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Cowpea field guide for Burkina Faso

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Cover photo: Woman sorts cowpea seed at Pathiri village.

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Preface

This guide was made for teachers of the Farmer School (FS) under the Cowpea for Burkina Faso (AVEC-BF) project supported by the Ministry of Agriculture, Forests and Fisheries of Japan (MAFF). The project carried out training to improve the technical knowledge of seed producers and farmers of cowpea in Burkina Faso. Several training programs were jointly organized with INERA. This guidebook was compiled during a period of the training. In this guide, the sentences are short, the language simple, and the various photographs specifically compiled for this guide. These are all intended to aid the understanding of target farmers in Burkina Faso. The content of this guidebook is unique. The guide documents the farmer's crop year starting in May with cultivation and planting in June, field management in July and August, and postharvest control in September and October. Farmers will learn the planting activity for each month.

Haruki "Kabore-Batia" Ishikawa, (Ph.D.)
Plant Physiologist/Cowpea Agronomist
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About AVEC-BF

Good linkages among farmers, the seed sector, breeders, and other stakeholders in the value chain are essential for the successful dissemination of newly developed improved varieties, especially to small-scale farmers. Though extensive efforts of the various sectors have been made to disseminate improved varieties of cowpea in West and Central Africa, dissemination is still very limited in many countries, and is often caused by weak linkages or communication among stakeholders. High priority should now be given to fill the gaps among stakeholders.

Cowpea is an extremely important leguminous crop in the drier regions of West and Central Africa, including Burkina Faso, and is grown with major cereals, such as maize, sorghum, and millet. It is primarily grown for human consumption, but also provides important cash income for farmers with an estimated market value of US$2.2 billion at the farm gate in the regions (FAO 2007–2009). Extra-early and early maturing varieties, which can be harvested within 70 days, suit the region that has a short (3–6 months) rainy season, and provide additional options for food security by escaping the frequent drought at the end of the growing season. Moreover, the harvests can be sold at the peak period (August–September), and generate better cash income for farmers. However, even now, numbers of extra-early and early maturing lines developed by IITA and various breeding programs have been on the shelf, not reaching the farmers who need them.

The AVEC-BF project, one of IITA's projects supported by the Japanese Government, was designed to develop a new dissemination platform of improved cowpea varieties, by filling major gaps among farmers, the seed sector, and breeders. AVEC-BF's dissemination platform consisted of three major activities: (1) Participatory varietal selection of suitable varieties with better understanding of farmers' needs and preferences, (2) Development of community seed producers for quicker introduction of new varieties within the community and surroundings, and (3) A farmers' school for increasing farmers' knowledge on improved varieties and required improved management skills, and various minor activities linking up stakeholders. Although these activities are simple, the distinguishing factor of AVEC-BF from other projects is its unique packaging of multiple activities in a single target village with low operational costs, flexibility and adjustability, and using local personnel.

Now that the project has ended, we could develop several models in our target villages. During the three years of the project, a 50-ha plot of new certified seed was developed by seed producers that we trained, 797 farmers participated in the farmers' school activities and obtained improved crop management skills, and over 1500 farmers in target and surrounding villages started to produce newly introduced, extra early variety IT98K-205-8 (released as "Niizwe"

which means “end of the hunger” in Gourounsi). Moreover, via our participatory selection involving 910 farmers, five selected breeding lines have just been released, and are ready for dissemination, and a number of breeding populations have been developed to meet farmers’ preferences and will be released in the future.

These results suggest that our activities under AVEC-BF were successful, but the most important aspect is that we developed a system linking our farmers, community seed producers, and breeders for quicker dissemination of improved varieties and further development of appropriate varieties for the target region. The low operational cost, and flexibility and adjustability of the system may support simultaneous, nationwide dissemination of improved cowpea varieties using local personnel. The individual activities in each village will be able to cover the whole country and paint a bright future for Burkina Faso, just like the paintings of Pointillism.

This material is primarily a field guide for farmers’ school activities that can enhance understanding of efficient cowpea management practices. Distinguished scientists from various institutions contributed to develop practical, but also informative material for users. This guide is expected to lead more farmers into increased cowpea production with adequate improved varieties, efficient crop management skills, and reinforced linkages among various stakeholders. The AVEC-BF project acknowledges the support from the following organizations and its members: the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF), the International Institute of Tropical Agriculture (IITA), Institut National d’Environnement et des Recherches Agricoles, Burkina Faso (INERA), the Japan International Cooperation Agency (JICA), the Japanese Embassy in Burkina Faso, and each province/regional agriculture agency, private companies, Service National des Semences (SNS), and our precious farmers in Burkina Faso.

During the project period, a girl was enabled to continue secondary school with the income generated by cowpea seed production. We sincerely wish that the younger generation in the villages would benefit from the system developed under AVEC-BF, and that the project could contribute to the future of Burkina Faso.

Satoru Muranaka, (Ph.D.)
Senior Researcher
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Introduction

Cowpea, *Vigna unguiculata* (L) Walp, is an important grain legume in subtropical and tropical regions, especially in sub-Saharan Africa where the totality of world production is obtained. It is cultivated annually on about 14 million hectares with more than 4.5 millions tons. Cowpea is the principal source of protein for rural and urban populations, young leaves used as a vegetable in West and Southern Africa. The green pods and fresh grain are also consumed everywhere in Africa and also in Asia and Latin America. The most important use of cowpea is as boiled grain, which is consumed in association with other grains or mixed into sauces, whether as powder or paste and used in many dishes such as *akara, kosaï,* and *moï-moï*. Cowpea fodder is also utilized for livestock.

Although cowpea is adapted and important in these regions, the productivity is generally very low because of many biotic and abiotic constraints and also due to the inappropriate agricultural practices (marginalized environments, low planting density, low or no fertilizer and pesticide use, etc.). The principal constraint in cowpea production are pest insects (aphid, thrips, pod borer, and pod sucking bugs), diseases (bacterial, viral, and fungal), parasitic plants (*Striga* and *Alectra*), drought, heat and cultural practice.

This work describes in a simple way the principal techniques in cowpea production for use in farmer schools by farmers' group or individual farmers with elementary education level. The principal steps in cowpea production starting with land and seed selection until production and seed storage are presented chronologically for easy understanding of the user. The farmer should be able to perform better cowpea production using these techniques.

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The activity of each month

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May

Activities

-Farmers' school

-Seed preparation

Join the farmers' school

Farmers' school

Land preparation and planning

Make a plan for cowpea production for the year. How big is the land? Have you already removed big stones and/or trees? What was planted there last year?

It is not good to grow cowpea on the same plot of land every year as this will reduce the yield of the cowpea.

Obtain technical knowledge

Let's join a farmers' school before preparing the field. In the farmers' school, the teacher who received training from the AVEC-BF project provides technical knowledge about the production of cowpea. Exchange information with a colleague about what happened last year, e.g., the yield, which variety you cultivated, how much did seed sell for? where did you buy seed (certified seed) from? etc. This information is very important and will greatly influence your future income.

Example
Name: IT98K-205-8, "Niizwe"
Properties: Extra-early maturing (60 days), medium-sized seeds, resistance to *Striga*, yields 1000–1500kg/ha

Choose variety

Before planting, choose the kind of the cowpea to plant. The photos show examples of improved varieties which you can choose in Burkina Faso. Choose the variety with the right characteristics. Choose an improved variety. Important characteristics to consider are maturity, disease-resistance, seed size, high yield, and seed structure. If you live in the north where there is little rain, the early-maturing variety will help your productivity.

Check and purchase the seed

Purchase certified seed from reliable seed producers. Purchase from INERA if there is no seed producer near your area. The quality of the seed has a direct influence on your income. Confirm seed quality carefully. Poor quality seed will not germinate well, and the yield will be low. Do not trust a supplier or a seed producer who sells bad seed.

CERTIFICAT D' ANALYSE DE SEMENCES

I IDENTIFICATION DE L' ECHANTILLON

II RESULTAT DES TESTS

III OBSERVATIONS RECOMMANDATIONS

Example

Purchase seeds from a certified seed producer!

Certified seed vs Grain seed

Certified seed and grain seed are not same. Certified seed is for sowing, and the quality is guaranteed by SNS (Service National des Semences). Do not eat these seeds. Grain seed is produced for eating; it is not suitable for germination. You must not use mere grain seed for sowing. You can purchase certified seed from a seed producer or distributor of certified seeds.

June

Activities

-Cultivation

-Planting

God bless you

Preparation of soil

Organic manure

Use compost that is fully ripened. When the compost is not ready, it can damage the roots later.

Chemical fertilizer

Buy artificial manure from a reliable store. You can receive government assistance to purchase fertilizer. Ask the provincial technical officer or regional DPA.

Land preparation

When soil is easy to dig after the first rains, plow the soil deeply, using an animal-drawn plow or a tractor. Cowpea has a taproot and need loose soil. Also, remove stones and/or trees. Incorporate organic manure (1 t/ha) and/or chemical fertilizer (100 kg/ha) well into the soil before planting. Sprinkle the manure on the field evenly and mix soil well using a hand hoe.

80 cm between rows
40 cm within rows

Planting

Planting should be done when the rain is established, possibly between mid-June and early July, depending on the location and the rain. Prior to planting, seeds should be dressed if this has not been done with any of the recommended seed dressing chemicals. Erect cowpea varieties should be planted at a spacing of 60 cm between rows and 40 cm within rows, especially for extra-early maturing varieties (60–70 days). For middle maturing varieties, spacing should be 80 cm between rows and 40 cm within rows. Sow around 3seeds/place.

Seed dressing

Seed dressing before sowing prevents insect damage. If you do not dress the seed, the insect will damage the seed before it germinates.

How many seeds are needed?

About 12-14 kg for 1 ha. Certified seed is recommended for planting.

When should I plant?

Plant after a good rain, 15 mm and above.

July

Activities

-Replanting and thinning

-Weed and insect control

Hard work!

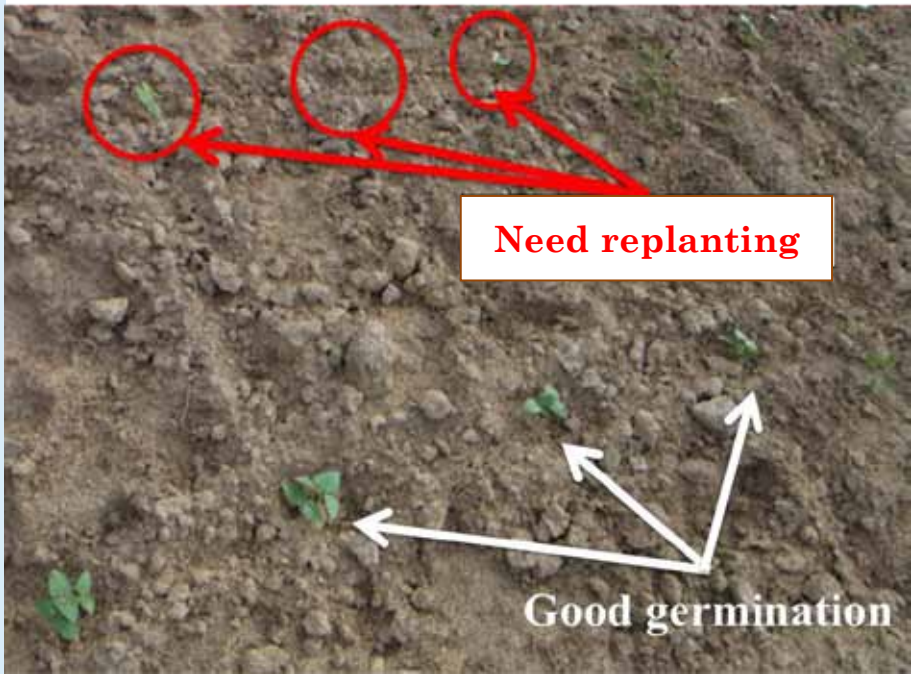
Replanting and thinning

Seed or stem eater

If you neglect seed dressing, various seed and/or stem eaters will attack the cowpea seedlings before and after germination.

Replanting and thinning

Check your field one week after planting. Where germination is bad, you must replant. Likewise, thin plants when there are 2 plants in one place. Keep a careful watch on how your plants are germinating.



Weed control

Adequate weed control is necessary for good growth and high yields of cowpea. Efforts should be made to keep fields weed free. The first weeding should be done two weeks after planting, and the second weeding three weeks later. **Remember, if you don't weed, the yields greatly decrease.**

Insect control

When there is a shortage of water for a while after germination, outbreaks of aphids will occur. Aphid, *Aphis craccivora*, is an important cowpea pest.. The damage may be very sporadic, and during dry spells, its population increases rapidly. Also, the aphid is a vector of several viruses. Aphids should be immediately controlled with agrochemicals.

Agrichemicals & Sprayer

The sprayer is useful for dispersing pesticides. Those of poor quality break quickly. Also, the water used for spraying must be pure. Pesticides are convenient, but are dangerous to your health. Make sure you wear protective clothing and handle them very carefully.

How to dilute

Put 32 mL "Decis" and 16 L of pure water into the sprayer tank. Dirty water is not suitable for spraying.

Aug

Activities

-Insect and desease control
-Additional fertilization

Attention, Insect attack!

Insect and disease control

Maruca

Larval damage to the flowers, stems, and pods increases with the percentage of infestation and reduces the yield.

(Photos: Dr. M. Tamò, IITA-Benin)

Insect and desease control

In August, cowpeas grow well, but pests and diseases increase at the same time. Insect damage, especially causes serious reduction in yield. Spraying pesticide is recommended to suppress the damage.

The pesticide mixes insecticide (Decis 32 mL) and antibiotics (Titan 40 mL) with 16 L of clean water. The spray will be done 32 days after sowing. If dirty water is used in the sprayer, it will break easily.

Additional fertilization

The use of the fertilizer makes a big difference to yield. Additional fertilizer is applied during the flowering period to promote an increase in yield. Fertilizers are costly, but the yields will increase with the right fertilizer application.

Weed control again

When weeding is neglected, the weeds compete with the plants for nutrients, so weeding should be done again.

Pod-sucking bugs

The bug is an active flyer and damages pods. Adults can be found on other plant leaves as well.

Blister beetles

Blister beetles feed on cowpea flowers causing considerable crop damage. Large numbers of beetles in the field may result in total crop loss.

Thrips

Thrips puncture the pod and suck up the contents. If this damage is severe, the cowpea does not flower. (Photos: Dr M. Tamò, IITA-Benin)

Sep-Oct

Activities

-Harvest
-Threshing
-Storage

Stay sharp!

Harvest and Post-harvest control

Wet pods cause mold

Harvest pods should be spread out, not piled up. Wet pods can lead to mold damage.

Hand threshing

Care must be taken to avoid damaging the grains.

Harvest

The harvest will be early when you do proper field management and use improved varieties (e.g., IT98K-205-8, KVx442-3-25). Harvesting should be done when 80–90% of the pods are dry. The dry pods can be manually beaten and winnowed. Depending on the variety grown, 2 to 3 harvests may be carried out. It is essential that only mature, dry pods are picked. Immature pods, apart from reducing the quality of the grain, are not easy to thresh.

Threshing

The cowpea pods must be well dried on the field before harvesting. In most cases, there may still be some pods that have not dried enough, hence the need for additional sun-drying for 2-3 days before threshing. Threshing can be done either manually or mechanically. Common methods include heaping the pods and beating them gently with sticks to avoid damaging the grains. Whichever threshing method is used, the essential things is that care must be taken to avoid damaging the grains. Afterwards, winnowing is done against the airflow so that the inert materials, such as chaff and broken seeds, are blown away and the grains are collected in a clean container.

Post-threshing management

Moisture content of the grains must be lower than 11%. For seed production, sorting has to be done to remove broken seeds or other debris. Dry the cowpea on a clean slab or on protective material, and spread on clean floors to avoid the introduction of stones and other materials.

Bagging commences as soon as the seeds are certified dry enough and at the right moisture content for storage. Note: new bags should be used and these must not be wet to avoid mold. The bags must be sealed to prevent entry of rodents and insects.

Threshing by machine

Machines are available in various sizes and shapes run by petrol, diesel, or electricity, for small, medium, and large-scale threshing of cowpea.

Winnowing

Do this against the airflow so that inert materials, such as chaff and broken seeds, are blown away by the wind.

Separate seed

Remove seeds that are too small, broken, and of different colors. Uniform and attractive seed fetches a good price.

Post-harvest pest management of grains

Take care,

and protect your profit.

Storage

Stored products are attacked by a number of storage pests. The three major ones are insects, molds, and rodents. Food prepared from damaged grains has an unpleasant flavor and the grains command low prices.

Insects

The major insect pests in stored cowpea are beetles and moths. Damage is done by the larvae, which feed and develop inside the grain kernels.

Molds and Rodents

Mold in the stored cowpea grain is the most difficult infestation to recognize for you cannot see it as easily as you can the damage by insects and rodents. Signs of mold infection could include discoloration, a change of texture, the presence of green, black, or white fruiting bodies of the fungus on the produce, or an unpleasant smell.

Rodents damage stored products in three major ways. They consume a quantity of the product, spoil part of the product with droppings, and gnaw holes in the packing material causing waste.

1. Carefully inspect the plastic bags for any hole. Even extremely small holes will reduce the effectiveness of the storage.

2. Fold back the top of the first bag and place the second bag in the first bag.

3. Place the third bag inside the second bag. Then, slowly fill the innermost bag with cowpea.

4. Twist up! Reduce air in the plastic bag as much as possible. Repeat for each of three bags.

How to manage the storage

Let's introduce a simple non-chemical storage method using a PICS bag. The bag, using polyethylene triple bags, has been found to deter bruchid infestation for up to 6 months or more.

1. Harvest the crop as soon as it is mature to avoid field infestation. The earlier the harvest, the less the chance of infestation.

2. Dry grains properly, making maximum use of the sun and wind. Low moisture content is important for insect pest and mold control. Ensure that dry crops do not become wet again through dew or rain.

3. Select clean and healthy grains to be retained for long-term storage. Clean granaries thoroughly before filling them with new grains. Repair all cracks in the floor and roofs to deter insects and rodents.

4. Preserve seed in PICS bags following proper instructions (see photo).

5. Set traps for rodent control. Also, cats and dogs hunt rats and physical barriers can keep rodents out of the stores. You may use a rat poison in some cases.

* PICS bag: Be careful of imitations and ordinary plastic bags. Contact FASOPLAST (Ouagadougou, Tel: 50 31 51 06) to buy the genuine article.

Annexes

1. How to make compost

2. Tips on selling seed

How to make compost

Cowpea does not require too much nitrogen fertilizer because it fixes its own nitrogen from the air using the nodules in its roots. However, in areas where soils are poor in nitrogen, there is a need to apply a small quantity of about 15 kg of nitrogen as a starter dose for a good crop. If too much nitrogen fertilizer is used, the plant will grow luxuriantly with poor grain yield. The soil in Burkina Faso is often nutrient poor. Therefore it is necessary to use manure and/or the fertilizer if you want to increase the yields of cowpea. The Burkinabe Ministry of Agriculture, Forestry and Fisheries will help you purchase artificial manure.

Chemical fertilizer

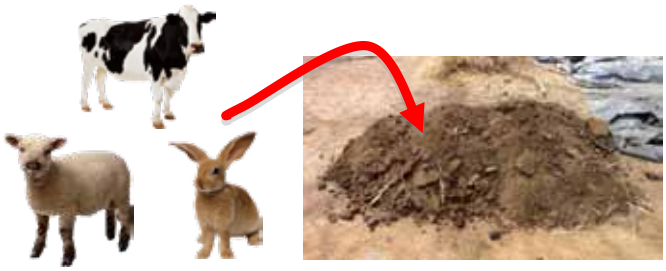
NPK 14-23-14 + 5S + 1B_2O_3: This package indicates that fertilizer includes nitrogen 14%, phosphorus 24%, potassium 14%, sulfur, and boron oxide.
Price: 17,000~23,000 CFA/50 kg
11,500~15,000 CFA/50 kg*
*When there is support by government

When the price of fertilizer is too low, the product could be fake.

However, the quantity is often insufficient. The quantity of fertilizer required for cowpea is 2.5 t/ha of manure and 100 kg/ha of chemical fertilizer, recommended by INERA. Chemical fertilizer is often expensive, and an imitation can be sold. Purchase fertilizers only from a reliable supplier. Chemical fertilizer is important for the crops and the right fertilizer application is effective.

Likewise, manure is important for the healthy growth of the crops. The purchase of manure is possible, but you can make compost yourself. Making compost takes three months. Therefore, begin to make compost in January at the latest.

Simple compost



Step 1.
Collect the dung of domestic animals and keep it. Likewise, collect weeds, dry them, and cut them into tiny pieces.

Step 2.
Put alternate layers of dung and weeds together. Then make a small pile. Next, pour on a lot of water and press the pile down. Pile it up 2–3 times.

Step 3.
Cover it with black vinyl to prevent drying and to raise the temperature. Stir it every two weeks, and add water again. Cover with black vinyl again.

Step 4.
Three months will pass by the time the process is repeated 6 times. The compost must ferment well.

Tips on selling seed

Prices of cowpea seeds will be established by negotiation after physical inspection of the grain. Quality is sometimes compromised along the value chain between producers and consumers through adulteration, bagging, etc. Also, the rainfall and crop yields greatly influence price. In addition, a buyer may be skillful in negotiations and can determine the price. Your income is variable depending on all these factors and may often decrease. On the other hand, to take advantage of industrialized markets, producers need to understand the needs of the market in terms of desired product types, product quality, and quantity of orders. Farmers need to organize themselves both as groups or individually to be able to satisfy these demands in a timely way and on a continual basis. This will assist in building reputation and confidence, which will lead to repeat orders by the buyers. To achieve such objectives, producers must understand the benefits of generating volume through bulking and use that strength for collective bargaining.

The basic contents that you should take are as follows:

What should you do?

-Calculate your expenses in cowpea production e.g. fertilizer cost, chemical cost, etc.

-Keep receipts or records of all expenses.

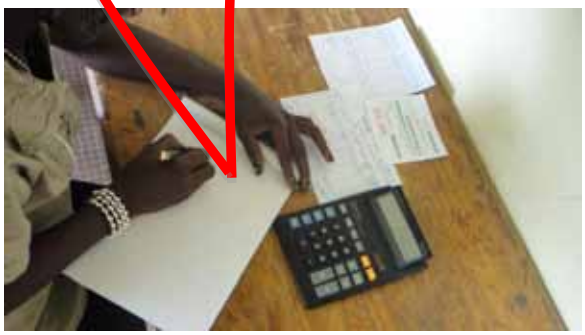
-Keep records on your yield.

(The profit must be more than the expense!)

-Estimate your profit!

Expense	Designation	Prix de unitaire	Quant	Total	
	Fertilizer	23000 CFA	100kg	46000	CFA
	Chemical	15000CFA	5L	75000	CFA
	Spade	2500CFA	1	2500	CFA
	Seed	600CFA	3kg	1800	CFA
	.....				
	Total	>>>>>>>>>>>>>>>>>>>>>>>>		125300	CFA

Yield	Variety	Ha	Kg
	IT98K-205-8	0.7	320
	KVx61-1	0.2	210
	.....		
	Total Yield >>>>>>>>>>>>>		530Kg



Client	Prix de unitaire	Quant	Total	
Mousa SAWADOGO	250CFA	2.5kg	625	CFA
Noufou KABRE	250CFA	10kg	2500	CFA
Rene NANEMA	250CFA	5kg	1250	CFA
Usumane KABRE	250CFA	40kg	10000	CFA
.....				
Total >>>>>>>>>>>>>>>>>>>>>>>>			14375	CFA

Take the record
-When?
-To who?
-How many kg?
-With how much?

Measure weight properly, and sell.

How do you sell?

-Find a reliable market or buyer.

-Make a receipt even if you sell seed to anyone, and record it.

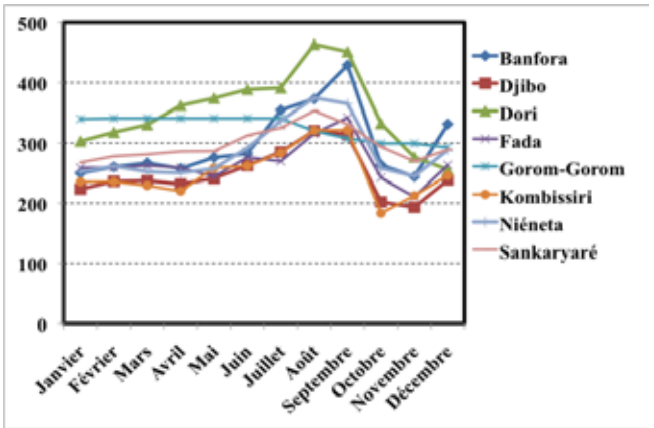
-Organize a sales group and negotiate with a buyer.

When do you sell?

-The price of cowpea fluctuates

-If you have suitable storage, you may wait for the price to rise

-There is a risk in deciding when to sell



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