

**NGGL AHAFO SOUTH PROJECT
AGRICULTURAL IMPROVEMENT AND LAND ACCESS PROGRAM**

CASH CROP EXTENSION SERVICES

COCOA

OIL PALM

SOYBEAN

CITRUS

CHILLY

C O C O A

PRODUCTION

GUIDE

PREPARED BY:
AILAP TEAM
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FOR FURTHER INFORMATION
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INTRODUCTION

Cocoa is normally propagated by planting seeds at stake on the field or by raising seedlings, which is usually the best method due to the high percentage loss associated with the direct sowing of seeds.

NURSERY ESTABLISHMENT

- Seeds can be nursed in poly bags or on beds.
- It is advisable to use hybrid seeds because of the following:
 - Mature early
 - Resistance to diseases
 - Produces more seeds per pod
 - Produces more pods per tree
 - Easy to harvest due to short height

Hybrid seeds can be obtained from recognized cocoa stations

SITE SELECTION

- Site should be accessible
- Soil should be well drained
- Site should be near a source of water

NURSING IN POLY BAGS

- Fill poly bags with topsoil to about an inch to the brim
- Arrange them in rows leaving paths (1.5 ft –2 ft)
- Water the soil in the bags

- Place in each bag 1 fresh bean with the pointed end up at a depth of 2 cm. (If in doubt place the bean flat at the same depth in the soil)
- Avoid sowing already germinated beans.

NURSING ON BEDS

- Make beds 4ft wide and of any convenient length.
- With a string make lines 60cm apart along the entire length of each bed. On each line sow fresh beans 5cm apart with the pointed ends up.
- Water the seedlings as and when necessary, erect shade using palm fronds to protect the seedlings.

LAND PREPARATION

SITE SELECTION

- Area should be fairly level
- Construct canal at waterlogged areas to drain excess water
- Area should have enough rainfall (1500-2000mm per annum)
- Clear land and leave 5 – 8 trees /acre to provide permanent shade.
- Temporal shady trees should be established with food crops (plantain) or Gliricidia before transplanting

TREES TO BE USED FOR SHADE

DESIRABLE TREES

Emire, Odum, Awiemfo samina, Oforuntum, Nyame Dua.

UNDESIRABLE TREES

Onyina, Watapuo, Krabire, Odwuma, Cola

TRANSPLANTING

- Transplant seedlings at 4 – 6 months old
- Transplant in May – mid July or when the rainy season is well established.
- Space at 10 ft. x 10ft. (3m x 3m) to give you 435 plants / acre or 1111 plants /ha.
- Water copiously plants ready for transplanting
- Transplant in the early hours of the morning or late afternoon
- Dig a hole up to the dimensions of the nursery bag
- Cut the plastic bag from top to bottom
- Place the seedling in the hole; remove the plastic , take care that the collar of the young plant remains at ground level
- Fill the hole with soil, firm by treading.

- Mulch around the plant, but prevent it from coming into contact with the collar

FIELD MAINTENANCE

- Brush farm 4x a year
- Remove chupons and mistletoes

Fertilizer application

Age of plant	Fertilizer	Quantity
1-3yrs	S.Ammonia	70gm/plant (matchbox full)
Above 3yrs	Asase wura	3bags / acre
	Coco feed	3bags / feed

MAJOR PEST AND DISEASE

Capsid and Black Pod

Control measures:

Capsid

- Spray 4x / year with recommended insecticide.
- Spraying period (August-December)

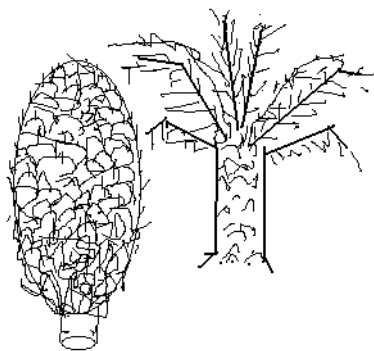
Black pod

- Chemical + cultural methods
- Spray cherelles at 3 – 4 weeks intervals with recommended fungicide.
- Remove pods starting to blacken immediately, bury or burn them
- Reduce humid conditions prevailing.

OIL PALM

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Botanical Name: *Elaeis guineensis*

ENVIRONMENTAL REQUIREMENTS

SOIL TYPE

- Select well-drained soils.
- Land should be fairly flat and high in organic matter.
- Valley bottoms and lower slopes are also ideal for cultivation.

AREAS SUITABLE FOR PRODUCTION

- Forest zones of Western, Central, Eastern, Brong-Ahafo, Ashanti and Volta regions.

RAINFALL REQUIREMENT

- An average rainfall of 1500 mm and well distributed throughout the year.

VARIETIES

- Dura, Tenera and Pisifera. The recommended variety is Tenera

LAND PREPARATION

- Clear land, practice zero/control burning
- Dig trenches for drainage if necessary, clear natural waterways and /or raise mounds in very wet areas.

PLANTING

- Plant on the onset of major rains, preferably in May-June.
- Planting can be done in minor rainy season in wet areas.

- Planting material should be 10-12 months old.

PLANTING DISTANCE

- Planting distance is 29 ft. triangle or 8.8m triangular (equilateral) in North – South alignment.
- An initial baseline East to West is necessary.
- Dig holes to plant seedlings.
- Put into hole some top soil and fertilizer (0.5kg, NPK)
- Plant seedling such that the top of ball of soil around the seedling is level/flat with the soil surface.

PROTECTION OF YOUNG TRANSPLANTS AGAINST RODENTS

Protect young seedlings against rodents with:

- Wire collars
- Raffia collars,
- Split bamboos etc.

Ensure regular circle weeding at 1m- 2m radius 6-8 times /annum manually.

POST PLANTING OPERATIONS

Fertilizer Requirements

Age of plant (Year)	Quantity of NPK 15-15-15
1	0.6 kg/plant
2	1.2 kg/plant
3-5	2.4 kg/plant
6 and above	3.0 kg/plant

Apply fertilizer in rings at 30-90cm radius at the base.

WEED CONTROL

- Plant cover crops (e.g. Pueraria, Centrosema etc) to control weeds.
- Do circle weeding by slashing 1m-1.5m radius from base of the plant every 6 weeks, and inter row weeding 3 times in a year.

FROND PRUNING

- Pruning starts 6 months after 1st harvest.
- Ensure a minimum of 2 palm fronds below the lowest bunch. Pruning is done in the dry season at 9months interval for palms less than 10 years old and 7 months' interval for palms 10 years and above.

HARVESTING

- Plant matures in 3-4 years. At this time, hands pick ripe nuts; do not cut bunch or branches with cutlass.
- 10-14 days harvesting interval is recommended. Ensure minimal removal of fronds during harvesting.

EXPECTED YIELD

- 10-15 tonnes/ha (4-6 tonnes/acre)

PESTS AND DISEASE CONTROL

LEAF MINER

The larvae eat the green part of the leaves, causing desiccation of fronds.

The fronds turn completely brown.

Browning starts from the lower fronds where attack starts.

MANAGEMENT

- Prune affected leaves.
- Spray with recommended insecticide.

RHINOCEROS BEETLE

- Attacks and destroys the growing points, young leaves and inflorescence.

MANAGEMENT

Physical removal of pests, removal and destruction of breeding sites i.e. decomposing organic matter including farm yard manure heaps and/or use of cypermethrin drenched in sawdust and put in growing points of palm.

WILT DISEASE

- Larvae hatched from eggs lay in wounds on trunks attack vegetative parts causing yellowing of the young leaves.

MANAGEMENT

- Avoid wounds during pruning and harvesting.
- Treat with recommended insecticides like dursban, dimethoate and cymethoate.

SOYBEAN

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SOYBEAN

STEPS TO INCREASE PRODUCTION

- Select a good site
- Plant an improved variety
- Use good seed
- Plant so that it can be harvested under relatively dry conditions
- Plant in rows
- Sow the seed about 3cm deep
- Control weeds early
- Harvest early
- Store in a cool dry place.

SELECTING A SITE

- Soybean may be grown in all parts of Ghana except in the acidic soils of the high rain forest and drier savannah areas.
- The best environments occur in the savannah and the transition zones.

CHOOSING A VARIETY

Choose from the four high yielding varieties that have been released by the Crop Research Institute:

- Sallintuya – 1
- Sallintuya – 2
- Bengbie
- Anidaso

The seeds can be obtained from registered seed outlets

CHARACTERISTICS OF THE VARIETIES

Variety	Maturity Days	Yield Bag/ Acre
Sallintuya – 2	105-115	4 – 6
Sallintuya – 1	120-130	6 – 8
Bengbie	100-110	5 – 7
Anidaso	105-115	7 - 7

PLANTING

- Conduct germination test 10 days prior to planting. Take 100 seeds and plant them in a trench 1-2m long. Cover with soil and water well. Count the number of seedlings emerged after 1 week.
- If 85 or more seedlings: - Plant at recommended seeding rate.
- If 70-84 seedlings: - increase-seeding rate by 25%
- If less than 70 seedlings: - get new seeds

PLANT SPACING

- Plant in rows at 75cm x 5cm and at 3cm deep.
- Germination takes about 12 days
- 30 lb of seed is required for an acre

TIME OF PLANTING

- In the transition, forest and savannah, it is planted in May – August so that the harvest will coincide with the dry period.

FERTILIZER APPLICATION

- Apply NPK: 15-15-15 at 1-2 bags /acre
- Apply preferably at planting or immediately after emergence.

WEED CONTROL

- Weed control is very important, especially during the 1st four weeks after planting.
- Two weedings within the 1st four weeks is normally efficient to control weeds in soybean.

INSECT CONTROL

- Insect damage may be negligible and there may not be the need to apply insecticide.
- However where pest cause problems, spray with systemic insecticide (Dimethoate, Thiodan, Perfekthion etc.)

DISEASE CONTROL

- Recommended varieties are fairly resistant to most of the diseases in soybean

RODENT CONTROL

- Rats, mice, rabbits and other rodents can cause serious damage to seedlings, especially in forest areas by eating the leaves, tops of the plant and also green pods.
- The rodents can be controlled by using bait or by scarring for the first two weeks of seed emergence.

HARVESTING

- Soybean is ready for harvesting when about 95% of pods have turned brown, tan or gray depending on variety.
- Sun dry for 2-5 days and thresh.
- Remove haul and winnow to obtain clean seeds.
- Sun - dry grain to about 10-12% moisture before storing in poly bags/ sacks under cool dry conditions.

CITRUS

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CITRUS

Botanical Name: Citrus spp

Important of commercial varieties

1. Sweet orange Citrus sinensis
Based on maturity times we have the following citrus varieties:

Maturity	Varieties
Early maturing (Aug-Oct)	Ovaletto, Skkan
Mid-season(Oct-Jan)	Obuasi, Mediterranean sweet, Red Blood
Late maturing (Mar-Apr)	Late Valencia, Olinda and Frost Valencia

2. Tangerine Citrus reticulata

Satsuma (May-June) and Puncan (Sep-Oct)

Other available citrus varieties: Grape fruit, Lemons, Lime, Tangors, Tangelos and ortanique.

Rootstocks: Rough lemon, Cleopatra mandarin, Volkanmeriana, Swingle citrumelo and Rangpur lime.

Source of planting material: University of Ghana-Agric Research Station, Kade.

Suitable areas of production in Ghana: Central, Eastern, Volta and Ashanti regions. Valley bottom and Hilly areas in these regions should be avoided.

Site selection: Fertile, well-drained, light loamy and moderately deep soil with PH of 5-6.5 is preferable. Orchard should be easily accessible.

Land preparation: Slash, line and peg at 6m X 6m and remove all stumps within 6m radius of the plant to avoid root rot. Special attention should be given to stumps of avocado and cola trees.

Planting: Plant seedlings between April and May to take advantage of the early rains. Where available, mix well decomposed poultry manure with soil and plant. Where manure is not available apply 15-15-15NPK at 10g per plant 4 weeks after transplanting. The size and depth of hole should be such that there will be no depression. Mulch plant with any available organic material.

Intercropping: Citrus can be intercropped with maize, plantain, cocoyam, cowpea, groundnuts and vegetable but not cassava. Intercrop about 1m away from citrus plant.

Pruning: Ensure that all offshoots are pruned periodical from the rootstock at the early stages of the plant growth. All dead and diseased limbs and branches that may touch the ground and allow ant infestation must also be pruned.

Fertilizer application: Use soil analysis as a guide for fertilizer application. In the first 4 years thoroughly mix 1-part each NPK 15:15:15 and Urea. Apply 20-50g (i.e., 4-10 match boxes) of the mixture per plant depending on the growth vigour and leaf colour of the plants. (i.e., when leaves are pale green)

At the fruiting stage (i.e., 4th year after planting) thoroughly mix 1 part each of Urea, NPK and Muriate of Potash and apply 0.5 to 2kg per plant depending on the previous season crop yield. This should be applied at flowering. It is best applied in a circular band 40 to 60cm in width on both sides of the outer ends of the branch spread. 30kg well decomposed poultry manure can also be applied per plant.

Irrigation: Give supplementary irrigation when necessary especially during the dry season by pouring water into 65cm long inverted bamboo sticks placed 30cm away from the tree stem, 15cm deep and 50cm above the soil surface.

Harvesting: Judge maturity by colour break of the rind and taste (brix 9-10, acidity 1.1-1.2 and 40%+ used volume). Harvest fruit individually by clipping or pulling with slight twisting. Do not shake tree as this increases post harvest losses. Cure should be taken to avoid fruit injury.

Farm hygiene: After harvest, collect all rejected fruits either bruised, insects damage, or diseased fruits and bury them deep in the soil. Practice routine weed management to avoid high humidity in the farm.

Diseased and pest control: the most serious citrus diseases and pest in Ghana:

Fruit fly (*Ceratitidis capitata*) is the major insect pest of citrus in Ghana. The fly lays its eggs in the fruit leading to premature ripping and fruit drop. The larvae pupate in the soil and come out as a fully mature insect. To control, harvest; collect and bury all infested fruits deep in the soil, use pheromone bait to trap insects, or, three months before harvest, begin routine spraying with recommended insecticides (e.g., Dursban, Decis). Application should be either in the morning up to 10am or late in the afternoon from 3-5pm. Fruit fly attacks peak between July and August.

Aphids: Can do serious damage, especially to young trees with new and tender foliage. The black citrus aphid, *Toxoptera citricidus* damages nursery trees and transmits tristeza or dieback. Another aphid, *Toxoptera aurantii* causes leaf curl. Regular

spraying with decis, dimethoate or dursban can control these aphids.

Mites: they cause leathery leaves and distorted rinds of fruits. Apply approved fungicide e.g. That flowerable sulphur at 60ml per 15L.

DISEASES

Gummosis: Caused by (*Diplodia natalensis*) treat early infestions by removing diseased bark until you reach the white stem and paint with ridonil mixture of 10per 650ml of water.

PARASITES

Mistletoe: is a parasite recognized by a cluster creepers with beautiful match size yellow flowers and red tips growing at the tops and sides of infected trees. Control is by cutting out the creeper with a pruner.

Yield: Citrus start bearing between three to four years after planting. The trees stay in full production for over 20 years and starts to, decline.

Post Harvest Management; Sort out diseased, bruised and damaged fruits and grade into sizes. Package into well ventilated boxes. Treat fruits gently to avoid bruises.

CHILLY

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CHILLI PEPPER

BOTANICAL NAME: *Capsicum spp(L)*

SUITABLE VARIETIES

Legon 18, Jalepeno, M12

SOIL REQUIREMENT

Hot pepper does well on well drained, fertile soils with sufficient organic matter.

LAND PREPARATION

Good land preparation is important in pepper cultivation to help in the crop establishment and weed control. Manure could be broadcast at a rate of between 8-10tonnes per acre and ploughed into the soil.

Manual land preparation could be practiced where mechanical means is not possible.

SOWING

Seeds are nursed before transplanting to the field to allow for good care and also crop establishment on the field.

Nursery

Seedbed size should be 1.2m wide and to any convenient length. After making seedbed, water seedbed, cover with dry grass and burn. It helps to control pathogens that may be present in the soil. Sow the seeds in drills. Cover seedbed with palm fronds or dried non-seeded mulch material. Seeds germinate within 4-6days. Remove mulch material after

germination and provide shade over the bed.

Careful watering with a watering can with fine hoses is important. Diseased, weak and malformed seedlings should be thinned out.

NPK fertilizer 15-15-15 could be given in solution (dissolve 5g NPK per 1 liter of water) 2-3weeks before planting out. Seedlings should be hardened before transplanting to the field by gradually reducing the amount of water supply or the shade to at least one day full exposure.

PLANTING

Transplant seedlings when they are between 5-6 weeks old. This should be during the latter part of the rainy season.

Pepper can be grown during the dry season with irrigation. The recommended spacing is 55cmx75cm

MAINTENANCE

Mulching should be done especially in the dry season to help conserve moisture. Irrigation or careful but regular watering is important. Two or three periods of shallow hoeing are adequate

Fertilizer Application; NPK 15:15:15 fertilizer can be applied 10 days after transplanting at a rate of 100kg per acre. Side dressing with Sulphate of Ammonia at a rate of 50kg per acre after 4 weeks of transplanting to the field so as to stimulate growth and development.

PESTS AND DISEASES

Pests

Common pests of pepper are aphids, mites, white flies, thrips and leaf miners. These can be controlled with pesticides e.g. Decis, Cymethoate, Dursban, Karate or Actellic and organic preparations.

Diseases

Some of the common diseases of pepper are Anthracnose, Damping Off, Mosaic and Leaf Curl diseases.

Damping Off

It is caused by a fungus. It attacks seedlings on nurseries. Control is by selecting well-drained area for nursery and regular irrigation. The use of fungicides e.g. Dimethoate.

Mosaic

Caused by a virus and transmitted by whiteflies and through mechanical means.

Damage

Mottled green, yellow and curled leaves.

Leaf Curl

Mites have been observed to cause leaf curl. Affected plants appear stunted. Thrips and aphids also transmit the disease. Control by using Dursban.

HARVESTING

Most peppers mature in 8 to 10 weeks after transplanting. Harvest at 10-day intervals for mature green export quality peppers.

Harvested fruits should be kept under shade in well ventilated containers. Sorting, grading and packaging activities should be done under shade. Transport fruits during the cool hours of the day.

After 75% of the fruits are harvested mature green for export, the rest is allowed to ripen (not rotten) on the plants and harvested weekly for the local market.

YIELDS

Yields vary greatly with cultivar, system of cultivation and management. Current average yields is 9-10 tons/ha.

POST HARVEST HANDLING

OF

CHILLIES AND CAPSICUMS FOR EXPORT

AND LOCAL MARKETS (FRESH & DRIED)

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POST HARVEST HANDLING OF PEPPER FOR LOCAL AND EXPORT MARKET

INTRODUCTION

Pepper, comes from the fruits of the capsicum. **Capsicum Frutescens** is also known as chilli, pimento or cayenne.

Peppers are grown in all the regions of Ghana. The main exportable varieties are:

- Legon
- Birds eye
- M12

The varieties can be traded as fresh or dried.

Critical factors to consider in pepper production as a business:

- Choice of crop- potential for satisfying market
- Adaptation of variety - testing critical to prevent costly mistakes
- Superior varieties to ensure high quality crop
- Good production planning ensures - reliability and consistency
- Quality supply good record keeping

Requirements for the fresh market:

- Good quality pepper
- Avoid harvesting immature, unripe and over-ripped product
- Avoid worm infestation
- Harvest pepper with the stalks intact

After harvest, clean, sort and grade. Weigh and pack in fiberboard boxes with ventilated holes. Weigh 5kg per box. Store at 4-7°C and at 90-95RH. ESL should be 10-15 days.

SCHEME FOR DRIED PEPPER

- Select only red-ripe ones
- Remove stalk
- Grade (the size must be uniform)
- Wash in cold water to remove soil and fertilizer
- Blanch to fix colour. Deactivate enzymes and kill insects and pest for 5-10 minutes
- Dry in solar or mechanical dryer to moisture 10%

If the above scheme is followed, the fruit will have:

- High pungency
- Bright red colour
- Glossy surface without moulds
- Uniform size

PACKING

- Dried pepper is packed in woven.
- Polypropylene or just sacks at 25kg weight.
- Dried ground pepper is packed in sacks with plastics inner lining.

STORAGE

- Area must be clean, free from insects infection
- Area must be dried and weather-proof

- Sacks should be packed on raised platforms to allow circulation of air and to guard against dampness
- Chillies must be stored for more than 6 months before export.

EXPORT SPECIFICATIONS

- (a) British Standard Institution (dried pepper)
- Moisture content max 11%
 - Total ash content 10%
 - Ash insoluble in HCL 1.6%
 - Non –volatile(other extract permitted min) 15%
- (b) The British Pharmaceutical Code
- Calyces and pedicels 3%
 - Foreign organic matter 1%
 - Ash content 8%
 - Capsium content 1.5%
- (c) American Spices Trade Association (ASTA)
Cleanliness Specifications
- Rodent excreta 2%
 - Other excreta mg/1b 8%
 - Extraneous matter %W 0.5%
 - Whole insects (dead) 2.5%
 - Mould %W 5%

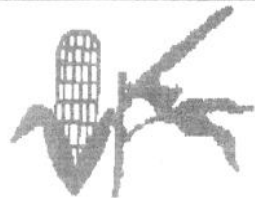
The content of each package must:

- Be uniform in size
- Contain fruits of same origin, variety and quality.

10 Steps to
A GOOD
COWPEA
PRODUCTION

Ghanaian Farmers :

Follow these 10 steps and
increase your cowpea harvest



GGDP

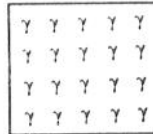
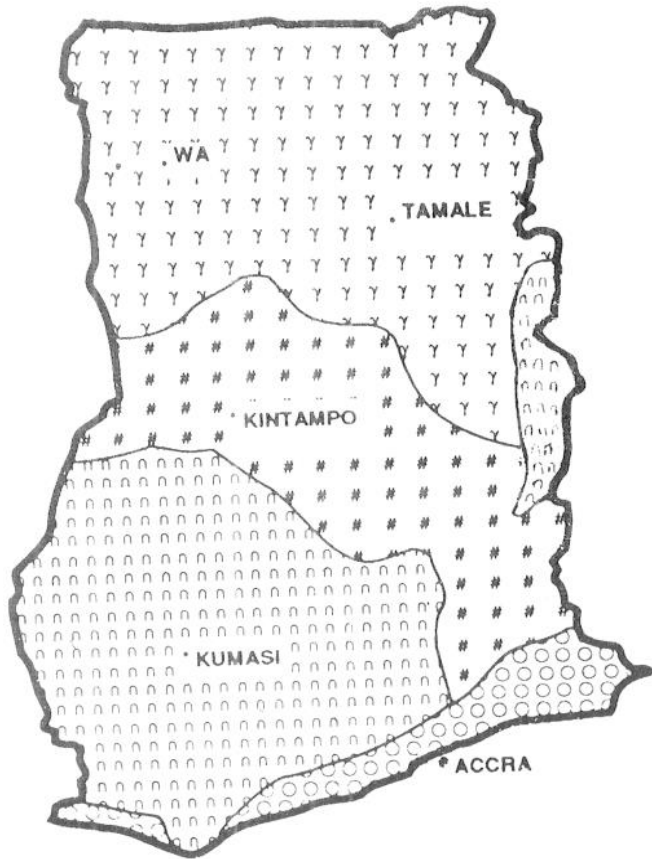




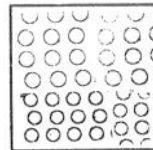
Step 1 Select a good site

Loamy soils in the Savannah and the Transition Zones have the highest yield potential

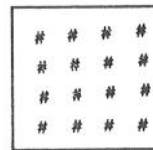
Cowpea produces better in the Savannah and Transition Zones



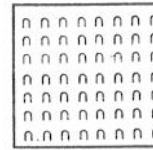
Guinea Savannah



Coastal Savannah



Transition



Forest

(Cultivate primarily in the minor season)

Loamy soils are the best

Hold water well

Avoid these soils

Sandy Soils do not hold water well

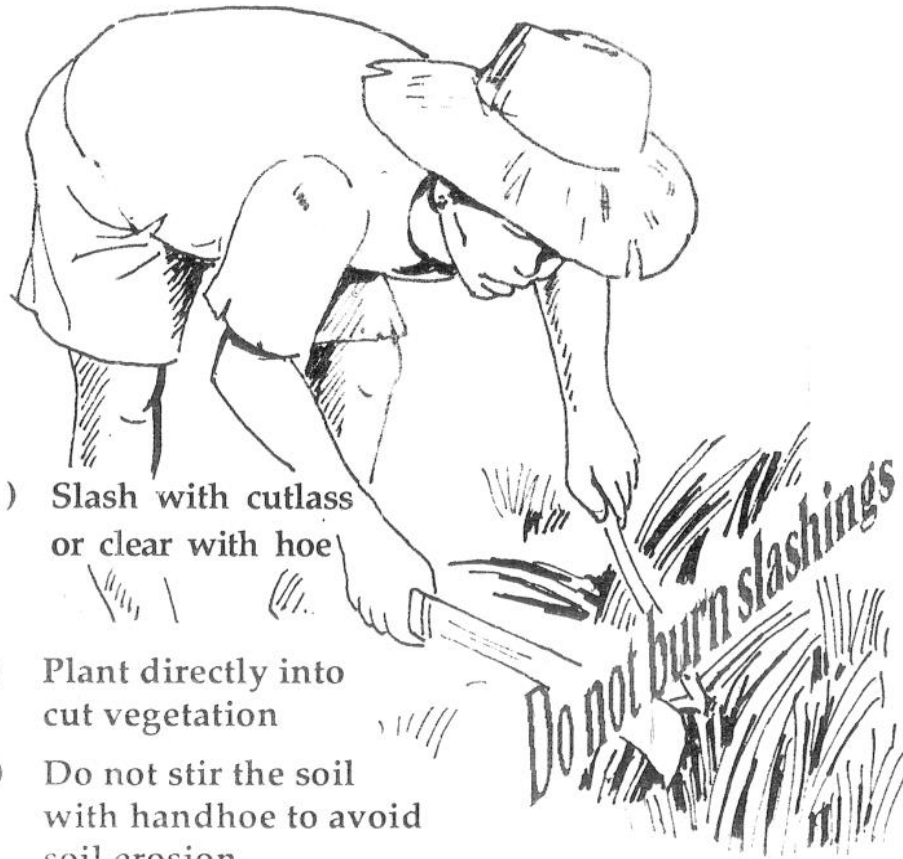
Clayey Soils Hold too much water

Note: Heavy rainfall in the major season promotes excessive growth and high disease incidence

Step 2 Prepare the land

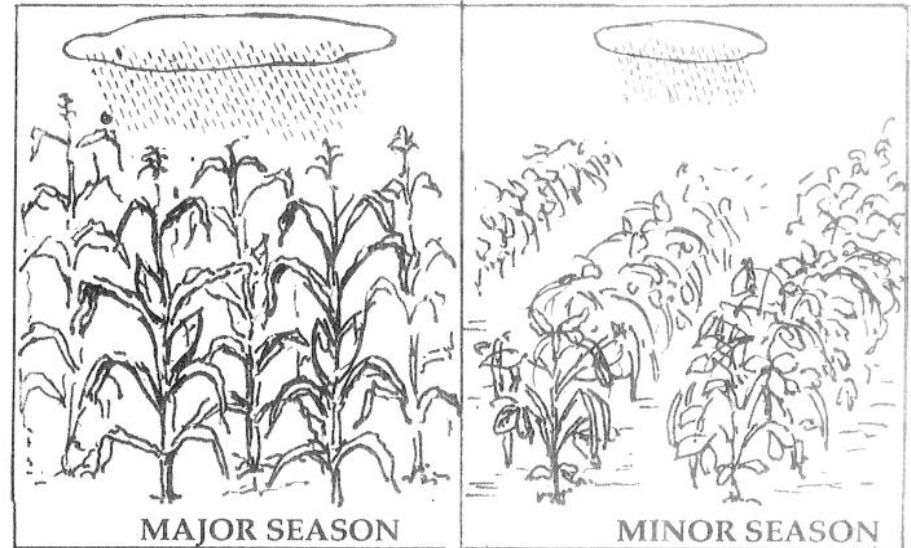
Proper clearing helps good stand establishment and reduces weed competition

Clear land in the traditional way



- A) Slash with cutlass or clear with hoe
- B) Plant directly into cut vegetation
- C) Do not stir the soil with handhoe to avoid soil erosion

Crop rotation sequence



Q: Why should I follow maize or millet or sorghum production with cowpea?

A: This is called crop rotation.
The advantages of crop rotation are:

1. Cowpea adds nitrogen to the soil
2. Reduces disease, weeds and insect infestation

Step 3 Plant improved varieties




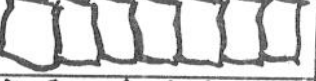


The yield potential of improved varieties is 5 times higher than most local varieties



For good germination purchase seed from :

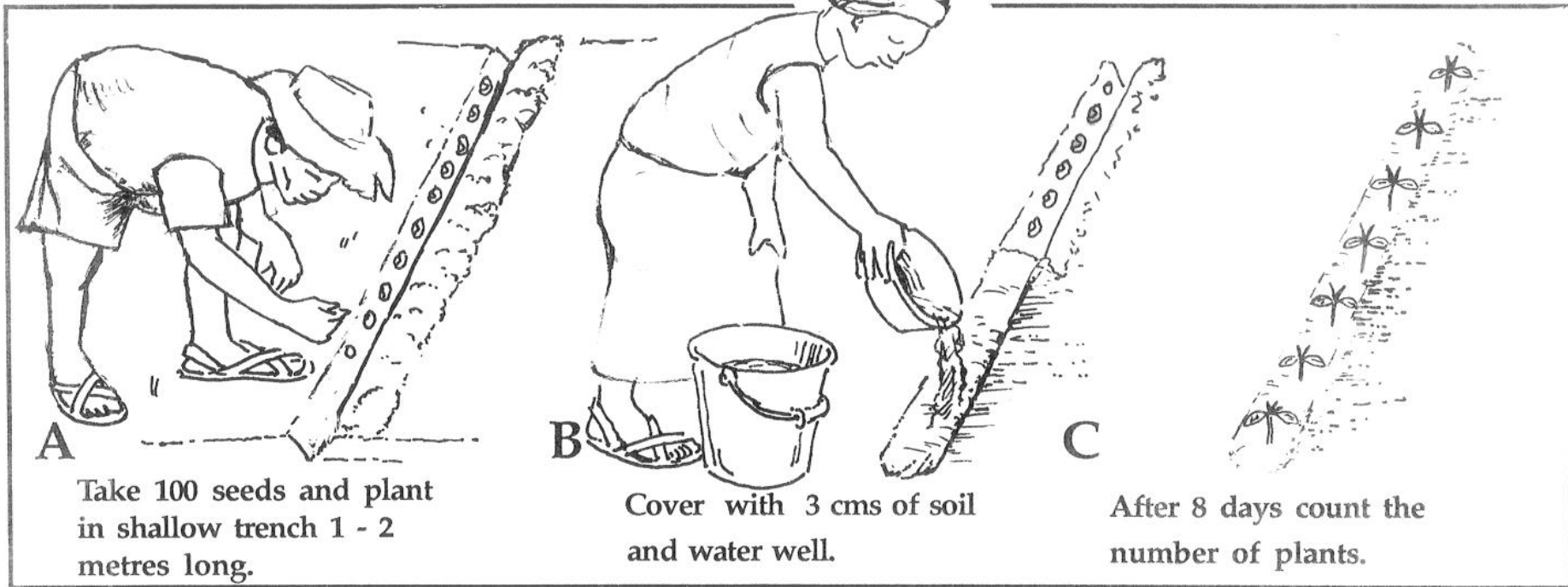
- Certified Seed Grower
- Ministry of Agriculture

Days to maturity	Maturity Group
60 - 70	early
75 - 80	medium

Variety	Colour	Maturity Group	Yield potential Bags/Acre
Amantin	mottled dark red	early	
Asontem	light red	early	
Vallenga	light red	early	
Bengpla	white	early	
Aiyi	white	early	
Soronko	brown	medium	

Conduct a germination test for all seeds

A germination test before planting will help you prevent poor stands



A Take 100 seeds and plant in shallow trench 1 - 2 metres long.

B Cover with 3 cms of soil and water well.

C After 8 days count the number of plants.

PLANTING GUIDE

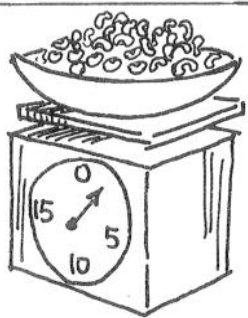
If you have this number of plants ...	Then put this number of seeds in each hole.
85 or more	2 seeds per hole
70-84 plants	3 seeds per hole

If you have this number of plants ...	Then put this number of seeds in each hole.
50 - 70 plants	Get better seeds or 4 per hole
Less than 50 plants	Do not waste your time sowing the seeds

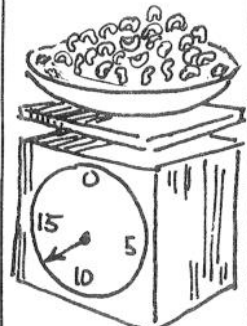
Step 4 Select the correct planting time

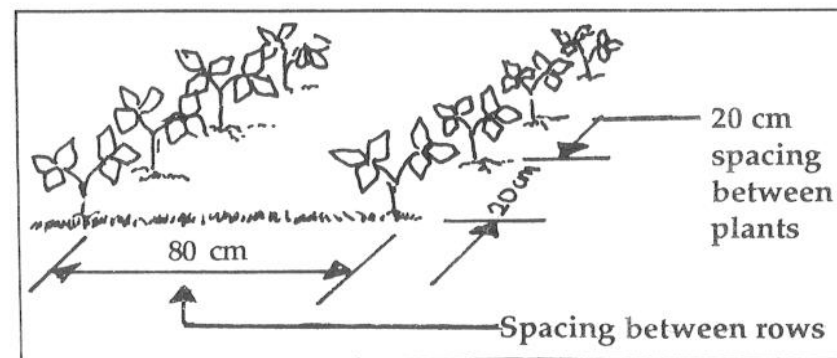
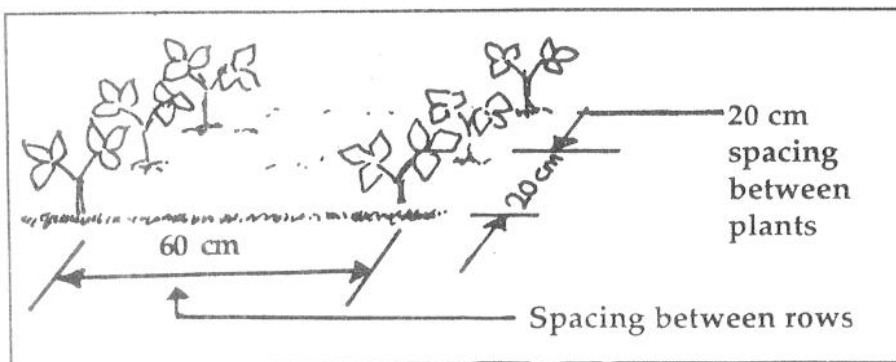
Cowpea should be planted such that maturity coincides with the end of the rains

EARLY MATURITY GROUP

Where	When	Seed Requirement
Guinea Savannah	April-Mid-August	
Transition	April-May Aug-Sept	
Forest	Late August-September	
Coastal Savannah	April-Early June or Mid-Sept	
		25 kg per ha (55 margarine cups)

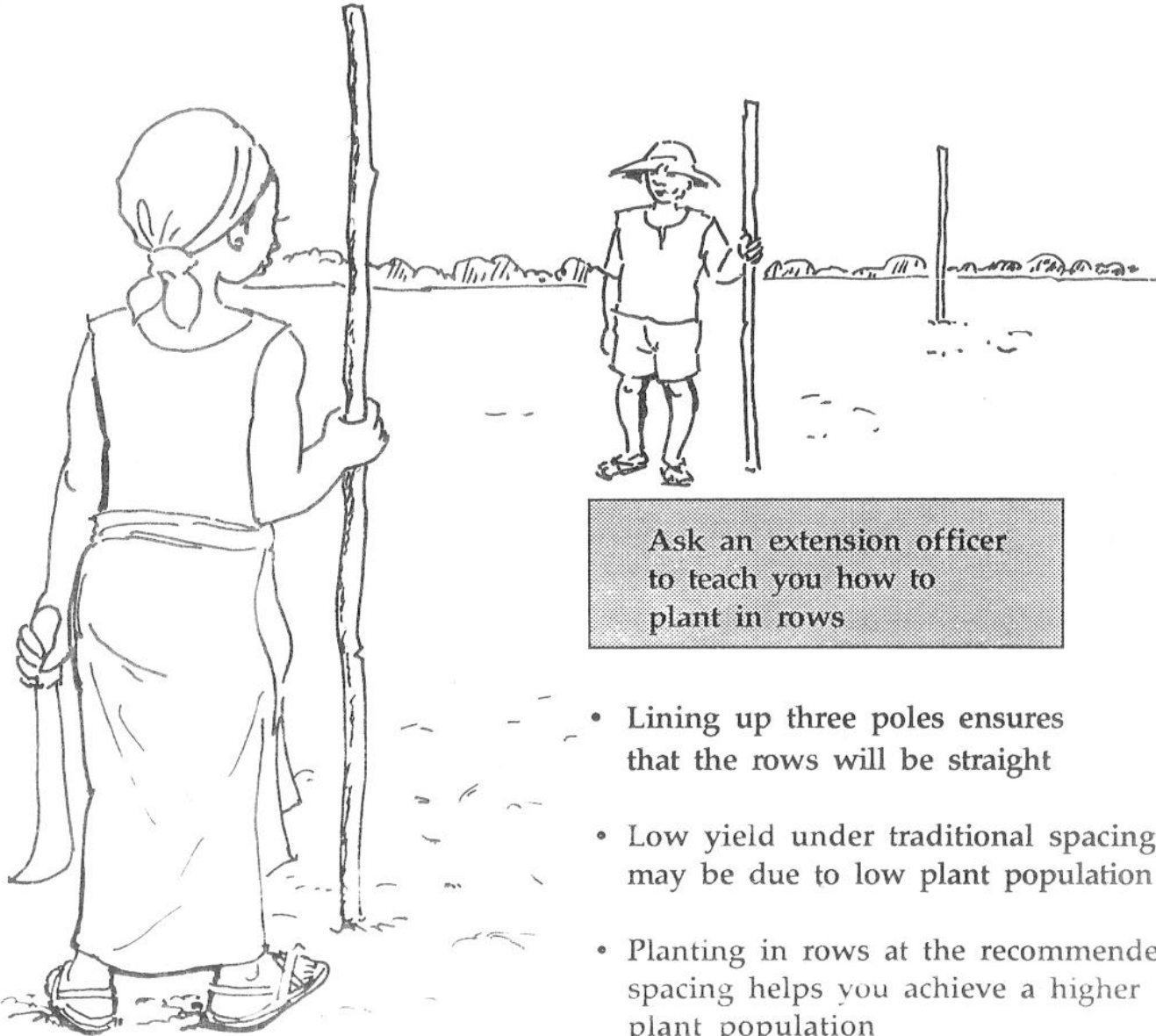
MEDIUM MATURITY GROUP

Where	When	Seed Requirement
Guinea Savannah	April-August	
Transition	April-May or Aug-Sept	
Forest	Late August-September	
Coastal Savannah	April-Early June or Mid-Sept	
		16 kg per ha (35 margarine cups)



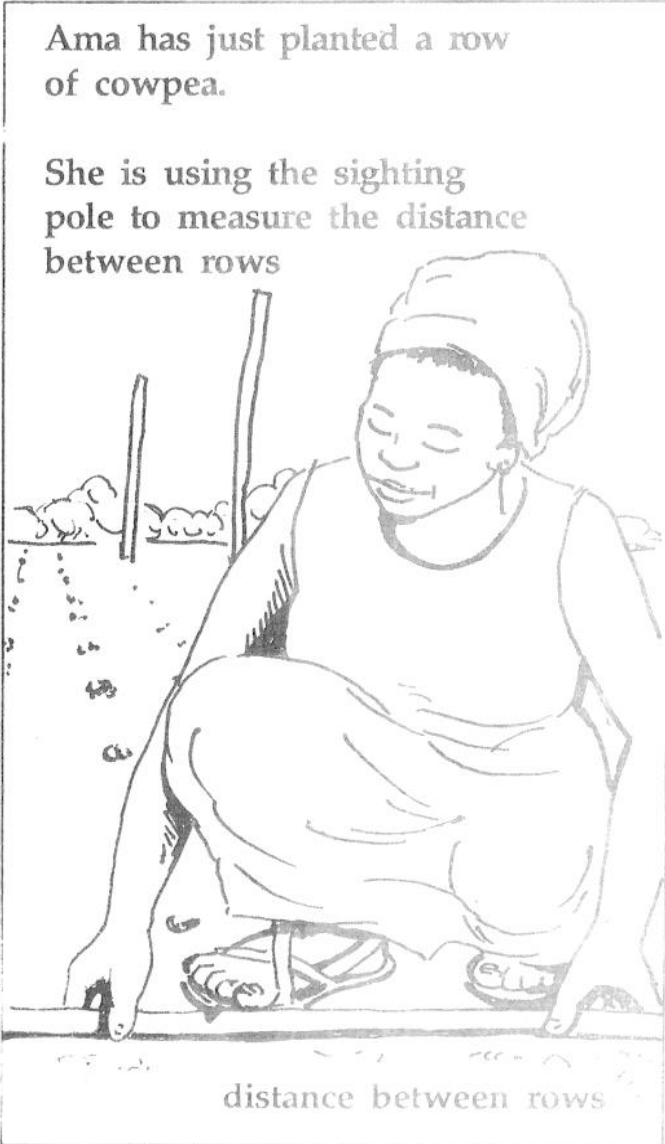
Step 5 Plant in Rows

Planting in rows makes weeding, spraying and harvesting easier



Ask an extension officer to teach you how to plant in rows

- Lining up three poles ensures that the rows will be straight
- Low yield under traditional spacing may be due to low plant population
- Planting in rows at the recommended spacing helps you achieve a higher plant population



Ama has just planted a row of cowpea.

She is using the sighting pole to measure the distance between rows

distance between rows

Step 6

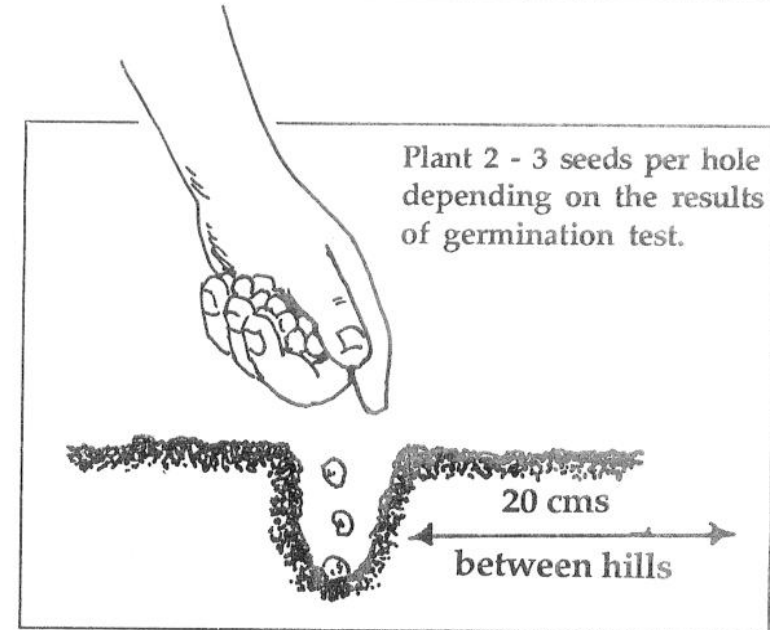
Plant at proper depth

Planting at the proper depth ensures high germination rates

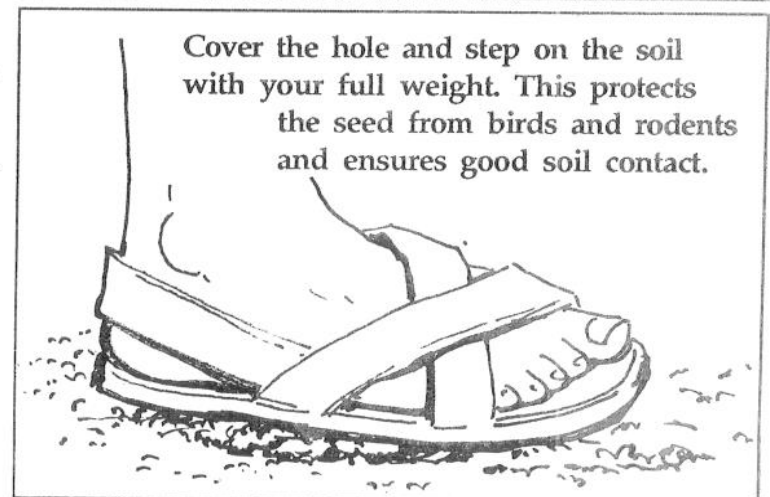
Make holes 2 - 3 cm deep.
For clayey soils which crust easily, 2 cm is recommended. For lighter soils (loamy, sandy), 3 cm is recommended.



Cowpea must be sown at the proper density (spacing) to obtain high yields. Proper planting procedure produces a good canopy which reduces weed problems.



Plant 2 - 3 seeds per hole depending on the results of germination test.

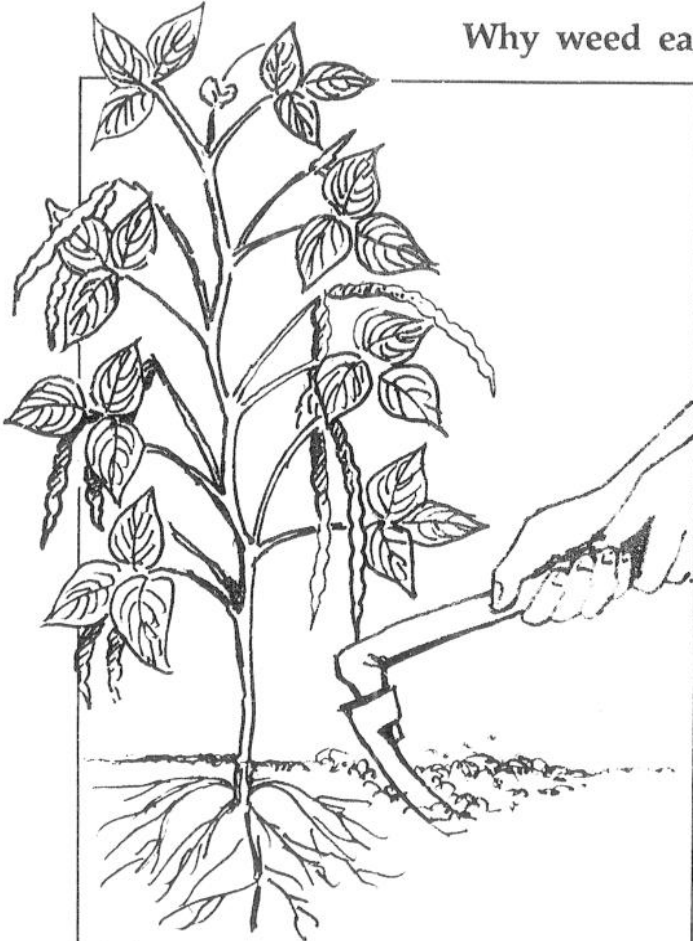


Cover the hole and step on the soil with your full weight. This protects the seed from birds and rodents and ensures good soil contact.

Step 7 Weed during 2 - 3 weeks after planting

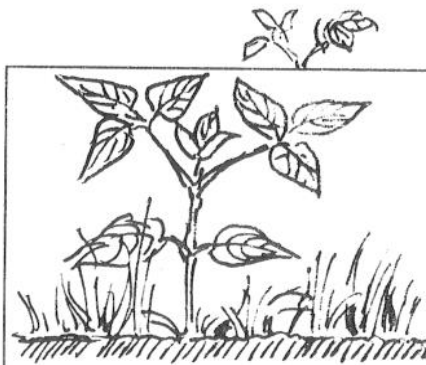
It is important that cowpea does not have competition from weeds during the first 4 weeks

Why weed early?



After 4 weeks, weeding with short handhoe damages the rooting system and interferes with the absorption of water and nutrients.

Do not stir the soil when controlling the weed to prevent soil erosion



Too much weed competition means a poor harvest.



One hand weeding 2-3 weeks after planting is normally sufficient to control weeds.

Step 8 Spray cowpea to control insects

Proper insect control is a key factor in successful cowpea production

IMPORTANT

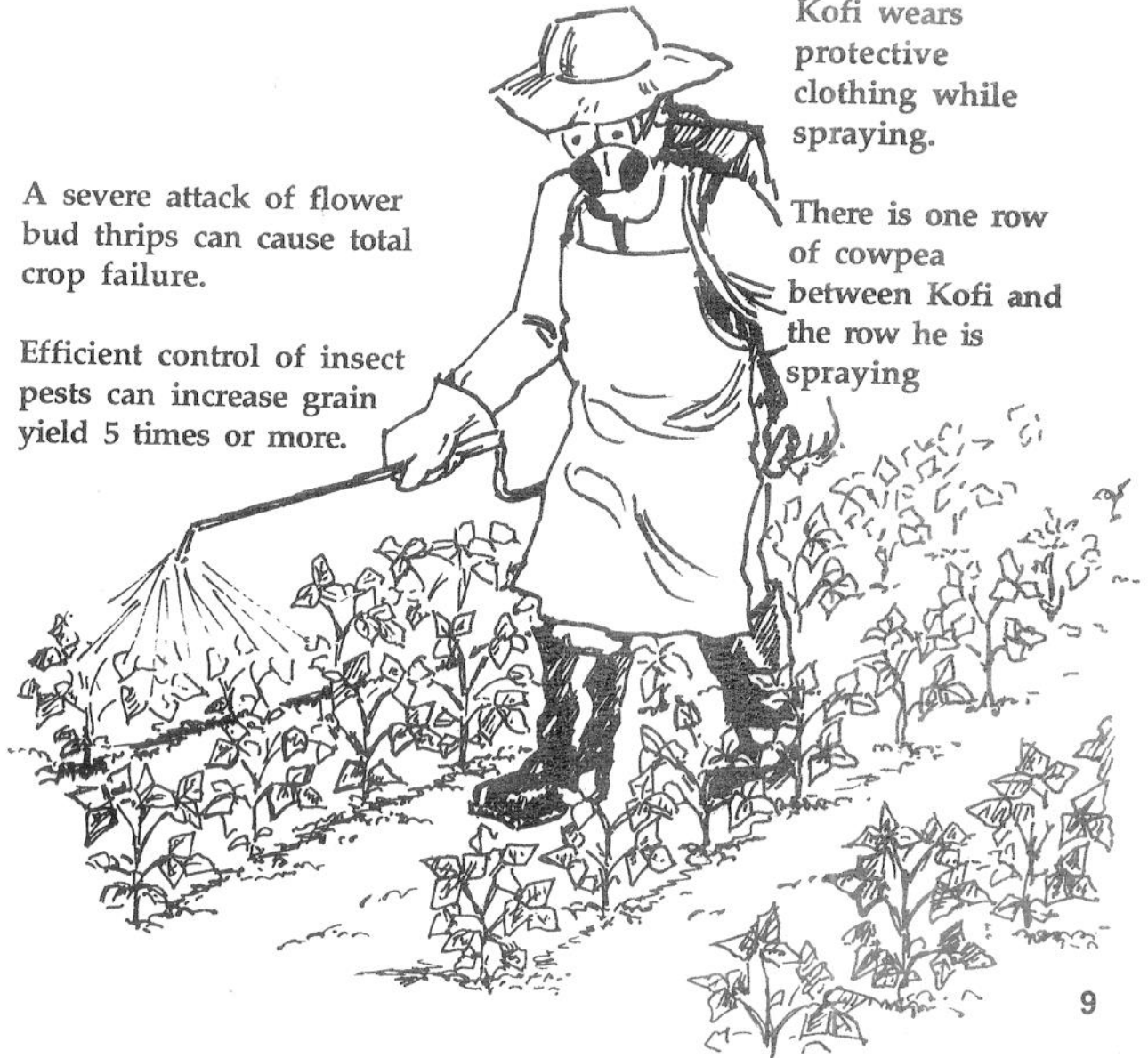
Insect pests constitute the single most important constraint to cowpea production in Ghana.



Ask the Extension Officer to explain how to use the insecticide correctly

A severe attack of flower bud thrips can cause total crop failure.

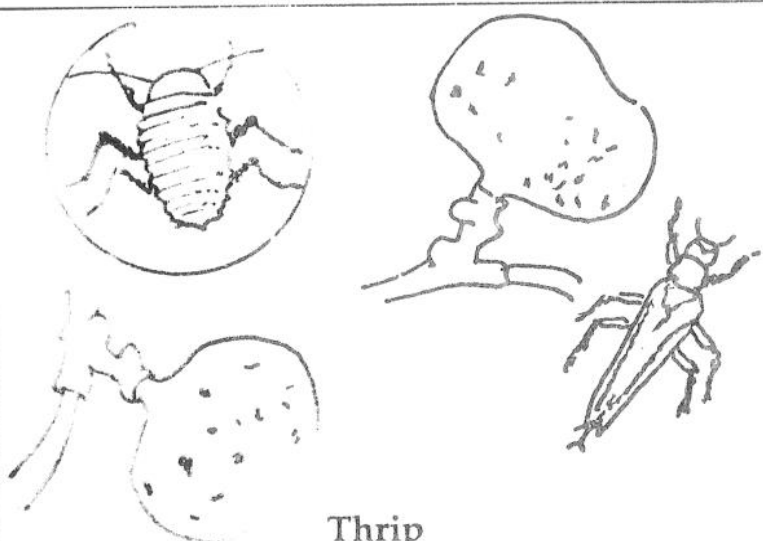
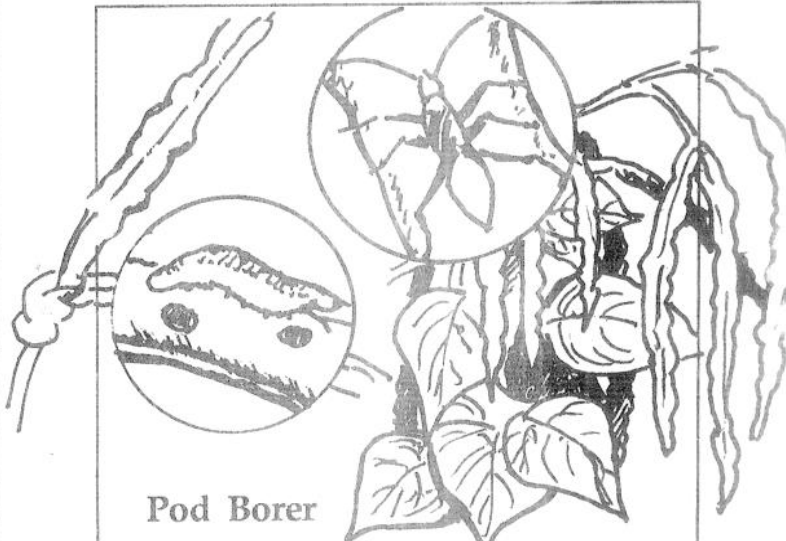
Efficient control of insect pests can increase grain yield 5 times or more.



Kofi wears protective clothing while spraying.




There is one row of cowpea between Kofi and the row he is spraying

The recommended Cowpea Spraying Schedule and the Insects Controlled

	1st SPRAY	2nd SPRAY	3rd SPRAY	4th SPRAY
DEVELOPMENT STAGE	Flower bud formation	Flowering	Podding	Pod filling
THE INSECT PEST	 <p style="text-align: center;">Thrip</p>		 <p style="text-align: center;">Pod Borer</p>	
NOTE: Other pests attack cowpea too. Those shown here are the most important to control				
CHOOSE ONE OF THESE INSECTICIDES	<ol style="list-style-type: none"> 1. Cymbush 2. Ripcord 3. Karate 		<ol style="list-style-type: none"> 1. Roxion 2. Perfekthion 3. Thiodan 	

Spraying Schedule for Early maturing Cowpea

Asontem, Amantin,
Vallenga, Bengpla,
and Ayiyi

1st SPRAY	2nd SPRAY	3rd SPRAY
30 days	40 days	50 days
<p>Flower bud formation</p> 	<p>Flowering</p> 	<p>Podding</p> 





CHOOSE ONE
OF THESE
INSECTICIDES

1. CYMBUSH
2. RIPCORD
3. KARATE

1. ROXION
2. PERFEKTHION
3. THIODAN

Spraying Schedule for Medium Maturing Cowpea

Soronko

1st SPRAY	2nd SPRAY	3rd SPRAY	4th SPRAY
Flower bud formation	Flowering	Podding	Pod filling
35 days	45 days	55 days	65 days
			

CHOOSE ONE OF THESE INSECTICIDES

1. CYMBUSH	1. ROXION
2. RIPCORD	2. PERFEKTHION
3. KARATE	3. THIODAN

Caution

Use only recommended insecticides
Do not use sprayed cowpea leaves in soupes

1) Fill half of the sprayer with water.



2) Measure carefully and add the amount of insecticide required.



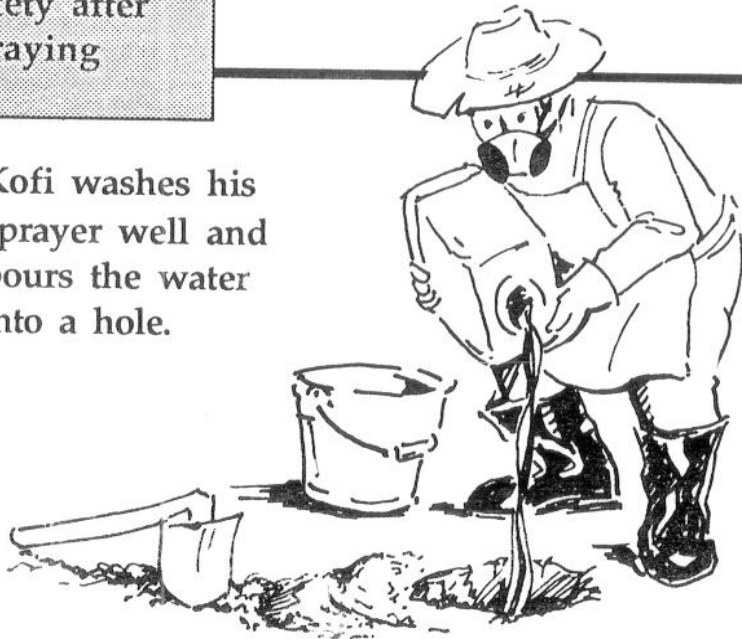
3) Add more water to fill the sprayer.



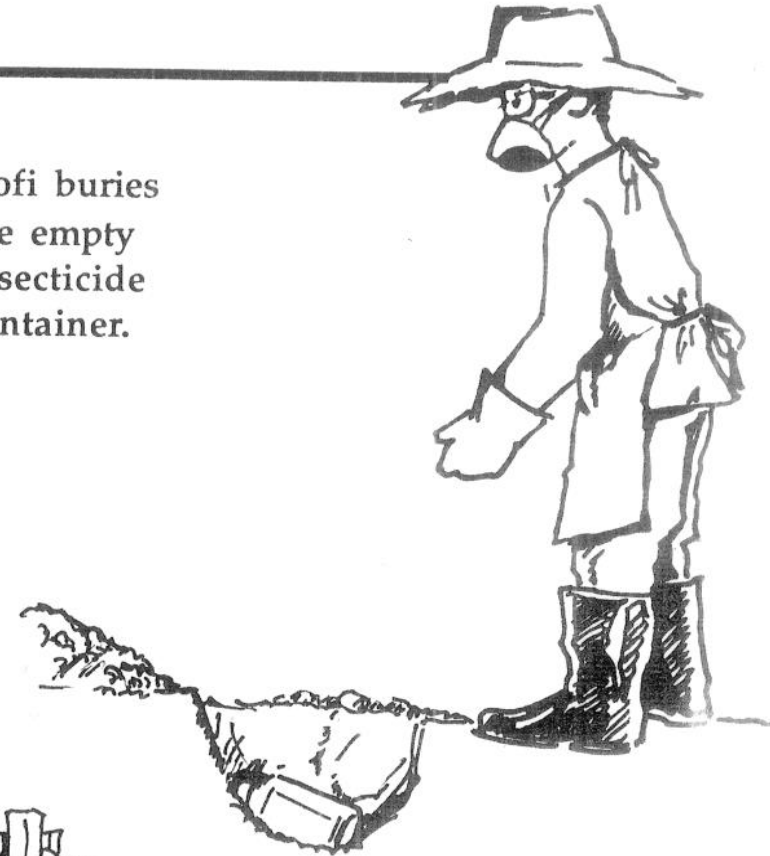
4) Shake the sprayer well

Safety after spraying

- 1) Kofi washes his sprayer well and pours the water into a hole.



- 2) Kofi buries the empty insecticide container.



- 3) Ama washes all protective clothing separately with soap.

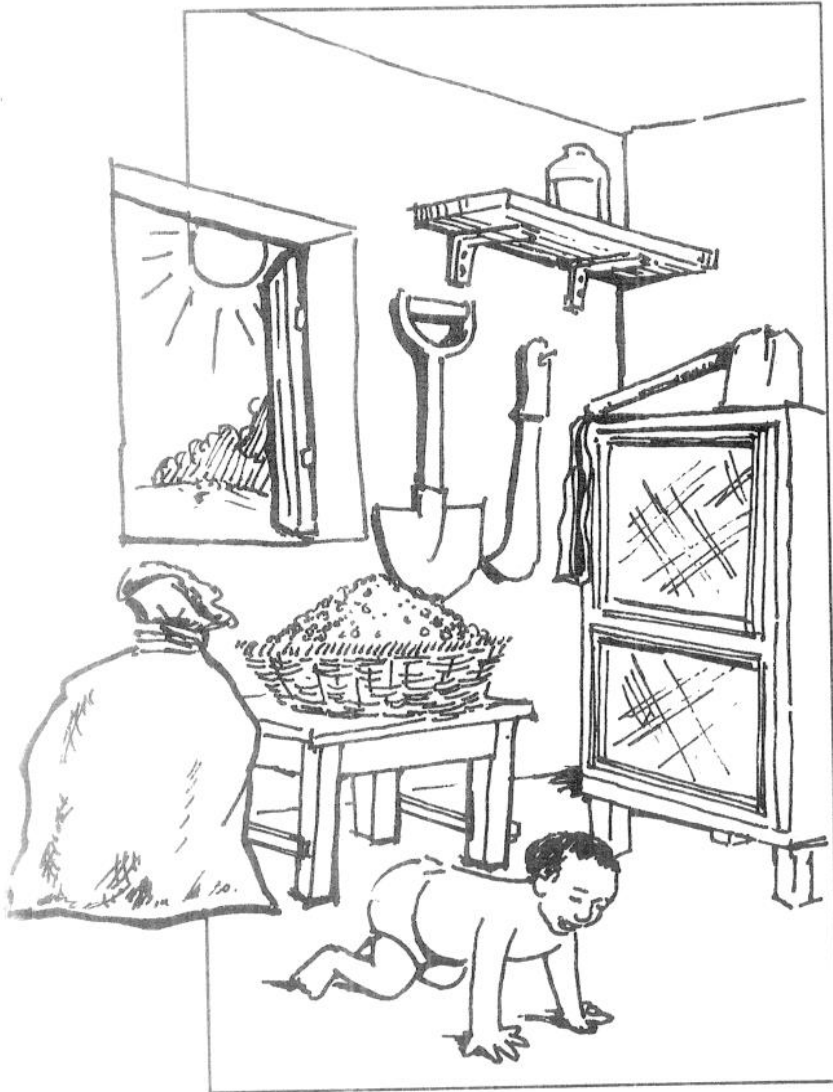


- 4) Kofi baths after spraying.



Observe these safety recommendations

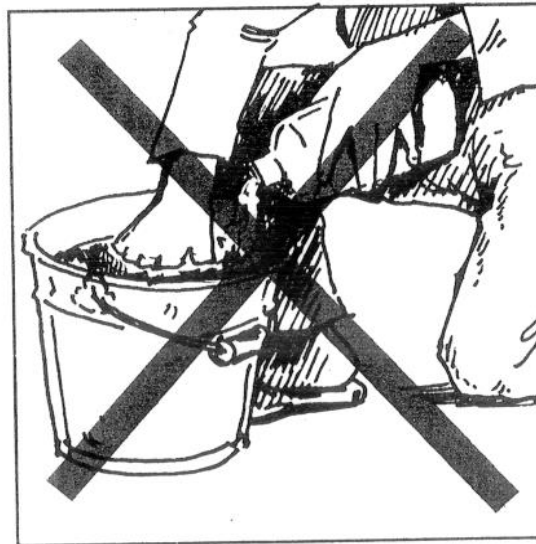
ALWAYS Store insecticides out of reach of children.

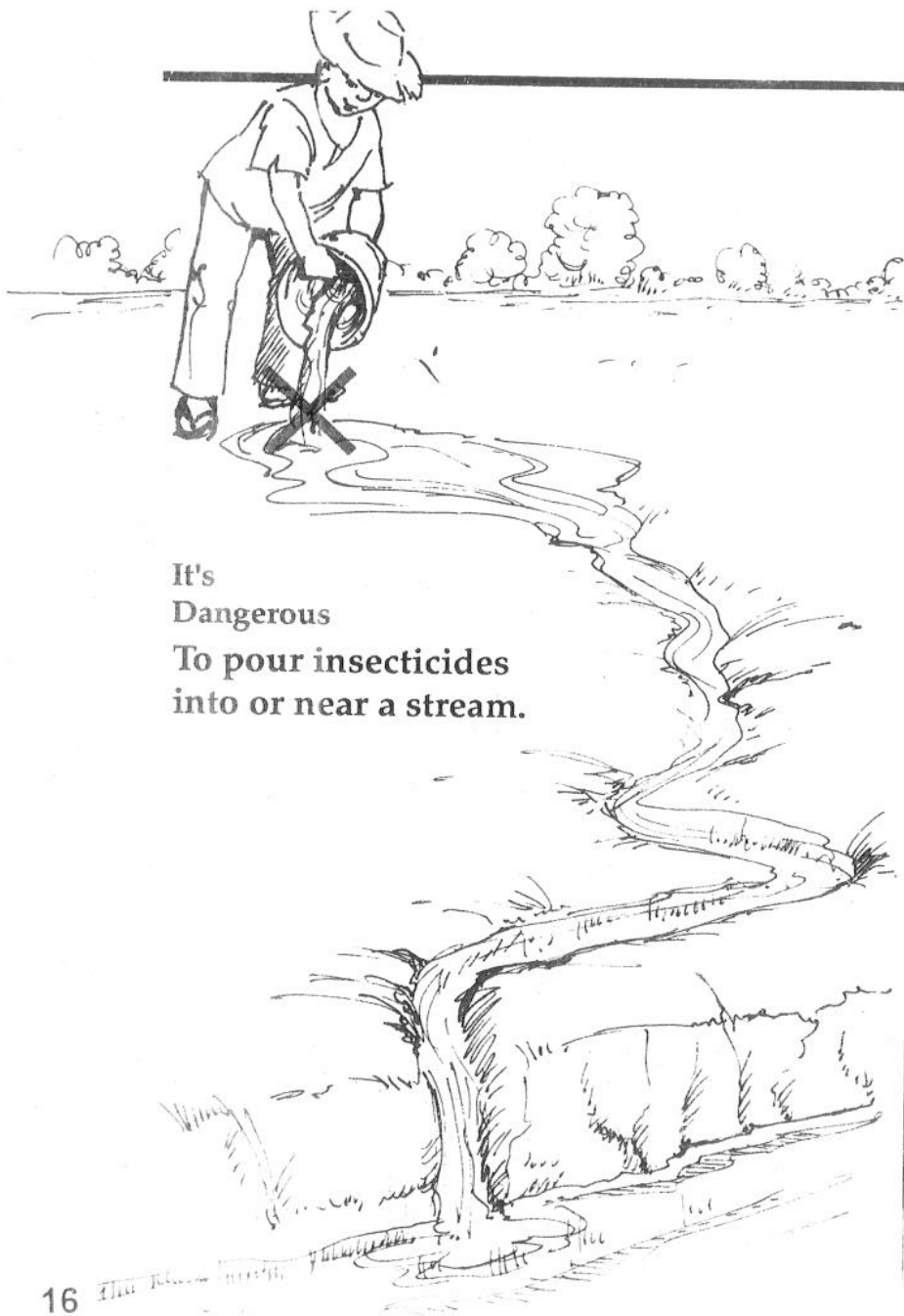


NEVER Handle insecticides without protective clothing.

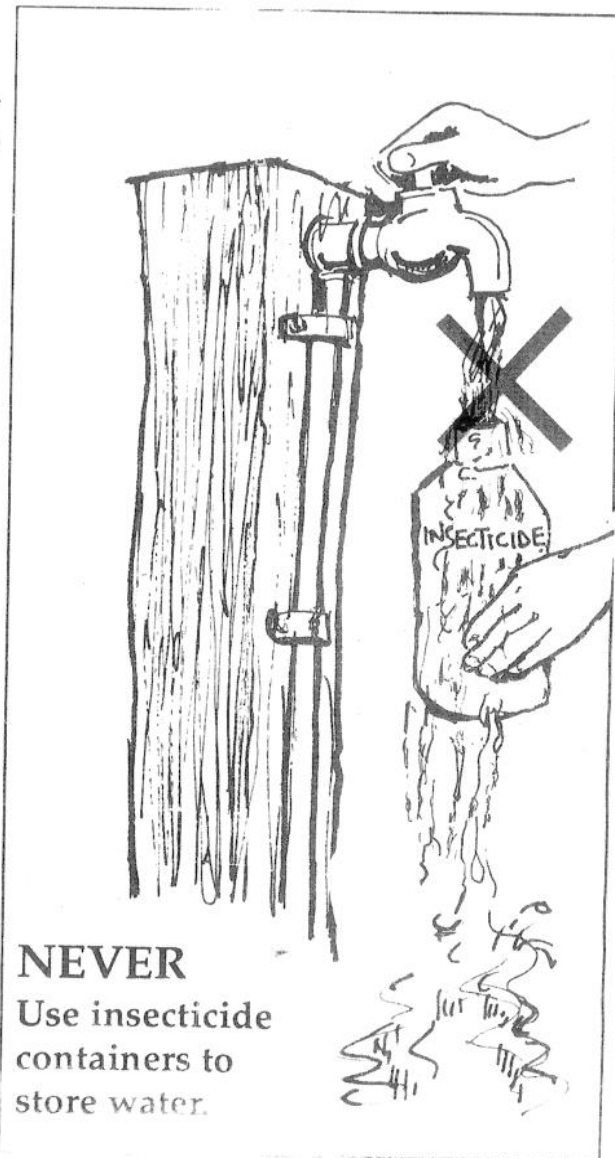
NEVER Eat or smoke while handling insecticides.

Never mix insecticides with your hands.





**It's
Dangerous
To pour insecticides
into or near a stream.**



**NEVER
Use insecticide
containers to
store water.**



**NEVER
Use insecticide
containers to
store food.**

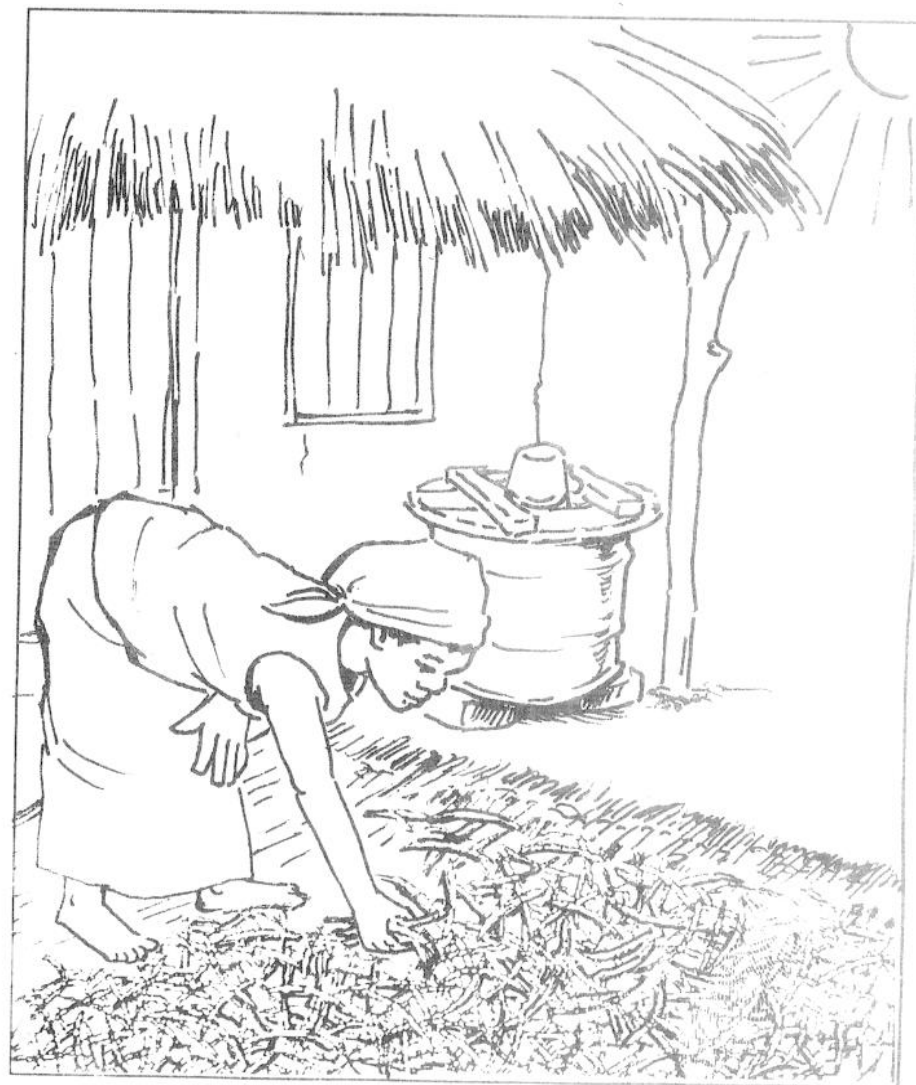
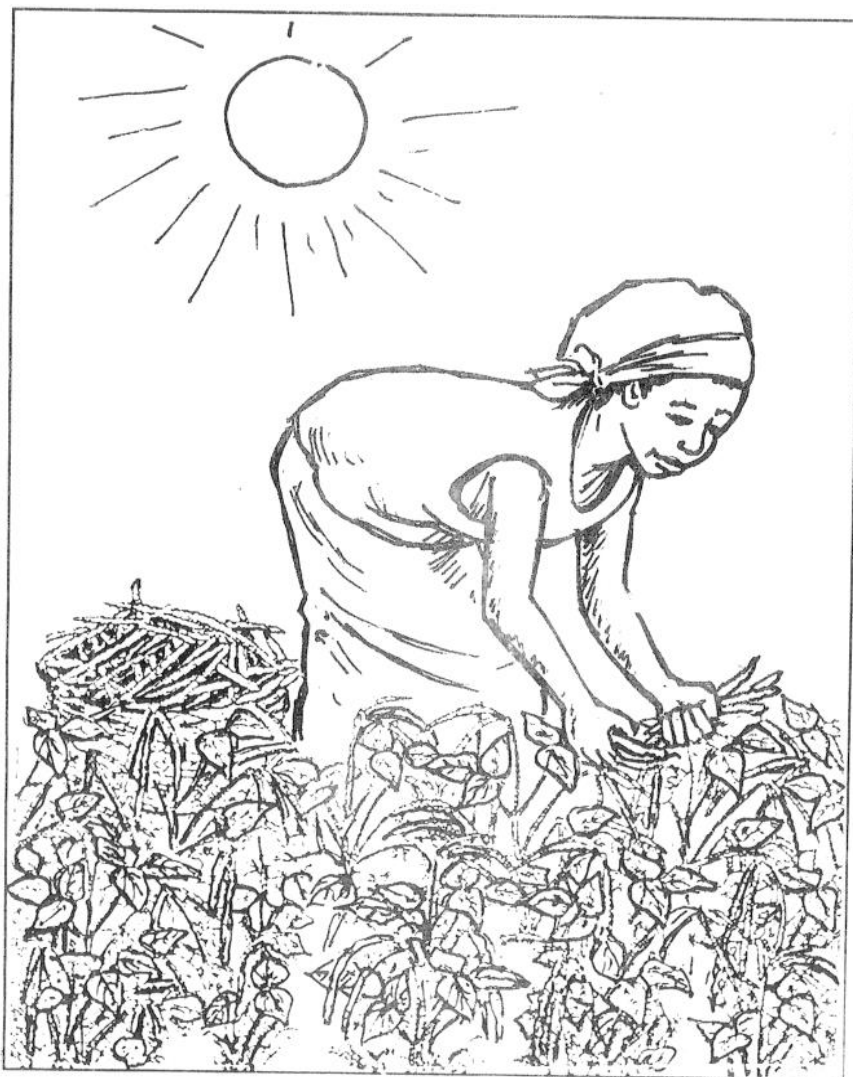
Kofi and Ama have a good Crop of Cowpea

The extension officer visits Kofi and Ama frequently. Today he is admiring Kofi and Ama's successful cowpea crop. The extension officer tells Kofi and Ama "I am proud of you and other farmers in Ghana who have adopted improved farming practices. In every region of Ghana progressive farmers are producing bumper crops of cowpea and maize. Our families will be prosperous and our children will be healthy".



Step 9 Harvest during the dry period

A timely harvest reduces weevil infestation, grain shattering and mouldiness



Ama threshes and winnows the cowpea when the pods are dry



Step 10

Treat with ACTELLIC before storing

Properly treated
cowpea can be stored
for up to 6 months

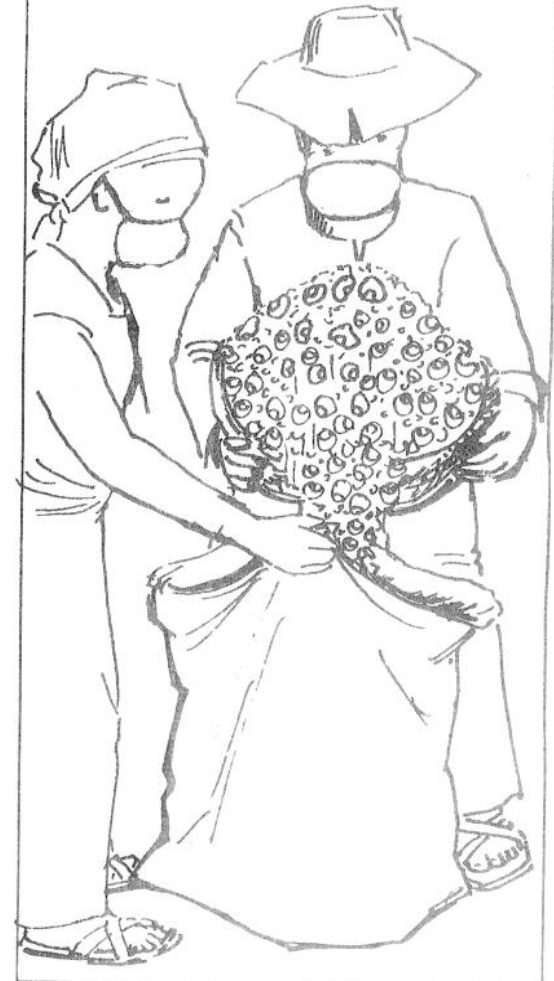
Use one bottle top of ACTELLIC
25 EC for one maxibag of cowpea.



Kofi sprays with ACTELLIC mixture
while Ama is mixing the cowpea to
ensure the best protection against
weevils.



Bag and store in dry place on
a raised platform safe from
rodents.



Questions frequently asked by farmers

QUESTION: *What are the advantages of planting Cowpea on last season's cereal field?*

ANSWER: This practice is called "Crop Rotation"
The advantages of this practice are:

- i. The Cowpea adds Nitrogen to the soil.
- ii. Diseases, weeds, and insect infestation are reduced
- iii. Crop Rotation improves soil fertility

QUESTION : *Why do I have to plant in rows?*

ANSWER: By planting in rows, you achieve optimum plant population. Also, it makes management (weeding, spraying, harvesting, etc.) easier.

QUESTION: *What will happen if I do not apply insecticides to my improved varieties of Cowpea?*

ANSWER: Improved varieties may suffer from severe attack of several insect pests which may cause crop failure.

QUESTION: *Why is it important to use only the recommended insecticide on cowpea crop?*

ANSWER: The use of insecticides which are not recommended for insect control in cowpea may:

- i. Result in little or no insect control
- ii. Cause the Cowpea to be contaminated with toxic insecticide making it unsafe to eat.
- iii May result in crop failure.

MEASUREMENTS, CONVERSION FACTORS AND COMMON EQUIVALENTS

Measurements

1 metre (m)	=	3.28 feet (ft)
1 foot	=	0.305 metre
1 centimetre (cm)	=	0.394 inches (in)
1 inch	=	2.54 centimetres
1 hectare (ha)	=	10,000 square metres (m ²)
1 hectare	=	2.47 acres (ac)
1 acre	=	0.405 hectare
1 kilometre (km)	=	0.621 mile (mi)
1 mile	=	1.61 kilometres
1 kilogram (kg)	=	2.20 pounds (lb)
1 pound	=	0.454 kilograms
1 kg/ha	=	0.89 lb/ac
1 lb/ac	=	0.454 kg/ac

Conversion Factors

1 t/ha grain	=	approx. 4 maxi bags/acre
1 bag 20:20:0 fertilizer (50 kg)	=	10 kg Nitrogen + 10 kg P ₂ O ₅
1 bag/acre 20:20:0 fertilizer (50 kg)	=	2.5 bags/ha (25 kg/ha N + 25 kg/ha P ₂ O ₅)
1 bag ammonium sulphate (50 kg)	=	10.5 kg N
1 bag/acre ammonium sulphate (10.5 kg N / acre)	=	2.5 bags / Ha (26 kg/ha N)

COMMON EQUIVALENTS

1 full " Ideal" milk tin	=	180 ml
1 beer bottle	=	600 ml
1 mineral bottle	=	300 ml
1 bottle top	=	5 ml
1 cap from Actellic 25 EC can	=	10 ml



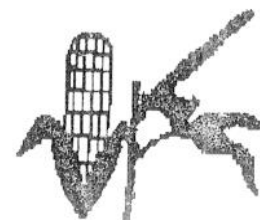
This publication is based on the
**MAIZE AND COWPEA PRODUCTION
GUIDE FOR GHANA**

published by:

**GHANA GRAINS DEVELOPMENT PROJECT
CROPS RESEARCH INSTITUTE,
P.O. Box 3785 Kumasi**

**Grains and Legume Development Board,
P. O. Box 4000 Kumasi**

**MINISTRY OF AGRICULTURE.
P.O. Box M37 Accra**



TECHNICAL SUPPORT:

INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTRE (CIMMYT)
INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA)

SPONSORS:

CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA)
GOVERNMENT OF GHANA (GOC)