

THE HUNGER PROJECT- GHANA
AGRICULTURE AND FOOD SECURITY PROGRAMME
TRAINING MANUAL FOR AGRIC TOTS ON PRINCIPLES IN CROP PRODUCTION

**THE OBJECTIVES OF TRAINING AGRIC TOTS IN PARTNERSHIP WITH THE
MINISTRY OF FOOD AND AGRICULTURE (MOFA)**

1. To build the capacity of selected farmers to enable them impart knowledge in agriculture to the farmers in their communities.
2. To bridge the wide gap of extension-farmer ratio, i.e. covering a lot more farmers than what the AEAs can alone cover.
3. To help improve food production and security on sustainable basis and ensure higher farm incomes.

Module 1: WHY DO FARMERS OBTAIN LOW FARM YIELDS?

FACILITATOR: *Introduce the topic and find out from participants on the reason why farmers sometimes obtain low yields and its effects on food security. The reasons may include:*

- High population growth
- Division of available land among family members leading to small farm lands
- Continuous cropping on the same piece of land without managing the fertility of the soil
- Decline in soil fertility
- Reduced crop yields

Other reasons why farmers experience low yields may include:

- Lack of rainfall or inadequate rainfall.
- Planting anyhow.
- Absence of inadequate advice or education on improved farming by extension officers.
- Attack by pests and diseases without any knowledge in controlling the pests and the diseases
- Untimely weeding of farms (poor farm maintenance)
- Lack of funds to buy improved planting materials.
- Lack of knowledge on improved farming.
- Non use of improved seeds

EFFECTS OF POOR OR LOW YIELDS

- Loss of production and income
- It brings poverty

- Hunger affects the individual or the community
- One cannot prosper in life
- One becomes discouraged and give up farming
- Stealing from other people's farm
- Inability to cater for children's education
- Children drop out of school
- Teenage pregnancy
- Sickness
- etc

FACTORS TO CONSIDER IN BASIC FARM PLANNING

FACILITATORS: *Engage the farmers in a discussion on the factors they normally take into consideration in planning their farms. This will make it easier for them to understand when gaps left out in the contributions are filled.*

1. The first thing to consider in planning for any crop farming is **the type of crop to cultivate**
 - Think about the marketability and profitability of the crop
 - You can do the above when you consider farming as a business
2. **Estimated Farm Income:** The cost of living will inform you on estimating how much income you wanted in a particular season. E.g housekeeping money, school fees, utility bills, etc.

Illustration: A scenario of using the cost of supper or dinner for a family of 4 or 5 people.

Cost of Supper only per day= GH¢ 5.00

Cost of Supper only per Month = GH¢ 150.00

Cost of Supper only per Year = GH¢ 1,800.00

If your expected income for the year does not exceed this amount then you cannot get money for breakfast, lunch, clothing and other utilities, as well as for the education of your children.

3. Land:

- The land depends on the type of crop and the expected income also determines the size of land to acquire.
- If your land is small you need to hire additional land
- You can also purchase additional land
- You can also enter into share cropping (abunu/abusa)

4. Capital

- Use of Farmers own resources
- Loan (bank, friends, family members, NGOs, money lenders)
- If farmers have limited resources then they can form work gangs ("nnobua") in order to meet their set target or estimated income.

ADVANTAGES IN FORMING WORK GANGS

- It brings love and unity

- It reduces expenditure
- It brings discipline among members in the gang
- It encourages continuous work
- One does not get too tired
- The weaker in the group gets strengthened
- Ability to cover a wider area. It speeds up work

Improving a Healthy Relationship with Hired Labour

You need to establish a very good relationship with hired labour in order to win them all the time especially where labour is scarce. E.g Respect them, provide them with food at the right time, and pay them their money after working for you.

It is also advisable to engage contract labour.

GENERAL PRINCIPLES IN CROP PRODUCTION

Activity: Principles in crop production

Put participants in groups. Ask them to outline how a farm is cultivated taking into account the land preparation, types of planting materials used, time of planting, etc. up to harvesting. It must be noted that farmers already have their traditional methods of farming and they have a reason for everything they do. It is therefore important to first know their ways and understand why they do certain things before the introduction of new improved methods of farming.

Module 2: Timely land preparation

- Land preparation should be on time since Rainfall is not regular
- Farming is dependent on the rains
- Practice control burning if it becomes necessary especially in very thick vegetation.
- Wait for one or two rains before burning (excessive burning kills all important soil organisms and get the soil caked with deep cracks)

2. Acquire improved planting materials E.g seeds

Advantages of improved planting material

- It matures early
- It gives more yield
- More vigorous
- It is disease and pest tolerant
- It has high nutritional value
- Longer shelf life or ability to store for longer period.
- Ability to withstand harsh weather conditions (drought tolerant)
- Produces its own kind (true to type)

Module 3: Timely planting

- Crops should be planted on time to take advantage of the rains (i.e. rain-fed agriculture)

- Planting should be done when the rains have come to stay so that planted crops do not get wilted after a few days of rains
- Know your planting distance for the crop;
 - make maximum use of the land.
 - You waste the land when you plant sparsely.
 - Similarly, you waste the land when you plant densely.
 - Ensure optimum plant population for the best yield.
 - Plant in rows. The advantages of planting in rows were discussed.
- When on slopes, planting should be across the slope and not along the slope.

Effects of planting along slopes

- Prone to erosion
- Difficulty in weeding within rows
- Fertilizers and manure are washed away

Effects of planting across slopes

- Checks erosion (especially in closely planted crops and on ridges)
- Preserves fertilizers and manure applied
- Easier to plant crops and carrying out other field activities.

Advantages of planting in rows

- i) It is easy to detect ungerminated crops and to fill in later
- ii) It is easy to carry out field operations e.g. weeding, fertilizer application, spraying, harvesting, etc
- iii) More plants on the same piece of land so more yield and more income
- iv) It is also easy to detect plants attacked by pests and diseases
- v) Plant nutrients are evenly distributed for the crops
- vi) It reduces run off water (erosion)
- vii) It reduces the lodging of plants (the lines serve as barriers to reduce the speed of the wind)

Module 4: Timely weed control

The effects of weeds on crops

- Weeds act as alternate hosts of insects and diseases and contribute to their spread on the farm.
- They the growth of plants to be Stunted
- Insect pests, and rodents will attack the farm
- Impede air passage through the farm
- There is always competition between the crops and the weeds for sunlight, water, air and nutrients in the soil.
- Weeds reduce the quality and quantity of crop yields.
- Weeds cause plants to lodge.
- Weeds affect the speed of harvesting and therefore increase the cost of production.
- Weeds may promote the burning of your farm.

Types of weed control

- a) Mechanical weed control like using cutlass and hoe
- b) Chemical weed control

- Broad spectrum (Total) weedicides (will kill almost all weeds)
- Selective weedicides
 - Selective for specific crops
 - Can be pre-emergence (sprayed on the land before the seeds germinate) or post-emergence (sprayed after the seeds have germinated but without any harmful effect on the crop)

Disadvantages of chemical weed control

- Selective chemicals can leave weeds which are similar to the crops of the same family.
- Continuous use of chemicals makes land bare
- Destroys medicinal plants
- Sprayed weeds takes long time to rot
- Can affect health of farmer due to lack of protective clothes

Advantages of Chemical Weed control (Weedicides)

- One person can cover a wider area than manual weeding
- Low cost compared to manual weeding
- Re-growth of weeds takes a longer time than manual weeding
- There is no disturbance to the soil and therefore reduces the serious effect of erosion.

Module 5: Soil fertility management

FACILITATOR: *Introduce the topic and find out from the participants, what is meant by soil fertility. The farmers should also respond to the question of the effects of infertile soil to crop production and what can be done to improve soil fertility.*

The Effects of poor soil in crop production

- Crops will not grow well
- Low crop yield
- Low income which brings about poverty and hunger.
- It demoralizes the farmer.
- Stubborn weeds grow on the soil.

Types of fertilizers

- Organic fertilizers
- Inorganic fertilizers (Mineral fertilizers)
Organic fertilizers are from natural wastes such as compost, poultry manure, cow dung, sheep and goats droppings, etc.

Inorganic manures are man made such as NPK, Ammonia and Urea

Advantages of organic fertilizers

- It reduces soil erosion
- It remains for a longer period in the soil and therefore releases the nutrients gradually over time.
- It improves the structure of the soil. e.g. it opens up clayey or heavy soils; It also binds up sandy soil to make it more productive
- It improves the ability of the soil to hold or conserve water
- It is less expensive

- No residual or negative effect on the soil or human (The risk to human life is highly reduced)
- It reduces the severe effects of nematodes
- It prevents the nutrients to be leached out (drain out of reach of crops' roots)
- It increases aeration which favours soil microbial activity.

Disadvantages of Organic fertilizers

- It produces foul smell (especially those of animal origin)
- It encourages fungus production in some cases
- You need more or large quantity to use.

Quantities of Organic Manure for Maize (per acre)

Make sure the organic manure is well decomposed.

- Cow dung – 2.5 tons
 - Poultry manure – 1.6 tons
 - Compost – 2 tons
- (Note: One ton is equivalent to the weight of 10 maxi bags of maize)

Advantages of Inorganic Fertilizer

- It releases the nutrients quickly
- It is easy to transport
- It is easy to apply

Disadvantages of Inorganic Fertilizer

- Can destroy crop when not properly applied e.g. when applied too close to the plant or when over applied
- It is expensive

Types of fertilizer application

- Broadcasting
- Point or ring application
- Foliar (liquid) by spraying

Analysis of fertilizer application

Fertilizer increases yield and profit even after subtracting the cost of fertilizer from total profit.

Example:

- Maize without fertilizer = 2 bags per acre = GH¢ 160.00
- Maize with fertilizer = 8 bags per acre = GH¢ 640.00
- Cost of fertilizer NPK/Ammonia = GH¢ 100.00
- Profit or income on use of fertilizer = GH¢ 640.00 - GH¢ 100.00 = GH¢540.00

Module 6: Pests and disease control

FACILITATOR: *Ask the participants to explain crop pest and diseases and their effects on crop production. Examples of must be given to ensure that they have a fair idea about what is been said. Farmers must also be asked to suggests ways of controlling the pests and diseases mentioned.*

The effects of pests and diseases in crop production

- Produce is reduced both in quality and quantity
- Crops will not grow fast
- Can destroy the entire crops
- Loss in revenue or income
- It brings hunger
- It also brings poverty
- It brings about stealing
- Inability to access health care when sick/ill
- It brings about discouragement in farming
- You cannot prosper or progress in life

Prevention of pests and diseases occurrences

- Avoid conditions that promote diseases occurrences on farms. E.g poor spacing of crops and poor drainage.
- Regular and timely weeding
- Adopt improved farming practices e.g timely planting, use of disease free or pest free planting materials
- Setting traps for rodents

Methods of pests and disease control

- By spraying with recommended chemical
- By removing the infested crop.

Types of Chemicals

1. Insecticides
2. Fungicides
3. Rodenticides

Precautions to be taken when using insecticides or pesticides

- Wear protective clothes e.g. hand gloves, respirators, wellington boots, goggles, overalls and hats.
- Spray following the wind direction. Do not spray against the wind.
- Do not eat, drink, smoke, or sniff, tobacco when spraying.
- Bath and wash clothes with soap after spraying and before eating
- Do not overfill the sprayer
- Keep the chemical out of reach of children
- Use recommended chemical at the recommended rate
- Spray in the morning or in the evening
- Do not use empty chemical bottles and containers to store food e.g salt or oil
- Do not buy unlabelled chemicals
- Burn or bury empty bottles and containers

Activity: Crop Pests and Diseases

Farmers or participants must be grouped. Each group must be assigned to submit about five samples of crops infected with different diseases to class. The groups must be tasked to separate the crops and perform the following assignments;

- Write the names of the crops
- Identify the particular disease that has infected each crop.
- Suggest methods of controlling each disease.

EXAMPLES OF CROP DISEASES TO BE USED AS A GUIDE

1. Downy mildew caused by *Peronospora manshurica*

Symptoms:

Appear on the upper surface of young leaves as pale green to light yellow spots which enlarge into pale to bright yellow spots



Management:

Do not plant seed from infected fields. If contaminated seed is planted the next season, the fungus can infect the seedling systemically and cause stunting and mottling of the leaves.

2. Cercospora Leaf Blight caused by *Cercospora kukuchii*

Symptoms:

Mottled purple-to-orange discoloration of the uppermost leaves and leathery leaf appearance.



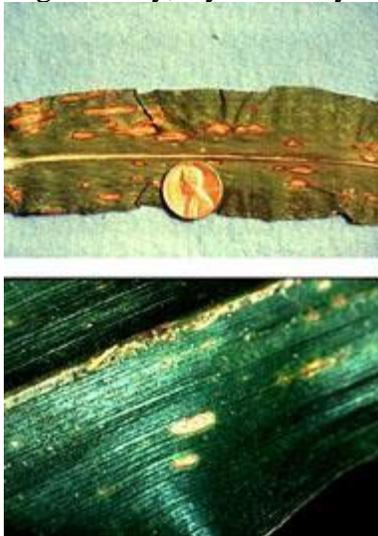
Management:

Tillage and crop rotation are effective ways to reduce the survival of these fungi from season to season on infested soybean residues.

3. Anthracnose Leaf Blight caused by *Colletotrichum graminicola*

Symptoms:

Leaf lesions are generally brown, oval to spindle shaped, about 1/4 inch wide by 1/2 inch long. Usually, a yellow or yellow-orange area surrounds the disease portion of the leaf.



Management:

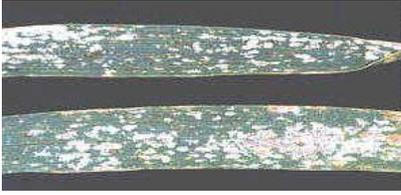
Hybrid selection is the first step in disease control. Growers should carefully select hybrids with the proper leaf blight and stalk rot resistance, with good standability, and high yield potential. Avoid excessive plant stress by using a balanced soil fertility program based on soil tests.

4. Powdery Mildew caused by *Erysiphe graminis* f. sp.

Symptoms:

White or gray-brown powdery or cottony patches of mycelium (fungal threads) on the upper surface of lower leaves. Tiny, brown-black specks (cleistothecia) are visible in older gray-

brown areas. Yellowing is usually visible on the undersides of leaves opposite the powdery patches.



Management:

Crop rotations, resistant variety, destruction of residues, proper fertilization, foliar fungicides. Do not plant susceptible seed prior to fly-free date.

5. Bacterial blight caused by *Pseudomonas savastanoi*

Symptoms:

Angular lesions with reddish-brown centers and water-soaked margins surrounded by yellow halos appear on leaves in the mid to upper canopy. Lesions grow together to produce large, irregularly shaped dead areas, which fall out, causing leaves to appear tattered. Young leaves are most susceptible to blight infection.



Management:

The best management tool is to prevent disease establishment through genetic resistance. Cultivars that are not highly susceptible to the disease should be considered for planting. Crop rotation can be an effective method to avoid inoculum from a previously infected crop.

6. Bacterial pustule caused by *Xanthomonas axonopodis* pv. *glycines*

Symptoms:

Early symptoms are minute, pale green spots with elevated centers on either or both leaf surfaces. Later, a small, raised, light-colored pustule forms in the center, usually in lesions on the underleaf surface.



Management:

Plant resistant cultivars. Crop rotation can be an effective method to avoid inoculum from a previously infected crop.

EXAMPLE OF PESTS

1. Aphids

Through their enormous reproductive capability, aphids can cause severe damage to several crops.



Damage symptoms

Nymphs and adults feed on plant sap. This halts growth, causing curled leaves. Sometimes yellow spots appear.

2. Beetles

An important pest species in the ornamentals is the black vine weevil, *Otiorhynchus sulcatus*, while the garden chafer, *Phyllopertha horticola*, causes a lot of damage in the grassland.



Damage symptoms

Adults of *Capnodis tenebrionus* feed on twigs and young branches mainly causing problems in tree nurseries and young plants. The greatest damage is caused by the larvae. They penetrate into the roots of the trees and feed on the cortex. Young trees die as a result of this damage.

3. Leaf miners

There are four leaf miner species which are common pests: the tomato leaf miner (*Liriomyza bryoniae*), the American serpentine leaf miner (*Liriomyza trifolii*), the pea leaf miner (*Liriomyza huidobrensis*) and *Liriomyza strigata*.



Damage symptoms

- Larvae cause mines. This can lead to cosmetic damage, leaves drying out or even early defoliation. The latter may affect the yield.
- Female adults cause feeding marks where they feed. This gives cosmetic damage to the plants. Indirect damage occurs when fungi or bacteria enter the feeding areas.

4. Mealybugs

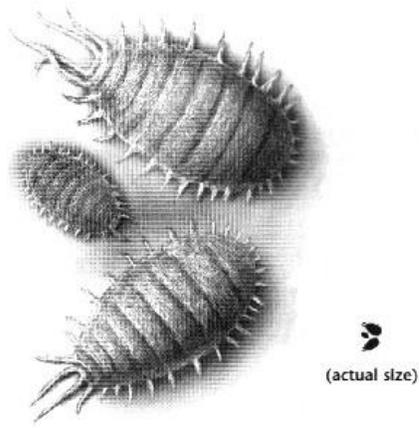
Mealybugs cause damage to several crops in the horticultural sector. The most important species occurring in the glasshouse belong to the genera *Planococcus* and *Pseudococcus*.

Damage symptoms

- Nymphs and female adults feed on plant sap. This reduces growth, and causes deformation and/or yellowing of the leaf; sometimes leaves even drop off the plant. This can reduce yield or cause cosmetic damage. Infested plants often drop flowers or leaves if present.
- Mealybugs excrete honeydew, on which dark sooty moulds develops. Together with the whitewax-like secretions these soil the plants. Photosynthesis of the leaves reduces, causing the production to decrease.



mealybug



5. Butterflies and moths

Caterpillars of several butterfly and moth species cause damage to a variety of crops. The most important species occurring in glasshouses are the tomato looper (*Chrysodeixis chalcites*), the tomato moth (*Lacanobia oleracea*), the cabbage moth (*Mamestra brassicae*), the beet armyworm (*Spodoptera exigua*) and the silver-y moth (*Autographa gamma*).



Damage symptoms

- Small caterpillars mainly feed on the undersides of the leaves. The upper layer (epidermis) remains undamaged. If caterpillars mature, they disperse on the plant. Initially they cause small, later also bigger holes in the leaves.
- The large amount of excrements of the caterpillars soils the crop.

6. **Sciarid flies**

Sciarid flies (Sciaridae) are a difficult pest, especially in young plant material. They can cause damage to seedlings, rootstock and cuttings of many plant species.



Damage symptoms

- Direct damage can occur to young and/or weak plants in a moist, organic environment, when larvae chew the plant's roots. This reduces the uptake of water and nutrients, causing the plants to die. Strong plants are only affected at very high level of infection.
- Indirect damage is caused when larvae transmit mites, nematodes, viruses and fungal spores. Also adult sciarid flies can transmit various fungal spores. The places where larvae have chewed are also potential places where fungi can attack. All things together can be lethal to the plant.

7. **Spider mites**

Spider mites are a pest in many crops. Their great reproductive capacity enables them to cause enormous damage in a short period of time.



Damage symptoms

- Spider mite larvae, nymphs and adults feed on the underside of the leaves and cause yellow spots, later even yellow leaves. This results in decreased plant growth and production. Finally the crop may die from the infestation.
- Nymphs and adults produce webbing that can cause cosmetic damage to the crop. If large numbers of spider mites are present, plants may be completely covered with webs.

8. **Scale**

Scale is a soft-bodied insect that hides beneath a shell-like covering.



Damage symptoms

As the insect feeds on plant juices, it excretes a waxy or wooly substance that forms this protective coating. Scale usually appears as smooth and brown or thick and white bumps on plant stems or leaf surfaces. When a plant is under attack from scale, its leaves gradually yellow and it loses vigor. Severely infested plants may die.

Prevention and Control

- Use your fingernails to scrape scale off of twigs.
- Prune off and destroy scale-infested twigs and branches.
- Encourage beneficial including lady beetles, soldier beetles, and parasitic wasps.
- Remove scale from leaves by dabbing with a cotton swab moistened with rubbing alcohol or a soft cloth soaked with soapy water. Rinse plants well after this treatment.

9. Pepper Maggot

These small white maggots are the larvae of a fly that lays its eggs beneath the skin of peppers, eggplant and other tomato-family crops.



Damage symptoms

Pepper maggot damage is similar to that of the European corn borer, and makes the fruit prone to rot. Feeding may also stunt the development of fruit and cause it to change color prematurely.

Prevention and Control

- Set up a trap crop of hot peppers around your garden to lure pepper maggot flies away from the main crop.
- Hang yellow sticky traps above the foliage of pepper plants to attract and capture adult flies.
- At the end of the growing season, remove spent tomatoes, peppers and eggplant from the garden.

10. Thrips

Onion thrips (*Thrips tabaci*) and western flower thrips (*Frankliniella occidentalis*) are a major problem in many protected crops, especially in cucumber.



Damage symptoms

- Thrips cause damage to the plant by piercing and sucking out cells on the leaf surface. This causes silver-grey spots on the leaves, with darkgreen spots (excretions) and reduces the production of the plant. At high infection levels leaves may even wither.
- The most important virus transmitted by thrips is tomato spotted wilt virus (TSWV). *Frankliniella occidentalis* is the major vector of this virus, that causes a lot of damage in the Mediteranean countries.

11. True bugs (capsids)

There are many different types of capsids, both harmful and useful. Harmful varieties include the common green capsid (*Lygocoris pabulinus*) and the common nettle capsid (*Liocoris tripustulatis*) that plague sweet pepper and aubergine crops, and the tarnished plant bug (*Lygus rugulipennis*) in cucumber crops.



Damage symptoms

- Common green capsids puncture soft plant sections, leaving tiny holes that become large gaps in full-grown leaves and pockmarks in the vegetables.
- Nymph and adult common nettle capsids generally stay around the head of the plant, giving rise to thick, bunched growth.

- Nymph and adult tarnished plant bugs secrete a toxin when they puncture the plant, killing the area around where the bug feeds.

12. Fruit Fly

Nothing draws a crowd of fruit flies like an overripe tomato or strawberry, because decaying fruit is a fruit fly's ideal egg-laying site.



Damage symptoms

After hatching, fruit fly grubs spend three or four days feeding on the decaying fruit before they mature into breeding adults and the cycle begins again.

Prevention and Control

- Fruit flies in the garden are a sign that you need to clean up decaying material and compost it.
- If you live in a mild climate and grow fruit trees, plant flowering groundcovers between trees to attract fly predators such as ground beetles. Pick up and destroy fallen fruit every day in the summertime.
- Indoors, consume ripening fruit immediately or store it in the refrigerator. Keep your indoor compost pail tightly covered and empty it every day or two.
- If you find fruit flies inside your house, first look for and remove any rotting fruit or vegetables. Don't forget to search cupboards for potatoes or onions that are starting to rot, and clean out your garbage disposal. The problem will usually disappear in a couple of days.
- Set up a fruit fly trap or place a sweet attractant such as cider vinegar inside a bottle or container that fruit flies can enter, but from which they can't escape.

13. Leafhopper

Leafhoppers are found throughout Africa and they cause serious damage to crops.



Damage symptoms

Stunted growth or leaves that are curled, stippled, or have a burned appearance are signs of leafhopper damage. The adults and nymphs pierce foliage and suck out plant juices. Their toxic saliva produces the characteristic damage symptoms and also transmits viral diseases. In vegetable gardens, leafhoppers seem to prefer potatoes, beans, lettuce, peppers and beets.

Prevention and Control

- Place garden fabric over susceptible plants to protect them from leafhopper damage. Check occasionally to be sure that no leafhoppers have emerged from the soil under the covers.
- Leaf hoppers can also be dislodged from plants with a strong spray of water from your hose. Recheck the plants a few days later and repeat the treatment as many times as needed. (Keep in mind that a blast of water can also kill beneficial insects.)
- Encourage predatory flies and parasitic wasps that prey on leafhoppers.
- Remove weeds and debris from the garden in fall to reduce the number of overwintering leafhoppers.

Module 7: Erosion control

FACILITATOR: *Introduce the topic and find out from the participants what they know about soil erosion. Use pictures or field trip to explain the different types of erosion and how they can be controlled.*

Erosion is washing away of the top soil which is rich in nutrients.

Evidence of Erosion

- Gutters on the farm
- Exposure of underlying rocks/stones and roots of trees.
- Accumulation of sand deposit

Control of soil erosion

- Create barriers
- Provide drainage to carry away run off water
- Mulching
- Plant cover crops e.g. mucuna, centrosema, pueraria
- Planting across slopes
- Practice Strip cropping and
- Alley farming

Module 8: Timely harvesting

FACILITATOR: *Find out from farmers about the maturity periods of named crops. Ask them to indicate the time of harvesting of the crops and the methods used in harvesting. It is also important to know the measures they put in place to avoid post harvest losses.*

Effects of delayed harvesting

- Rotting of produce
- Quality and quantity of crop are affected by pests and diseases
- Loss of income or profit

- Loss of nutritional value
- Delayed harvesting weakens the plant and reduces its life span

NB: the profitability of the farming business depends on the timely harvest. Late harvesting brings about post harvest losses.

Simple Record Keeping

Why do we keep farm records

1. to know expenses made and the income obtained from the farm.
2. helps to know if we made profit or not
3. for future reference about cost of inputs or the time a successful activity was carried out
4. It helps us to identify our weaknesses and strengths.

Examples of Farm Records to keep

1. Daily Farm Operational Records
2. Farm Expenditure or Inputs Records
3. Farm Income Records

Action Plan

Agric TOTs at the beginning of the year have to draw their action plan to guide them on what they want to do for the year. This can be prepared quarterly (every 3 months). The action plan should focus on the date the activity will be carried out, the location or community where the activity will take place and the topics to be discussed. The activities could be farm visits, demonstrations, home visits and educational sessions at community meetings, churches, communal labour sites, etc.

Module 9: Measurements and conversions

FACILITATOR: *Find out from the farmers their knowledge in measurements of land and farm sizes. Let farmers know the importance of knowing their farm sizes, that it will help them to predict the cost and benefit of cultivating a particular land.*

1 acre = 210×210 ft
70×70 yards
64×64m

1 ha = 2.5 acres
100×100m
10,000m²

1kg = 2.2 pounds
1m = 100cm = 3.2ft

Match box (wetable powder) = 10gms

Tin tomato
Liquid = 70 ml

Wettable powder = 40g

Milk tin

Powder = 100gms

Liquid = 170mls

1 inch = 2.54cm

2 inches = 5cm

4 inches = 10cm

5mls = 1 teaspoon

10mls = 1 tablespoon

2 fanta crown cock with lining = 5mls

Module 10: Introduction to food crops, tree crops and vegetable production

This is done in collaboration with the Ministry of Food and Agriculture (MOFA)

FACILITATOR: *You should do your best to read the books and other documents provided by The Hunger Project on crop productions thoroughly in order to have the facts at your finger tips. Explain to farmers how the under listed crops are cultivated with respect to the soil and climatic requirements, the methods of sowing, interval requirements, fertilizer application etc. Farmers should however be asked to first describe how they cultivate them before any gaps filled.*

1. Maize
2. Plantain
3. Cowpea
4. Cassava
5. Yam
6. Pepper
7. Okro
8. Garden eggs
9. Cabbage

10. Tomato
11. Cocoa
12. Oil Palm
13. Citrus
14. Mango

DEMONSTRATIONS

The facilitator should have practical applications of the following:

- Establishing a baseline before making rows or lines using the 3-4-5 method
- Row planting
- Nursery beds preparation
- Compost preparation
- Fertilizer application
- The use of handsprayers – calibrations water /chemical
- Root paring in plantain,
- etc

ACTION PLANNING

Work plan

What goes into an action plan

USE OF AGRIC TOTS MONITORING FORMS

Explain

Module 11: Biodiversity improvement project

FACILITATOR: *Introduce the topic and find out from the farmers, what they know about climate change. Explain what biodiversity, climate change or global warming means to the farmers. Let them know how it affects their livelihood and food security in general.*

Climate change or Global Warming has been a topical issue these days and every effort should be made to stop the warming. The Hunger project is working hard through the biodiversity improvement program to address some of the factors that contribute to the climate change.

Areas Considered Under Biodiversity are:

- Woodlot plantations
- Grasscutter rearing
- Snail farming
- Mushroom production
- Honey production (through bee keeping)

Importance of woodlot

- Source of income
- Firewood production

- Charcoal production
- It reduces the difficulty of women and children who travel long distances in search of wood for fuel.

Examples of trees that can be used for woodlots

- Cassia
- Nim tree
- With a 4 acre land, an acre each can be planted each year
- Every acre takes 1000 seedlings
- It is planted 6ft×6ft.
- Can be harvested in the fifth year.
- As the trees mature there will be a cycle of harvesting each year i.e. as the 1st farm is harvested the 5th year, the 2nd farm will be ready for harvesting in the sixth year and so on. The first farm when harvested will be ready again for harvesting after another 4 years.

Module 12: TIT BITS IN EXTENSION EDUCATION

Extension means **working with people**. No matter how competent an Agric TOT is, he will not be fully effective unless he understands how to work harmoniously with people. How the Agric TOT can put his knowledge to work and gain the confidence and cooperation in his community is considered.

Personal Attitude:

Under this heading are listed some of the qualities an Agric TOT needs in order to carry out his tasks.

Original Thought:

When faced with a problem whether familiar or not, the Agric TOT should not pick on a solution just because it has always served in the past. He should try and look at the problem from a fresh view point period. The Agric TOT is an agent of change. He is trying to bring about changes in the way farmers think and act.

Initiative:

The successful Agric TOT does not wait to be asked for advice. When a problem exists, he must try to do something about it, in the first place. If it is too difficult for him to solve, the problem should be clearly defined and referred to an Agric Extension Agent (AEA of MOFA) as promptly as possible. One of the tasks of an Agric TOT is to discuss problems of farmers and encourage them to make wise decisions for themselves.

Leadership:

The value of working closely with leaders is stressed. But the Agric TOT must also be a leader himself, a leader among leaders. Sincerity and enthusiasm for his job and his programs and his beliefs in the ability of the people he serves to progress will develop the Agric TOTs own powers of leadership. As soon as possible, he must develop powers to leadership among members of the various groups with which he works. In time, they will take an active interest in promoting the program and the ideas of the Agric TOTs as their own.

Organizational Ability:

If the Agric TOT activities are well planned, and organized, local leaders will find it easier to support the programs, and better results will be obtained. These results will increase the reputation of the extension services.

Module 13: Essentials in adult learning

FACILITATOR: *An Agric TOT is a teacher, and because of this he should thoroughly understand the principal factors involved in adult learning. Remember patience is an essential tool in teaching adults.*

1. Adults Learn Best (Most Rapidly) When They Have A Strong Desire to Learn:

A farmer has a crop that is being ravaged by insects. He knows his crop will soon be destroyed unless the insects are killed but he does not know how to kill the insects. What spray to use, how to mix it or how to apply it. He seeks advice from an Agric TOT. This farmer is eager to learn and will learn rapidly because there is a strong desire on his part to learn, how to save his crop.

The desire to learn must be stimulated in many people by the Agric TOT. He must show them that learning a new method or technique is important for them and will give them money or add to their satisfaction in other ways. He will then have them in his frame of mind where they will want to learn.

2. Adults Learn Best When They Have Clear Goals:

An adult learns best when he knows exactly what he wants to accomplish. An Agric TOT has observed in a certain village that the eggs production of the chickens is low. He holds a meeting with the poultry farmers to discuss egg production. He convinces them in the discussion that their eggs production is far too low and that they can improve/increase their production from 3 to 5 eggs per week by feeding them with improved ration and using birds from improved stock. He fixes a goal in their minds on increase of 2 eggs per week. The poultry farmers are then eager to learn the methods by which this goal can be reached.

Set simple and direct goals in only a very few fields. Farmers will become confused if too many goals are set. Set one or two goals and teach how they may be reached. When these goals have been attained then set new ones.

3. Adults Learn Best When They Put Forth An Effort to Learn:

A third requirement in the learning process is to put forth effort. Each person must do his own learning because no one else can learn for him. Learning is an individual matter. Learning something new is never complete until it is put into practice. A farmer has not necessarily learned to follow a recommended practice because he tried it. He has learned it if he continues to practice. Only repetition or continual practice will completely establish the new learning as habit. (Practice makes perfect)

4. Adult Learn Best When They Receive Satisfaction From What They Have Learned:

Adults learn best when they receive some reward from learning. This reward may be in the form of more profit from the sale of a crop grown by improved methods, or in the satisfaction from a home improvement or in the esteem of their neighbours for leadership in a village improvement project.

Things learned which provide satisfying action tend to be repeated. The farmer who obtains larger yield of corn by planting hybrid seed is likely to continue this practice. **Satisfaction from one learning experience stimulates desire for learning in other fields.**

It is frequently necessary for the Agric TOT to help the learner to see that he is moving towards the desired goal and to help him recognize and appreciate the progress that he is making.

Module 13: Steps in Teaching

***FACILITATOR:** Know that teachers are best understood when illustrations and field demonstrations are used. It is important for you to equip yourself and understand the concept first in order to make it easier to put your message across.*

In the last lesson we learnt that continued practice is necessary for the retention of learning and for the development of habits. In order to bring about the desired changes in the behavior of people, the Agric TOT needs to organize activities so that there will be repetition of the desired behavior, each successive repetition building on the one before.

The Agric TOT, therefore, plans and arranges situations and activities whereby the things to be learned is called to the attention of the prospective learner; his interest developed, desire aroused and action promoted.

The following 6 steps in teaching are parallel to the 4 requirement in the learning process. Only the point of view is different:-

Step 1: Getting the Attention of the Learner:

Most of our farmers do not know of the great improvement in farming methods that have been developed in our agricultural stations, and how the employment of these methods can make farming so much more profitable. The first job of the Agric TOT is to direct the attention of the farmer to the newer methods of farming suggested by the research institute.

Step 2 Stimulating the Learner Interest:

After the learners attention has been directed to the newer methods, the next step is to appeal to his interest by showing him how the new method may be of value to him, how it may increase his yield and profit or save his labour.

Step 3 Arousing the Learner's Desire for Information:

When the attention of the farmer has been directed to a new method and his interest aroused in the possibility that this new method may be of direct value in meeting his want, the farmer will want to get all possible information on how the new method may be employed to his advantage.

Step 4 Convincing the Learner That He Should Act

An Agric TOT has directed the attention of a cultivator to a new method, he has stimulated his interest, supplied him information on the method. The next step is to convince him that he must put the new method into operation. Generally, this is not hard to do if steps 1-3 have been taught.

Step 5 Getting Action by the Learner:

Teaching is of little value unless converted into action. The Agric TOT must do everything possible to make action easy. If the improvement requires fertilizer or a type of seed or new equipment, Agric TOT must take the responsibility of arranging for its purchase by the

farmer at a convenient source and at a fair price. The farmer by himself cannot do this and will act if there are blocks in the way of action.

Step 6 Making Certain That The Learner Obtains Satisfaction From His Action:

The Agric TOT has a follow up job. He must help the learner evaluate the progress, made, measure an increased yield and strengthen the satisfaction obtained. A farmer that meets a want by the successful appreciation of a new method becomes a local teacher/leader in influencing his (people) neighbours to satisfy their wants by following the same practice and he finds satisfaction and prestige in teaching and helping them. Again, when a farmer has adopted a new practice and realized profit and satisfaction from its employment, he gains confidence in his own ability to learn and is ready to try yet new methods.

Module 14: Communication

The communicator is usually the Agric TOT. Unless the farmer respects the Agric TOT and has confidence in him, he may reject the message. However, even if the farmer has confidence in the communicator and the source of the message, this confidence is not always sufficient alone to ensure complete learning. How much he learns is affected by the communicator's attitude to the message and how it is put over. Not only must he know his facts, he must present them with sincerity and enthusiasm and in a manner that the farmer will understand. The message is what it is wished to communicate to the farmers. It normally contains facts and the evidence to support those facts. Facts alone are not enough; proof acceptable to the audience is also needed. It may be necessary to break the message down into simple easily understood steps and to prove each step.

The channel is the method used to bridge the gap between our knowledge and the farmers' problem. One of the three (3) types of methods of communication will be used.

Mass Methods:- such as radio, newspaper, mobile units and films

Group Methods:- such as demonstration, meetings and field days

Individual Methods:- as personal visit to the farmers

The channel which is most suitable should be selected. For example, a message on the need for early preparation of fields for planting is usually put over the mass and group methods, whereas farm management or planning advice usually involves personal visits to individual farmers. The audience and the response desired largely determine the channel used. Situations which require large numbers of people to do something simple are best tackled by mass and group methods. Where limited numbers of people are to be taught some complex innovation, individual methods will be necessary.

To communicate effectively, planning is necessary. All too often pressure of work results in insufficient time being given to the planning of meetings and demonstrations. Communication is the business of understanding and being understood. Unless the farmers understand the message, they will learn nothing. If they have failed to learn, then we have failed to teach.

Module 15: Extension teaching methods

The extension agent is a teacher and he must plan the teaching activities he will use and the teaching tools most appropriate. Extension teaching makes use of the same general methods that are used in other fields of teaching.

In college, an instructor in poultry lectures to his class. He is using oral instruction or the spoken word. Following the lecture he leads his class in discussion. This is a group meeting with all students participating. He shows pictures, sketches or slides illustrative of his lecture. This is visual instruction. From his platform before the class, he carefully shows them how to debeak a chicken – a method demonstration. He takes the class to the college poultry farm to witness the difference in response to feeds of varying nutrient levels. This is a result demonstration

These basic methods, modified or combined as the occasion may demand, are tools of the Agric TOT also but employed in a totally different setting other than a college classroom and with totally different objectives.

The methods used in doing extension teaching are commonly grouped into three broad categories

1. Individual Contacts
2. Group Contacts
3. Mass Media or Contacts

In dealing with the individual, we have a person to person approach which must result in mutual friendship and confidence if the contact is to be successful. This is not as important with group contacts and even less so for the use of mass media. On the other hand, a successful Agric TOT should try to become skillful in all three categories. The reason for this is because people learn faster and make changes more rapidly if several methods are applied to each practice you wish to change.

Individual Contacts:

Farm and Home Visits
Telephone Calls
Personal Letters
Result Demonstration

Group Contacts:

Method Demonstration meetings
Leader training meetings
Lecture meetings
Discussion meetings
Meetings at result demonstration
Tours
Schools
Miscellaneous meetings

Mass Media or Contacts

Bulletins, Leaflets, News stores, Circular letters, radio, exhibits, posters, Television

a) Culture-based barriers

1. Tradition:

Most rural societies look upon new methods with indifference and sometimes with suspicion. Respect for elders often results in the attitude that the old ways are best. People fear the unknown and untried; they also fear to incur criticism for doing something different from the rest of the society. Village people may think that Agric TOT is introducing changes to benefit himself. These attitudes may explain the behavior of people who seem to agree with you that a new method is good, but are not prepared to put it into practice.

2. Belief in their own Culture:

Members of all societies believe that their way of life is best. "These new methods of farming may be right for other people but they are not good for us". This attitude results in people being reluctant to try something new. "How can it be better than our way? We know what is best for us".

3. Pride and Dignity:

People may be too proud to practice ways of farming that may result in people looking down on them. For example, they may be too proud to carry cattle manure to their fields. Many young people leaving school look down on farming although some successful farmers earn more than most government employees and school teachers.

4. Relative Value:

Certain improved varieties of maize have been shown to yield much better than local maize. However, some have not been used by farmers because they do not keep so well in store (La posta) or the colour or taste of (porridge) made from them is not acceptable. Rural people may value taste, appearance or some other factor more than the yield or cash return of different variety of a crop.

5. Customary Body Position:

People in the Northern and Upper Regions use long hoes and work nearly upright whereas those in the Ashanti and Volta Regions use short handled hoes and bend to work with them. New methods or tools may require different body positions. The need to learn new positions may slow down acceptance of the new ideas.

b) Social barriers to change

1. Responsibilities of the Individual:

Individuals within a society or a kinship group have responsibilities which they are expected to carry out. People who avoid such responsibilities anger other members of the society. A man may find that as his income increases, so his obligations to his society or family increase. The more money he earns, the more help his kinsmen will expect from him. This can be a very serious barrier to change if individual sees little advantage in improving his position when he does not benefit much from the improvement himself.

2. Traditional Ceremonies:

Ceremonies such as wedding, funerals, and enthronement of chiefs can take up so much of the farmers time that he is unable to work his farm to the maximum efficiency. He is, therefore, unlikely to adopt new methods which, while they might increase his income, mean

that he has to devote more time to working his farm and less time to ceremonial social obligations.

3. Social Structure:

Agric TOTs should understand the structure of the society with which they work so as to be able to recognize and use the influential people who are most likely to be able to persuade the society to accept change. A village may split into two or more factions because of quarrels between family heads. When working with these factions, it is necessary not to favour one or the other. If a new idea is accepted by one faction, it may be rejected by the other simply because the first has accepted it. Always find out who is an authority in a village. It may be one individual or a number of people. Sometimes a whole family may participate in making village or group decisions. Elected officials, chiefs, or headmen are not necessarily the only leaders or people of most influence. It is necessary to recognize and work through such officials, leaders but there may be other people who have no official position yet who have an influence within the group and who should be consulted.

DISCUSS THE CORE ACTIVITIES TO BE CARRIED OUT BY AGRIC TOTS:

1. Monitoring of Farms:
2. Education:- at community meetings, at communal labour and at churches
3. Farm Visits
4. Method and Results Demonstration on:-
 - Row planting
 - Fertilizer application
 - Chemical weed control
 - Treatment of maize before storage , etc
 - Crib construction
5. Home visits
6. Writing and submitting Monthly Reports on activities carried out.
7. Etc