

# Pack 111, Item 9

# Type: Backgrounder

May 2019

# \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Backgrounder on cocoa production**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Introduction:***

The cocoa tree is native to South America, and was brought to West Africa in the 1800s. In 1879, cocoa pods were brought from Equatorial Guinea to Ghana. The first cocoa farm was started at Akuapem Mampong in the Eastern region. Now, farmers also grow cocoa in the forest areas of Ashanti Region, both the southern and northern parts of the Western Region, Brong Ahafo Region, Central Region, and Volta Region.

Cocoa is a valuable cash crop and Ghana is the second largest producer of cocoa in the world. The Ghana Cocoa Board (COCOBOD) is the main body that regulates cocoa production, processing, and marketing in Ghana.

***Why is this subject important to listeners?***

Because it’s important for cocoa farmers to know:

* The right climatic conditions for growing productive cocoa trees.
* The best soil for planting cocoa.
* The types of seeds to plant for a healthy and better-yielding cocoa tree.
* How to grow cocoa seedlings and transplant them to farms.
* The growing practices that will result in better yields.
* How to prevent insect infestations and diseases.
* How to follow sanitary requirements that reduce disease problems and meet market demands.
* The best methods for harvesting and drying cocoa pods to satisfy market standards.

***What are some key facts?***

* Cocoa is a tropical plant that is normally grown in forested areas with sufficient rainfall and deep soils. It cannot survive high temperatures.
* Cocoa can be grown in areas that receive between 1,100 and 3,000 millimetres of rainfall yearly.
* Cocoa requires adequate rainfall for about six months to grow well and a dry season of not more than three months.
* Cocoa cannot be grown in a place where the soil is too dry and shallow.
* Cocoa farms should not have too many trees as they block cocoa plants from receiving adequate sunlight.
* Cocoa seedlings are fragile and farmers must care for seedlings in nurseries before transplanting them to the farm.
* It is recommended to temporarily plant cocoa trees near plantain so that the plantain can shade the cocoa. Each cocoa plant should have one plantain tree.
* A one-acre cocoa farm requires about 6-8 economic shade trees\*.
* In Ghana, recommended hybrid cocoa trees require two years to bear fruits (pods).
* Growing cocoa is labour-intensive and farmers must be determined and hardworking to be successful.

***What are the big challenges of growing cocoa?***

* Cocoa production is labour-intensive and costly, and farmers may lack knowledge of how to find cheap labour.
* Farmers cannot regularly or readily access chemical inputs, and may need to travel long distances to purchase them.
* Failure to protect farms from insects and diseases that affect pods but do not result in visible damage.
* Failure to ensure that land is not near trees infected with Cocoa Swollen Shoot Viral Disease.
* Failure to harvest cocoa pods in a timely manner. (Over-ripening can cause germination of beans, which reduces quality. It can also reduce the weight of cocoa beans.)

***Is there misinformation about this subject that I should cover?***

* Some cocoa farmers may view their cocoa farms as solely a family inheritance and a way of life to be passed on to future generations. But farmers should understand that cocoa farming is also a way to make profits which can improve their livelihoods. Thus, they should treat the business side of farming seriously.

***Gender aspects of growing cocoa***

In Ghana:

* Most land—including cocoa farms—is owned by men. There are fewer women than men farmers because women have poor access to land.
* Traditionally, more men than women inherit farmlands. But some women inherit cocoa farms and are responsible for all decisions taken on the farm.
* Women assist men in all cocoa farming practices.
* COCOBOD markets all cocoa in Ghana, and neither men nor women are involved with the crop after they send their cocoa to COCOBOD. COCOBOD approves particular companies to establish “shells.” Shells are places in cocoa-producing villages or towns where farmers can bring their cocoa and sell it. Each company has a shell, and farmers can choose which company’s shell to sell their produce to.
* Depending on the family system, men may or may not consult their partners when deciding what to do with the income from cocoa farming.

***Predicted impact of climate change on cocoa production***

* Cocoa production may be reduced when the rains are delayed.
* Pest and disease organism populations increase with excess rain.
* Because climate changes affect weather, including the rains, unpredictably, farmers may miss the right time to treat their farms.
* A change in climate may bring new pest and disease problems to cocoa farms.
* Too much sunshine and too little rain can cause cocoa to dry up on the tree before the harvest.
* Rising temperatures because of climate change make pest and disease problems more frequent and severe, while droughts, windstorms, and floods can destroy crops*.*

***Key information about growing cocoa***

**1. Land selection and land preparation:**

Before starting a cocoa farm, farmers should:

* Select land that is farther than ten metres from trees affected by Cocoa Swollen Shoot Virus Disease (CSSVD).
* Consider vegetative cover: cocoa does not grow well on grasslands.
* Ensure that land is not rocky, sandy, or waterlogged.
* Ensure that soil is moist and deep. Loamy-clayey soil is preferable.
* Ensure that the soil is deep enough to allow the roots of the cocoa plant to penetrate more than one metre into the soil.
* Choose a site to build a nursery. The site should preferably be flat. It must be near a permanent source of water and not far from the cocoa farmland.
* The nursery must be at least 10 metres away from trees that could be infected by CSSVD.

After choosing suitable land, the next step is to prepare the land for farming.

* Farmers should weed the nursery site clean and remove any debris or obstacles.
* Farmers should fell trees on their main farm and chop them into small pieces.
* Leave the debris on the soil to improve soil fertility while you work on your nursery.

For further information, see documents inresource list below: 2, 3, 4, and 9.

**2. Seeds, varieties, and planting:**

**Planting**

* Cocoa beans are fragile and should be raised as seedlings in a nursery.
* Protect cocoa seedling by providing dense shade for the first few weeks, then gradually reducing the amount of shade before transplanting them onto your farm.
* Protect cocoa seedlings from too much sunlight. Palm fronds raised on wooden sticks can provide shade for the nursery. Gradually reduce shade from the palm fronds, then remove before transplanting.
* Plant seeds or beans in black polythene bags containing loamy-clayey topsoil. It is important to make a hole at the base of the bag to allow water to drain out.
* Water the nursery once a day, preferably in the morning.
* Use mild doses of fungicides and insecticides to protect nursery seedlings from pests and diseases, following label directions.
* If topsoil is deficient in nutrients, spray foliar fertilizer on cocoa seedlings one month after germination.
* Transplant the seedling after six months in the nursery. If you use smaller polythene bags, transplant no later than three months after germination. Transplant the seedling near a plantain to give it temporary shade. After the cocoa tree outgrows the plantain, farmers can either cut it down or leave it in the field.
* One month before transplanting, reduce shade to gradually “harden” the seedling. Completely remove shade about a week before transplanting.
* Transplanted cocoa trees should be about 10 feet (three metres) apart in rows 10 feet (three metres) apart.
* Shade or economic trees should be about 60 feet apart.

 For further information, see documents 2, 3, 5, and 8.

**3. Lining and pegging**

* For maximum yields, line and peg the farm at a recommended distance of 10 feet apart before transplanting. (“Pegging” is placing sticks or pegs to mark the recommended plant spacing.) This results in plant spacing that minimizes competition among cocoa plants for light, water, and soil nutrients.
* Lining and pegging at the right intervals also allows farm operations such as weeding, spraying, harvesting, and fertilization to be conducted more easily.

**4. Mulching**

* It is vital to mulch young cocoa trees during the first and second years, especially during the dry season. Spread plant materials such as dry grass or chopped plantain stalks around the base of the cocoa seedling towards the end of the rainy season. When the mulch decays, it improves the nutrient status of the soil.
* Mulching helps conserve soil moisture and promotes the beneficial activities of soil organisms.
* Mulching reduces weed growth by blocking the light weeds need for growth.
* Mulching reduces the direct impact of raindrops on the soil and slows runoff, enabling nutrients in the mulch to improve the soil, and keeping nutrient-rich topsoil on the farm.

**5. Pruning**

It is essential to prune cocoa trees at various stages of growth to enhance productivity and facilitate fieldwork. Pruning adjusts the height of young cocoa plants and creates a desirable shape. Pruning also removes diseases or unwanted branches from mature plants and shapes the canopy to the desired size or shape.

* Prune young cocoa plants in the third and fourth year of growth. Cut off the low branches to ensure that the first branching point (the jorquette\*) is at least 1.5 metres above the surface of the soil.
* Cut the branches of the cocoa tree at an angle to allow water to drip off the cut surfaces and prevent fungal infection.
* Prune before the onset of the rainy season. In Ghana, the onset of rain is April or May.
* Remove excess shoots growing from the jorquette, leaving only two shoots that face each other. Remove shoots growing in the middle of the plant to open up the canopy\*.
* Remove mistletoe and epiphytes\* on cocoa branches in the canopy.
* Remove mistletoe when it can be easily detected due to the presence of flowers.
* Pruning reduces vegetative growth and increases cocoa pods production.
* Pruning enhances penetration of sunlight, which helps reduce the risk of disease.

**6. Sanitary harvesting**

This refers to pruning mature cocoa trees, and involves removing basal growth or shoots (also called *chupons* or suckers) from the stem at every round of weeding. Farmers should remove all new growth that could sprout at the base of trees to minimize competition for nutrients. Farmers should also clear all black growth (from cherelle wilt) from trees to minimize fruit loss and keep the farm healthy.

**7. Economic shade trees**

* Economic shade trees are mostly forest trees with good canopies and with economic benefits for farmers because they produce fruit, timber, or other products.
* Economic shade trees provide necessary shade to cocoa trees but do not act as alternative host plants for cocoa pests or diseases.
* Trees such as *odum* (*Milicia regia* or African teak), *ofram* (*Terminalia superba* or *afara*) and *emire* (*Terminalia ivorensis* or Ivory Coast almond) are usually preferred to trees like cola or *odwuma* (*Musanga cecropioides* or umbrella tree) because they can be sold whenever farmers need to cut and replace them.

For further information, see documents 1, 2, 3, and 7.

**8. Soil fertility:**

Farmers are encouraged to apply organic or inorganic fertilizer to keep the soil fertile. Foliar fertilizers are recommended for young cocoa trees, especially those five years and under. However, farmers can also apply foliar fertilizers to mature cocoa.

Organic fertilization methods include:

* Leaving land fallow for a period to enable the soil to regain its fertility.
* Using organic manure like farmyard manure and decomposed vegetable peelings.

**Organic fertilizer**

* Organic fertilizers contain macronutrients (nitrogen, phosphorus, and potassium) and micronutrients (boron, copper, iron, etc.). They improve the soil’s mineral composition, organic matter content, and ability to retain moisture. Examples include poultry manure, cocoa pod husk ash, and compost.
* Using organic fertilizers reduces the risk of environmental pollution associated with inorganic fertilizers, for example, leaching of fertilizer to ground or surface water.

**Inorganic fertilizer**

* Apply inorganic fertilizers to the soil either by broadcasting or by adding a ring application of fertilizer around each cocoa tree once a year.
* The best time to apply inorganic fertilizer is at the beginning of the main rainy season.
* After applying inorganic fertilizer on the same plot for four consecutive years, farmers should take a one- or two-year break.
* It is recommended to apply foliar fertilizers once per month. Foliar fertilizer is recommended for seedlings, but can be used for larger trees, though they usually receive granular fertilizer.
* When using foliar fertilizer, spray in the morning to avoid high winds and strong sunshine.
* Use a mist blower to apply foliar fertilizers to tall cocoa plants and a knapsack for medium-sized plants.
* CRIG (Cocoa Research Institute of Ghana) recommends that farmers use the broadcasting method to apply inorganic fertilizers to mature cocoa (10 years and older).
* Dispose of fertilizer containers by crushing or burying them far away from households or water sources. Do not use fertilizer containers to store water or food, and do not store fertilizers near food or close to areas where children can come into contact with them.
* Use only registered and safe inorganic fertilizers.

For further information, see documents 2, 3, 5, and 8.

**9. Weeds:**

Managing weeds is a critically important aspect of cocoa farming. Weeds compete with cocoa trees for nutrients, while some weeds provide habitat for pest insects. Farmers are encouraged to weed their farms manually in order to reduce the use of herbicides (also called “weedicides”). If farmers decide to apply weedicides, they should use the safest and most effective products available.

* Farmers should weed manually three to four times a year in young cocoa farms and about twice a year in mature cocoa farms.
* Cut (“brush”) weeds when they are 30 to 45 cm high. Brush weeds close to the ground and remove climbers on cocoa trees.

For further information, see documents 2, 3, and 7.

**10. Pest and disease management:**

**Pests**

* Capsids (several types of bugs known as *akate* in the Twi language) are the most invasive pest in Ghanaian cocoa farms. They are difficult to detect because they are small and feed on cocoa pods without deforming them. Therefore, farmers are encouraged to prevent them by spraying during the onset of rains. The following non-chemical methods may also be helpful:
	+ Using the predatory ant, *Oecophylla longinoda*, as a biologica1 control agent.
	+ Applying a seed extract solution of neem.
	+ Mass trapping of capsids with sex pheremone traps.
* Unlike capsids, the cocoa shield bug (*Bathyceolia thelassina*), known in the Twi language as *atee*,is easy to detect because it deforms cocoa pods. The pest does not cause economic loss, so insecticides are not required. Insecticides that manage capsids can also deal with outbreaks of cocoa shield bug. Farmers can manage small, localized infestations by carefully inspecting the farm, then handpicking and killing the adult bugs.
* There are many other pests that affect cocoa farms in Ghana, including caterpillars, grasshoppers, and termites. Because of this, farmers are encouraged to spray their farms with insecticides from August to October. It is recommended that spraying stop in November to allow pest eggs to hatch, and then spray again to kill hatched eggs in December. This process should be repeated every year. Pest problems are reduced when farmers use cultural practices such as pruning, weeding, and sanitary harvesting.

**Diseases**

* Farmers should not grow cocoa in areas where trees are infected with CSSVD, and should leave at least ten metres between cocoa trees and these areas. There is no effective treatment for CSSVD; farmers typically destroy infected trees. Please check with extension officers before selecting land for growing cocoa.
* Black pod diseases affect cocoa farms during the rainy season. They can also affect unpruned trees, and are more likely to occur when there is water on the farm. Farmers should create gutters to allow excess water to leave the farm in order to eliminate conditions that favour black pod and other diseases. To manage the disease, farmers are encouraged to spray fungicides from May until December.

For further information, see documents 3, 5, and 8.

**11. Harvesting:**

* Harvest within two to three weeks of cocoa pods becoming ripe. Overripe cocoa pods lose weight and may start to germinate.
* Use harvesting hooks, including locally produced tools, to harvest cocoa.
* Take extreme care during harvesting not to damage the cushions\* that carry the flowers and pods.
* When harvesting, carefully remove diseased pods and those damaged by rodents. Carry healthy pods to a central point in the farm where they can be broken.
* Break the pods within three days after harvesting. Break pods with a wooden mallet and not with a knife. Knives may cut through the beans, which can result in fungal infection. They can also injure the farmer.

**12. Fermentation of cocoa**

After the pods are broken, fermentation must take place. Fermentation is important because it develops the chocolate precursors in the cocoa bean. The pulp surrounding the cocoa bean ferments, not the cocoa bean itself. Fermentation normally takes six days. The micro-organisms involved in fermentation are yeasts, lactic acid bacteria, and acetobacter, another kind of bacteria.

* There are four methods of fermentation: heap, basket, tray, and box methods. In Ghana, the heap and basket methods are simpler and more commonly used by small-scale farmers.
* *Heap method*: Spread fresh plantain leaves in a circle on the ground and heap fresh cocoa beans on them. Puncture the leaf mat with a pointed stick to allow easy drainage of pulp. Cover the heap with more leaves and place pieces of wood in a ring or square around the heap to hold it in place. Covering the heap protects the fermented beans from drying and growth of mould, and helps retain the heat generated within the heap.
* *Basket method*: Line baskets with fresh plantain leaves, then place the wet beans in the baskets. Cover the baskets with more leaves and hold in place with small, clean pieces of wood. The sweating\* drains from the sides and the bottom of the basket and air passes through the openings in the basket. After 48 hours, farmers should turn the fermenting mass by transferring the beans from one basket to another.
* Ensure that the environment is clean to avoid contaminating beans during fermentation. Wash hands thoroughly, and clean all tools with warm water before using.
* Harvesting immature, diseased, or damaged beans pods results in poor quality beans for fermentation.
* Do not store pods for more than six days. The pulp surrounding the beans will dry up.

**13. Drying cocoa pods**

On the day that the fermentation process ends, farmers should begin drying the beans immediately.

* Dry cocoa beans by spreading them thinly on raised mats. Do not dry on the bare floor or on asphalt roads.
* Stir beans frequently and remove germinated, flat, or black beans, placenta\*, and any foreign material.
* In Ghana, sun drying is the best method and is recommended for small-scale farmers because it is effective and affordable. Mechanical drying is more expensive.
* Cover beans every evening to protect them from possible rain and dew. Cover beans to protect them from afternoon rains. Uncover early in the morning and immediately after rain.
* Do not allow fire under or close to beans during the drying process as it will give beans a bad taste or smell.
* The beans are fully dry when they produce a “cracking” sound when lightly squeezed in a closed hand.
* Drying continues until beans are well-dried, a minimum of seven days.
* Well-fermented and well-dried beans are brown in colour.

**14. Storing cocoa beans**

After drying, clean cocoa beans by removing unwanted matter, then pack in clean, strong jute bags. Just as farmers take great care from harvest to drying to be the best quality beans, this care must continue during storage.

* Store dry beans in a well-ventilated storage room with relatively low humidity to avoid introducing moisture to the beans.
* Pack bags of cocoa on wooden pallets to avoid rodents and insect pests.
* Ensure that stored beans are not exposed to strong odours.
* Do not make fires in the storage room.
* Forced air\*, chemical fumigation\*, and good sanitary practices all contribute to optimal storage conditions.
* When cocoa beans have a moisture content of 7%, they can be stored for many years in ideal conditions.

For further information, see documents 3, 4, 5, 7, and 8.

***Where can I find other resources on this topic?***

1. AA Resources (Applied Agriculture Resources), undated. *Nursery: Site selection and Preparation* http://www.aarsb.com.my/nursery-site-selection-preparation
2. Cocoa Research Institute of Ghana, 2010. *Cocoa manual: A Source Book for Sustainable Cocoa Production*. Downloadable from <https://www.researchgate.net/publication/283018115_Cocoa_Manual_A_source_book_for_sustainable_cocoa_production>
3. Conservation Alliance, 2013. *Sustainable cocoa production: Farmers training manual*. Conservation Alliance. [https://www.ifc.org/wps/wcm/connect/a06b1f80432c3b709b68ffd8c62d54d0/Sustainable+Cocoa+Production.pdf?MOD=AJPERES](https://www.ifc.org/wps/wcm/connect/a06b1f80432c3b709b68ffd8c62d54d0/Sustainable%2BCocoa%2BProduction.pdf?MOD=AJPERES) (1.07 MB)
4. Divine Chocolate Ltd., undated. *From Bean to Bar*. <http://www.divinechocolate.com/uk/about-us/research-resources/divine-story/bean-to-bar>
5. Federation of Cocoa Commerce, undated. *Good agricultural practices in cocoa product*ion. <https://www.cocoafederation.com/education/agricultural-practices>
6. Food and Agriculture Organization of the United Nations (FAO), 1966. *Selection of soils for cocoa*. Soils Bulletin 5. <http://www.fao.org/docrep/017/46562e/46562e.pdf> (18.8 MB)
7. Gyarko Farmers, undated. *How Cocoa Beans Fermentation Works?* https://www.gyarkofarms.com/cocoa-beans-fermentation-process-works/
8. Opoku-Ameyaw et al, 2010. *Cocoa manual: A source book for sustainable cocoa production*. Cocoa Research Institute of Ghana. Downloadable from: <https://www.researchgate.net/publication/283018115_Cocoa_Manual_A_source_book_for_sustainable_cocoa_production> (8.7 MB)
9. Rieger, M, undated. Cocoa (or Cacao) – Theobroma cacao. <https://www.fruit-crops.com/cocoa-theobroma-cacao/>

***Key definitions***

1. *Cocoa canopy:* The uppermost branches of the cocoa tree, which form a continuous layer of leaves.
2. *Cushions:* The flower cushions (or small stalks), from which the flower emerges.
3. *Economic shade trees:* Trees that provide shade for cocoa trees. These are mostly forest species with good canopies and which produce marketable products such as fruit and timber.
4. *Epiphytes:* Non-parasitic plants that grow on other plants. Note: unlike parasitic plants, epiphytes do not take their nutrients from the host plant.
5. *Forced air:* Introducing either carbon dioxide or nitrogen into a storage area to reduce or eliminate the oxygen that pests require for survival.
6. *Fumigation*: The action or process of disinfecting an area with the fumes of certain chemicals or natural substances.
7. *Jorquette:* Cocoa seedlings produce a single vertical shoot for a distance of several feet, at which point it divides into three to five pieces and produces a whorl of lateral growing branches called a “jorquette.”
8. *Placenta:* The inner tissue lining of the cocoa that supports the beans.
9. *Sweating:* The mucilage around the cocoa beans that breaks off the beans during fermentation.

## Acknowledgements

Contributed by: Abena Dansoa-Danso, script writing and research consultant, Eagles Roar Creatives, Accra, Ghana.

Reviewed by: Dr. Felix Kwame Appiah, Principal Technical Officer (operations), Cocoa Health and Extension Division (COCOBOD)

**Sources of information**

Interview:

Mr. Enoch Kwame Afenyi, Principal Technical Officer at COCOBOD Cocoa Health and Extension Division (CHED) Ghana, January 2019.