To control insect pests:

- Regularly check the field for harmful insects and hand-pick and destroy them. Wear gloves when picking CMR beetles because those beetles can release a liquid that burns the skin.
- Clean up (for example bury) crop residues from previous crops, in which insects may survive.
- Plant resistant varieties.
- Practice crop rotation.
- Plant early.
- Spray with insecticides

Frequency of spraying to control insect pests:

- *1st spraying*: generally 4-5 weeks after planting, when flower bud initiation has started. This controls thrips. Spraying can be at 2-3 weeks after planting if aphids are present.
- *2nd spraying*: 10 days after the first spraying, when podding has started.
- *3rd spraying*: 10 days after the second spraying. This is only necessary for medium/late-maturing varieties, or varieties that are indeterminate, and when there is a heavy attack of pod-sucking bugs.

Check the table below for different types of insecticides and/or ask for advice from an extension worker.

<i>Product name</i>	<i>Active ingredient</i>	<i>Use rate (L/ha)</i>	<i>Amount for one sprayer load</i>	<i>For which pest</i>
Dursban	Malathion	1.5 l	50-75 ml	Cutworms, diamond back moth, grasshoppers
Carbaryl	Carbaryl	1 kg	50-75 g	Cutworms, bean stem maggot, stink bugs, leafhoppers
Dimethoate 40 EC	Dimethoate	1 l	50-75 ml	Aphids
Karate	Lambda-cyhalothrin	0.14 l	5-8 ml	Bollworms, cutworms, semi-loopers

Safe use of chemicals

- Use only herbicides, pesticides and fungicides that are recommended to cowpea to avoid damage to the plant.
- Chemicals can be toxic, so always follow instructions on the product package or from the agro-dealer for safe use. Also follow the instructions about the time needed between spraying and safe consumption of fresh pods.
- Do not store chemicals in the same place as food.
- Do not eat from the same spoon you used to measure chemicals.

Step 6: Harvesting



Cowpea can be harvested in various stages, for example for consumption of fresh immature pods or for grain. Many varieties have a prolonged and uneven ripening period. When you harvest grain only pick dry pods.

1. Harvest pods when they are dry. Pick pods from plants and leave the rest of the plant material in the field or use for compost. Plant material left in the field or composted will improve soil fertility.
2. Dry the pods in the sun and protect from rain. Dry the pods on a clean surface such as a mat, plastic sheet or tarpaulin, or on a raised platform. Do not dry the pods on the soil.
3. Thresh the dry pods on a clean surface such as a tarpaulin.
4. Clean the grains. Winnow to remove chaff, dust and other rubbish. Also remove shrivelled, diseased or broken grains and grains of other varieties.
5. Dry the threshed grains on a clean surface for two sunny days. Test the grain to see if it is dry enough for storage or market by biting or pinching grain with your finger nails – when dry enough, grain should break or crack not bend or stick between teeth or fingernails.
6. Place grain in clean bags; if re-using bags in which grain was previously stored, the bags must first be washed and then disinfected by boiling them in water for 5 minutes. If the bag is polyethylene, make sure it doesn't touch the outside of the pot or it will melt. Completely dry container/bag before placing the grain inside.



7. Grain can be treated before storage to control storage pests. For example coat seeds with edible oil, ash or insecticides like *Pirimiphos-Methyl + permethrin*, *fenthothion+Fenvalerat*.
8. You can also use PICS (Purdue Improved Cowpea Storage) triple bags to store grain under air-tight conditions and keep away insects from the grain. Place grain in the innermost bag and tie this bag tightly. Then tie the middle bag, and finally tie the outermost bag. When all the bags are tied, any insects in the grain die from lack of oxygen. It is not necessary to treat seed against storage pests when using PICS bags.
9. Clean the storage room. Stack the grain bags on a raised platform or wooden pallet away from the wall. Avoid direct contact of storage bags with the ground.
10. Inspect and remove infested or rotting grains on a regular basis.

If you apply chemicals to grain before storage, do not eat or sell grain before it is safe for consumption.

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