



German
Development
Cooperation

UNHCR-BMZ Partnership Program

Implemented by **gtz**

Multi-storey gardening

Training Manual 2008



Micro-Agriculture (MSG) promotes good health (capsicum California wonder)

GTZ DADAAB 2004 - 2005

Introduction

Participants

Each participant (Facilitator/Extension officer) has to introduce him/herself to the other

Guiding Questions

1. What is agriculture?

- Means Cultivation of the field for the purpose of crop production, rearing of livestock. it involves storage, processing and marketing of agricultural products

•

2. What are the key principles of agriculture?

- Land
- Rainfall
- Capital
- Marketing

•

3. What are the roles of agriculture in the economies of ---?

- Provides food
- Provides employment
- Provides raw materials for industries
- Provide foreign exchange

•

4. What are the problems facing agriculture?

- Poor crop and animal husbandry
- Poor marketing facilities
- Lack of capital
- Physiological and sociological factors
- Poor tools
- Pests and diseases
- Fluctuation of commodity prices
- Aridity
- Land use
- Land tenure
- Poor storage

5. What are the principles of crop production?

- Rainfall –distribution of rainfall, rainfall reliability, erosion and stormdamage, evaporation
- Temperature and Altitude
- Light –light intensity, light duration, light wave length
- Evapotranspiration—(factors contributing -air temperature, relative humidity ,wind)
- Wind
- Soil

•

6. Common vegetable production

- Kales
- Spinach

- Okra
- Capsicum
- Pepper-chili
- Tomato
- Onion
- Cabbage
- Cow peas
- sorghum

6 Field operations/MSG see bklet

- Land preparation
- Sowing-Germination,Transplanting,plant population
- Weeding
- Pests and disease control
- Harvesting
- Storage

7. Record keeping

MSG

Multi-storey gardening is a simple farming technology, which is aimed at producing vegetables to supplement the food basket for micronutrient provision



Okra growing in MSG

The project goal is to improve the nutritional status of the community.

The purpose (Project expectation from the target group) is to increase production of vegetables through small scale vegetable production (MSG and conventional farming)

An expectation of the participants has to be explored through plenary.

MODULE 1

NUTRITION

Definition of Nutrition: (WHO)

“Nutrition is a process where living organisms utilize food nutrients for the maintenance of life, maturation, and normal functioning of organs and tissues and the production of energy.”

In other words, nutrients from different foods allow the body to do the following:

- develop, replace and repair cells & tissues
- produce energy to keep warm, move & work
- carry out chemical processes such as the digestion of food
- protect against, resist & fight infections, as well as recover from sickness

FOOD is made up of nutrients – we classify foods into different groups according to their nutrient content

Macronutrients – the body needs these in large amounts – they are:

- Proteins
- Carbohydrates
- Fats & Oils

Micronutrients – the body needs these in small amounts – they are:

- Vitamins
- Minerals

As well as non foods that play essential roles in the body – they are:

- Fibre
- Water

Most foods have mixtures of nutrients – but many of them contain a lot of one nutrient and a little of the other nutrients – hence foods are grouped ideally according to the nutrient they contain in abundance i.e. highest content in terms of functions in the body.

FUNCTIONS & FOOD SOURCES OF NUTRIENTS

NUTRIENT	Roles/function/s in the body	Sources
PROTEINS	Body building. Build and repair body tissue NB. Animal proteins contains all essential Amino acids – plant proteins do not	Animal proteins: milk,meat,fish,eggs,chicken Plant proteins: beans, soya, ndengu, peas, groundnuts
CARBOHYDRATES	Energy giving foods – for work and other functions NB. These foods contain mostly carbohydrates but	Wheat flour, maize, rice, millet, sweet- Potatoes, Sorghum, potatoes,

	also small amounts of other nutrients e.g. proteins, minerals, vitamins	cassava, Matoke Sugar – simple carbohydrate. Contains only energy
FATS & OILS	Energy giving. Support/cushion organs e.g. heart, kidney, intestines. Insulation – keeps body warm Fats & oils are a concentrated form of calories i.e. more than twice the amount of energy in carbohydrates. Excess kcal get converted into fat & stored in body	Animal fats: cooking fat, ghee, butter Plants: corn oil, palm oil, simsim oil, groundnut oil, margarine (blue band)
VITAMINS	Organic substances found in foods in small amount and are essential for metabolic functions	Fat soluble: A D E K Water Soluble: C & B complex (8) *see separate table
MINERALS	Organic substances needed in small amounts but essential for regulating & building the cells which make up the body	* separate table
FIBRE	Binds the contents in the large intestine that are not digested into a soft faecal mass that can be expelled	Leafy vegetables, fruits
WATER	To makes cells & fluids e.g. tears, digestive juices, urine. To make sweat for cooling body. For essential body processes. Keeping linings of mouth, gut, eyelids, lungs etc wet & healthy	
VITAMIN	Roles/function/s in the body	Sources
A	Makes white blood cells. Essential for good eye sight, healthy skin, & mucous membrane. Development of teeth & bones	Yellow & orange fruits & vegetables – carrots, papaya, mangoes, oranges. Dark green leafy vegetables – sukuma wiki, spinach Liver, eggs, oily fish, milk, butter, chicken
D *sunshine vitamin	Proper formation of bones & teeth. (prevents rickets- brittle & soft bones)	Sunshine.(makes Vit D under skin) In small amounts in eggs, butter, fish oil, ghee
E *antiageing factor	Protects the cell structures i.e. ensures cells function properly. Helps body fight infections & diseases (e.g. heart, asthma, arthritis...)essential for fertility & reproductive health	Vegetable oils – sunflower seed oil, soya bean oil, wheat germ oil Nuts & seeds Dark green leafy vegetables Eggs
K *anti-haemorrhagic vitamin	Helps the blood to clot (thru production of clotting agent prothrombin)	Sukuma wiki, spinach, cabbage, broccoli Bacteria in intestines produces Vit K
C ascorbic acid	Helps body fight infections. Healing wounds thru formation of collagen. Helps body use other nutrients e.g. calcium for building bones, blood vessel walls, skin & teeth. Helps body absorb iron	Citrus fruits – lemons, oranges Cabbages, tomatoes, pilipili hoho (capsicum),potatoes, apples, mangoes, melons, papaya,
B1 Thiamine	Helps convert carbohydrates into energy. Promotes growth. Protects the heart muscle. normal functioning of nervous system	Wholegrain cereals – Wheat flour, rice, maize, soya beans, peas, potatoes, nuts, Meat (esp. liver, sheep), Milk
B2 Riboflavin	Essential for growth & general health. Helps with enzyme functions. Health skin, hair, nails	Wholegrain cereals (as B1), Nuts Meat, Milk & milk products, vegetables, fruits
B3 Niacin	Essential for energy metabolism, general health. Nerves, digestion.	Milk, fish, meat, eggs, chicken Wholegrain cereals, Nuts
B6	Helps with metabolism, absorption of fats & proteins. Helps in brain function, nervous system, and healthy pregnancies. Helps to make antibodies against bacterial infections, re-generation of red blood cells	Meats, fish, beans, maize, wheat, nuts Leafy green vegetables Bananas, avocados

B9 Folic Acid/Folate	Prevents anaemia. Required for making of red blood cells – specifically the formation of haemoglobin. Healthy skin & hair. building of antibodies	Liver, meat, fish, eggs, Cowpeas, lentils, beans, Spinach, wholegrain cereals, Avocadoes,
B12	Development of new cells and healthy nervous system. Proper utilization of fats, carbohydrates & proteins. promotes growth	*Animal products only liver (esp. sheep & goat).meat, fish, chicken, eggs, milk

NB. B9 – Folic Acid is the single most important nutrient for a pregnant woman and her growing foetus.prevents anaemia in the mother & protects the foetus against certain birth defects

Other B complex vitamins are B5 pantothenic acid found in extensive quantities foods, & is involved in all vital functions of the body & B8 – Biotin, vital for a healthy immune system, skin & nervous system

MINERALS*those of concern	Roles/function/s in the body	Sources
Calcium	Proper development of bones & teeth Helps muscles to function Aids with blood clotting & healing process	Milk & milk products (yoghurt, cheese, mala) Dried fish Millet, coconut, beans, nuts, green leaves
Iodine	Part of thyroxine hormone produced by thyroid gland. Essential for regulating body's metabolism	Primary source is seafood.(esp. salt water fish) Iodized salt
Iron	Essential for production of haemoglobin. Helps blood carry oxygen through the body. removes carbondioxide from the tissues (purifies the blood) Aids growth. Prevents fatigue	Animal foods -meat, liver, chicken, fish (heme iron – better absorbed) Plant foods – soya beans, beans, wholegrains, peas, cauliflower greens, nuts (non heme iron – not well absorbed)
Zinc	Boosts the immune system. Helps digestion & healing. Transports Vitamin A in the body. Normal growth & development of children	Meat, fish, chicken Beans, dengue, peas, wheat Leafy green vegetables

NB .Iron from animal sources is better absorbed by the body (heme iron), than iron from plant sources (non heme iron).

Vitamin C helps with absorption of non heme iron. Also, including a bit of animal protein with plant proteins helps the body absorb the non heme iron.

NB. Anaemia = low haemoglobin level. (Normal levels = 12 – 18 (M) 11-18 (F) of hb per 100 ml
Anaemia

Very common in expectant women

Is deficiency of blood caused by in adequate synthesis of hemoglobin in the body?

Symptoms

- dizziness
- fatigue
- shortness of breath
- headache
- loss of appetite
- Numbering and tingling of fingers and toes.
- The mucous membrane becomes pale.

Intervention of Anaemia

Diet rich in iron,

- Liver ,green leafy vegetables, eggs
- Legumes –beans, peas, cowpeas, green grams.
- Meat

Note; Absorption of iron is interfered by tea

Night Blindness

- Vitamin A deficiency. It affects the eyes.

Symptoms

- reduced ability to see in dim light
- reduced immunity especially in children

Intervention of Night Blindness

Foods rich in vitamin A –vegetables, pawpaw, tomatoes,

Exercise –collect data on how many do not see well as from 6 00 pm

Group work;

Identify persons suffering from Anaemia/night blindness

Visit one of the pharmacies and find out frequency of persons buying vitamin drugs

MICRONUTRIENT DEFICIENCIES

Refers to conditions or illnesses that are caused by lack of certain micronutrients in our bodies.

Those of concern to us are as follows:

Vitamin A deficiency – leads to Xerophthalmia i.e. dryness of the eyes, & Night blindness

Iron deficiency – leads to anaemia

Iodine deficiency – causes Goiter, Mental impairment (critical to school going children)

Vitamin C deficiency – can lead to scurvy – a condition characterized by swollen & bleeding gums.

* In Dadaab – children <5 years are supplemented with Vitamin A every 6 months. Moderately malnourished children <5 years are supplemented with Vitamin C on admission to the SFP

Example s of Food value

	100gm amaranth us	Cowpeas leaves	cabbage
Iron	8.9	5.7	0.7
Vit c – (mg)	64	-	54
Calcium	410 mg	25 6	47 mg
B- carbonate (vit A)	5,716	7,970	100 (micro gram)

See the table attached

Group work assignments

- What is the common food in the community
- Analyze the class it belongs
- Nutrients it provides to the body
- Are there GAPS?
- What are the solutions?

MODULE 2
MSG CONSTRUCTION/ESTABLISHMENT

MSG

Multi-storey gardening is a simple farming technology, which is aimed at producing vegetables to supplement the food basket for micronutrient provision

Components of MSG



Tools and Equipments

1. Jembe – used to dig the soil that will be mixed with other components for constructing the garden.
2. Forkjembe – used to dig the soil in hard ground areas.
3. Spade –used in collection and mixing the soil components.
4. Tinsnip/Knive – used to cut the top part of the tin completely.
5. Tin punch- used to punch holes on the tins surfaces and the bottom.
6. Wheelbarrow – used to measure and transport the various soil parts to the recommended ratio.

Equipments for MSG

1. Perforated tins.
2. Sacks.
3. Gravel clay soil.
4. Sand soil (main Part).
5. Manure.
6. Seeds.
7. Water.

Purpose of various equipments

- | | | |
|--------------------|---|--|
| 1. Perforated tins | - | To pass water through to the soil component |
| | - | To hold the gravel in the sack |
| | - | Filters dirty water |
| | - | Bottom tins have few holes and no holes on the bottom. |
| | - | 2 nd bottom tin have more holes. |
| | - | 3 rd tin has more holes than the rest. |
| 2. Sacks | - | Hold the soil. |
| | - | To act as a planting base. |
| 3. Gravel | - | To water garden through it. |
| | - | To filter dirty water. |
| | - | To divert the flow of waterside ways |
| 4. Clay soil | - | Collect the topsoil for better crop development |
| | - | Main soil part of the garden. |
| 5. Sand soil | - | To create air spaces |
| 6. Manure | - | Provides nutrient to the soil for good plants growth. |
| | - | Should be well rotten manure. |

Ratio: This depends with the area soil type.

MSG construction

- Tools
- Mix the three soil parts
- 2 Spades of soil are put in the sack and leveled. The bottom tin perforated at the sides filled with gravel, but not perforated at the bottom is placed on the soil.
- Soil is filled at the sides to the level of the tin and the other tin placed on.
- Soil is again filled at the sides to the level of the second tin; same process is repeated till the last tin.



Sitting /basic requirement of each crop to be observed.

- A place without direct sunlight.
- A place without direct wind blowing.
- A place where no interference.
- Places where there is enough protection and if necessary protect the area first if not.

Pretreatment

After the garden is constructed watering is supposed to be done till all parts receive enough moisture content for sowing and planting.

Vegetables suitable for Multi storey gardening.



Vegetables needs constant husbandry from germination to harvesting.



Suitable vegetables for MSG

Common name	Somali name
Dania - Coriander	Dania
Sukuma wiki - Collards	Sukuma
Capsicum - California wonder	Pilipilihoho
Egg plant - Black beauty	Birganya
Spinach - Fordhok giant	Spinach
Tomatoes - Caj, M82	Nyanya
Okra - Pusa sawani	Bamia
Amaranthus - Terere	Terere

Suitable vegetables for MSG



Seeds and seedlings production

Seeds

Treated seeds from certified seed company are the most preferred for sowing due to their resistant to soil borne diseases. In the present world research is still on progress to get seeds which will produce maximum yield.

Seedlings Production

This sowing of seeds either **direct** or **indirect** to produce young vegetables.

Direct sowing

- Sowing on the garden top part as seedbed and transplant some at the recommended period to the sides of garden as per the recommended layers, plant population per garden per vegetable .

(Demonstrate the right quantity of seeds to be sown, layers recommended, plant population per vegetable).

Indirect sowing

- This is the sowing of seeds in the seedbed for special care and transplanting them, later to the field (portable seedbed suitable also).

Transplanting seedlings

This transfer of the seedling from seedbed to the required place for growth or full development till harvesting.

- Watering the seedling before transplanting is recommended.
- Uprooting the recommended hardened seedling always to ensure survival at the field.

Seedling selection/plant population per MSG

- A mature seedling, healthy seedling meeting the below age,

Show the recommended transplanting age /population of various seedlings/vegetables in MSG,

Vegetable	Transplanting age	Plant population
Dania - coriander		16-25 plants.
Sukuma wiki – collards	4- 6 true leaves	16- 25 plant
Capsicum – california wonder	4-6true leaves	12 plants
Egg plant – black beauty	4- 6true leaves	12 plants
Spinach – fordhok giant	4-6 true leaves	16-25 plants
Tomatoes – caj,M82	4-6 true leaves	12 plants
Okra – pusa sawani	4-6 true leaves	16-25plants
Amaranthus -Terer	4- 6 true leaves	16-25plants
Onion	Pencil thickness	16-25plants

This will ensure that the plant stem will have acquired the recommended strength to avoid breaking during transplanting period. Transplanting is always done in the evening. After transplanting watering in the morning and evening 5litres simultaneously.

Water in MSG



Water is essential for life.

After transplanting, watering is done in the morning and evening 5 liters simultaneously. Waste water from kitchen, water stands/taps/kiosks spillage water is used to water the garden. Various areas need to have water troughs and more roof catchment be constructed. The target group should be informed that waste water is suitable for the farming technology in practice or introduced.



Example

Irregular watering in tomatoes causes a disease called Blossom End Rot due to insufficient translocation of the nutrients required for its fruit development. Lack of calcium ions which act as electrolyte for water transportation in plants helps water move from one cell to the other.

Questions fro group work.

1. Why is water/ waste essential in MSG?
2. How do you detect if your garden has insufficient water?
3. How do you detect if your garden I over watered?
- 4 How do you come up with additional water source?

Group work

Practical on MSG construction, sitting, pretreatmnet and transplanting.

MODULE 3

MALNUTRITION

Dfn: It is a condition that occurs due to lack of the required amounts or right kind of food that the body needs to grow, develop and function normally.

There are two forms of growth failure (Malnutrition)

1. Wasting
2. Stunting

1. Wasting (acute malnutrition)

Condition of persons suffering from above

- Extremely weak
- Readily reversible
- Measured by weight for height index
- Is evidence of P.E.M(Protein Energy Malnutrition) means lack of protein body building foods

3. Stunting (chronic Malnutrition)

Condition of persons suffering from above

- Develops over long period of time as a result of inadequate nutrition or repeated infection or both.
- Are short for age
- Look younger than their usual age
- By 2years height deficits may not be reversible
- Measured using the height for age index.

Types of Malnutrition

1. Marasmus

- means starvation

Signs and symptoms

- Protruding stomach and prominent ribs.
- Hair colour changes
- Looks like old person
- Low weight for height
- Very hungry, have good appetite
- Skin is thin, wrinkled and looks too big for the body.

2. Kwashiorkor

- Due to lack of protein

Signs and symptoms

- Oedema (swelling of the body especially the face-moon face, hands, forearms, hands, legs and feet.
- Child looks miserable and disinterested in surroundings
- Lack of appetite
- Skin looks light in colour
- Retarded growth.

- Thin sparse hair that looks reddish, grayish.

3. Marasmic kwashiorkor

- A condition where both protein and energy intake is low

Intervention of Kwashiorkor

- High protein foods-eggs, milk, fish, beans, cowpeas, spinach
- Energy giving foods –millets, sorghum, enriched maize porridge, rice, wheat products.
- Appropriate weaning of the practices in terms of age of child.

Causes of Malnutrition

- Environment factors- famine
- Wars and displacements
- Disease illness
- Poor diet-under nutrition, over nutrition
- Ignorance
- Cultural factors (traditional beliefs and taboos)

Group work;

Identify persons suffering from Anaemia/night blindness

Visit one of the pharmacies and find out frequency of persons buying vitamin drugs

MODULE 4
TARGET AND TARGETING

Selected households/areas targeted will be reported as below:

Sites/households selection criteria's	No. of households and on site of the group	No. of MSG	Acreage	Remarks
Households with children under 5years				
Households living with HIV AIDS (home based care patients				
Female headed families,				
Households with agricultural background				
Households with old persons				
Schools (Environment club members),				

Each farmer to have data collection forms for record keeping

MODULE 5

PEST AND DISEASE CONTROL

Pest – is any living organism or animal that causes plants disorder affecting the total yield either by feeding/sucking the plant saps on the leaves or stem thus impairing with photosynthesis. Disease – is any infection caused by fungi, nematode and virus. It's a physiological disorder caused by fungi, virus, nematode, bacteria, insects and nutrient deficiency.

Vegetables are prone to pests and disease attacks but if field hygiene is observed it can be minimal.

Four Main Methods of Pest and Disease control.

- Cultural methods
- Traditional methods
- Chemical methods
- Biological methods

Cultural methods

This is control of pests and disease through good farming practices such as use of clean planting materials, early planting, field hygiene, crop rotation, growing resistant varieties, manuring, correct spacing/pruning, weed control and quarantine incase of disease outbreak.

Traditional methods

These are those methods which people have been using since they started farming.

Chemical methods

If the above two could not work this method is tried. This method is expensive and chemicals are harmful and instruction manuals should be followed strictly.

The following are important points to note;

- The pest/disease to be controlled must be clearly identified so that the right agrochemicals is purchased
- Buy /acquire agrochemicals that you will use and exhaust within that spraying time
- Confirm the expiry dates before you move out from the source
- Do not transport chemicals with the same basket with food, as they are poisonous.
- Dilute agrochemicals according instructions given at the label
- Advice farmers to harvest mature vegetables before spraying.
- Spraying should be done in the evening in hot areas.
- Advice the farmer to water the vegetables before spraying.
- Spray agrochemical with longer-harvest interval when plants are young/when you have long time to harvest.
- Spray agrochemicals with short pre-harvest internal when you have to harvest in a short time
- Wash the knapsack sprayer at the end of spraying.
- Do not store diluted chemicals.
- Dilute chemicals that will be exhausted at the spraying period.

Group work on Pesticide (chemical) analysis

Assignments

- Classify the chemicals and follow the above guidelines for use and give information required.
- Name of chemicals
- Manufactured date
- Mixing ration
- Type of chemicals (pesticide)
- Crop applied.

Pests/Disease identified

Specimens to be collected from the field if any vegetables available.

Vegetable	Group assignments	Remarks
Spinach leaf,okra fruit, leaf	1	Observation
Tomatoes, eggplant	2	Observation
Pepper, kales	3	Observation

Common pests and diseases and their control.

	Pest/disease	Crops infected	Symptoms	Recommended controll methods
1	Red spider mite	Okra,Eggplant,Tomatoes	Brown spots on leaves. Later whole leave turn brown. Red small mites visible	Crop rotation Spray with thiovate insecticide.omite,kelthane Marshal, Brigade, Mitigan.
2	Blight	Tomatoes	Leaves have lessons and dry up after few days	Crop rotation. Use of resistant/tolerant varieties Use preventive antracoal,dithane-M45 Use curatives Milraz,Ridomil,topsin,fosphite
3	Bacterial wilt	Tomatoes Okra, Eggplant	All plants wilt suddenly the plant crosssectional areas shows xylem and phloem black. When squeezed, the sap smells rotten	Uprooting the plants
4	Diamond back month	Kales ,cabbage	Large holes on the leaves	Practice crop rotation Transplant seedlings at the beginng of rain season -spray Thuricide treat the seeds with red copper and all transplants in solution of topsin

				for prevention
5	Cutworm	Tomatoes ,eggplant,okra,kales	Cut the plant at the base and falls down, burrows in the stem of the plant and produces	Practice crop rotation Transplant seedlings at the beginning of the rain season. Spray thuricede,diazinol,dimetheoat,karate

For others see the crop protection handbook

- **Biological Method**

This by use of other insects/animal feed on the pest

Example: the lady bird feeds on beetles aphids, American boll worm and chafferworm

Identify the pests/disease well and differentiate from the natural enemies.

Learn the life cycles of the different pests and disease transmitters for detection of the best stage to control

Refer to integrated pest Management booklets, tomatoes, brassisca and okra by Anna Milena Varela and Abdurabi Seif.

Traditional pest/Disease Management

- **Tobacco-powder**
- **Pepper-powder**

Group presentation
Facilitators Options.

MODULE 6

HARVESTING/FOODPRESERVATION

Each vegetable has harvesting technique,

Vegetable	Harvesting technique
Spinach	Prick the 2 lower leaves
Kales	Prick the 2 lower leaves
Okra	Prick the pods as more will be produced
Tomato	Pick the ripe fruit
Eggplant	Pick the biggest fruit
Pepper/Capsicum	Pick the bigger peppers always
Spinach amaranthus	Prick the bigger leaves always and fresh ones
Leek onion	Prick the leaves

When optimum vegetables are husbandry is adhered, benefits, goal/purpose are achieved.

Do all of you know how to cook the vegetables? Do you personally eat the vegetables planted in multi storey gardens?

Vegetable	Part cooked	Remarks
Spinach	Leaves	Big leaves
Kales	Leaves	As above
Tomatoes	Fruit	When ripe
Eggplant	Fruit	Big fruits
Dania	Whole plant	Mature
Okra	Fruit	Small fruits
Leek onion	Leaves /bulbs	Average big
Capsicum	Fruit	Mature (ripe)fruit

Group assignments

Salad group

Ingredients for salad preparations

Tomatoes, onions, spinach, carrots, leek onion.

- Wash each of the vegetables well in clean sufuria
- Remove the stems of the vegetables slowly
- Cut and slice the vegetables in order of their suitability
- Add some pinches of salts and a spoon of vegetable oil.
- Cover your prepared salad ready to serve
- Its ideal to use separate plates when preparing salads

Mixed preparations group.

- Wash any vegetable before cooking
- Cut the kales into small pieces
- Slice the onion into small pieces
- Cut the eggplant into small pieces

- Put oil into the sufuria
- Add leek onions
- Place into fire and stir using spoon.
- Add tomatoes, eggplant, okra and cover with a lid.
- Let the mix cook for 5 minutes.
- Remove the mix from the fire and pour on plate and cover.

Separate preparations group

Spinach, onion, tomatoes, eggplant.

Onion and tomatoes

- Wash the vegetables
- Cut the vegetables into small pieces
- Take a clean sufuria put the small oil and place on fire.
- Add cut onion and let it fry for sometimes
- Add cut tomatoes
- Add spinach and let it fry for a while
- Wait for 5 minutes and remove

Spinach and onion

- Wash the vegetables
- Cut the vegetables into small pieces
- Take a clean sufuria put the small oil and place on fire.
- Add cut onion and let it fry for sometimes
- Add cut spinach
- Add spinach and let it fry for a while
- Wait for 5 minutes and remove

Onion and Eggplant

- Wash the vegetables
- Cut the vegetables into small pieces
- Take a clean sufuria put the small oil and place on fire.
- Add cut onion and let it fry for sometimes
- Add cut eggplant
- Add spinach and let it fry for a while
- Wait for 5 minutes and remove

Food Preservation

Its process of keeping food safe and wholesome for later use by preventing spoilage.

Reasons for food preservation

- Use when fresh food is out of season
- Left over food to be utilized again at later date.
- Easier for transportation
- Minimizing later expenses on buying the same food.

Causes of food spoilage

- Micro organisms
- Yeast
- Moulds
- Bacteria

To preserve food enzymes must be rendered inactive.

During preservation process ensure that the flavour, colour and nutrients and nutrient value of the food is retained.

We must ensure that microorganisms do not invade.

a) Micro organisms

- Require, air, warmth, moisture, and food to grow.
- To control
- Reduce moisture content
- Taking air away
- Making food unsuitable for the micro organisms to establish.

b) Moulds

- Develop rapidly in warm, damp and dark places.
- Control of moulds
- Boiling food for a few minutes.

c) Bacteria

- High concentration of salt and sugar do not favour the growth of bacteria.

d) Yeast

- It thrives best in warm moisture, air, sugar, flour, for growth.

Control of Yeast

- It is destroyed by high temperatures.

e) Enzymes

- Are organic compounds produced by living cells.
- They do grow
- Causes considerable and undesirable change in the food.
- Responsible for ripening
- During storage they change the flavour of vegetables

N/B very active at room temperature become inactive by boiling.

Methods of Food Preservation

a) Drying

- i) Sun / solar drying
- ii) Hot air Drying
- iii) Smoking
- iv) Deep Freezing
- v) Vinegar

To get good results observe the following rules

- a) Use clean utensils, clean made and water.
- b) Use only fresh food which is in good condition.
- c) Cover the drying food to prevent dust, dirty, flies, and other insects. From contaminating food.
- d) Place the food in a safe place where it cannot get dirty, or be destroyed by animals.
- e) Never dry food directly on the ground or sand.
- f) Store food in air tight containers.
 - When drying vegetables one must blanch them before drying to kill the enzyme, so that they do not spoil the food.
 - Blanching should be done by dipping vegetables into boiling salted water for 0-1 min
 - Be cooled.

Preparing dried vegetables

- First soak in water to restore the moisture.
- It can take 30 minutes to 2 hrs depending on the vegetable.
- Soaking water should be used for cooking.
- Now you can prepare like just fresh vegetable.

MODULE 7 COMMUNICATION

Under participatory approach, matter of subject being known by the extension officer, facilitators will assess what is known by the beneficiary to what is unknown.

The beneficiaries are adults and have a wealth experience on many other issues in their lives

The trainer should use simple clear and audible language while talking to the beneficiaries. For adults practical lessons will be of great importance and regularly used than any other in aid of visual aids.

What is communication?

- Passing information from one person the other or place to other place

In communication we must have the following

- Message
- Sender
- Receiver

In our case what is the message?

- Small scale vegetable production on conventional farming and Multistorey gardening

In our case who is the sender?

- Trained farmers /MOA/UNICEF/GTZ.

In our case who is the receiver?

- Beneficiaries at household level/institutions.

In our case what do we expect from the beneficiaries/institutions?

- Response

What kind of response are we expecting?

- Selected /invited farmers/households/institutions to attend training
- To come and receive materials for small scale vegetable production through conventional farming and Multi-storey gardening
- To construct MSG/establish small farms.
- Sow seeds
- Water the plants
- Transplant
- Harvest the vegetables
- Consume the products
- Malnutrition controlled
- Hidden hunger eradicated

In communication forums are used, name some,

- Public baraza
- Home visits
- Demonstrations
- Group meetings
- On spot trainings
- Neighbour to neighbour approach

In our case why are we communicating?

- To empower the community with knowledge.
- Create common understanding
- Motivate the community
- Build trust
- Trigger fro action

Group assignments

Group 1 Why is it important to conduct public baraza?

Group 2 why is group meeting /home visits vital strategy in promoting small scale vegetable production?

Group 3 what are the barriers of communication?

Group presentations 1, 2, 3.

Part 2 Poultry Production

How is it practiced in the region?

Facilitator roles; Look for the systems applied and improve on that

High feed costs and comparatively low cost of other competing meats
However through the sale of eggs/meat can boost family's income.

Breeds of chickens

Light breeds

- **White leghorn**-has white plumage with yellow legs and beak. The cock weighs 3kg with a firm comb while the hen comb is large and may flop over one eye and the hen 2kg
- **Other light** breeds are Ancona, Minorca and the Sykes

Heavy breeds

- **Rhode Island Red**-Has broad, deep body and lowly set tail. The flesh and legs are yellow
- The cock has medium sized comb which stands upright.
- Plumage is reddish brown, cock weighs 4kg, hen 3kg when all heavy breeds finish laying will provide valuable carcass.
- **Other heavy breeds**-Light Sussex and New Hampshire

Hybrids

- Crossed two inherent different breeds of chicken
- Present day hybrid birds are capable of reaching an average live weight of 2kg in 56 days and laying over 200 eggs per hen during the laying season,
- Examples: Thorner 404 and 707, Hilina stock, shavers, sterling and Ross birds

Rearing systems

- Can be done intensive and extensive system of MGT
- Commonly used ones are
 1. **Free range system**
 2. **Fold system**
 3. **Deep litter system**
 4. **Battery cages**

1. Free range system

- Chickens growing and laying eggs are left to roam in a perimeter fence
- Adopted where there is enough land 200-300 per hectare

- Eats randomly insects ,grasshoppers, green grass etc
- Vices such as cannibalism, feather pecking, egg eating and broodiness are reduced to minimum
- Area becomes progressively contaminated with diseases and parasites'

2. Fold System

- Limited number of birds can be kept in this system.
- Birds are confined in small movable houses known as folds or arks-3.5mx1.5mx1.5m for 10-15 birds
- 1/3 of the fold is roofed to provide shelter and laying place, other part is open covered with suitable wire
- The folds are movable in one area to the other for fresh air
- **Advantages of this system**
 1. Manure is spread evenly
 2. Feed cost is reduced
 3. Worm and parasite build up is reduced.

However the folds are not durable, if a lot of chicken are to be kept many folds are to be made.

3. Deep Litter system

- Birds are confined through out the their life in the house
- House is well ventilated and insulated to keep the birds healthy
- House should be sited in a well- drained and easy to clean place.
- House is filled with appropriate liter(saw dust,woodshavings,crushed maize cobs or chopped straws)10-15cm high
- Old litter should be mixed with fresh litter to inject bacteria which break down down the droppings and thus keep the litter dry and warm.
- The litter may become dump if the house is leaking , high humidity .this can be controlled by constant raking
- Remove old litter when new stock of birds is to be kept.
- 2-3birds per meter square
- Laying nests, resting perches, feed and water troughs should be provided

Advantages

1. low initial capital investment in housing
2. low labour needs and high stocking rates

Disadvantages'

1. High cannibalisms
2. High egg eating
3. Predisposition of chicken if litter is dump
4. Inaccurate egg record per hen.
5. if litter is not available risk to diseases
- 6- Welded /slated floor is also used for droppings to slate below the floor.

4 Battery systems

- Most intensive system and birds are confined in cages
- Per cage 1-4birds
- Cages are made of wire and are placed in tiers one above the other in the whole house.
- Each cage has a sloping floor to allow eggs flow to one side

- Since the droppings fall onto the floor, the lowest tier of cages should be 0.6m to 0.9m above the floor to facilitate cleaning
- Watering and feeding are continuous throughout the length of the cages
- The battery house should be well lighted and ventilated
- Floor should be concrete or cemented

Advantages

1. High stocking rates is achieved
2. Individual hen stock rates can be easily kept.
3. No egg eating, cannibalism, contamination of food and water

Disadvantages'

1. High capital required.

Management of Poultry

- **Incubation** ;dfn-the embryonic development of fertile egg to chick hen takes 21days;Ducks28days,Turkeys 28days and Geese 30days
- Incubation can be natural or artificial
- **Natural incubation;**
- Hen sits on the 10-15 eggs and provides the heat for21 days.
- Laying box should be provided
- Survival to hatching is high.
- **Artificial incubation**
- Done in an incubator and special training is required ,conditions are maintained at an optimum level for hatching for instance temperature, moisture and aeration are controlled
-
- **Brooding**
- During 8 weeks after hatching chick needs to be kept in an enclosure supplied with heat.
- Brooding house should be well ventilated and provide with water/food.
- 1st few weeks temp-25-30 degrees and reduce it gradually there after.
- Chicks at this stage should be fed on finely ground grains and skimmed milk, starters mash may be used contains 20-22 %protein
- Debeaking to be done in8-10 days

Rearing of growers

- 9 -22nd week chicks
- Need 18-20cm cubic space for 100 birds
- Diet (Growers mash)should contain a proportion of insoluble grit,16-17% protein

Rearing of layers

- 22-24weeks start laying eggs
- Well fed, grit in diet to produce strong egg shells, enough space of 0.3msquare per bird.

Rearing of table birds

- Chickens kept for meat production only

There are various classes of table birds.

Broilers –

- 60-70 days ready for slaughtering, 2kg body weight

Roasters

- Slaughtered at 3-5 months – less tender than broilers.

Capons

- Castrated cockerels sold at 16-22 week sold, 3-3.5kg weight

Meat birds should have their feeds with high energy to produce rapid growth.
After the 10th week the protein content should be low

Egg quality

- Characteristics; strong, regular and clean shell, the albumen should be thick, clear and firm; yolk should be light-colored well centered and free from blood and meat spots

• ;

1. Ensure the following is done to get good quality eggs

Ask plenary

- -feed the laying hens with proper rations containing minerals and grit
- Provide clean nesting materials
- Gather eggs frequently
- Clean dirty eggs and keep them in a cool place.
- Candle eggs to look for blood spots/meat
- Separate eggs in small/medium/large. pack carefully and sell them immediately

Production records

Rearing records

- Daily food consumption.
- Number and . cost of purchased chicks
- Cost of heating the brooder
- Labour and medicine cost
- Dead chicks

Layers records

- Number /value of hens as they start
- Number of eggs collected per day
- Daily food consumption
- Labour and medicine cost
- Number of dead hens
- Number of culled hens

Qts **why are chickens considered as the most successful poultry for rearing**
Name the main hazards in encountered in poultry farming

Table of contents

Part 1	Pg 1/27
MSG Training	
Covering page	Pg 1
Introduction	Pg 2
Module 1	
Nutrition	Pg 4-7
Classes of food	Pg 4
Functions and Food sources of Nutrients	Pg 4/6
Micro-Nutrient Deficiency	Pg 6/7
Module 2	
MSG Construction/Establishment	Pg 8-14
Components of MSG	Pg8
Tools/Equipments for MSG	Pg 9
MSG Construction	Pg 10
Purpose of various Equipments	Pg 10
Suitable vegetable for MSG	Pg 11/12
Seeds and seedlings production	Pg 12
Transplanting seedlings	Pg13
Water in MSG	Pg 14
Module 3	
Malnutrition	Pg 16/17
Module 4	
Target and Targeting	Pg18
Module 5	
Pest/Disease control	Pg19/21
Module 6	
Harvesting /Food Preservation	Pg 22
Cooking methodologies	Pg 23
Food Preservation Methods	Pg 23/24
Cooking Methods of Preserved vegs	Pg 25
Communication	Pg 26/27
Part 2	
Poultry production	Pg 28-31