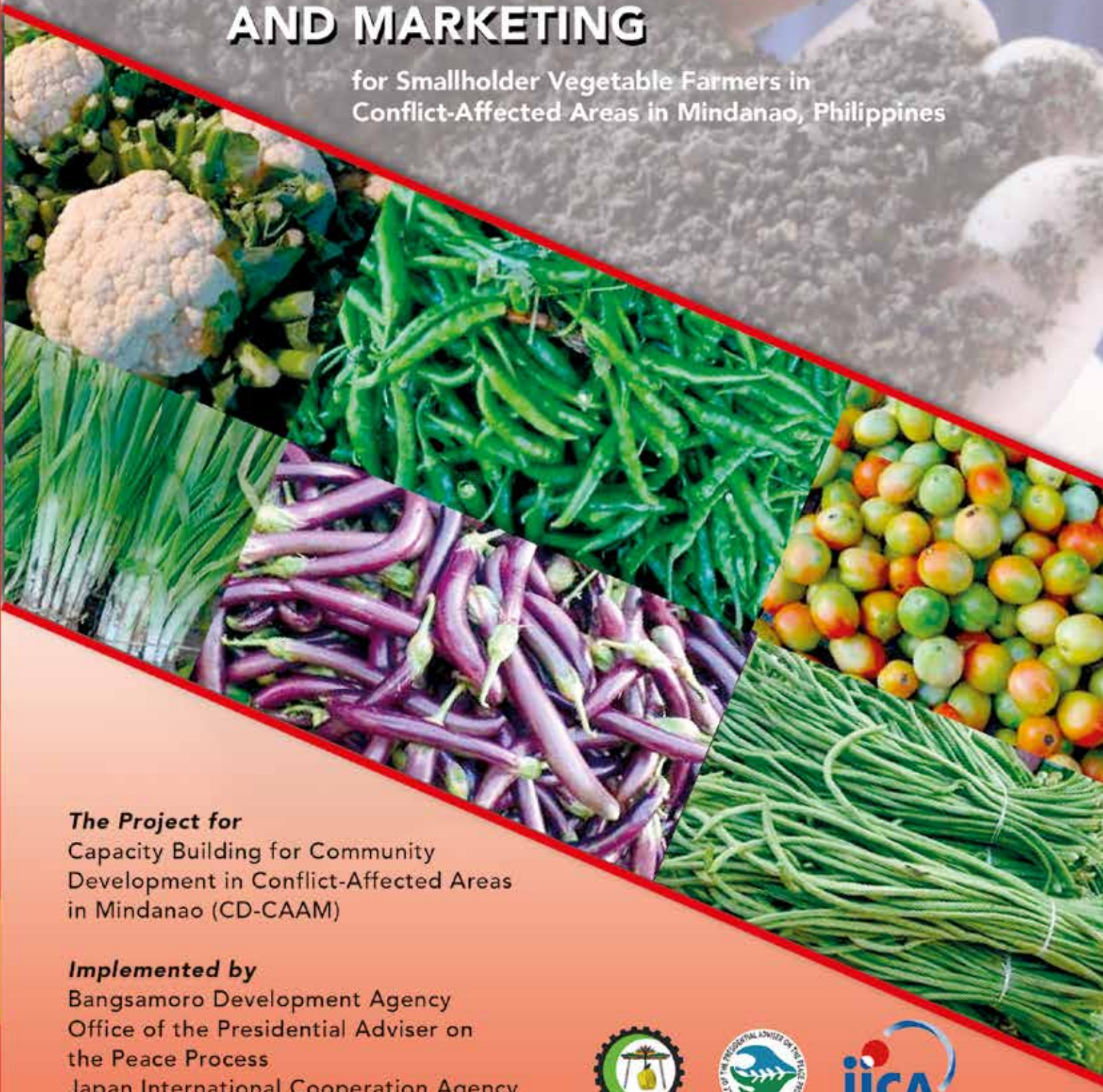
BASIC MANUAL

FOR VEGETABLE PRODUCTION AND MARKETING

for Smallholder Vegetable Farmers in
Conflict-Affected Areas in Mindanao, Philippines



The Project for
Capacity Building for Community Development in Conflict-Affected Areas in Mindanao (CD-CAAM)

Implemented by
Bangsamoro Development Agency
Office of the Presidential Adviser on the Peace Process
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1. Introduction

The Basic Manual for Vegetable Production and Marketing was prepared based on experiences and lessons learned from actual practices performed on the vegetable demonstration farms at Barangay Macabiso, Sultan Mastura of Maguindanao Province, and Barangay Puntod, Matungao, Lanao del Norte Province, as pilot project under CD-CAAM.

The said demonstration farms in the two municipalities showcased "Learning while Doing and Earning". They were designed to be an avenue for the beneficiaries of CD-CAAM to learn appropriate technology on vegetable production in sustainable manner as one of income generation activities of CD-CAAM.

In general, certain techniques in ensuring high yields require excessive use of chemical inputs such as synthetic fertilizer, pesticide and insecticide. These are the so-called conventional way of farming in which the increasing prices of inputs are burden to most marginalized farmers in which they cannot afford. Therefore, the demonstration on vegetable production at the demonstration farms showcased the adoption of practical farming systems that reduces the use of those inputs and tries to replace them with organic inputs like vermi compost and liquid concoction.

Consequently, the environmentally friendly techniques are also introduced in the Manual. Meanwhile, it is also the intention of this document to show the benefit of the agricultural fertilizer and chemicals at a minimal application that helps suppress and control destructive pests and diseases thus providing food nutrients to the plants in order to maximize production.

This Manual emphasizes marginalized farmers not only to familiarize with vegetable cultivation techniques but also to instruct them in handling perishable products after harvest and introduce to them some other facilities for vegetable production. In addition, the Manual emphasizes the importance and technology of record keeping thereby treating their farming system as a business.

2. Environmental requirements

Vegetable cultivation and maximum harvest much depend on environmental condition. The following are preferable environmental conditions that must be considered before starting vegetable cultivation in Mindanao.

Ambient temperature

Average temperature of Mindanao is ranging from 22.5 to 32.5 degrees Centigrade. Most vegetables are suited to be cultivated under this tropical climate condition. Tropical vegetables such as bell pepper, okra, bitter gourd, eggplant, chili pepper, sweet potato, kangkong and others, and semi-tropical ones like cucumber, pumpkin, string beans, corn and so forth can be all cultivated in Mindanao. Cultivating lettuce, cabbage, cauliflower, and onion might be difficult to grow and secure quality under such temperature condition.

Water

Water is an important factor in plant growth. During dry season, it is a vital requirement for the vegetable grower and should plant vegetables in a place where water be easily obtained for the plants. If water resources like rivers or lakes nearby is not available, digging borehole can be one alternative.

Sunlight availability

The garden site should receive sunlight throughout the day since growing plants need sunlight to manufacture food. However, strong sunlight sometimes has to be avoided during nursery making so that some facility will be required to make shade.

Soil and farm land

Soil is a natural medium for plant growth. The soil in the garden should be fertile enough to make plants grow. Vegetables thrive well in many types of soil but a fairly fertile, well-drained soil, free from root knot nematode, bacterial wilt, fusarium wilt, and other soil-borne diseases is preferable. The desirable soil pH is 5.5-6.8. The farm land, of course, should be flat enough for any farm works which can be performed effectively and safely.

The farm land should be established on a very slight slope to make drainage easy, especially during rainy season. If the land is flat, drainage canals or ditches be dug around the planting area. High steep areas are not recommended. Cultivation of vegetables under coconut trees in Mindanao is common and intercropping with cash crops like coffee and cacao is also technically possible.

3. Basic Information for planting various kinds of vegetables

Vegetables	Climatic Requirement		Appropriate soil pH	Preferable soil Texture	Recommended planting density	Estimated yield (ton / ha)	Period of Maturity (days)
	Wet season	Dry season					
Tomato	Fair	Well performing	5.5 – 6.8	Sandy loam	100 cm x 50 cm	20-30	80 - 100
Eggplant	Fair	Fair	5.5 – 6.8	Sandy to clay loam	100 cm x 50 cm	20-40	70 - 90
Sweet Pepper	Fair	Well performing	5.5 – 6.8	Sandy to clay loam	30 cm x 45 cm	15-20	120 - 180
Bulb Onion	Fair	Well performing	5.5 – 6.8	Sandy loam	7 cm x 15 cm	15-25	90 - 130
Okra	Well performing	Fair	5.5 – 6.8	All types	75 cm x 1 m	10-15	60 - 80
Bitter gourd	Well performing	Fair	5.5 – 6.8	Sandy loam	1 m x 2 m	10-15	70 - 90
Squash	Well performing	Well performing	5.5 – 6.8	All types	1 m x 2 m	20-40	90 - 120
String Beans	Well performing	Well performing	5.5 – 6.8	All types	50 cm x 75 cm	20-25	60 - 80
Bottle gourd	Well performing	Well performing	5.5 – 6.8	All types	1m x 2 m	30-40	80 - 120
Cucumber	Well performing	Well performing	5.5 – 6.8	Sandy to clay loam	75 cm x 1 m	10-15	60 -90
Cauliflower	Well performing	Fair	5.5 – 6.8	Sandy to clay loam	40 cm x 45 cm	10-15	45 – 120
Cabbage	Well performing	Well performing	5.5 – 6.8	Sandy to clay loam	40 cm x 45 cm	15-20	60 – 120
Pechay	Well performing	Well performing	5.5 – 6.8	All types	20 cm x 20 cm	10-15	30 – 60
Broccoli	Well performing	Well performing	5.5 – 6.8	Sandy to clay loam	40 cm x 45 cm	10-15	60 - 120

Source: Upi Agricultural School, 2014

4. Vegetable production in general

4-1 Soil analysis and neutralization

Soil analysis is recommended before starting vegetable production to know the soil pH and some lacking macro elements: Nitrogen (N), Phosphorus (P), Potassium (K), Calcium, Magnesium, and Sulfur, etc. Recommended pH is 5.5 because tolerance of some vegetable ranges from pH 5.5 to 6.8 as shown in the Table of Basic information for planting of various kinds of vegetables.

If soil is extremely acidic, it should be neutralized by lime that contains calcium and magnesium. The following Table is an indication of lime to be applied to reach pH 5.5. Lime is best applied by broadcasting during a month before transplanting / sowing land preparation. As for fertilization, its example of result of soil analysis can be referred to in "4-3 Fertilizer application".

Table 4-1 Amount of lime applied

Soil pH	Amount of Lime (ton/ha)
5.45	1.5
5.30	2.0
5.20	2.5
5.10	3.0

Soil sampling

DA, a service provider in agriculture, will provide techniques in soil sampling; sampling procedure, number of sample, location of sampling, depth and volume of soil, etc.

Table 4-2 Example of soil analysis by DA-RSTL 10 (Regional Soil Testing Laboratory)

Fertilizer Recommendation for:

	Eggplant	Pechay	Tomato	Squash	S. beans
	bags/ha.				
OPTION 1:					
Diammophos (18-46-0)	1 1/2	2	3	2	1
Urea (46-0-0) =	1 1/2	2 1/2	1		
Potash (0-0-60)=	1	1	3	1	1/2
OPTION 2:					
Ammophos(16-20-0)=	3	4	6		
Urea (46-0-0) =		2			
Potash (0-0-60)=	1	1	3		
OPTION 3					
Complete (14-14-14)=	4 1/2	4 1/2	6	3	
Urea (46-0-0) =	1/2	2			
Potash (0-0-60)=			2	1/2	
Sulophos (0-18-0) =		1	2 1/2	2 1/2	
SECOND APPLICATION:					
Urea (46-0-0) =	1	3	2	1	1/2
or					
Ammonium Sulfate(21-0-0)=					
Potash (0-0-60)=					
THIRD APPLICATION:					
Urea (46-0-0) =	1				
Potash (0-0-60)=					

SQUASH **1/2 N + (P + K)**
1/2 N
1st Application :Mix the fertilizer with the soil at planting time
2nd Application :Sidedress the fertilizer when fruits begin to form

LETTUCE, MUSTARD, 1/2 N + (P + K)
PECHAY / KANGKONG 1/2 N
1st Application: Apply the fertilizer as a dressing 8-14 days before planting.
2nd Application: Topdress the fertilizer 2-5 weeks after planting.

USE OF ORGANIC FERTILIZER

(chicken dung, guano, Azolla,etc.): Partial substitution of inorganic by organic fertilizer at the rate of 10-50% of the total fertilizer recommendation. Be sure to know the nutrient (N,P,K) content of the organic fertilizer to be used.

Lime Application: It should be applied one (1) month before planting

PEAS, STRING BEANS, SITAO
½ N + (P + K)
½ N
1st Application: (1/2 N+P+K) Broadcast/ incorporate the fertilizer by tillage either at the time of sowing or soon after the plants come up.
2nd Application: (1/2 N) Topdress the fertilizer after flowering but not during the first blooming.

EGGPLANT
1/2 N + (P + K)
1/4 N
1/4 N
1st Application: (1/2 N+P+K)Apply the fertilizer in in furrow at transplanting.
2nd Application: (1/4 N) Top dress the fertilizer one (1) month after transplanting.
3rd Application: (1/4 N) Repeat top dressing after the second harvest of marketable fruits.

TOMATO

1st Application: Apply the fertilizer 7.0 cm away from the base of the plant and 7.0 cm deeper than the root system before or at planting.
2nd Application: Sidedress the fertilizer when the plants starts to bloom or when there are small fruits developing. Repeat after every two weeks.
Note:
Tomatoes are sensitive to too heavy application of N and may result in delayed ripening of fruits that are soft and split easily.

4-2 Land preparation

Land preparation is performed in order to loosen or break-up soil, incorporate organic matter into soil, expose insects or weeds under sunlight or bury weeds in soil, smoothen and level soil surface, establish good condition of seed / planting beds, and control soil erosion.

The most practical way is to plow and harrow soil twice or more, depending on soil condition. Plowing depth is from 20 - 25cm in depth. The work can be done by power tiller of 5 – 10 horsepower or animal power. When vegetable is required to be planted on ridge, ridging implement or hoe and rake are used.

Power tiller with 5-horsepower engine

Before and after pulverizing by the power tiller

Land preparation by animal power

Making ridge by use of hoes and rakes

Flat bed or ridge can be established to grow most vegetables. Meanwhile, Raised Bed with Siding (RBS) is recommended for leafy vegetable to practice easy maintenance of farm. Bamboo can be used for frame siding.

Raised Bed with Siding framed with bamboo for leaf vegetables

4-3 Fertilizer application

(1) Fertilizer application

There are two types of fertilizer; inorganic and organic fertilizers. Simple comparison can be referred to Table 4-3. It is difficult to grow vegetable by using only organic fertilizer at first unless fertility of farm is high enough. It takes several years or more to fertile farm by organic fertilizer. Therefore, at first, it is recommended to use inorganic fertilizer and organic fertilizer so that effect of both fertilizers: fast and short lasting and slow and long lasting, can replenish each other. Then, application of inorganic fertilizer can be reduced while fertility increases by organic fertilizer. Organic compost in detail can be referred to in "5-1 Basic compost making and 5-2 Vermicomposting and vermi-cast".

Applying organic fertilizer on ridge

Table 4-3 Comparison of inorganic and organic fertilizer

Fertilizer	Effect	Sustainability
Inorganic fertilizers	Fast and short lasting	N-containing fertilizer induces soil acidity
Organic fertilizers	Slow and long lasting	Improve soil structure and keep soil healthy

Basal fertilizer application during land preparation before planting is essential. First top dressing is done 10 - 15 days after planting / transplanting or at vegetative stage. Second top dressing is performed during flowering stage, 30 days after planting / transplanting. It is recommended that the amount of fertilizer to be applied and timing of application should be based on soil analysis results. It is also noted that Phosphorus (P) is not

likely to erode by rain, while Nitrogen (N) and Potassium (K) are eroded by rain easily. Thus, P should be applied as basal application and 1/2 to 1/3 of total N and K can be applied during basal application. The remaining N and K are to be applied as top dressing for several times.

(2) Calculation of application for fertilizer

One can figure out number of bags of inorganic fertilizer to be applied for 1 ha. For example, if basal application of N – P - K is needed 120 kg (N) – 30 kg (P) – 90kg (K) for particular crop by use of fertilizer shown in Table 4-4, procedure is as follows:

1. Notice that amount of fertilizer is half of indicated figure on label for 50kg of a bag.
2. Identify available fertilizer first.
3. For example, if complete fertilizer is available, knowing its nutrient content (14-14-14), satisfy first the amount of P, which is minimum requirement to get amount of fertilizer to use.
4. Calculate as follow.

For "P", 30kg / 7kg (half of 14% indicated on label) = 4 bags of "Complete 14-14-14".

For "N", 120kg – (7kg x 4bags of Complete) = 92kg is left. Then, choose "Urea 46-0-0"; therefore, 92 kg / 23kg = 4 bags of "Urea (46-0-0)".

For "K", 90kg – (7kg x 4 bags of Complete) = 62kg is left. Then, choose "Muriate potash 0-0-60"; therefore, 62kg / 30kg = 2 bags of "Muriate potash 0-0-60".

5. As result, 4 bags of "Complete 14-14-14", 4 bags of "Urea 46-0-0", and 2 bags of "Muriate of potash 0-0-60" should be applied.

Table 4-4 Typical inorganic fertilizer

Inorganic fertilizer	Label (Nutrient contents)	Amount (kg per 50 kg of 1 bag)		
		N	P	K
Urea	46-0-0	23	0	0
Ammonium phosphate	16-20-0	8	10	0
Solophos	0-18-0	0	9	0
Complete	14-14-14	7	7	7
Muriate of potash	0-0-60	0	0	30

4-4 Nursery Making

Making furrow for sowing 5cm apart

(1) Seed treatment

Procure seeds from reliable sources for best germination results and check germination ratio. Seeds, which are harvested from previous production, should be treated with fungicides and insecticides prior to planting. Soaking seeds in lukewarm water for about two (2) minutes is proven to be effective in preventing seed borne diseases.

(2) Nursery preparation

Some vegetables such as tomato, eggplant, bell pepper and some others require nursery making instead of direct sowing. Nursery/seedlings can be grown by sowing seeds on nursery beds, plastic seed pots, or trays.

Procedure:

In the preparation of soil media, most ideal ratio is 1:1:1 in volume, vermi-cast, garden soil, and carbonized paddy hull.

- Sterilize the soil media by burning dried paddy hull and mix it with vermi-cast and garden soil.
- For seeds bed, saturate the mixture "1" with water and make seed beds of 1m width x 10m length x approximately 15cm high.
- Make horizontal furrow 5cm apart.
- Sow the seeds thinly in rows and cover with a thin layer of soil and water gently.
- Cover the beds with banana leaves to retain moisture contents of soil.

Use of net to avoid direct sunlight

Nursery making by use of seedling trays

(3) Hardening

Before transplanting seedlings in main farms, "hardening" is necessary for 2 - 3 days. This is done by exposing the plants gradually to sunlight in the field if the plants had been shaded. Hardening helps plants recover rapidly from transplanting stress. Normally, after transplanting, plants show slower growth; but, they will resume normal growth sometime later after period of acclimatization.

6 days after sowing of tomatoes on seedling bed

4-5 Transplanting/Direct sowing

For bell pepper, eggplant, and tomato, transplant healthy and well-hardened seedlings with 3 - 5 leaves, 21 – 28 days after seedling emergence. As for bulb onion, transplant 28 – 35 days seedlings with well-formed 2 healthy leaves are recommended. Transplant one (1) seedling per hill with appropriate planting density. See "planting density" in "3. Basic information for planting of various kinds of vegetables" for appropriate hill distance and row

Use of string and sticks to keep precise planting density

◁ *Opening black net for hardening*

distance. Thus, most ideal timing of transplanting and direct sowing is early in the morning or late afternoon.

To measure the row and hill distances, use strings. Make holes, insert seedlings, and press soil gently around base of the seedlings. Water them gently immediately after transplanting. Cover the seedlings with banana bracts to prevent wilting caused by direct sunlight for 5 – 7 days. Use a PVC pipe with zigzag-shaped edge to easily make holes on vinyl mulch if film is used as mulch. If missing hills are observed, replant 5 - 7 days after transplanting.

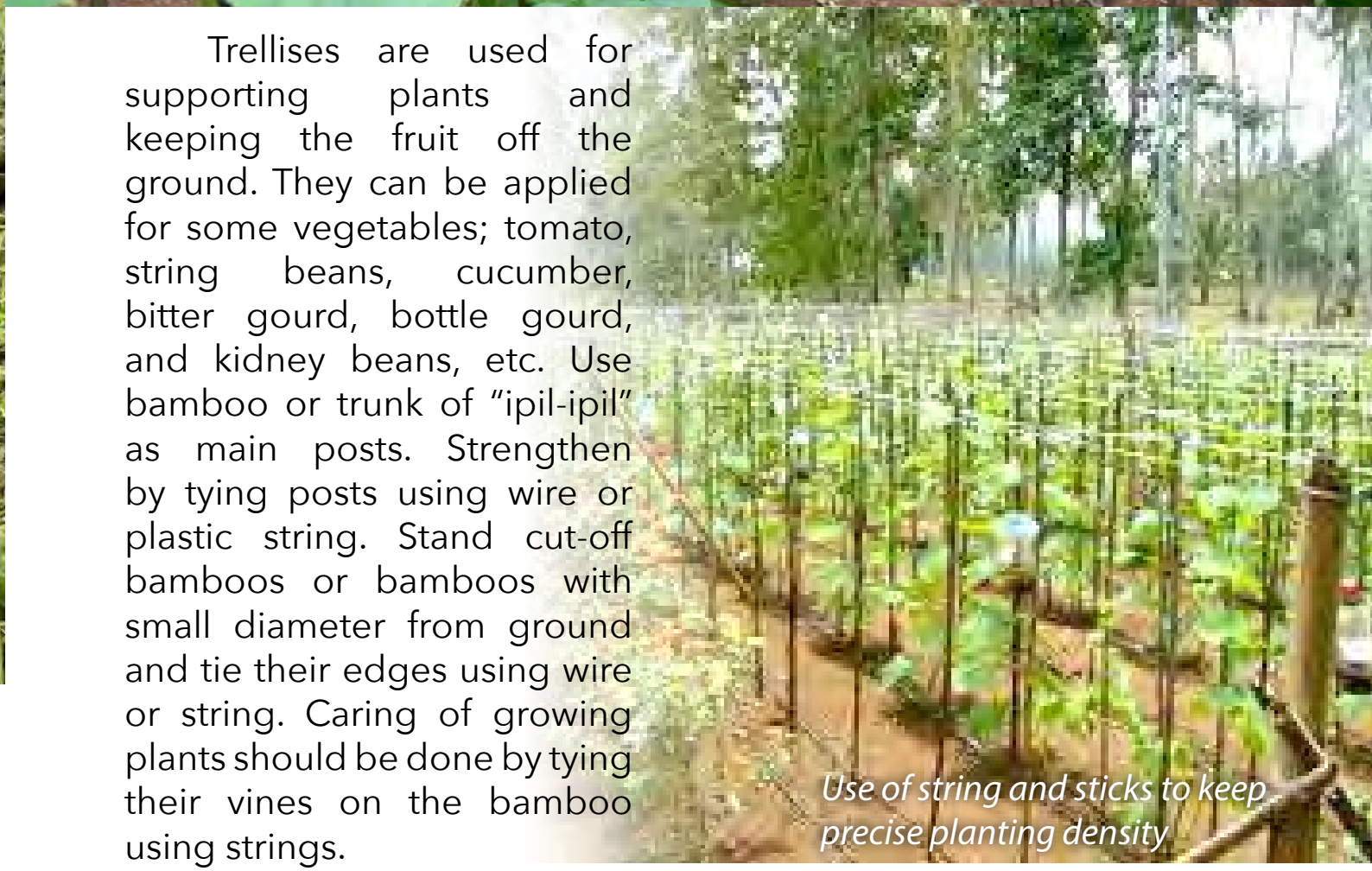
Banana bracts covering seedlings

Zigzag-shaped edge that makes holes on vinyl mulch.

4-6 Trellising

▲ *Tying vines of cucumber*

Trellises are used for supporting plants and keeping the fruit off the ground. They can be applied for some vegetables; tomato, string beans, cucumber, bitter gourd, bottle gourd, and kidney beans, etc. Use bamboo or trunk of "ipil-ipil" as main posts. Strengthen by tying posts using wire or plastic string. Stand cut-off bamboos or bamboos with small diameter from ground and tie their edges using wire or string. Caring of growing plants should be done by tying their vines on the bamboo using strings.



Use of string and sticks to keep precise planting density

▲ *A-shaped trellising structured by only bamboo*

◀ *Trapezoid-shaped trellising for bitter gourd*

Table 4-5 Comparison of Straight and A-Shaped trellising

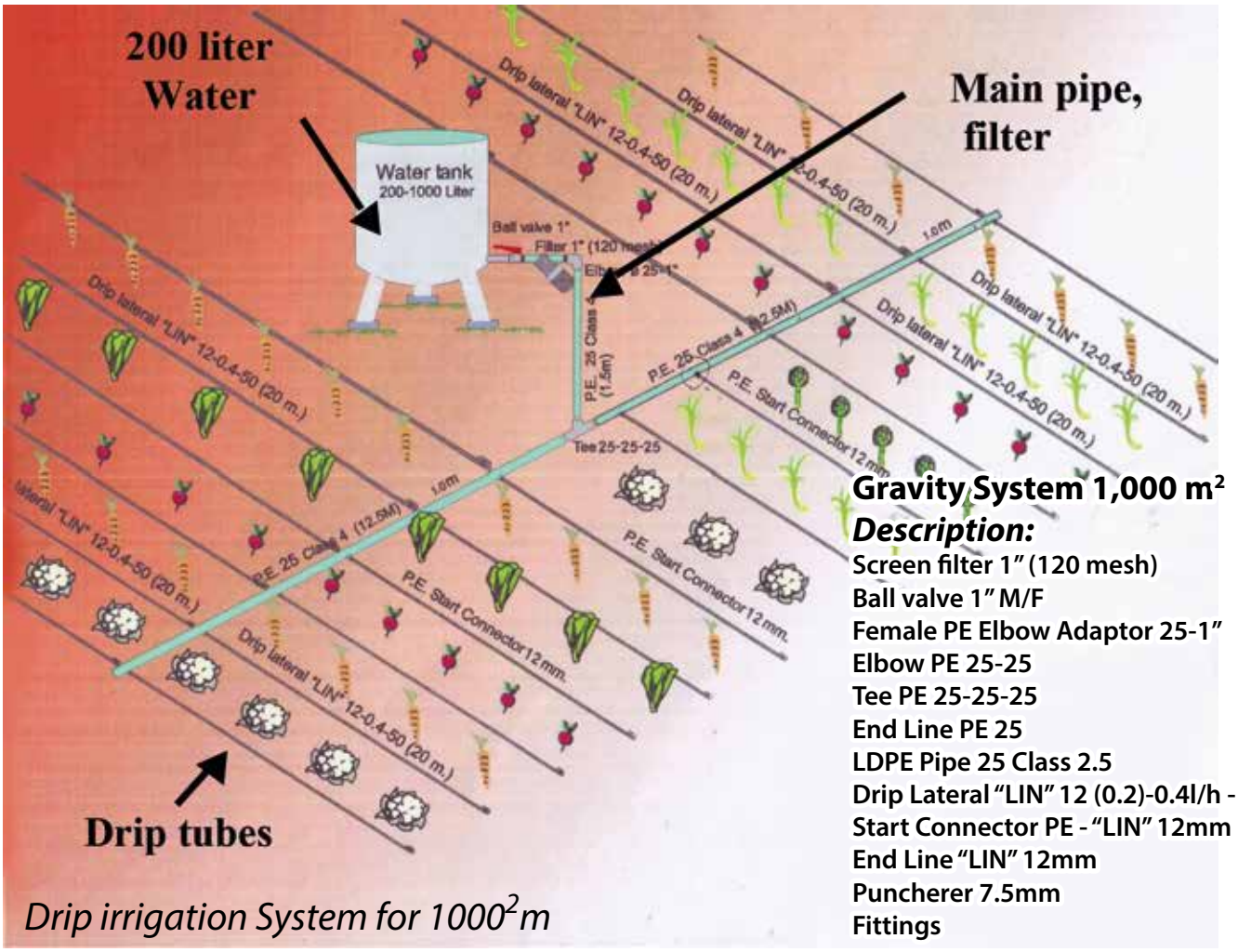
	Advantage	Disadvantage
Straight trellising	● Easier to construct and maintain ● Easy to do manual weeding ● Sunlight penetration is maximized ● Less occurence of pest	● Labor intensive during construction. ● Weeds easily can grow
A-Shaped trellising	● Sunlight utilization is effective ● Shading limits growth of weeds	● Weeding work will be difficult ● Difficult for maintenace ● More presence of pest due to shading place for hiding

4-7 Irrigation and drainage

Methods of irrigation vary for small scale vegetable cultivation: manual watering with watering can, furrow irrigation, sprinkler irrigation, and drip irrigation. Selection of method depends on scale of farm, availability of tools, and cost. If water source is not available, borehole with hand pump can be established.

Drip irrigation is more water saving than the others. Water is carried under pressure from a tank through pipes and tubes which are equipped with small holes to control water discharge at low rates ranging from 2 to 20 liters an hour directly onto base of or close to vegetable plant.

Furrow irrigation



Drip irrigation System for 1000^{2}m

Gravity System 1,000 m²

Description:

Screen filter 1" (120 mesh)
Ball valve 1" M/F
Female PE Elbow Adaptor 25-1"
Elbow PE 25-25
Tee PE 25-25-25
End Line PE 25
LDPE Pipe 25 Class 2.5
Drip Lateral "LIN" 12 (0.2)-0.4l/h - 50 cm
Start Connector PE - "LIN" 12mm
End Line "LIN" 12mm
Puncherer 7.5mm
Fittings

Water tank for drip irrigation

Pipes and tubes for drip irrigation

Water is conveyed through pipes and tubes

Water is discharged from tube

Making water pathway as drainage

Drainage is required to avoid excess water which might cause overflow or stagnation of water especially for areas where water is logged in a farm. Therefore, small water pathway can guide excess water to be drained out of farm.

4-8 Pest, disease, and weed control

Prior to application of any control of pest and diseases, it is important to diagnose diseases first and identify the kind of pest or insects which attack plants.

If disease is caused by a fungus, spray the plant with fungicide. If damage is caused by bacteria, spray bactericide. If there is an insect attack, spray appropriate insecticide. If the diseases are caused by a virus, remove the damaged plants and bury them immediately to prevent spread of the disease. It is advisable to use chemical judiciously. It can be also recommended to use organic pesticide in the control of pest and diseases, such as use of organic herbal nutrients (OHN) and botanical extracts. To prevent insect pest prevalence, it is recommended to avoid mono cropping, misuse of pesticide, and over-fertilization.

Bacterial wilt

Preventive measures against pest and diseases can be alternative in order to minimize use of chemicals. In this Manual, cultural control and physical control are demonstrated. Use of resistant varieties, intercropping and crop rotation, use of companion plants, use of pest repellants, and attractants are examples of cultural control. Use of mulch and net house are examples of physical control.

Stem borer

Weeds compete with vegetable plant with nutrients. Therefore, weeds near the base of plants be removed before the first side dressing. Cultivate and hill-up the soil just after side dressing to cover the fertilizer and to control weeds.

(1) Resistant varieties

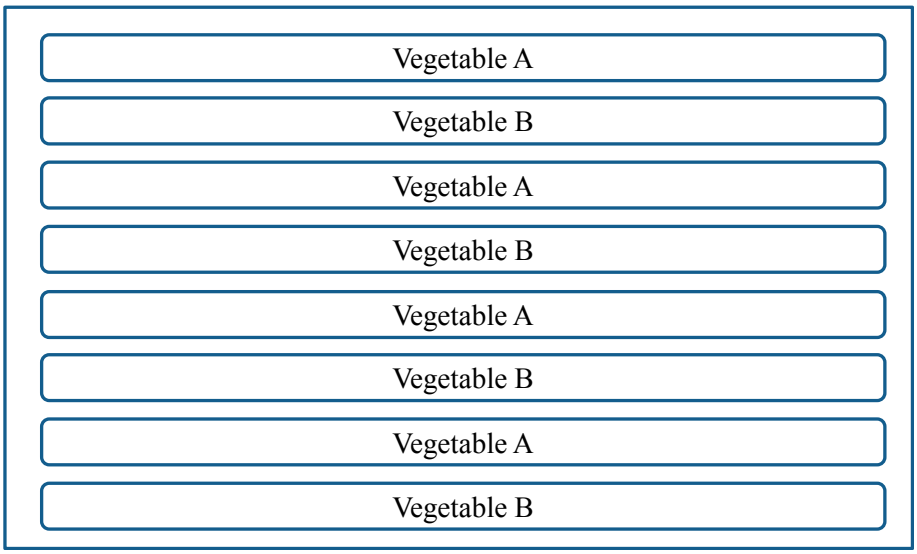
Selections from the DA-BAR Project "Varietal Evaluation under Organic Condition" recommend using varieties which have characteristics against pest and diseases.

Table 4-6 Recommended varieties

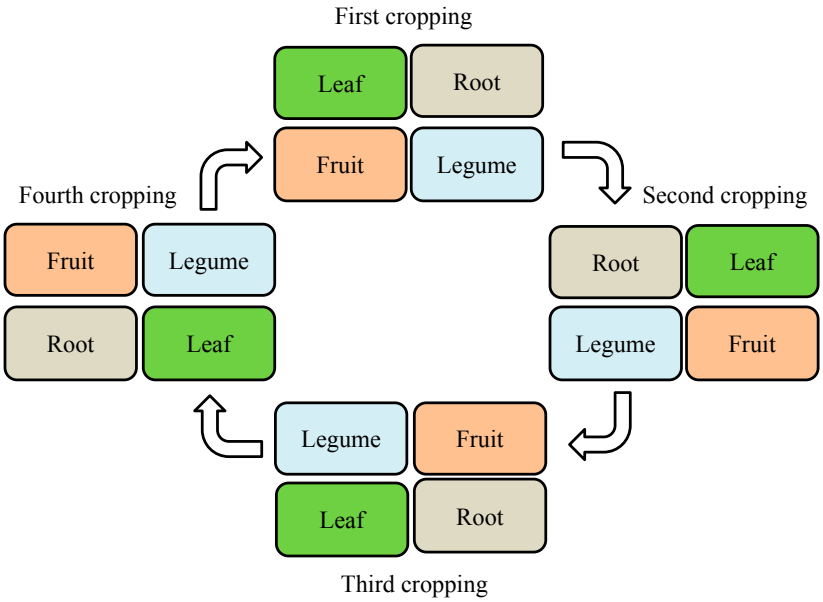
Vegetables	Recommended varieties
Eggplant	A-300, Mara, Conception, Arayat
Bitter gourd	SR#3, Million Green
Tomato	Pinusyo, Grandeur, BRCI
String beans	Sandigan, CSL 19, Acc 288
Pepper	Bright star, Inokra
Garden pea	CGP 14
Bagiuo beans	T#1, B-12, Hab 63
Cabbage	Alex, Tropical King
Broccoli	Pinnacle
Cauliflower	Silver Cup 40
Petsay/Pechay	Green stem
Lettuce	President

2) Intercropping and crop rotation

Intercropping, mixed cropping, and crop rotation are preventive measures against pest and diseases. Plant different crops depending on usage (main plants, repellants, or attractants), adaptability of crop / variety on certain location, and market preferences. Intercrop within the row and in plots. Use different varieties even in the same crops as much as possible.



Crop rotation helps disturb life cycle, habitat and food supply of pests and diseases. It also conserves and improves soil fertility, and reduces weeds. Crop rotation contributes to diversification and efficient use of farm land. The figure shows rotational cropping pattern of leaf vegetable, root crops, leguminous crops, and fruit vegetable.



(3) Companion plants

Table 4-7 shows some combinations of main crops and companion plants.

Table 4-7 Companion plants

Main	Companion crops
Chili	Okra, Eggplant, Radish
Cabbage	Onion, Tomato, Lettuce
Tomato	Carrot, Cucumber, Onion, Garlic
Cucumber	Radish, Corn, Lettuce
Lettuce (Asteraceae)	Brassicaceae (Cabbage, Cauliflower)
Groundnut (Fabaceae)	Solanaceae (Eggplant, Tomato)

(4) Pest repellants

Repellent crops are planted purposely to drive insects and pests away. The repellant plants can be planted along side of the circumference of a farm and within main plants.

Table 4-8 Repellent crops

Target pest	Repellent crops
Aphids	Onion, Garlic, Chives, Coriander, Anise
Borers	Onion, Garlic
Ants	Mint, Lemon grass
Beetles	Marigold, Pyrethrum, Fever few, Radish, Tomato
Cabbage moth	Mint, Celery
Mites	Onion, Garlic, Chives, Lemon grass
Whitefly	Marigold, Lemon grass
Nematode	Marigold, Dahlia, Calendula

Lemon grass (pest repellants)

Liquid attractant

Marigold

(5) Insect attractant

Insect attractant is a concoction that is used to attract insects and monitor them. Through this, friendly insects can be monitored and insect pest can be attracted; thereby, population of insect pest can be reduced. It helps farmers in making sound decision for insect pest control.

This is a liquid concoction placed in a plastic bottle. Materials for the trap are: 1 kg of Kinugay / Muscovado (dark brown raw sugar from sugarcane), 4 liters of water, 1 liter of coconut toddy or vinegar, 1 basin, 20 empty used plastic bottles of 500 ml, plastic string, and bamboo sticks. Procedure to make is as follows:

1. Mix 4 liters of water, 1 kg of Muscovado, and 1 liter of coconut toddy and stir until Muscovado is melted.
2. Fill the mixture "1" of 200 ml into empty plastic bottle.
3. Open a square window holes to both sides of bottles and hang at farm.
4. Continue monitoring trapped insect.
5. Re-fill concoction as often necessary especially in wet season.

Marigold is also used as attractant because its color attracts insects. The flower can be planted along side of a farm or within crops.

Sticky trap with grease

Trapped insects

A yellow colored sticky trap is an alternative method because the color attracts insects such as whiteflies, fruit flies, moths, and leafhoppers. It can also monitor type of insects damaging plants.

Procedure in preparation and use:

1. Apply grease or used oil, which is resistant to heat and rain, on surface of plastic yellow sheet.
2. Size and number of trap depend on size of a farm.
3. Hang the trap along periphery of a farm.
4. Practice continuous monitoring of insect trapped.
5. Re-application should be done when necessary especially during wet season.

(6) Mulching

Mulching controls weeds and keeps moisture in soil. It hinders growth of weeds because soil is not exposed to sunlight. It prevents evaporation of soil during dry season. It improves soil structure if bio-mulch is used; hence, increases soil fertility.

Mulching materials can be made from any of the following; rice straw, cut grass, paddy husk, or a vinyl mulching film. The materials are spread out on the surface of the ground around the plants or between the rows of plants.

Vinyl film mulching

Lemon grass mulching

Nethouse

(7) Net house

Net house or net tunnel can be used to prevent or minimize insects from flying to vegetable. Bamboo is recommended for frame. Mesh size ranges from 0.2 mm to 2.0 mm, depending on target insects. Net must be made of polyester.

4-9 Harvesting

The date of harvesting can be estimated by knowing the days of maturity of vegetables Its actual harvesting depends on physical appearance of the crops. For tomato, harvest the fruits with reddish streaks or at fully red ripe stage. For eggplant, harvest fruits when they are bright purple in color and tender. For bulb onion, harvest it when the leaves start to bow down and brown in color. For pechay, harvest them when they show dark green color with erect leaves. For bell pepper, harvest it when the color becomes dark green with marketable size, depending on variety.

Pruning scissors

Plastic crate

Ideal harvest time is early in morning or late afternoon when ambient temperature is low so that quality and freshness can be maintained. Use harvesting tools like pruning scissors and knives. Place the harvested crops in plastic crates or containers to avoid contamination with soil

4-10 Post-harvest handling

Vegetables are highly perishable therefore, proper post-harvest handling should be practiced to maintain quality and freshness. Avoid exposure of the crops to heat and sunlight. Protect them from stray animals.

Sorting and grading of harvested crops should be done immediately after harvesting. For sorting and grading, sorting wooden tables can be used and products can be weighed by weighing scale. Crates should be cleaned. The products are accommodated in the crates and should be covered with banana leaves or plastic sheets for temporal storage before shipment. Use of crates will minimize damage of the vegetables during transportation. Record the types of the products and their weight before shipping.

- *Sorting tomatoes on sorting table*
- *Weighing the produce after sorting*
- *Weighing of pechay*

Pechay in crates covered with banana leaves

5. Supplemental information for healthy vegetable cultivation

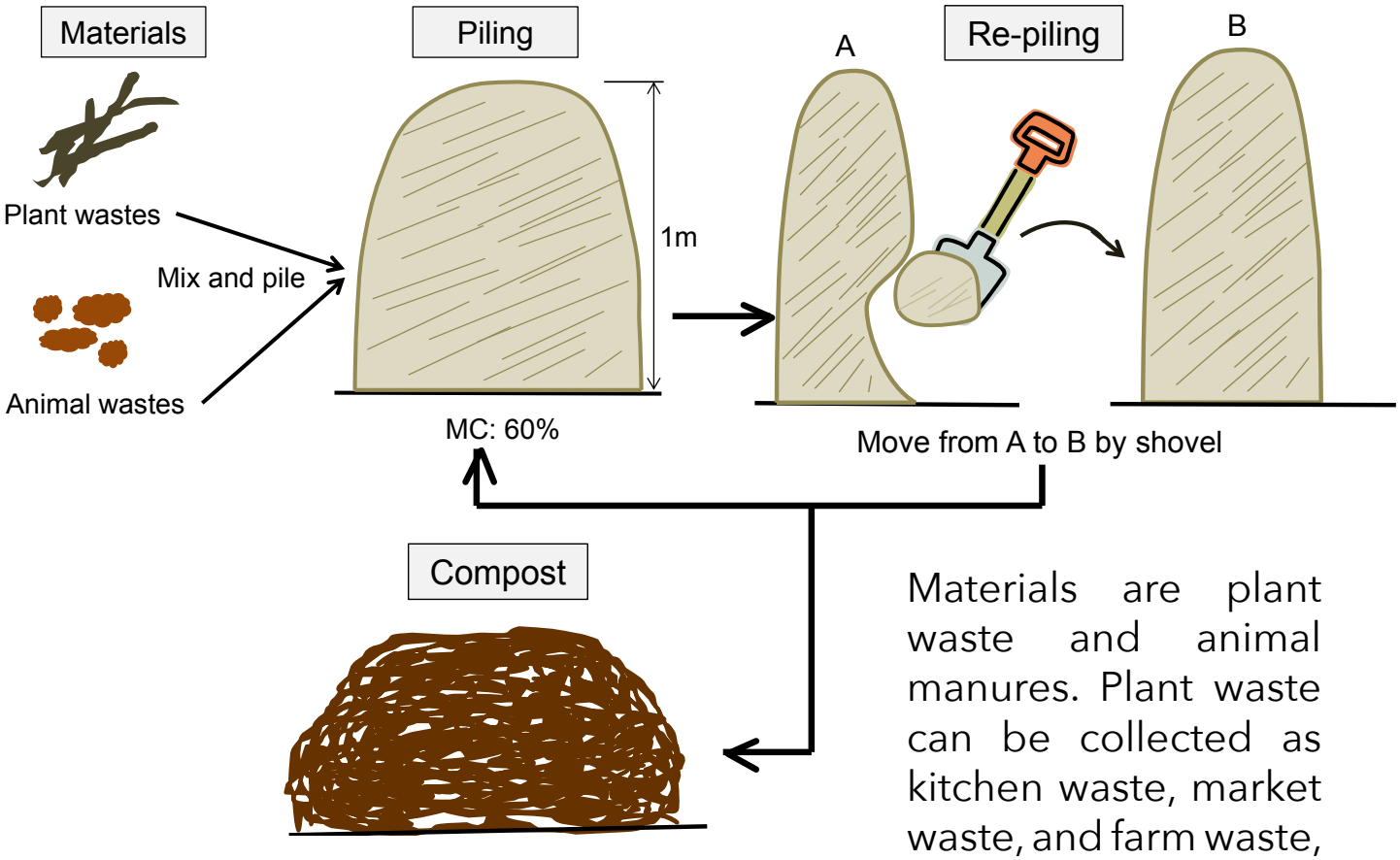
Use of healthy soil is a key to produce vegetable in sustainable manner. In sustainable farming practice, the essence is to feed the soil and the soil feeds the plant. Hence, it is important to feed the soil with organic fertilizer which contains proper nutrients needed by plants for growth and development.

In this manual, 5-1 introduces preparation of basic compost making. 5-2 explains vermicomposting procedure to produce vermicompost and vermi-cast. 5-3 introduces liquid fertilizer such as vermi-tea. 5-4 demonstrates preparation of concoction that is also recommended as bio-fertilizers and organic pesticide.

5-1 Basic compost making

Compost / composting can be used for improving soil texture, structure and enhancing water-holding capacity of soil. Compost may be low in NPK compared to chemical fertilizer; however, it contains essential micronutrients (e.g., calcium, magnesium, manganese, copper, iron and zinc) and microbial population which are not found in chemical fertilizers. Compost has microbial activities that promote plant health and pest and disease resistance. Compost has high organic matter content that serves as energy source for microorganisms and storage of nutrients for gradual release. This cannot be found in any inorganic fertilizers.

The following illustration shows the procedure of making compost.



Materials are plant waste and animal manures. Plant waste can be collected as kitchen waste, market waste, and farm waste, and trimmings of tree branches.

1. Plant waste should be chopped into pieces with 5 to 10 cm length. Proportion of the 2 materials is 60 – 70% for plant waste and 30 – 40% for animal waste in weight.
2. They are mixed while being piled like a mound at 1 meter high. The mound is covered by plastic sheets to avoid rain.
3. Approximately 15 to 20 days after first piling, the mass of the piled mound is moved from one place to another by a shovel to avoid rising temperature and heat because of fermentation.
4. Re-piling is repeated every 15 – 20 days again and again until compost is made. Re-piling will be repeated.
5. It will take about 2 – 3 months to make complete compost.

5-2 Vermicomposting and vermi-cast

Vermicomposting is the process of converting biodegradable farm waste and other household waste into compost or organic fertilizer through the action of earthworms. It is a low cost and scientifically based technology. The benefits of vermi-cast are:

- It serves as an alternative source of organic manure and substitute for chemical fertilizer.
- It is rich in indigenous bacteria, actinomycetes, and fungi.
- It improves soil's physical structure such as water holding capacity, aggregation, and porosity and enriching soil with microorganisms.
- It enhances Cation Exchange Capacity of soil; thus, enhancing the plants' capability to absorb other nutrients applied to soil.
- It is effective in adjusting soil pH from acid to ideal pH range.
- Vermicomposting can easily be adopted by vegetable farmers. The following is the procedure for vermi composting.

(1) Vermi-bed preparation

1. Vermi-beds are required to be constructed first. Recommended size of a bed is 3 – 5m long, 1 – 2m wide, and 0.3 – 0.8m deep.
2. Construction materials vary depending on budget and convenience. Recommended materials for small scale farmers can be trunk of coconut trees.

Vermi-beds construction by use of coconut trunks

(2) Materials or Substrates preparation

1. Locally available and low cost farm wastes particularly biodegradable farm wastes such as crop residues, livestock wastes, grasses, leaves of leguminous trees, saw dust, and coco coir can be used as materials or substrates.
2. The materials can be categorized into two: carbon source and nitrogen source. The recommended ratio of carbon source and nitrogen source materials is 3:1 in volume.

Table 5-1 Carbon and nitrogen source

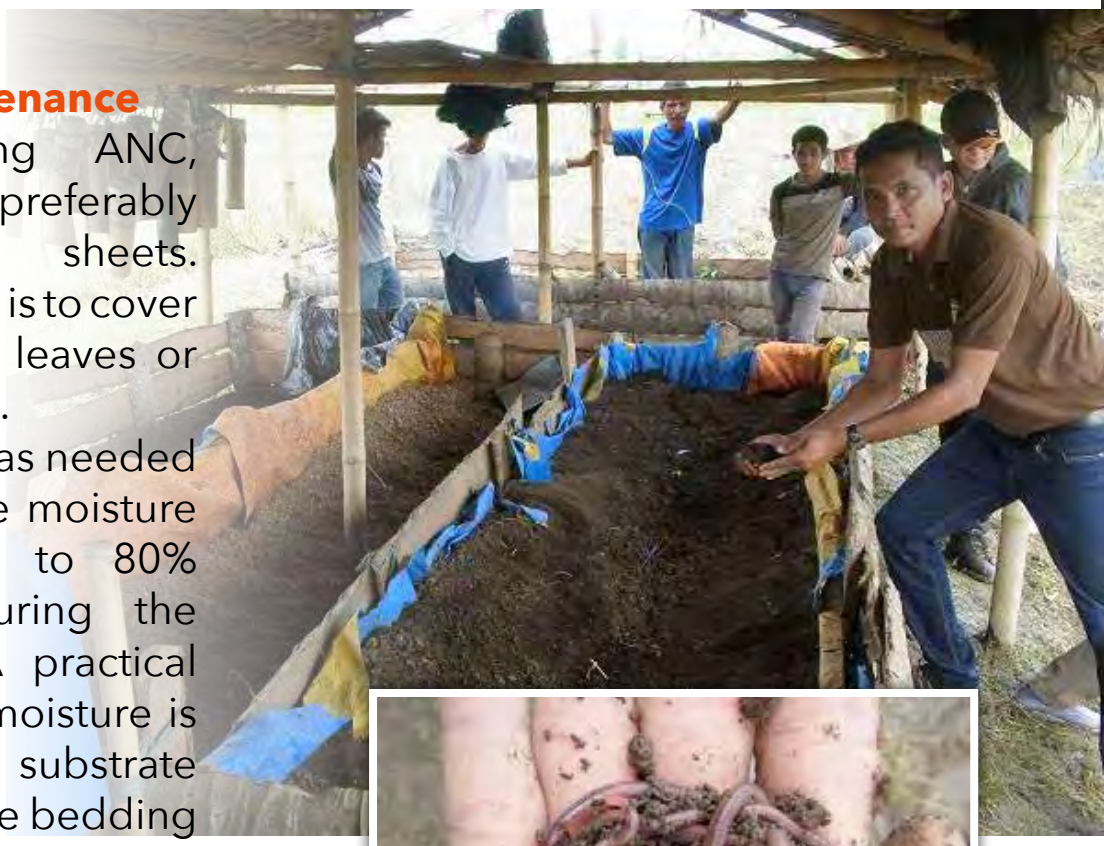
Carbon source (40 – 75%)	Nitrogen source (25 – 60%)
Grass clippings, rice straw, corn cobs, corn stalks, saw dust, cocodust, cane tops, cane trash, vegetable refuse, kitchen waste, and leaves of all trees.	*Plant source: kakawate and ipil-ipil leaves, mongo, peanut, kudzu, baging ilog, wild sunflower, katuray leaves, azolla, other leguminous plant parts. Animal source: animal manure of cow, goat, carabao, chicken, bats, and rabbits.*

3. If plant waste materials are long, it must be shredded or chopped mechanically or manually into 5 – 10 cm long pieces for faster decomposition.
4. Place properly the mixed materials or substrates in the bed at 50 kg/m2 to form bedding.
5. Apply trichoderma harzianum at a rate of 10 sachets or 1 kg per 1,000 kg of materials or substrates to hasten decomposition.
6. Cover the vermi-bed with plastic sheet or several layers of banana leaves to initiate thermophilic or anaerobic decomposition for 2 weeks.

Shredding banana trunk (below) and the shredded materials (right)

(3) Stocking of African Night Crawler (AWC)

1. After the pre-decomposition of the materials, their ideal temperature of not more than 30 degrees Celsius and moisture contents between 60 to 80% should be checked prior to the stocking of African Night Crawler (ANC)
2. Odor of the materials should be sweet smelling and not pungent
3. Sprinkle the bedding with wather to further lower the temperature.
4. Ideal Stocking density of ANC is 1 kg/cm^2 (Cost of 1 kg of ANC is about 1,000 Php).
5. One (1) kg of worm grows up to 30 kg after 6months under ideal conditions.



(4) Care and maintenance

1. Upon stocking ANC, cover the bed preferably with plastic sheets. Another option is to cover it with banana leaves or coconut fronds.
2. Water the bed as needed to maintain the moisture level of 60% to 80% particularly during the dry season. A practical way to check moisture is to squeeze a substrate sample from the bedding in one hand and observe the amount of drops of water. Three (3) to 5 drops is just right.

Sieving of vermi-compost and harvested vermi-cast (inset)

(5) Harvest, processing, and storage

1. Timely harvest of ANC is important to avoid its loss due to build-up of waste and migration of ANC due to lack of substrates.
2. Stop watering the beds 5-10 days before harvest.
3. Depending on the biomass stocked and the quality of bed materials used, vermicompost can be harvested 30 – 45 days after stocking, or as soon as the granular form of thick vermicast is visible.
4. Harvest vermicast, which are accumulated at surface of the beds, early morning by scraping and put them in container (vermi-cast).
5. Some vermi-compost, which is mixture of vermi-cast and de-composed substrates, can be sieved manually or mechanically to separate ANC and vermi-compost which can be used as fertilizer. ANC can be used for another round of composting.
6. The initial vermicast can be stored for 2 weeks on tarpaulin or concrete floor and it must be covered with a net to air-dry.
7. Pack vermicast and vermicompost separately in plastic bags and then pile in sacks for storage and application.

5-3 Vermi-tea

Vermi-tea is an organic liquid foliar fertilizer. Its purpose is to spray / apply to plants to strengthen immune system of the crop. It can also be an excellent pesticide because it suppresses plant diseases and plant parasitic nematodes. There is another function to promote growth of plants. Vermie tea is introduced as replacement of slurry production to use indigenous materials available in surrounding of farms. The materials used to produce vermi-tea and procedure are explained.

Materials

- 12 kg vermie cast
- 500 ml molasses
- 100 ml Indigenous Microbial Organism (IMO, refer to 5-4 Concoction)
- About 200 liters of water
- 200 liter capacity of drum
- Electrical aerator with hose and syringe
- Net bag

Procedure

1. Fill drum with water up to 3/4 capacity of drum
2. Aerate the water for 30 minutes by electric aerator
3. Fill net bag with vermie cast and immerse it onto the water surface of “2”
4. Add 500 ml molasses in water of “3”
5. Aerate “4” for 30 minutes again
6. Add 100 ml of IMO (refer to 5-4 Concoction) to “5”
7. Cover the drum and ferment with aeration for 24 hours

For Application of vermi-tea, mix 8 liters of vermie-tea and 8 liters of water and spray this using a knapsack sprayer on soil and plants.

5-4 Concoction (Bio-fertilizers and organic pesticide)

Concoction is an artificially made liquid plant growth enhancer, repellants, and liquid fertilizer to be applied to plants directly or to soil. Here, this manual introduces 7 concoction examples:

- Indigenous Microbial Organism (IMO),
- Fermented Plant Juice (FPJ),
- Fermented Fruit Juice (FFJ),
- Fermented Fish Amino Acid (FAA),
- Oriental Herbal Nutrients (OHN) / Herb Medicine Nutrient (HMN),
- Calcium Phosphate (Ca Phos), and
- Lactic Acid Bacteria Serum (LABS).

On each respective concoction, the function, materials, procedures, and dosage/application are explained.

(1) Indigenous Microbial Organism (IMO)

IMO is an agricultural biological inoculant to revive and improve soil fertility; thus, promoting growth of plants. It also speeds up composting works like "vaccinating" against sickness, illness and weeds.

Materials

- Either bamboo tube, earthen jar, or clay pot
- Plain Manila paper
- Basin
- Cooked rice
- Five (5) kg Muscovado sugar
- Wire screen
- Four (4) liters of clean water
- Plastic string for tying

Procedure

1. Mix 1 kg. cooked rice with 1 kg Muscovado sugar
2. Place "1" in either a bamboo tube, earthen jar, or clay pot
3. Cover with manila paper and fasten with plastic string
4. Bury the bamboo into the ground and allow fermenting for 7-14 days.
5. Separate / filtrate juice in a clean container / bottle by screen and seal, ready for use.

Dosage and application

Mix 5ml to 10 ml of IMO with 1 liter of water and spray the mixture on soil surface within root zone. It can be sprayed during early vegetative growth stage. Never spray on plants because it damages the plant.

(2) Fermented Plant Juice (FPJ)

FPJ can be foliar fertilizer and drench fertilizer for seedlings. There are a lot of enzymes and growth hormones apex of leaves; thus, plant growth is enhanced by applying FPJ on leaves. As a result, photosynthesis is activated more.

Materials

- Five (5) kg of any of the following plants: Trichanthera leaves; kangkong; banana trunk; camote shoots; carabao grass; hagonoy (Chromolaena odorata – used for crops only); alugbati; etc.
- Clay pot that can contain 10 kg / liters of liquid, earthen jar, or bamboo tube
- Plain Manila paper
- Plastic string for tying
- Five (5) kg Muscovado sugar
- Clean water

Procedure

1. Mix 1 kg chopped banana pseudo stem, which is 2 feet long on the upper most section that should be taken early morning or before sun rises.
2. Mix with 1 kg muscovado or molasses and the "1"
3. Place "2" in a bamboo tube
4. Cover with manila paper and fasten with plastic string
5. Bury the "4" to the ground and allow to ferment for 7-14 days
6. Squeeze out the juice.

Dosage and application

Mix 5 ml to 10 ml FPJ with 1 liter of water. Spray directly to the leaves of plants when it is not so sunny, before sunrise or two hours before sunset. It can be applied during early vegetative stage.

(3) Fermented Fruit Juice (FFJ)

FFJ can also be foliar fertilizer and drench fertilizer for seedlings. It is effective to sweeten fruit as nutrient enhancement with potassium factor.

Materials

- 5 kg of any of the following fruits: mango, papaya, marang, jackfruit, or banana (but not pineapple)
- Clay pot that could contain 10 kg or liters of liquid, earthen jar, or bamboo tube
- 5 kg Muscovado sugar or molasses
- Plain Manila paper
- Plastic string for tying
- Clean water

Procedure

1. Mix 1 kg chopped banana or other fruits (except citrus) with 1 kg Muscovado
2. Place "1" in a bamboo tube, earthen jar, or clay pot
3. Cover "2" with Manila paper and fasten with plastic string
4. Bury "3" in the ground and allow to ferment for 7-14 days
5. Separate the juice in a clean container, bottle it and seal

Dosage and application

Mix 5 ml to 10 ml FFJ with 1 liter of water. Apply directly to leaves of plants before sun rises or very late afternoon. Add FPJ to FFJ and spray together to leaves and soil of fruit bearing trees or during vegetative and reproductive stages.

(4) Fermented Fish Amino Acid (FAA)

FAA can be foliar fertilizer, growth activator, insect repellent, and fungicide. It contains nitrate which is made from fish. It also contains abundant amount of nutrients and various types of amino acid.

Materials

- 5 kg chopped fish or fish trash such as gills, entrails, golden snail whose shell is removed or meat scrap and rejects
- Clay pot that can contain 10 kg or liters of liquid, earthen jar, or bamboo tube
- Plain Manila paper
- 5 kg of Muscovado sugar
- Plastic string for tying
- Clean water

Procedure

1. Chop, grind or pound solid fish and herbal mix
2. Mix 1 kg of "1" with 1 kg of muscovado sugar
3. Place "2" in clay pot, earthen jar, or bamboo tube
4. Cover "3" with Manila paper and fasten it with plastic string
5. Bury in ground and allow to ferment for 15 to 30 days
6. Mix the materials every 5 days
7. Squeeze out juice and place in a clean container and seal
8. Collect solid fish bones to be used for making calcium nutrient spray formula for plants.

Dosage and application

Mix 5 ml to 10 ml FAA to 1 liter of water. Apply directly to soil where plant stem is standing. Do not spray to plants directly. It can be applied during late growth and bearing stage. Keep FAA in a container and store it in dry and cool place.

(5) Oriental Herbal Nutrients (OHN) / Herb Medicine Nutrient (HMN)

OHN can be sprayed against insects and fungi. It is so-called Natural Pest repellant. It can be used throughout early, vegetative and change over and fruiting stages of vegetables. This will develop the immune system of plants.

Materials

- 1 kg of ginger
- 1 kg of garlic
- 1 kg of bulb onions
- Turmeric (Optional)
- Neem leaves (Optional)
- Plain Manila paper
- Clay jar that can contain 10 kg of liquid, earthen jar, or bamboo tube
- Plastic string for tying
- 5 kg of Muscovado sugar
- 3 liters of Coconut vinegar
- One small bottle of gin or coconut wine

Procedure

1. Mix 1 kg of ginger, 1 kg of garlic and 1 kg of bulb onion and crush them by stone or wood
2. Mix "1" with 3 liters of coconut vinegar and place in a jar or bamboo tube and leave it for 12 hours
3. Mix "2" with 1 kg of Muscovado sugar
4. Cover mouth of the jar or bamboo tube with a manila paper and tie with plastic string
5. Keep "4" for 4 - 5 days and open it and mix it with a bottle of gin. Cover it again
6. Allow to ferment for 7-14 days

Dosage and application

Mix 3 ml of OHN with 1 liter of water. Spray on leaves and soil every week.

(6) Calcium Phosphate (Ca Phos)

Ca Phos induces flowering and prevent plants from overgrowth, especially tomato, cucumber, and eggplant. It increases calcium factor on roots and leaves.

Materials

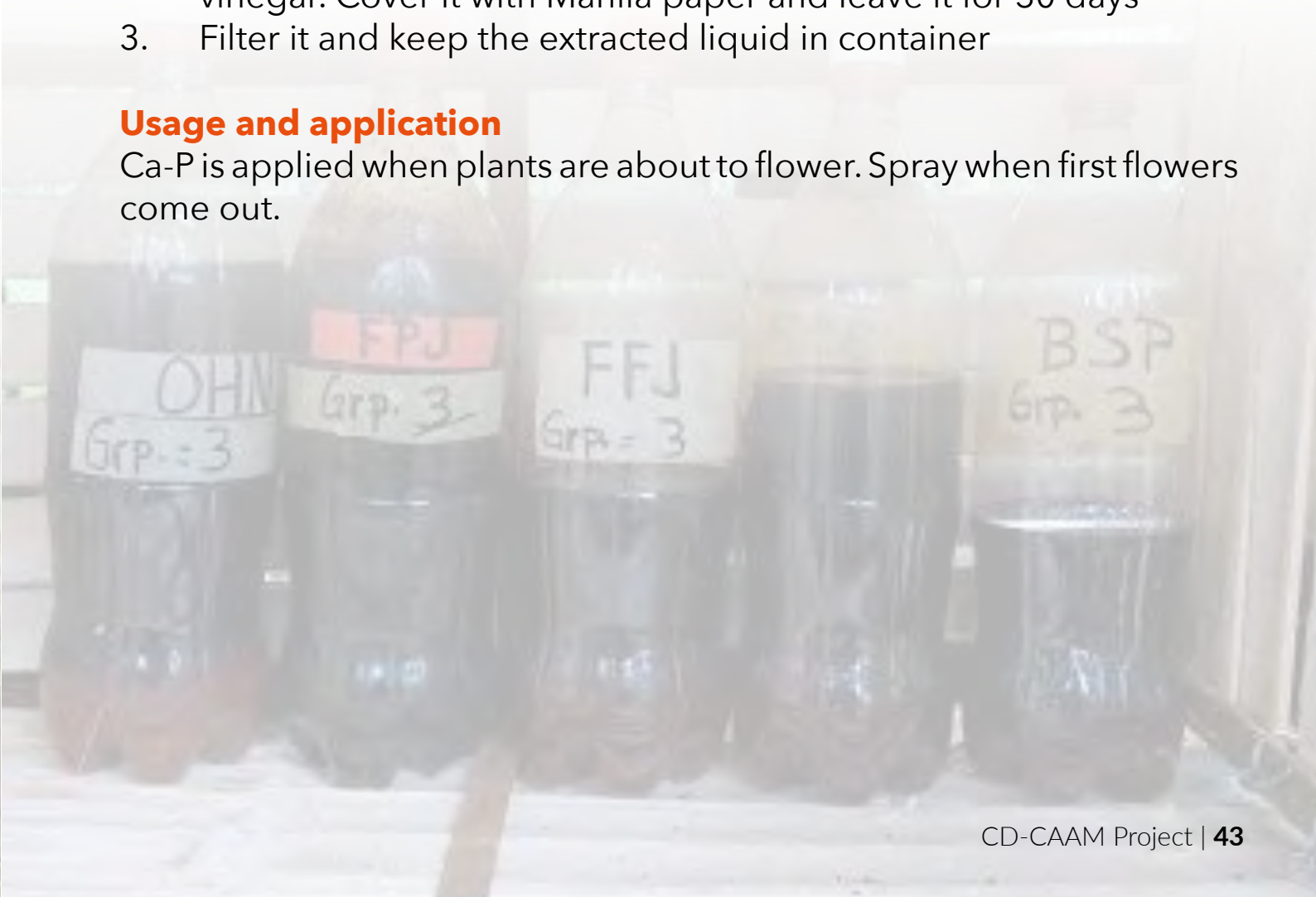
- 2 kg of any of the following: fish or beef bones, eggshells, kuhol shells, or any shells
- Clay pot that can contain 10 kg / liters of liquid
- Plain Manila paper
- Plastic string for tying
- 5 liters of Coconut vinegar
- Griller

Procedure

1. Grill 2 kg of animal bones until they become charcoal and let them cool down. Do not over burn the bone
2. Place the bone in a plastic container and pour 5 liters of coconut vinegar. Cover it with Manila paper and leave it for 30 days
3. Filter it and keep the extracted liquid in container

Usage and application

Ca-P is applied when plants are about to flower. Spray when first flowers come out.



(7) Lactic Acid Bacteria Serum (LABS)

LABS gives strength to weak plants, increases fruit size, provide defense against fungus and viruses as improving growth rate of plants. It can be used as soil conditioner or fertilizer as well. LABS can be mixed with other microorganisms as inoculant for compost making and prevents disease development.

Materials

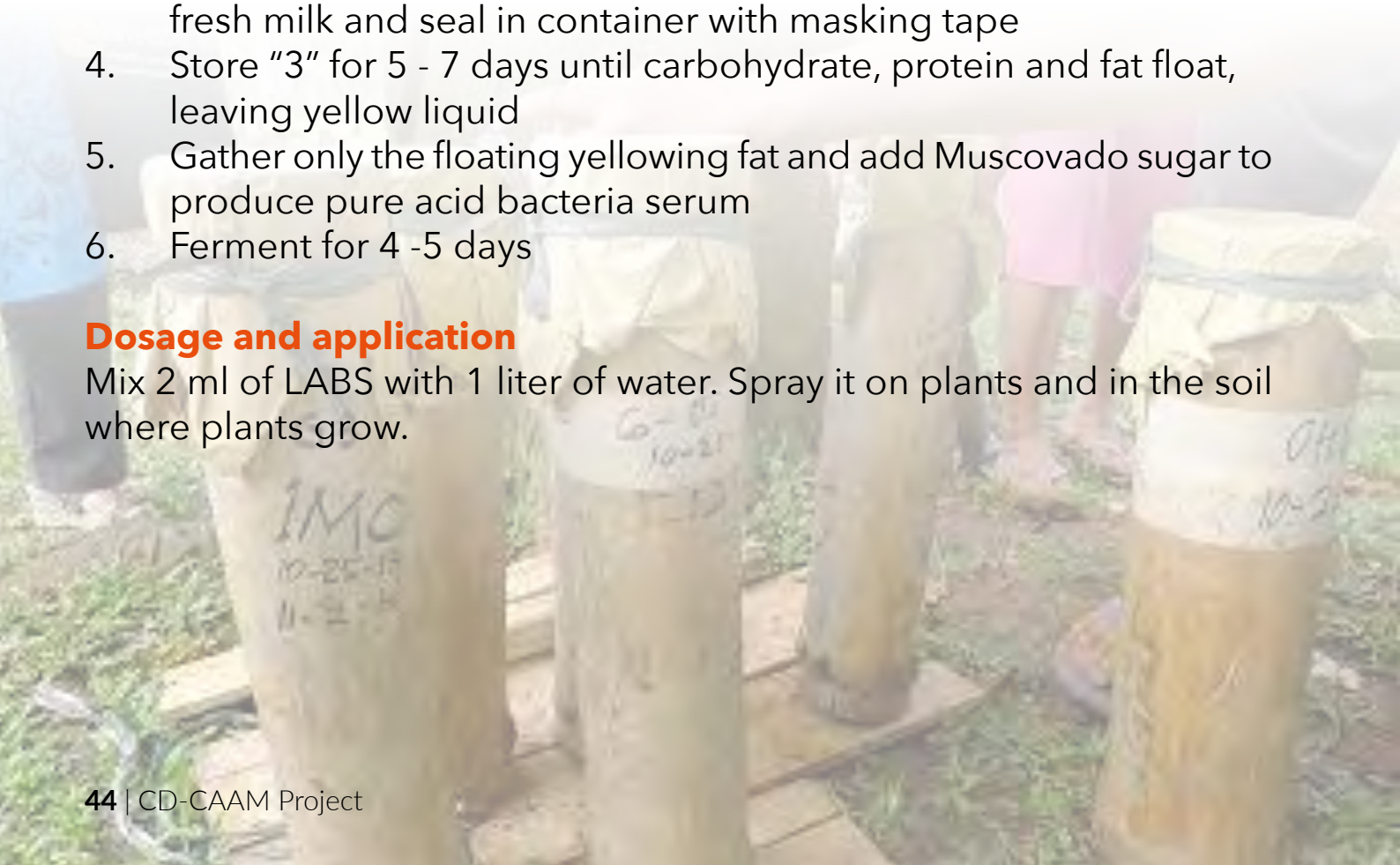
- 1 liter of water which has been used to wash rice
- 1 liter or kg fresh milk, skimmed, or powdered milk
- Clay pot that can contain 10 kg or liters of liquid
- Masking tape
- 1 kg of Muscovado sugar
- Syringe and plastic tube

Procedure

1. Keep a glass of used water after washing rice and pour it to container
2. Leave the "1" for at least 5 to 7 days until lactic acid bacteria floats, smelling sour
3. Take 10 ml of "2" by using syringe and tube and mix it with 1 liter of fresh milk and seal in container with masking tape
4. Store "3" for 5 - 7 days until carbohydrate, protein and fat float, leaving yellow liquid
5. Gather only the floating yellowing fat and add Muscovado sugar to produce pure acid bacteria serum
6. Ferment for 4 -5 days

Dosage and application

Mix 2 ml of LABS with 1 liter of water. Spray it on plants and in the soil where plants grow.



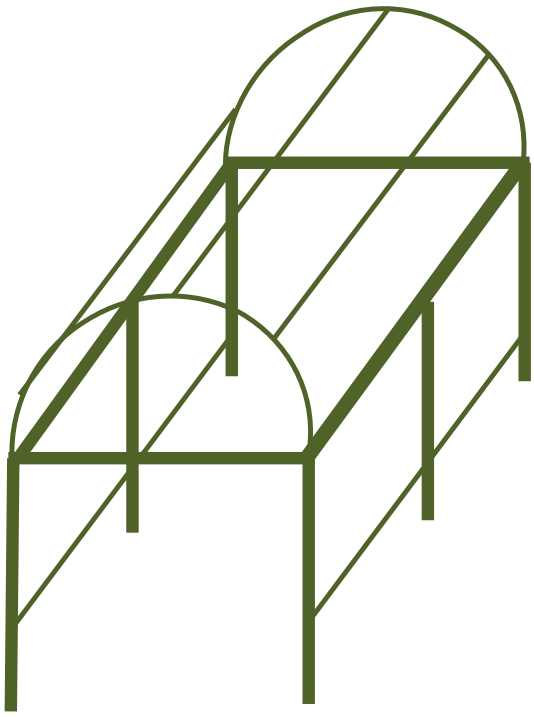
Inside of rain shelter

A rain shelter

6. Rain shelter

Rainfall is erratic and typhoon often carries heavy and intensive rain that physically damages vegetables in Mindanao. Rain also causes pest and diseases due to wetness on plants and high humidity. Rain shelter is a solution to protect vegetables from rain. It is a vinyl house wherein only ceiling is covered with vinyl film and that 4 sides are all opened.

The skeleton of a rain shelter can be structured with bamboo. Its size is determined by considering plants height, width and number of ridges, and length and width of available PVC film. Dome shape of ceiling is recommended.



Frame of rain shelter

7. Design of demonstration farm

Two (2) designs of a vegetable demonstration farm are illustrated for extension purpose (see next two page). Total area of respective design is 1,000 m^2. The farms are composed of main plots or ridges to plant different vegetables, vermicomposting hut, irrigation facilities, and nursery making facility, rain shelter, and fence. The first design shows some small plots for diversification of vegetable crops. The second design shows vegetables grown on ridges using intercropping.

Matungao Demo Farm (opposite page)
Macabiso Demo Farm (page 48)


Cucumber
Okra
Rain Shelter
Ampalaya
Tomatoes
String Beans
Leafy Vegetables
Water Reservoir
Vermie Composting Hut
Meeting Area
Nursery Hut
Storage Hut
ENTRANCE


Drip
Irrigation
Eggplant
Bell Pepper
Tomato
Bulb Union
Eggplant
Bell Pepper
Tomato
Bulb Union
Bell Pepper
Tomato
Eggplant
Bell Pepper
Tomato
Bulb Union
Nursery Hut
Tomato
Manual Hand Pump
Post Harvest &
Sorting Facility
Vermie Composting Hut
ENTRANCE

8. Business management in vegetable production

8-1 Marketing

(1) Market survey

Marketing is one of the most important activities for vegetable producers to actually find out what, where, when, how and how much they sell their produce to maximize profit. In other words, they have to consider following significant key factors; crops to sell, prices, demand of wholesaler, retailers, and consumers, locations, and other factors, in farming business. To know these factors, marketing survey is necessary.

Marketing channel is simplified in the following illustration. As shown in the figure, market margin from producers to final consumers is large because of traders, wholesalers, and retailers. Produce can be surely conveyed to the final destination; however, producers' proportion of market margin is small.

Therefore, vegetable farmers can explore and develop lucrative channels, letting produce reach to consumers by avoiding some factors especially traders. There are three possible kinds of marketing channels: (1) selling to retailers, (2) selling to wholesalers, and (3) direct selling to consumers / restaurants

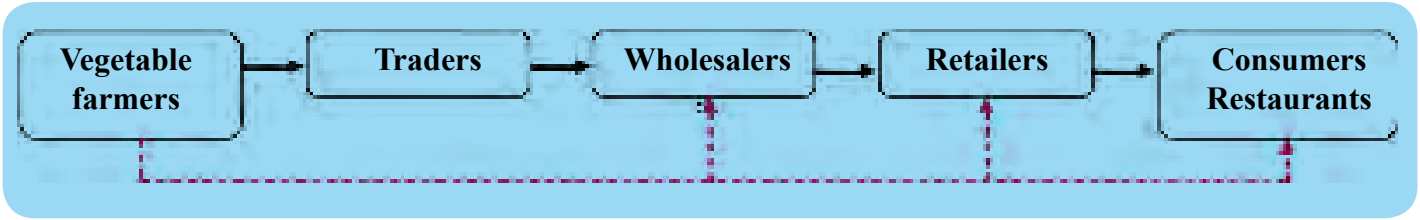


Fig 8.1. Marketing Channel

The following two Tables are survey formats with which basic information to be collected for the patterns of (1) and (2) to consider where to sell.

Table 8-1 Information to be collected from individual retailers

Retailer / restaurant	Name of vegetable	Buying price	Q'ty at once (Max)	Frequency	Days / mth	Total Q'ty / per mth	Total sale / mth

Table 8-2 Information to be collected with wholesalers at wet markets

Market	Distance	Name of vegetable	Buying Price	Other observation

(2) Market analysis for selling products (example)

This section demonstrates actual analysis with real data and information that were obtained through the pilot project at Sultan Mastura, Maguindanao province, as examples of market analysis. Sultan Mastura is located about 20km from Cotabato City in Mindanao.

Selection of market is the most significant consideration. The thing that should be identified is accessibility to markets for public population. If markets are nearer to populated areas, there will be a great opportunity for high rate of demands of vegetable. Next consideration is prices of products and cost of transportation when comparing markets. Survey was first conducted at nearest possible buyers in Cotabato City; retailers in wet market, restaurants, and all vendors as shown in Table 8-3.

Prices are different from a buyer to buyer; however, one can understand that there is certain demand in terms of maximum quantity and frequency for buying produce from producers. Therefore, producers will be able to calculate how much they can obtain a month if they can provide continuous supply.

Table 8-3 Example of market survey results on retailers and restaurant (Cotabato City)

Retailer / restaurant	Vegetable	Price (Php) / kg	Q'ty (kg) at once (Max)	Frequency to buy	Days / mth	Total Q'ty (kg) / mth	Total sale (Php) / mth
Retailer A	Bell pepper	60	2	every 2 days	12	24	1,440
	Tomato	28	2	every 3 days	12	24	672
	Eggplant	35	2	every 4 days	12	24	840
	Cauliflower	120	2	every 5 days	12	24	2,880
	Cucumber	20	2	every 6 days	12	24	480
Retailer B	Bell pepper	100	1	every day	28	28	2,800
	Eggplant	25	10	every day	28	280	7,000
	Cucumber	25	5	every day	28	140	3,500
	Onion	120	3	every day	28	84	10,080
Retailer C	Bell pepper	70	5	every day	28	140	9,800
	Tomato	30	2	every day	28	56	1,680
Retailer D	Bell pepper	90	1	every day	28	28	2,520
	Tomato	16	8	every day	28	224	3,584
	Eggplant	25	5	every day	28	140	3,500
Retailer E	Bell pepper	50	1	every day	28	28	1,400
	Tomato	20	15	every day	28	420	8,400
	Eggplant	30	10	every day	28	280	8,400
	Onion	150	10	every day	28	280	42,000
Retailer F	Bell pepper	25	300	every 3 days	8	2,400	60,000
	Tomato	15	500	every 3 days	8	4,000	60,000
	Eggplant	10	1,000	every 3 days	8	8,000	80,000
	Cauliflower	45	200	every 3 days	8	1,600	72,000
Restaurant A	Bell pepper	60	2	every day	28	56	3,360
	Tomato	28	1	every day	28	28	784
	Eggplant	30	4	every day	28	112	3,360
	Cauliflower	120	2	every day	28	56	6,720

Source: CD-CAAM 2014

In the real situation, the retailer B, E, and F were selected by farmers to sell their products. Some reasons are:

- Though there are maximum quantity, the retailers can buy on a transaction, they can still buy more volume;
- They didn't require any document to accept products since the selling to them was first trial, and
- They accept any timing to sell from the producers, meaning that whenever the farmers harvest, they can communicate with the buyers.

Wholesale wet market survey and retailer (shopping mall) survey

Moreover, a wet market survey was conducted at such locations as Kabacan, Kidapawan and Davao. It was observed that prices of some vegetables are not the same at respective markets. Prices of tomato and bell pepper are higher in Kabacan than in the other markets; however, there are competitors as suppliers of vegetables from Makilala and Davao. Direct selling is not allowed at Kidapawan market. Prices in Davao seemed to be lowest. Finally, due to constraint of transportation, retailers of Cotabato were considered buyers.

Table 8-4 An example of market survey results on wholesalers in wet markets

Market	Distance (km)	Vegetable	Price (Php/kg)	Other observation
Kabacan		Tomato	25	Makilala and Davao are sources of vegetable Market days: Thursday and Sunday Transportation cost: *100 - 120 Php / person* Truck rental fee: 4,500 Php / day Multicab rental fee: 2,500 Php / day
		Bell Pepper	80	
		Eggplant	15 – 20	
		Cucumber	10	
		Cauliflower	120	
Kidapawan	120	Tomato	10 – 15	Products should go to Bagsakan first Direct sellers are not allowed to public market Grading of products is required Source of vegetable is adjacent town
		Bell Pepper	40	
		Eggplant	20	
		Cucumber	20	
Davao	260	Tomato	8 – 10	Products are within Davao region Lowest price among surveyed markets
		Bell Pepper	15 – 25	
		Onion	70 – 80	
		Eggplant	25	

(3) Selling patterns (example)

Some patterns of selling products such as selling to retailers or wholesalers, and direct selling are illustrated as examples which the farmers experienced during CD-CAAM project.

Selling to retailer

Based on the analysis on the above, the farmers group of Sultan Mastura in CD-CAAM started selling products to the retailer F in wet market in Cotabato City. The farmers sell tomato in bulk in plastic crates. The buyer welcomes quality of the products and sometimes he visits the farm of the group to observe how the produce are cultivated. Communication between the producer and the buyer is very tight and smooth for business transaction.

Selling to supermarket in shopping mall

Another example to sell products to retailer is found from farmers' group of Matunago, Lanao del Norte, under CD-CAAM. The retailer is GAISANO mall. It was selected as selling target during market survey because of many opportunities and advantages; accepting delivery in bulk, preferable selling price, cash on delivery, and sure market. Moreover, according to its Marketing Heads, Gaisano has 11 branches in Northern Mindanao; they can also supply vegetables to other branches whenever there is a request from them.

Gaisano Mall doesn't have specific requirements for any vegetables so long as the product is good, not too ripe or unripe, and not rotten and

Retailer in wet market of Cotabato City

Selling to supermarket (receiving section of supermarket)

with no damages. Organically grown vegetables are welcomed. The mall accepts minimum delivery of 20 kg of any vegetable products.

Prior to getting orders from Gaisano Mall, farmers need to bring sample of vegetables to Gaisano Mall for marketing manager to check the quality. The staff will inform farmers price per unit weight (kg). Once price is agreed by the two parties, farmers can deliver vegetables on agreed day. The farmers need to take care of transportation expenses.

Selling at farmer's selling hut

Selling to small huts located near to both farm and trunk road in Municipality is very simple, easier and manageable and advantageous to farmers. Some of the advantages are as follows:

- Farmers are able to sell all products including the ones that cannot be accepted in markets.
- Farmers can finish selling all amounts within a day.
- If location of farm is near to main road, transportation cost is not incurred.
- All the people passing by the hut can be walk-in buyers.
- Farmer only needs to prepare for weighing scale, calculator, and plastic cellophane where they can put the vegetables. Giving of receipts to buyers is very optional.

Selling at farmer's direct selling hut

8-2 Record keeping

The objective of this part is to learn how to evaluate vegetable production from the view point of agri-business to sustain and improve livelihood for small scale vegetable farmers.

A farmer should understand if there is profit from vegetable farming or none. He or she should also know how much the profit or loss and why it is created. Understanding of expense and profit will help a farmer to make the vegetable production more lucrative by continuous improvement of farming business. To do so, recordkeeping / bookkeeping is necessary to clearly express profit and loss in numerical value. Here, (1) expenses recording of production activities, (2) bookkeeping for selling, (3) profit calculation, (4) return on investment, and (5) savings from profit are demonstrated.

(1) Expenses recording of production activities (first notebook)

In the vegetable production, there is a need to record all farming activities and inputs with corresponding expense on each day from the start until completion of production cycle. For instance, cost of seeds for vegetable is one of input costs. Similarly, renting a carabao is a cost of land preparation.

The recording becomes the Record Expense Notebook (first notebook) and it is the start of bookkeeping. The format sample of activities with dates and costing is shown in the following Table. The objective of this tabulation is to get the total expenses of all activities related to vegetable production.

Table 8-5 Record expense notebook (first notebook)

Date	*Activities*	Cost (Php)
10/2/13	Clearing	1,500
10/9/13	Plowing and harrowing	2,600
11/18/13	Fencing of Nursery	1,000
11/26/13	Seeds and nursery making	1,600
12/12/13	Transplanting	1,500
…	…	…
…	Harvesting	…
	Total	8,200

The sample matrix shown above was the estimated cost of the bulb onion bulb farmers of Sultan Mastura, Maguindanao as an example and this is actually the appearance of their Record Expense Notebook. Similarly, when such activity will be done individually by any farmer, he or she should list farming activities from the starting of land preparation till harvesting as a cultivation cycle, specifying the date per activity with corresponding cost and finally getting the total expenses.

(2) Bookkeeping for selling (second notebook)

Taking for granted that it is harvest time. Get a second notebook for recording selling activities. Divide each page into two columns, writing Sales at the left column and Expenses at the right column for daily transactions. Don't forget to write the date of transaction at the left upper corner. Get the summation of sales and expenses for everyday transactions.

Next, get the total production expenses from the first notebook or the Record Expense Notebook and write it at the right upper corner of the second notebook. Enclose this in a parenthesis ( ) to indicate loss or expenses during production. This practice is shown in Table 8-6. The objective of this Table is to show the daily flow of money and its relation to expenses.

Table 8-6 Cash Flow Transactions on first day for selling

December 18, 2013	(8,200)
Sales (Php)	**Expenses (Php)**
Eggplant 3,200	Transportation 400
Tomato 2,900	Labor 350
	Food 150
Sub Total of Sales 6,100	**Sub Total Expenses 900**
Cash on Hand (COH) for the day	6,100 - 900 = 5,200

Then, remove the COH for the day from the total production costs. Therefore; (8,200) + 5,200 = (3,000) can be calculated. This (3,000) can be forwarded to the next day transactions as shown in Table 8-7.

Table 8-7 Cash Flow Transactions on second day for selling

December 19, 2013	(3,000)
Sales (Php)	Expenses (Php)
Eggplant 3,500	Transportation 100
Tomato 950	Labor 200
	Food 150
Sub Total Sales 4,450	Sub Total Expense 450
Cash on Hand (COH) for the day	4,450 - 450 = 4,000

Remove again the COH for the day from the remaining production costs. This will show the farmer when he can retrieve back his production or input expenses. Thus, (3,000) + 4,000 = 1,000 can be calculated. This 1,000 is now a profit to be forwarded again to the next day transactions as shown in Table 8-8.

Table 8-8 Cash Flow Transactions for third day for selling

December 20, 2013	1,000
Sales (Php)	Expenses (Php)
Eggplant 2,900	Transportation 200
Tomato 1,900	Labor 200
	Food 150
Sub Total Sales 4,800	Sub Total Expense 550
Cash on Hand (COH) for the day	4,800 - 550 = 4,250

This time, add the latest COH and the previous income of 1,000. It means that 4,250 + 1,000 = 5,250. This profit is again to be forwarded to the next day transactions. This shall continue until all products are sold out.

(3) Calculation of profit

In summary, the cost of production should be subtracted from the total sales during the same day. The difference is called the "Cash on Hand (COH)" during the day. Compare this COH during the day with the overall production expenses from the Record Expenses Notebook and the result is called the Cash at the end of the day or "Cash ending".

Table 8-9 Summary Table for Cash Flow Transactions

Particulars	*Dec. 18*	*Dec. 19*	*Dec. 20*
Sales	6,100	4,450	4,800
Expenses for sales	900	450	550
COH for the day (Sales – Expenses for sales)	5,200	4,000	4,250
Combine COH and production expenses (Sale – Gross production expenses)	(8,200)	(3,000)	1,000
Cash Ending	(3,000)	1,000	5,250

The cash flow will tell a farmer when he / she can regain his / her expenses or business inputs or capitalization. The flow of the cash can help farmers in budgeting and planning for the next cropping.

(4) Return on Investment (ROI)

For instance, a farmer has sold all harvested products, and then he / she has actually completed the cycle of farming business. He / she can then determine the proportion of overall net income versus capital expenses or Return on Investment (ROI), in other words, efficiency of profit making.

Assuming that the profit is the Php 5,250, get the percentage of this income against the total production expenses from the Record Expense Notebook.

Profit or ROI = (Php 5,250 / Php 8,200) x 100% = 64%

This means that for every Php 1.00 expense of vegetable business, there is a profit of Php 0.64. Therefore, the details of the farmer's profit ROI are explained as below.

- For every Php 1 expense, the farmer has a profit of Php 0.64.
- For every Php100 expense, the farmer has a profit of Php 64.
- For every Php 200 expense, the farmer has a profit of Php 128.
- For every Php 1,000 expense, the farmer has a profit of Php 640.
- For every Php 8,000 expense, the farmer has a profit of Php 5,120.
- For every Php 8,200 expense, the farmer has a profit of Php 5,250.

(5) Savings from profit

The profit in vegetable production business can be handled carefully. One can segregate or set aside some proportion of profit, like 25% of it, as savings. Some amount should be left for continuous agribusiness investment as second cropping. Further, savings can be improved through wise spending or further spending only for minimum needs or wants.

Let's use the above example of profit of Php 5,250. From an income of P5,250, the farmer has to separate at least 25% of the income for savings. The difference of the income and savings becomes the farmer's budget for expenses. Therefore, savings equals to Php 1,312.50 which is 25% of Php 5,250. From the savings, the farmer has to allocate and manage properly the segregation of the percentages and these are shown in Table 8-10. All the allocations are very important. In fact, the farmer can still create other allocations according to his convenience, but the core objective of Table 8-10 is for future business of the Investment Fund so that additional income can add to the agribusiness. This setting aside of 25% of income as savings should be continuously done by the farmer until it becomes a routine habit and becomes a part of his attitude and discipline.

Table 8-10 Savings allocations

	PARTICULARS	Percentage Allocation (%)	Amount Required (PhP)
1	Zakat (Alms) / Tithing	3.0	157.50
2	Investment Fund	10.0	525.00
3	Reserve Fund	5.0	262.50
4	Emergency Fund	5.0	262.50
5	Miscellaneous Fund	2.0	105.00
	Total	25.0	1,312.50

The Project for

Capacity Building for Community Development in Conflict-Affected Areas in Mindanao (CD-CAAM)

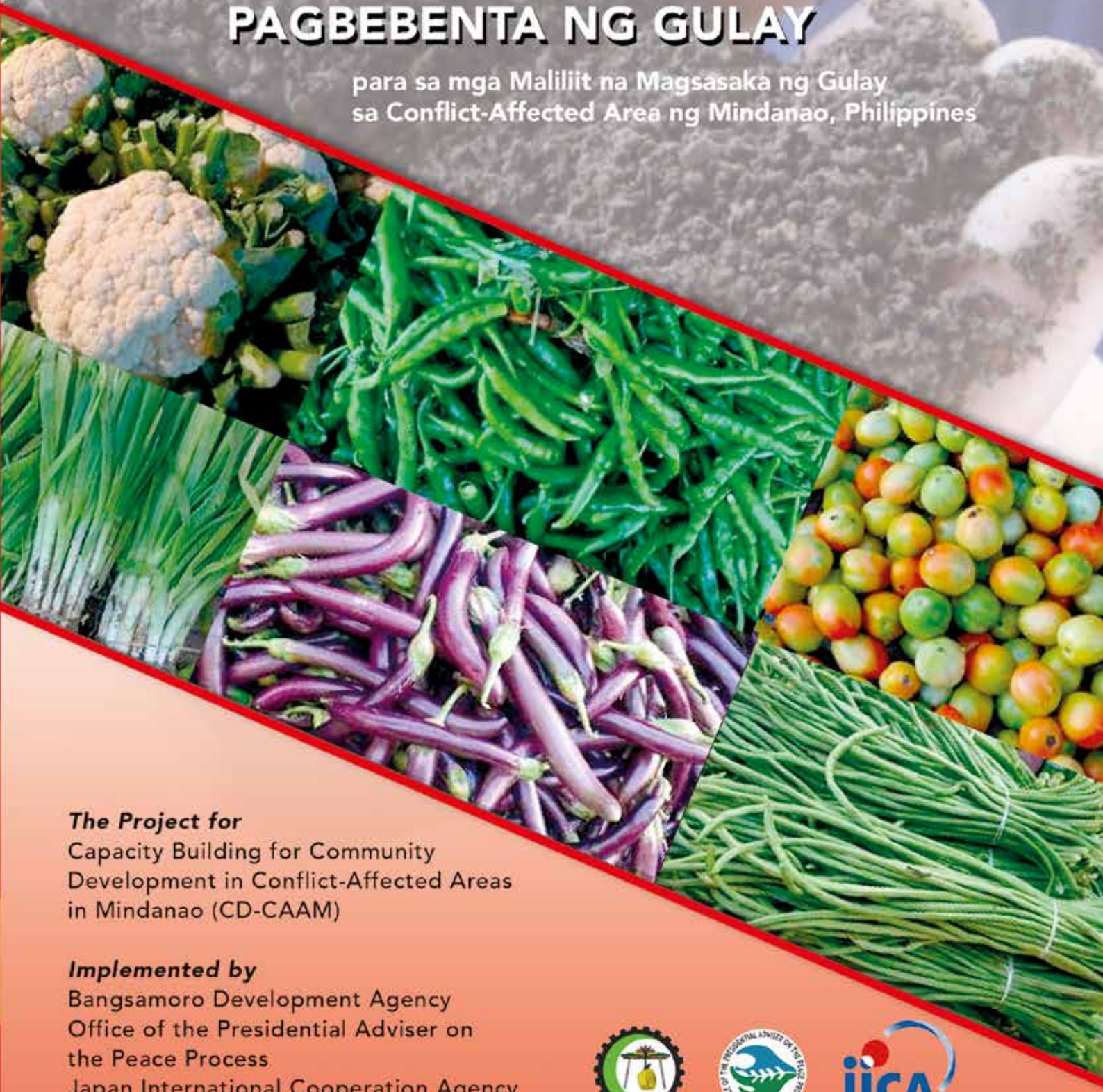
Implemented by

Bangsamoro Development Agency (BDA)
Office of the Presidential Adviser on the Peace Process (OPAPP)
Japan International Cooperation Agency (JICA)

PANGUNAHING GABAY

SA PRODUKSYON AT PAGBEBENTA NG GULAY

para sa mga Maliliit na Magsasaka ng Gulay
sa Conflict-Affected Area ng Mindanao, Philippines



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Pagkilala

Ikinagagalak kong maibahagi ang Gabay na ito hindi lamang sa mga maliliit na magsasaka kundi pati na rin sa ating mga kaakibat sa pag-unlad. Ipinaaabot ko ang aking taos-pusong pasasalamat sa Upi Agricultural School (UAS) at Agricultural Training Institute (ATI) sa kanilang ambag na kaalamang teknikal.

Maraming salamat din kina G. Mohalidin T. Akmad, Regional Project Operation Officer (RPOO), Regional Management Office (RMO) ng Central Mindanao, at G. Cosain B. Solaiman, RPOO ng RMO sa Ranaw ng BDA, sa kanilang matatag na koordinasyon at dalisay na pakikitungo sa mga benepisyaryo sa panahon ng pagpapatupad ng patnubayang proyektong nakasentro sa mga pakitang taniman.

Ipinahihiwatig ko rin ang aking pasasalamat sa Municipal Agriculture Officers mula sa dalawang pook, na sina G. Ibrahim U. Alimpang ng Sultan Mastura at Bb. Diamond Arimao ng Matungao, sa kanilang magiliw na pagsuporta, makabuluhang kaalaman at sa kanilang kooperasyon at partisipasyon sa iba't ibang bahagi ng proyekto, na kung wala ay ikahahantong sa hindi pagkatapos ng pagpapatupad ng proyekto ayon sa naitakdang panahon.

Marso 2015
Furuichi Shingo
JICA Expert in Income Generation / Agriculture
CD-CAAM

1. Panimula

Ang Pangunahing Gabay sa Produksyon at Pagbebenta ng Gulay ay inihanda batay sa mga karanasan at kapulutang-aral mula sa mga aktwal na kasanayan sa mga vegetable demonstration farms sa Barangay Macabiso, Sultan Mastura, Probinsya ng Maguindanao, at Barangay Puntod, Matungao, Probinsya ng Lanao Del Norte, bilang proyekto sa ilalim ng CD-CAAM.

Ang naturang mga demonstration farms sa dalawang nabanggit na munisipyo ay nagtatampok ng "Natututo habang Kumikilos at Kumikita" (*Learning while Doing and Earning*). Ang mga ito ay dinisenyo upang magsilbing lugar para sa mga benepisyaryo ng CD-CAAM na mapag-aralan ang naaayong teknolohiya kaugnay sa produkyson ng gulay sa *sustainable* na paraan bilang bahagi ng mga kilos ng JICA kaugnay sa paglikha ng kita.

Sa pangkalahatan, may mga kaparaanan sa pagtiyak ng masaganang ani ang nangangailangan ng labis-labis na paggamit ng kemikal katulad ng sintetikong pataba, pestisidyo at insektisidyo. Ito ang mga tinatawag na nakagawian o conventional na pamamaraan sa pagtatanim kung saan ang tumataas na halaga ng mga gamit-paggawa o *input* ay pinapasan ng napakaraming maliliit at mahihirap na magsasaka. Samakatuwid, ang demonstrasyon sa produksyon ng gulay at pakitang taniman ay nagpapahayag ng pagyakap sa mga praktikal na sistema ng pagtatanim na nakapagpapababa sa paggamit ng naturang mga gamit-paggawa at sumusubok na palitan ang mga ito ng mga organikong gamit-paggawa tulad ng abonong binulok ng bulate at samu't-saring likido o *liquid concoction*.

Kaya, ang mga makakalikasang pamamaraan ay inihahandog sa Gabay na ito. Samantala, hangarin din ng dokumentong ito na maipakita ang pakinabang ng malimit na paggamit ng mga kemikal pang-agrikultura na nakatutulong sa pagsugpo at pagkontrol ng mga mapanirang peste at sakit, at sa pagbigay ng sustansiya sa mga tanim upang mapalabis ang produksyon.

Ang Gabay na ito ay hindi lamang nagbibigay-diin sa mga mahihirap na magsasaka na alamin ang iba't-ibang pamamaraan sa paglinang ng gulay kundi pati na rin gabayan sila sa pag-asikaso sa madaling mabulok na mga produkto matapos ang ani at ng iilang mga kagamitan sa produksyon ng gulay. Bilang dagdag, ang Gabay na ito ay nagbibigay-diin sa kahalagahan at teknolohiya ng pagtatala o *record keeping* at ng pagturing sa kanilang sistema ng pagtatanim bilang isang pangangalakal.

2. Mga pangangailangang pangkalikasan

Ang paglinang ng gulay at ang masaganang pag-ani nito ay lubos na nakabatay sa kondisyon ng kalikasan. Ang mga sumusunod ay ang mga pinakaangkop na kondisyong pangkalikasan na dapat maisaisip bago magsimula sa paglinang ng gulay sa Mindanao.

Temperatura ng kapaligiran

Ang pamantayang temperatura ng Mindanao ay nasa 22.5 hanggang 32.5 na antas ng sentigrado . Karamihan ng mga gulay ay angkop na itanim sa tropikal na klimang ito. Ang mga tropikal na gulay tulad ng siling-pula, okra, ampalaya, talong, sili, kamote, kangkong, at iba pa, at mga mala-tropikal gaya ng pepino, kalabasa, sitaw, mais at marami pang iba ay maaari ring itanim sa Mindanao. Ang paglinang ng letsugas, repolyo, cauliflower at sibuyas ay maaaring maging mahirap mapalago at masigurong dekalidad sa naturang temperatura.

Tubig

Ang tubig ay mahalagang elemento sa pagtubo ng tanim. Sa panahon ng tagtuyot, ito ay lubos na kinakailangan ng siyang nagtatanim ng gulay na dapat ay magtanim at maglinang ng gulay sa lugar na madaling makakuha ng tubig para sa kanyang mga tanim. Kung walang malapit na pagkukuhanan ng tubig gaya ng ilog o lawa, ang paghukay ng tubig mula sa ilalim ng lupa ay maaaring maging isang alternatibo.

Sikat ng araw

Ang taniman ay nararapat na makatanggap ng sapat na sikat ng araw sa buong araw dahil ang pagtubo ng tanim ay nangangailangan ng sikat ng araw upang makagawa ng pagkain nito. Subalit, ang labis-labis na sikat ng araw kung minsan ay dapat maiwasan tuwing panahon ng paggawa ng *nursery* at nang sa gayon ay ang iilang pasilidad ay magawang lilim.

Lupain at ang lupa sa taniman

Ang lupa ay natural na gamit sa pagtubo ng halaman. Ang lupa sa taniman ay nararapat na maging mataba, sapat para sa pagtubo ng mga halaman. Maaaring mamuhay ang isang tanim sa klase-klaseng uri ng lupa, subalit ang pinakaangkop ay siyang may katamtamang taba ng lupa at may maayos na daloy ng tubig, ligtas sa bulate ng ugat o *root knot nematode*, nakalalantang bakterya o *bacterial wilt*, nakalalantang *fungi* o *fusarium wilt,* at iba pang sakit mula sa lupa. Ang pinakaangkop na antas ng asido, o pH, ng lupa ay 5.5-6-8. Ang taniman ay nararapat lamang na maging sapat ang kapatagan upang ang mga trabaho dito ay ligtas at komportableng maisagawa.

Ang taniman ay dapat maitatag sa may libis na may lubos na sikat ng araw upang maging madali ang pagdaloy ng tubig, lalo na sa panahon ng tag-ulan. Kung ang lupa naman ay patag, ang paggawa ng kanal at sangkahan sa palibot ng taniman ay nararapat. Ang mga napakatarik na lupain ay hindi iminumungkahi. Ang paglinang ng gulay sa ilalim ng mga puno ng niyog sa Mindanao ay karaniwan at ang pagtatabi-tabi ng magkaibang pananim o *intercropping* ng mga ibinebentang pananim tulad ng kape at *cacao* ay maaari kung titingnan sa aspetong teknikal.

3. Pangunahing kaalaman sa pagtatanim ng iba't-ibang uri ng gulay

Gulay	Kinakailangang Klima		Angkop na pH ng lupa	Gustuhing kayarian ng lupa	Minumungkahing kakapalan ng pagtatanim	Tansiyang ani (tonelada / ektarya)	Haba ng paghinog (araw)
	Tag-ulan	Tag-araw					
kamatis	Katamtaman	Mahusay	5.5 – 6.8	Mabuhanging lupa (*sandy loam*)	100 cm x 50 cm	20-30	80 - 100
Talong	Katamtaman	Katamtaman	5.5 – 6.8	Mabuhangin o luwad (*clay*) na lupa	100 cm x 50 cm	20-40	70 - 90
Siling-pula	Katamtaman	Mahusay	5.5 – 6.8	Mabuhangin o luwad na lupa	30 cm x 45 cm	15-20	120 - 180
Sibuyas	Katamtaman	Mahusay	5.5 – 6.8	Mabuhanging lupa	7 cm x 15 cm	15-25	90 - 130
Okra	Mahusay	Katamtaman	5.5 – 6.8	Lahat ng uri	75 cm x 1 m	10-15	60 - 80
Ampalaya	Mahusay	Katamtaman	5.5 – 6.8	Mabuhanging lupa	1 m x 2 m	10-15	70 - 90
Kalabasa	Mahusay	Mahusay	5.5 – 6.8	Lahat ng uri	1 m x 2 m	20-40	90 - 120
Sitaw	Mahusay	Mahusay	5.5 – 6.8	Lahat ng uri	50 cm x 75 cm	20-25	60 - 80
Upo	Mahusay	Mahusay	5.5 – 6.8	Lahat ng uri	1m x 2 m	30-40	80 - 120
Pepino	Mahusay	Mahusay	5.5 – 6.8	Mabuhangin o luwad na lupa	75 cm x 1 m	10-15	60 -90
Cauliflowe	Mahusay	Katamtaman	5.5 – 6.8	Mabuhangin o luwad na lupa	40 cm x 45 cm	10-15	45 – 120
Repolyo	Mahusay	Mahusay	5.5 – 6.8	Mabuhangin o luwad na lupa	40 cm x 45 cm	15-20	60 – 120
Petsay	Mahusay	Mahusay	5.5 – 6.8	Lahat ng uri	20 cm x 20 cm	10-15	30 – 60
Broccoli	Mahusay	Mahusay	5.5 – 6.8	Mabuhangin o luwad na lupa	40 cm x 45 cm	10-15	60 - 120

Mula sa: Upi Agricultural School, 2014

4. Produksyon ng gulay sa pangkalahatan

4-1 Pagsusuri at neutralisasyon ng lupa

Ang pagsusuri sa lupa ay iminumungkahi bago magsimula sa produksyon ng gulay upang malaman ang pH ng lupa at kakulangan ng mga pangunahin o macro na elemento: Nitroheno *(Nitrogen)* (N), Posporo *(Phosphorous)* (P), Potasyo *(Potassium)* (K), Kalsyo *(Calcium)*, Magnesyo *(Magnesium)*, Asupre *(Sulfur)*, at iba pa. Ang iminumungkahing pH ng lupa ay 5.5 dahil ang kaya lamang ng ilang gulay ay nasa pH 5.5 hanggang 6.8, tulad ng nasa Talaan ng Pangunahing kaalaman sa pagtatanim ng iba't-ibang uri ng gulay.

Kung labis-labis ang asido ng lupa, ito ay dapat neutralisahin gamit ang apog *(lime)* na nagtataglay ng kalsyo at magnesyo. Ang susunod na Talaan ay nagpapakita ng dami ng apog na dapat ilagay upang makamit ang pH 5.5. Pinakamahusay na ilagay ang apog sa pamamagitan ng pagkalat nito sabay sa paghahanda ng lupa isang buwan bago ang paglilipat-tanim / pagpupunla. Para sa pagpapabunga o *fertilization*, ang halimbawa ng kinalabasan ng pagsusuri ng lupa ay maaaring tukuyin sa "4-3 Paglagay ng pataba".

Pagsampol ng lupa

Talaan Blg. 4-1 Dami ng inilagay na apog

Soil pH	*Amount of Lime* (ton/ha)
5.45	1.5
5.30	2.0
5.20	2.5
5.10	3.0

Ang Department of Agriculture (DA), isang serbis-probayder sa larangan ng agrikultura, ay gagabay sa pagsasagawa ng pagsampol ng lupa; proseso ng pagsampol ng lupa, bilang ng sampol, lokasyon ng pagsampol, dami ng lupa, atbp.

Talaan Blg 4-2 Halimbawa ng soil analysis ng DA-RSTL (Regional Soil Testing Laboratory)

Iminumungkahing Pataba sa:

	Talong	Petsay	Kamatis	Kalabasa	Sitaw
	bag/ektarya.				
OPSYON 1:					
Diammophos (18-46-0)	1 1/2	2	3	2	1
Urea (46-0-0) =	1 1/2	2 1/2	1		
Potash (0-0-60)=	1	1	3	1	1/2
OPSYON 2:					
Ammophos(16-20-0)=	3	4	6		
Urea (46-0-0) =		2			
Potash (0-0-60)=	1	1	3		
OPSYON 3					
Complete (14-14-14)=	4 1/2	4 1/2	6	3	
Urea (46-0-0) =	1/2	2			
Potash (0-0-60)=			2	1/2	
Sulophos (0-18-0) =		1	2 1/2	2 1/2	
IKALAWANG PAG-APLAY					
Urea (46-0-0) =	1	3	2	1	1/2
o					
Ammonium Sulfate(21-0-0)=					
Potash (0-0-60)=					
IKATLONG PAG-APLAY:					
Urea (46-0-0) =	1				
Potash (0-0-60)=					

KALABASA **1/2 N + (P + K)**
1/2 N

Unang Paglagay :Ihalo ang pataba at lupa sa panahon ng pagtatanim

Ikalawang Paglagay :Tapalan sa gilid (*sidedress*) ang pataba kapag nagsimula nang pumorma ang mga bunga

LETSUGAS, MUSTASA, 1/2 N + (P + K)
PETSAY / KANGKONG 1/2 N

1Unang Paglagay: Ilagay ang pataba bilang tapal 8-14 na araw bago ang pagtanim.

Ikalawang Paglagay: Tapalan sa ibabaw (*topdress)* ang pataba 2-5 na linggo matapos ang pagtanim.

PAGGAMIT NG LIKAS NA PATABA

(dumi ng manok, guano, Azolla,etc.): Parsyal na pagpalit sa 'di-organiko sa organiko na pataba sa tansiya na 10-50% ng kabuuhang iminungkahing pataba. Siguraduhing alamin ang sustansyang (N,P,K) taglay ng gagamiting organikong pataba.

Paglagay ng Apog: Maglagay isang (1) buwan bago ang pagtatanim

GISANTE, SITAW
½ N + (P + K)
½ N

Unang Paglagay: (1/2 N+P+K) Ikalat/ ihalo ang pataba ayon sa paglinang sa oras ng pagpunla o pagkatapos simulang lumabas ang halaman

Ikalawang Paglagat: 1/2 N) I-*topdress* ang pataba matapos mamunga ngunit hindi habang sa unang pamumunga.

TALONG
1/2 N + (P + K)
1/4 N
1/4 N

Unang Paglagay: (1/2 N+P+K) Ilagay ang pataba nang patudling sa palilipat-tanim.

Ikalawang Paglagay: (1/4 N) I-*topdress* ang pataba isang(1) buwan matapos ang paglilipat-tanim.

Ikatlong Paglagay: (1/4 N) Ulitin ang pag-*topdress* matapos ang ikalawang pag-ani ng maibebentang bunga

KAMATIS

Unang Paglagay: Maglagay ng pataba 7.0 cm ang layo sa paanan ng tanim at 7.0 cm na mas malalim sa mga ugat bago o sabay sa pagtatanim.

Ikalawang Paglagay: I-*sidedress* ang pataba kapag nagsimulang sumibol ang tanim o mamuo ang malilit na bunga. Ulitin matapos ang bawat dalawang linggo

Pansinin:
Ang kamatis ay sensitibo sa labis-labis na paglagay ng N at maaaring magdulot sa pagkaalantala ng pagkahinog ng mga bungang madaling lumambot at bumiyak.

4-2 Paghahanda ng lupa

Ang paghahanda ng lupa ay isinasagawa upang mabuhaghag ang lupa, maihalo ang organikong materyal sa lupa, maitapat ang mga insekto o damo sa araw o maibaon ang mga damo sa lupa, mapakinis at maipatag ang ibabaw ng lupa, maitatag ang magandang kondisyon para sa taniman ng similya, at makontrol ang pagguho ng lupa.

Ang praktikal na paraan ay: araruhin at suyurin ang lupa ng dalawang beses o pataas, batay sa kondisyon ng lupa. Ang lalim ng pag-araro ay nasa 20 – 25 na sentimetro. Ang pagtatrabaho nito ay maaaring gawin gamit ang *power tiller* na may 5 – 10 *horsepower* o sa tulong ng hayop pang-araro. Kung ang gulay ay kinakailangang itanim sa gulod, maaaring gumamit ng gamit panggulod o asarol at kalaykay.

Power tiller na may 5-10 na horsepower na makina

Bago at matapos ang pag-araro gamit ang Power Tiller

Paghahanda ng lupa gamit ang hayop pang-araro

Paggawa ng gulod gamit ang asarol at kalaykay

Ang patag na higaan o gulod ay maaaring maitatag para sa paglilinang ng gulay. Samantala, ang paggawa ng elebadong higaan na may haligi o *Raised Bed with Siding* (RBS) ay iminumungkahi sa mga dahong-gulay upang mapadali ang pag-aalaga ng taniman. Ang kawayan ay maaaring gamitin bilang balangkas ng nasabing haligi.

Raised Bed with Siding na binilangkas gamit ang kawayan para sa mga dahong gulay

4-3 Paglagay ng pataba

(1) Paglagay ng pataba

May dalawang uri ng pataba: 'di organikong pataba at organikong pataba. Ang simpleng paghahambing ay maisasangguni sa Talaan Blg. 4-3. Sa simula, mahirap magpalago ng gulay na ang gamit lamang ay organikong pataba, maliban na lamang kung sadyang likas na mataba ang lupang tinaniman. Inaabot ng maraming taon ang pagpapataba ng lupa kung organikong pataba lamang ang gamit. Kaya, sa simula, iminumungkahi ang sabay na paggamit ng 'di organiko at organikong pataba nang ang epekto ng dalawa – mabilis ngunit panandalian sa una, at mabagal ngunit pangmatagalan naman sa pangalawa – ay makayanang punan ang kakulangan ng isa't-isa. Matapos nito, ang paglalagay ng 'di organikong pataba ay maaari nang bawasan habang nadaragdagan naman ang pagyabong ng lupasatulongngorganikong pataba. Ang mga detalye ng organikong pag-aabono ay maisasangguni sa "5-1 Paggawa ng simpleng abono o compost at 5-2 Pag-aabono sa pamamagitan ng Vermicomposting at *vermi-cast*

Paglalagay ng organikong pataba sa gulod

Talaan Blg. 4-3 Pagkakaiba ng 'di -organiko at organikong pataba

Uri ng Pataba	Epekto	Kapanatilihan o *Sustainability*
'Di-organikong pataba	*Mabilis ngunit panandalian*	*Patabang naglalaman ng Nitroheno na naghihimok sa kaasiduhan ng lupa*
Organikong pataba	*Mabagal ngunit pangmatagalan*	*Nagpapabuti sa istruktura ng lupa at nagpapanatiling malusog ang lupa*

Ang paglalagay ng *basal fertilizer* sa panahon ng paghahanda ng lupa bago ang pagtatanim ay napakahalaga. Ang unang *top dressing* ay inilalagay 10 – 15 na araw matapos ang pagtatanim / paglilipat-tanim o sa yugto ng pagpaparami o *vegetative stage*. Ang ikalawang *top dressing* naman ay isinasagawa sabay sa yugto ng pamumulaklak o *flowering stage*, 30 na araw matapos ang

pagtatanim o paglilipat-tanim. Iminumungkahing ang dami ng patabang ilalagay at ang tiyempo ng paglagay nito ay ayon sa resulta ng pagsusuri sa lupa. Mapapansin rin na ang Posporo (P) ay malamang na hindi maagnas sa ulan at ang Nitroheno (N) at Potasyo (K) naman ay malamang na madaling maagnas sa ulan. Samakatuwid, ang P ay dapat ilagay habang naglalagay ng basal na abono at ½ hanggang 1/3 ng kabuuhang N at K ay maaaring i-aplay sa panahon ng paglalagay ng basal na abono. Ang natitirang N at K ay ilalagay bilang *top dressing* nang ilang ulit.

(2) Kalkulasyon sa paglagay ng pataba

Maaaring malaman ang bilang ng sako ng 'di-organikong pataba na kinakailangang iaplay para sa isang ektarya. Halimbawa, kung ang paglagay ng basal na *fertilizer* ng N – P – K ay nangangailangan ng 120 kilo ng N – 30 kilo ng P – 90 kilo ng K para sa isang partikyular na uri ng tanim gamit ang pataba na nakasaad sa Talaan Blg. 4-4, ang kaparaanan ay ang mga sumusunod:

1. Pansinin na ang aktwal na dami ng pataba ay kalahati ng isinasaad na dami sa tatak o label para sa 50 kilo ng sako;
2. Alamin muna ang mga patabang mayroon na;
3. Halimbawa, kung ang lahat ng kinakailangang pataba ay mayroon na, at alam na ang mga taglay nitong sustansya (14-14-14), unang pawiin ang dami ng P, na siyang minimong dami ng gagamiting pataba;
4. Kalkulahin ayon sa sumusunod:
Para sa "P", 30 kilo / 7 kilo (kalahati ng 14% na nakasaad sa tatak) = 4 na sako ng "Complete 14-14-14".
Para sa "N", 120 kilo – (7 kilo x 4 na sako ng Complete) = 92 kilo ang natira. Pagkatapos, piliin ang "Urea 46-0-0"; samakatuwid, 92 kilo / 23 kilo = 4 na sako ng "Urea (46-0-0)".
Para sa "K", 90 kilo – (7 kilo x 4 na sako ng Complete) = 62 kilo ang natira. Pagkatapos, piliin ang "Muriate potash 0-0-60"; samakatuwid, 62 kilo / 30 kilo = 2 na sako ng "Muriate potash 0-0-60".
5. Bilang kinalabasan, 4 na sako ng "Complete 14-14-14", 4 na sako ng "Urea 46-0-0", at 2 sako ng "Muriate of potash 0-0-60" ang dapat mai-aplay.

Talaan Blg. 4-4 lilang tipikal na uri ng 'di-organikong pataba

Uri ng 'di organikong pataba	Tatak (Nilalamang sustansya)	Dami (kilo sa bawat 50 kilo ng 1 sako)		
		N	P	K
Urea	46-0-0	23	0	0
Ammonium phosphate	16-20-0	8	10	0
Solophos	0-18-0	0	9	0
Complete	14-14-14	7	7	7
Muriate of potash	0-0-60	0	0	30

4-4 Paggawa ng nursery

Paggawa ng tudling para sa pagpupunla na may 5 sentimetro ang pagitan

(1) Paggamot o *treatment* ng mga punla

Kumuha lamang ng mga punla mula sa pinagkakatiwalaang pinagkukunan para sa dekalidad na resulta ng pagsibol o *germination* at pagtsek ng panumbasan ng pagsibol o *germination ratio*. Ang mga punla mula sa ani ng nakaraang produksyon ay dapat magamot muna ng *fungicides* at insektisidyo bago maisali sa pagtatanim. Ang paglublob ng mga punla sa maligamgam na tubig sa loob ng 2 minuto ay napatunayan na isang mabisang panlaban sa mga sakit na nagmumula sa punla.

(2) Paghahanda ng *nursery*

May ilang mga gulay gaya ng kamatis, talong, atsal at iba pa na kinakailangang gawan ng punlaan imbis ng *direct sowing*. Ang mga ito ay maaaring patubuin sa mga *nursery beds*, mga plastik na pasong pampunla o *seed pots*, o mga *seed trays*.

Tuntunin:

Sa paghahanda ng lupa, ang pinakamainam na panumbasan ay 1:1:1 ang dami ng *vermi-cast, garden soil*, at *carbonized paddy hull*.

- Isterilisahin sa pamamagitan ng pagsusunog ng *dried paddy hull* at ihalo ito sa *vermi-cast* at *garden soil*.

Para sa *seedbed*, ibabad ang pinaghalo sa tubig at gumawa ng *seedbed* na may 1 metro ang lapad, 10 metro ang haba, at nasa 15 sentimetro ang taas.

- Magtudling nang pahalang na may 5 sentimetro ang pagitan.
- Ikalat nang manipis at pahilera ang mga punla at marahang takpan ang mga ito ng manipis na suson ng lupa at tubig.
- Takpan ang mga higaan ng mga dahon ng saging upang mapanatili ang kahalumigmigan ng lupa.
- Takpan ang mga *seedbed* ng *net* nang hindi ito direktang masikatan ng araw.

Paggamit ng net upang iwasan ang direktang sikat ng araw

Paggawa ng nursery gamit ang mga seed trays

(3) Pagpapatigas

Bago ang pagtransplant ng mga punla sa pangunahingtaniman,ang"pagpapatigas" ay kinakailangan sa loob ng 2 – 3 araw. Ito ay ginagawa sa pamamagitan ng banayad na pagtapat ng mga halaman sa araw sa may batawan kung sila ay nasilungan. Ang pagpapatigasaynakatutulongsamabilisna pagpawi ng mga halaman mula sa pagod na dulot ng pagtransplant. Kadalasan, matapos ang pagtransplant, nagiging mabagal ang pagtubo ng mga tanim; subalit, sila naman ay babalik sa normal na pagtubo makaraan ang pakikiayon ng mga ito sa bagong kondisyon o *acclimization*.

6 na araw matapos ang pagpupunla ng kamatis sa seedling bed

4-5 Transplanting o Direct Sowing

Para sa atsal, talong, at kamatis, ilipat-tanim ang mga punlang malulusog at mahuhusay ang pagkatigas na may 3 – 5 na dahon, 21 – 28 na araw matapos ang paglitaw ng mga punla. Para naman sa sibuyas, ang paglilipat-tanim ng 28 – 35 na punla na may 2 – 3 na mabibikas na mga dahon ay iminumungkahi. Magtransplant ng isang (1) punla bawat burol na may naaayong densidad ng pagtatanim. Masdan ang densidad ng pagtatanim ayon sa "3. Pangunahing kaalaman sa pagtatanim ng iba't ibang uri ng gulay" para sa angkop na distansya ng burol at distansya ng hilera. Samakatuwid, ang pinakaangkop na pagsasaoras ng pagtransplant at pagdirect-sowing ay sa kinaagahan ng umaga at sa paglapit ng dapit-hapon.

Gumamit ng plastik na tali at patpat upang mapanatiling eksakto ang densidad ng pagtatanim

◁ *Pagbukadkad ng itim na net para sa pagpapatigas*

Sa pagsukat ng distansya ng burol at ng hilera, gumamit ng mga tali. Gumawa ng mga butas, magpasok ng mga punla, at pisilin nang dahan-dahan ang lupa sa may *base* ng mga punla. Diligan ng dahan-dahan ang mga punla pagkaraan ng pagtransplant. Takpan ang mga punla ng balat ng puno ng saging o *banana bracts* sa loob ng 5 – 7 na araw nang mapigilan ang pagkalanta dulot ng direktang sikat ng araw. Gumamit ng PVC *pipe* na may paliku-likong dulo upang mapadali ang paggawa ng mga butas sa *vinyl mulch* kung *film* ang gagamiting *mulch*. Kung may mapapansing naglahong butas, muling magtanim 5 – 7 na araw matapos ang pagtransplant.

Banana bracts na pantabon sa mga punla

Paliku-likong dulo na gagawa ng butas sa vinyl mulch

4-6 Pagbalag o trellising

▲ *Pagtali ng mga bena ng pepino*

Ang mga balag o *trellis* ay ginagamit bilang pangsuporta sa mga tanim at mapanatiling malayo ang mga bunga nito mula sa lupa. Maaaring gamitin ang mga balag sa iba't ibang uri ng gulay: kamatis, sitaw, pepino, ampalaya, upo, abitsuwela, atbp. Gumamit ng kawayan o puno ng ipil-ipil bilang pangunahing poste. Patatagin sa tulong ng pagtali ng mga poste gamit ang alambre o plastik na tali. Itirik sa lupa ang mga pinutol na kawayan o kawayang maliliit ang diyametro at talian ang kanilang mga dulo gamit ang alambre o plastik na tali. Ang pag-alaga sa mga tanim ay dapat isagawa sa pamamagitan ng pagtali ng kanilang mga bena sa kawayan gamit ang plastik na tali.

Paggamit ng tali at patpat upang mapanatili ang wastong densidad ng pagtatanim

▲ *Hugis-A na pagbalag na gawa lamang sa kawayan*

◀ *Hugis-trapezoid na pagbalag para sa ampalaya*

Talaan Blg. 4-5 Paghahambing ng tuwid at hugis-A na pagbalag

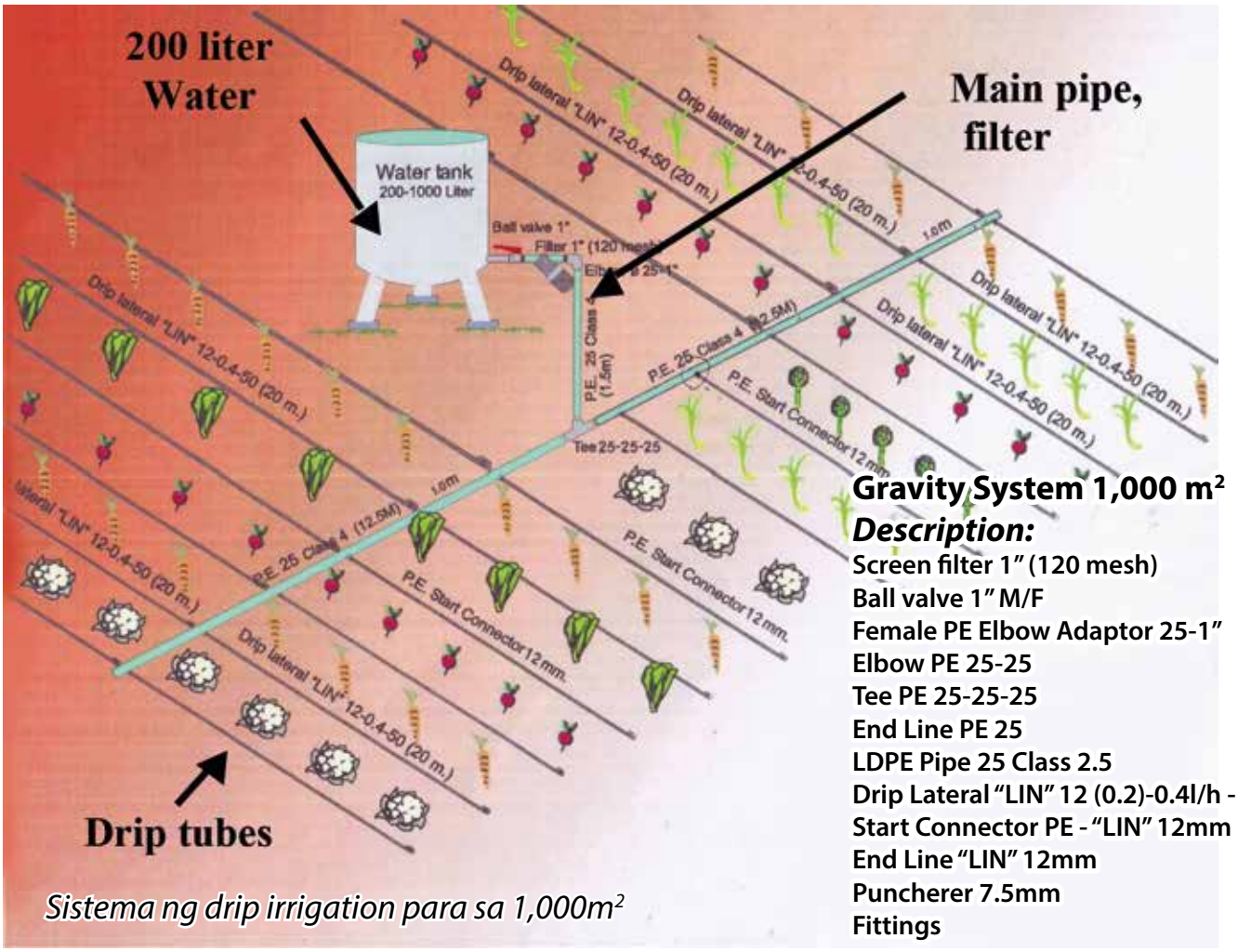
	Kalamangan	Kawalan
Tuwid na pagbalag	• Mas madaling itayo at panatilihin • Madaling i-mano-manong gamasin • Sapat ang pagpasok ng sinag ng araw • Kakaunting pagsulpot ng mga peste	• Labis ang mano-manong trabaho sa panahon ng pagtatayo • Madaling tubuan ng mga damo
Hugis-A na pagbalag	• Epektibo ang paggamit ng sikat ng araw • Ang pagtatabing ay nakakalimit sa pagtubo ng mga damo	• Mahirap gamasan • Mahirap panatilihin • Mas maraming peste dahil sa uri ng pagtatabing

4-7 Patubig at paagusan

May samu't-saring pamamaraan ng patubig o irrigation para sa mga maliliit na taniman ng gulay: maaaring manu-manong magdilig ng tubig, patubig sa tudling, patubig gamit ang *sprinkler*, at *drip irrigation*. Ang pagpili ng naaayong pamamaraan ay nakabatay sa sukat ng taniman, taglay na mga kagamitan, at presyo. Kung walang mapagkukuhanan ng tubig, maaaring gumawa ng poso.

Ang *drip irrigation* ay mas matipid sa tubig kung ikukumpara sa iba. Sa paraang ito, ang tubig ay dumadaloy sa tulong ng puwersa mula sa tangke na dadaan sa mga tubo na may maliliit na mga butas na siyang nagtitiyak na ang pagpapakawala ng tubig ay nasa mababang antas lamang na nasa 2 hanggang 20 na litro bawat oras direkta sa mga paanan ng o malapit sa mga tanim na gulay.

Patubig sa tudling



Sistema ng drip irrigation para sa 1,000m²

Tangke ng tubig para sa drip irrigation

Mga pipe at tubo para sa drip irrigation

Ang tubig ay dumadaloy sa mga pipe at tubo

Ang tubig ay nailalabas mula sa tubo

Paggawa ng tubig-agusan bilang paagusan

Ang paagusan o *drainage* ay kinakailangan upang maiwasan ang labis-labis na tubig na maaaring magdulot ng pag-apaw o pagtimik ng tubig lalung-lalo na sa mga lugar sa taniman kung saan nakatalang may tubig. Samakatuwid, ang maliliit na tubig-agusan o *water pathway* ay maaaring daluyan ng sobrang tubig paalis sa taniman.

4-8 Pagkontrol ng peste, sakit, at ng damo

Bago pa man maglagay ng anumang pangkontrol ng peste at mga sakit, mahalaga munang suriin ang sakit at malaman ang uri ng peste o insekto na nananalanta sa mga halamang gulay.

Kung ang sakit ay dulot ng *fungus*, magwilig ng *fungicide*. Kung ang pinsala naman ay dala ng bakterya, magwilig ng naaayong insektisidyo. Kung ang sakit ay sanhi ng mikrobyo, alisin ang napinsalang halaman at ibaon sa lupa nang maiwasan ang pagkalat ng sakit sa ibang mga halaman. Ipinapayo ang maingat na paggamit ng kemikal. Iminumungkahi rin ang paggamit ng organikong pestisidyo sa pagkontrol ng mga peste at sakit, katulad ng paggamit ng mga *organic herbal nutrients* (OHN) at mga katas botaniko o *botanical extracts*. Upang maiwasan ang paglaganap ng mga peste, iminumungkahing iwasan ang pagtatanim ng iisang uri lamang ng tanim taun-taon sa parehong taniman o *mono cropping,* maling paggamit ng pestisidyo, at labis na paglagay ng pataba o *over-fertilization*.

Nakalalantang bakterya o bacterial wilt

Ang mga pang-iwas laban sa mga peste at sakit ay maaaring maging alternatibo nang malimitahan ang paggamit ng kemikal. Sa Gabay na ito, ang mga kultural at pisikal na pangkontrol ay naisiwalat. Ang paggamit ng mga uri ng pananim na may taglay na panlaban sa mga peste at sakit o *resistant varieties*, pagtanim nang malapitan ng magkakaibang pananim o *intercropping*, pagpapalit-palit ng mga pananim o *crop rotation*, paggamit ng halamang magkatambal o *companion plants*, paggamit ng mga panaboy-peste, at mga pang-akit ay mga halimbawa ng kultural na pangkontrol. Ang paggamit ng *mulch* at *net house* ay halimbawa naman ng pisikal na pangkontrol.

Ang mga damo ay nakikipagkumpetensya sa sustansya na dapat ay sa halamang gulay. Dahil dito, kinakailangang maalis ang mga damo malapit sa paanan ng halaman bago pa man ang unang *dressing* nito. Bungkalin paitaas ang lupa kasunod ng *side dressing* upang matakpan ang abono at makontrol ang damo.

Aksip o stem borer

(1) Mga Uri ng Halaman na may Taglay na Panlaban sa mga Peste at Sakit o *Resistant Varieties*

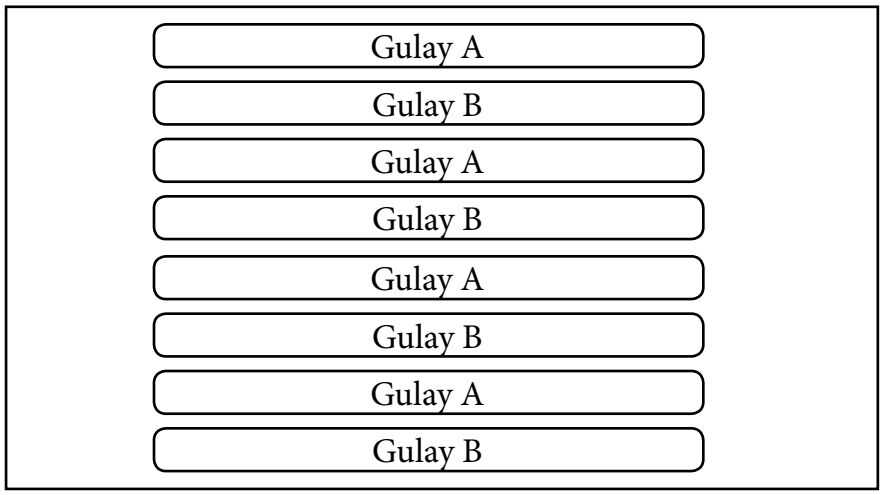
Ang seleksyon mula sa DA Project *Varietal Evaluation under Organic Condition* ay nagmumungkahi sa paggamit ng mga uri na may taglay na panlaban sa mga peste at sakit:

Talaan Blg. 4-6 Iminumungkahing sari ng mga gulay

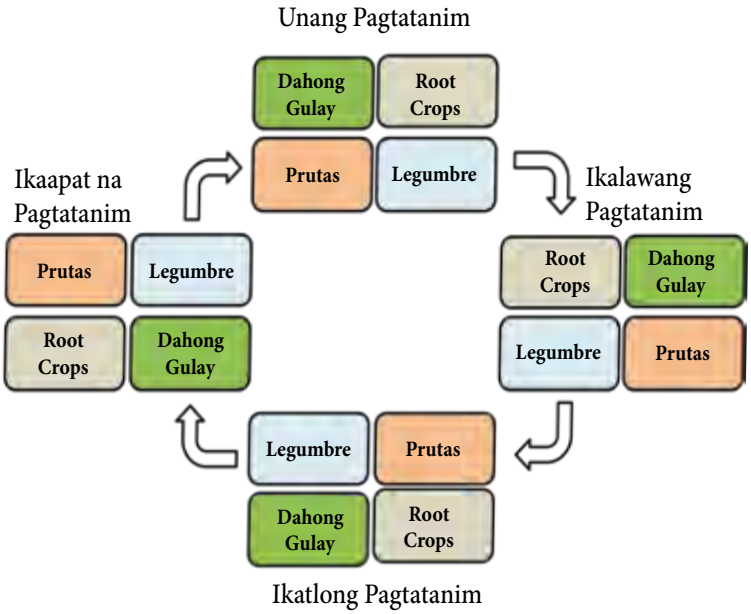
Uri ng gulay	Iminumungkahing sari
Talong	A-300, Mara, Conception, Arayat
Ampalaya	SR#3, Million Green
Kamatis	Pinusyo, Grandeur, BRCI
Sitaw	Sandigan, CSL 19, Acc 288
Paminta	Bright star, Inokra
Sitsaro	CGP 14
Baguio beans	T#1, B-12, Hab 63
Repolyo	Alex, Tropical King
Broccoli	Pinnacle
Cauliflower	Silver Cup 40
Petsay	Green stem
Letsugas	President

2) *Intercropping* at *crop rotation*

Ang pagtanim nang malapitan ng magkakaibang pananim o *intercropping,* sabayang pagtanim ng magkaibang uri ng tanim o *mixed cropping*, at ang pagpapalit-palit ng mga pananim o *crop rotation* ay mga pang-iwas laban sa mga peste at sakit. Magtanim ng magkakaibang pananim ayon sa gamit (pangunahing tanim o *main plant*, pantaboy o *repellant*, at pang-akit o *attractants*), kakayahang makibagay ng tanim ayon sa lokasyon, at ang kung ano ang mabili sa merkado. *Mag-intercrop* sa mga hilera at balangkas. Gumamit ng iba't ibang sari maging sa parehong uri ng tanim hangga't sa maaari.



Ang pagpapalit-palit ng pananim o *crop rotation* ay nakatutulong sa pag-abala sa ikot ng buhay, tirahan at suplay ng pagkain ng mga peste at sakit. Napapangalagaan at napapabuti rin nito ang pagkataba ng lupa, at nakapagpapababa rin sa dami ng damo. Ang pagpapalit-palit ng pananim ay nakakapag-ambag rin sa kaibhan at mahusay o episyenteng paggamit ng lupa sa taniman. Ang pigurang nasa ibaba ay nagpapakita ng *rotational cropping* ng dahong gulay, root crops, mga aning legumbre, at mga prutas.



(3) *Companion plants*

Ang Talaan Blg. 4-7 ay nagpapakita ng ilan sa mga *companion plants*:

Talaan Blg. 4-7 Companion Plants

Pangunahin	*Companion Plants*
Sili	Okra, Talong, Labanos
Repolyo	Sibuyas, Kamatis, Letsugas
Kamatis	Karot, Pipino, Sibuyas, Bawang
Pepino	Labanos, Mais, Letsugas
Letsugas (Asteraceae)	Brassicaceae (Repolyo, Cauliflower)
Mani (Fabaceae)	Solanaceae (Talong, Kamatis)

(4) Mga halamang panaboy-peste o pest repellants

Ang mga halamang panaboy-peste o *repellant crops* ay tinatanim upang itaboy palayo ang mga insekto at peste. Ang mga halamang panaboy-peste ay maaaring itanim sa palibot ng taniman at sa loob ng pangunahing taniman.

Talaan Blg. 4-8 Mga halamang panaboy-peste

Target na Peste	Halamang Panaboy-peste
Dapulak (Aphids)	Sibuyas, Bawang, Kutsay, Unsoy, Anis/Sangki
Aksip (Borers)	Sibuyas, Bawang
Langgam	Menta/Malipukon, Tanglad
Salagubang	Amarilyo (*Marigold*), Pyrethrum, Fever few, Labanos, Kamatis
Gamugamo (Cabbage moth)	Menta/Malipukon,(*Mint*), Kintsay
Tungaw (Mites)	Sibuyas, Bawang, Kutsay, Tanglad
Whitefly	Amarilyo (*Marigold*), Tanglad
Nematode	Amarilyo (*Marigold*), Dalya, Calendula

Tanglad bilang panaboy-peste

Liquid attractants

Amarilyo (Marigold)

(5) Pang-akit-insekto o Insect attractants

Ang pang-akit-insekto o insect attractant ay isang pinaghalu-halong likido o *concoction* na ginagamit upang akitin at matyagan ang mga insekto. Sa ganitong paraan, ang mga kapaki-pakinabang na insekto ay masubaybayan at ang mga salot na insekto naman ay maaakit; kaya, mababawasan ang populasyon ng mga salot na insekto. Ito ay makakatulong sa mga magsasaka na magdesisyon nang mahusay hinggil sa pagkontrol ng mga salot na insekto.

Ito ay isang pinaghalu-halong likido na inilalagay sa plastik na bote. Ang mga materyales para sa patibong ay: 1 kilo ng kinugay / Muscovado, 4 na litro ng tubig, 1 litro ng sukang tuba, 1 palanggana, 20 basyo ng 500 milimetro na plastik na bote, plastik na tali, at mga patpat na kawayan. Ang proseso ng paggawa ay ang sumusunod:

1. Ipagsama ang 4 na litro ng tubig, 1 kilo ng Muscovado, at 1 litro ng sukang tuba at haluing mabuti hanggang sa matunaw ang Muscovado.
2. Ilagay ang pinaghalu-halong likido "1" ng 200 milimetero sa basyo ng plastik na bote.
3. Gumawa ng parisukat na butas sa magkabilang parte ng bote at isabit sa may taniman.
4. Ang pagsasagawa nito ay makapagpapatuloy sa pagsubaybay sa mga nabitag na insekto.
5. Muli't muling maglagay ng pinaghalu-halong likido hangga't sa maaari lalung-lalo na sa panahon ng tag-ulan.

Ang amarilyo o *marigold* ay ginagamit rin dahil sa mapang-akit nitong kulay sa mga insekto. Ang nasabing bulaklak ay maaaring itanim sa gilid ng kahabaan ng taniman at maging sa loob nito.

Madikit na patibong na may grasa

Mga nabitag na insekto

Ang isang kulay dilaw na madikit na patibong ay isa ring alternatibong paraan dahil ang kulay nito ay nakahuhumaling sa mga insekto tulad ng puting langaw o *whiteflies*, langaw, gamu-gamo, at ngusong-kabayo o *leafhoppers*. Maaari rin itong gamiting pangsubaybay sa mga insektong sumisira sa pananim.

Ang proseso ng paghahanda at paggamit ay ang mga sumusunod:

1. Maglagay ng grasa o pinaggamitang mantika, na may panlaban sa init at ulan, sa buong panig ng dilaw na latag ng plastik.
2. Ang laki at bilang ng patibong ay nakabatay sa laki ng taniman.
3. Bitayin ang ginawang patibong sa kahabaan ng paligid ng taniman.
4. Ang pagsasagawa nito ay makapagpapatuloy sa pagsubaybay sa mga nabitag na insekto.
5. Ang muling paglalagay nito ay kinakailangan lalung-lalo na sa panahon ng tag-ulan.

(6) Pag *Mulching*

Ang pag*mulching* ay nagkokontrol ng mga damo at nagpapanatili ng kahalumigmigan ng lupa. Hinahadlangan nito ang pagtubo ng mga damo sapagkat ang lupa ay hindi nakatapat sa sikat ng araw. Pinipigilan nito ang ebaporasyon sa lupa tuwing panahon ng tagtuyot. Pinalalago nito ang istruktura ng lupa kung ang gamit ay *bio-mulch*; kaya, nagpapataba ito ng lupa.

Ang mga materyales pangmantilyo ay maaaring gawin mula sa alinman sa mga sumusunod: dayami ng palay, ginikan, ipa, o *vinyl mulching film*. Ang materyales ay inilalatag sa ibabaw ng lupa palibot sa mga tanim o sa pagitan ng mga hilera nito.

vinyl mulching film

Tanglad na mantilyo

Nethouse

(7) Net house

Ang *net house* o *net tunnel* ay maaaring gamitin pang-iwas o pambawas sa paglipad ng mga insekto patungo sa mga gulay. Ang kawayan ay iminumungkahi bilang balangkas. Ang laki ng mata o mesh size ng lambat ay nasa 0.2 milimetro hanggang 2.0 milimetro, depende sa pinupuntiryang insekto.

4-9 Pag-aani

Malalaman kung kailan maaaring anihin ng mga magsasaka ang mga gulay depende kung gaano katagal huminog ang mga ito at sa pisikal na anyo ng ani. Kinakailangang anihin ang mga kamatis kapag mapula-pula ang kulay o pulang-pula ang kulay ng bunga. Kinakailangang anihin ang bunga ng talong kapag ito ay kulay na matingkad na ube at malambot-lambot. Para sa mga sibuyas, aanihin ang mga ito kapag yumuko na at naging kulay kayumanggi na ang dahon nito. Para sa mga petsay, aanihin ang mga ito kapag naging berdeng-berde na ang kulay at nagsitayuan ang mga dahon nito. Para sa atsal, kinakailangang anihin ang mga ito kapag naging berdeng-berde na ang kulay nito at katamtaman na ang laki nito depende sa uri ng atsal.

Pruning scissors

Plastik na kahon

Ang angkop na oras ng pag-ani ay sa pagsapit ng bukang-liwayway o sa pagsapit ng dapit-hapon. Ito ay upang masigurong 'di gaanong mainit ang temperatura ng kapaligiran upang manatiling dekalidad at presko ang ani. Gumamit ng mga kagamitang pang-ani gaya ng *pruning scissors* at kutsilyo. Ilagay ang naaning mga gulay sa plastik na mga kahon o lalagyan upang hindi ito madaling madumihan.

4-10 Pag-aasikaso pagkatapos ng ani

Madaling masira ang mga gulay. kung kaya't kinakailangan ng maayos na pagtatago ng mga gulay matapos ang ani upang manatiling presko at dekalidad ang mga ito. Iwasang ibabad ang mga ani sa init at sa araw. Protektahan ang mga ito mula sa mga nakawalang hayop.

Pagkatapos ng pag-ani ay ang paghihiwa-hiwalay at ang pagkaklase-klase ng mga gulay gamit ang mesa na gawa sa kahoy o *sorting wooden tables*. Itimbang ang mga nasabing produkto gamit ang timbangan. Linisin ang mga kahon. Ilagay ang mga ani sa mga nalinis na mga kahon at ibalot ang mga gulay gamit ang mga dahon ng saging o plastik bago ito ipadala. Nakakabawas sa pagkasira ng mga gulay ang paggamit ng mga kahon habang ipinapadala ang mga ito. Itala ang timbang at pangalan ng mga produktong ipapadala.

Mga petsay na nilagay sa mga kahon at tinakpan gamit ang dahon ng saging

- *Pagkaklase-klase ng mga kamatis sa mga sorting table*
- *Pagtitimbang ng mga ani matapos ang pagkaklase-klase*
- *Pagtitimbang ng petsay*

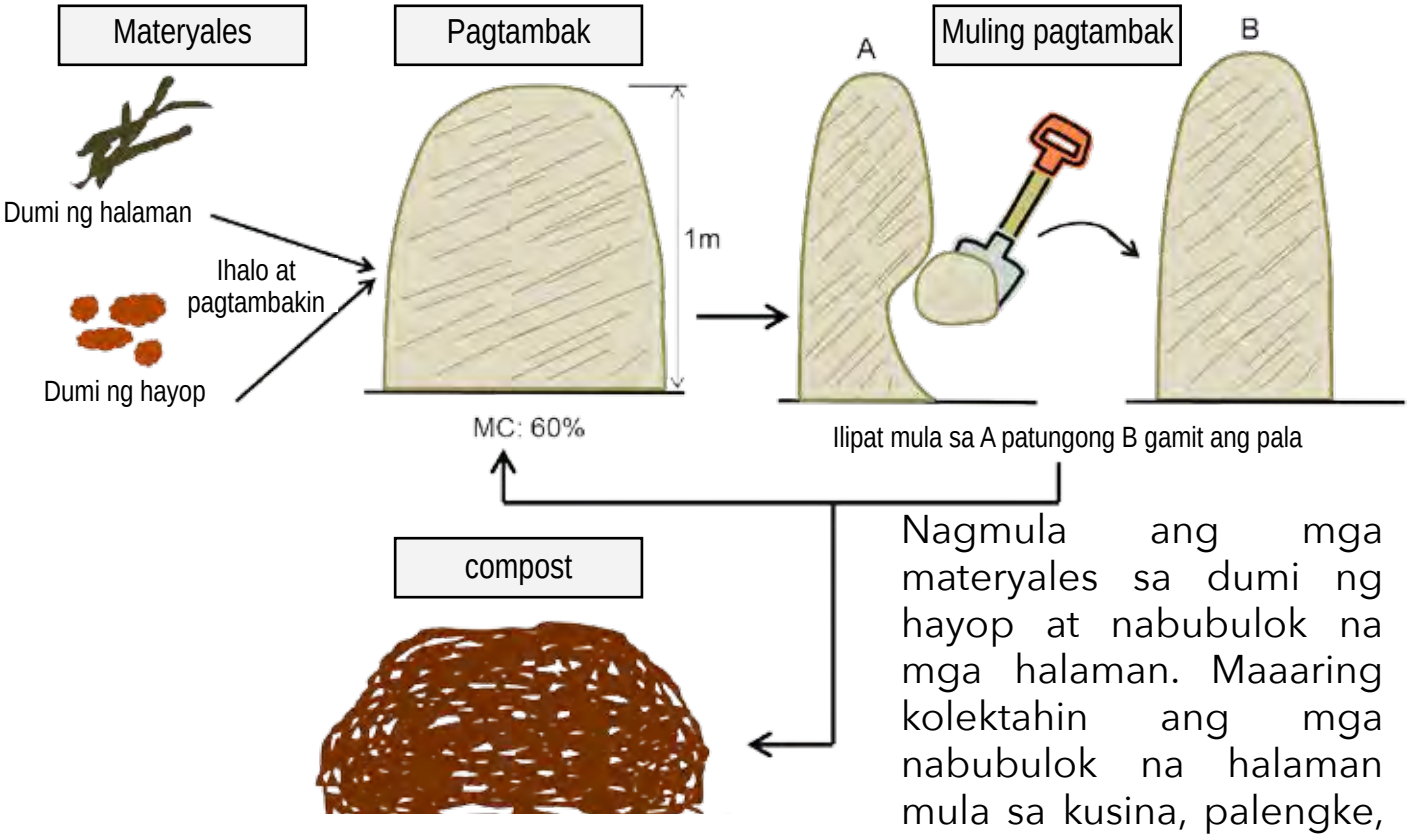
5. Karagdagang kaalaman sa masaganang paglilinang ng gulay

Importanteng mataba ang lupang pagtatanman ng mga gulay upang siguradong bubunga ang mga ito. Ayon sa kapana-panatiling kasanayan sa pagtatanim o *sustainable farming practice*, importanteng bigyan ng sustansya ang lupa na siyang magpapasustansya sa mga halaman. Kaya't kinakailangang patabain ang lupa gamit ng organikong pataba na mayroong nutrisyon na kakailanganin ng mga tanim upang bumunga at tumubo ang mga ito.

Sa gabay na ito, ipinapakita ng 5-1 ang paghahanda sa paggawa ng simpleng abono o *compost*. Ipinapaliwanag ng 5-2 ang pagsasagawa ng *vermicomposting* sa pamamagitan ng paggawa ng *vermicompost* at *vermi-cast*. Ipinapakita ng 5-3 ang mga likidong abono gaya ng *vermi-tea*. Ipinapaliwanag ng 5-4 ang paghahanda ng iba pang uri ng pataba gaya ng *bio-fertilizers* at organikong pamatay-insekto.

5-1 Paggawa ng simpleng abono o compost

Ang paggawa ng simpleng abono o compsting ay maaaring gamitin upang mapabuti ang kalidad ng lupa at ng istraktura nito, at upang mapahusay ang kakayanan ng lupang humawak ng tubig. Maaaring mababa ang antas ng NPK (*nitrogen, phosphorous* at *potassium*) ng compost kumpara sa mga kemikal na pataba subalit mayroon itong mahahalagang *micronutrients* (halimbawa: *calcium, magnesium, manganese, copper, iron* at *zinc*) at *microbial population* na wala sa kemikal na mga pataba. Mayroon ding *microbial activities* ang compost na nagtataguyod sa kalusugan ng halaman at nagpoprotekta nito mula sa sakit at salot. Mayroon ding mataas na antas ng *organic matter* (mga bagay na mula sa mga labi ng mga patay na halaman at hayop) na pagmumulan ng enerhiyang kakailanganin ng mga maliliit na organismo *(microorganisms)* at nagsisilbi ring imbakan ng nutrisyon na magagamit sa susunod. Hindi ito makikita sa mga 'di-organikong pataba. Ang susunod na paglalarawan ay ang proseso sa paggawa ng compost.



Nagmula ang mga materyales sa dumi ng hayop at nabubulok na mga halaman. Maaaring kolektahin ang mga nabubulok na halaman mula sa kusina, palengke, sakahan at mga naputol na sanga ng kahoy.

1. Putul-putulin ang mga nabubulok na halaman at ang bawat putol na piraso ng nabubulok na halaman na may habang lima (5) hanggang sampung (10) cm. Pagsamahin ang mga nabubulok na halaman at ang dumi ng hayop. Kinakailangang 60 – 70 porsyento ng mga pinagsamang dumi ay mula sa nabubulok na halaman habang ang natitirang 30 – 40 porsyento ay mula sa dumi ng hayop.
2. Paghalu-haluin ang mga nasabing materyales at itambak ang mga ito na parang burol na may isang metro ang taas. Takpan ang tambak gamit ang mga piraso ng plastik upang hindi maulanan.
3. Pagkatapos ng 15 hanggang 20 araw, kinakailangang ilipat ang tambak sa ibang lugar gamit ang pala upang hindi ito uminit na dulot ng paghihilab (*fermentation*).
4. Itambak nang paulit-ulit (*repiling*) ang burol bawat 15 hanggang 20 araw hanggang sa maging compost ito.
5. Aabutin ng 2 – 3 buwan bago matapos ang composting.

5-2 Pag-aabono sa pamamagitan ng *vermicomposting* at *vermicast*

Ang *vermicomposting* ay ang proseso ng paggawa ng organikong pataba mula sa pagbubulok ng mga duming mula sa sakahan at sa mga pamamahay gamit ang mga bulate. Ang siyentipikong teknolohiyang ito ay abot-kaya. Ang produkto ng *vermicomposting* ay tinatawag na *vermicast* (abonong binulok ng bulate). Ang mga benepisyo ng *vermicast* ay ang mga sumusunod:

- Isa itong magandang pagmulan ng organikong pataba at magandang panghalili sa mga kemikal na pataba.
- Mayaman ito sa mga bakterya, *actinomycetes* at *fungus*.
- Pinapabuti nito ang pisikal na balangkas ng lupa gaya ng kakayanan ng lupa na humawak ng tubig, pagkukumpul-kumpol at ang pagbibigay-sustansya sa lupa sa pamamagitan ng mga *microorganism*.
- Pinapahusay nito ang *Cation Exchange Capacity* ng lupa (kakayanan ng lupang humawak ng positibong ions; ito ay isang mahalagang katangian ng lupa kung inimpluwensyahan nito ang katatagan ng lupa at ang lebel ng pH nito kung kaya't mas mapapahusay ang kakayanan ng mga halamang sumipsip ng iba pang sustansya na idinilig sa lupa.
- Epektibo nitong isinasaayos ang pH ng lupa mula sa asidiko patungo sa katamtamang mga lebel.
- Madaling matutunan ng mga magsasaka ang *vermicomposting*. Ang mga sumusunod ay ang proseso ng *vermicomposting*.

(1) Paghahanda ng vermi-bed

1. Magtayo ng *vermi-bed*. Ito ay may habang 3 - 5 m, may lapad na 1 - 2 m at may lalim na 0.3 - 0.8 m.
2. Ang mga materyales sa pagpapatayo nito ay nakadepende sa laki ng badyet. Isa sa mga nirerekomendang materyales na maaaring gamitin ng mga maliliit na magsasaka ay ang troso ng puno ng niyog.
3. Mahalaga ring patayuan ng bubong ang vermi-bed upang hindi ito maulanan. Maaaring gumamit ng mga katutubong materyales sa pagpapatayo nito.

Ang pagpapagawa ng vermi-bed gamit ang troso ng niyog

(2) Paghahanda ng mga materyales

1. Maaaring gamitin ang mga basura mula sa mga sakahan lalung-lalo na ang mga nabubulok na mga basura mula sa sakahan gaya ng mga tira-tira ng mga pananim, dumi ng hayop, damo, dahon ng mga punong malalegumbre, mga pinaglagarian, at mga bunot ng niyog bilang materyales.
2. Ang mga nasabing materyales ay maaaring pag-uriin sa dalawa: pinagmulan ng karbon (*carbon source*) at pinagmulan ng nitroheno (*nitrogen source*). Ang nirerekomendang proporsyon ng dami ng mga materyales na pinagmulan ng karbon sa dami ng mga materyales na pinagmulang ng nitroheno ay 3:1.

Talaan Blg. 5-1 Nagmula sa karbon at nitroheno

Carbon source (40 – 75%)	*Nitrogen source* (25 – 60%)
Damo, dayami ng bigas, busal ng mais, tangkay ng mais, mga pinaglagarian, alibok mula sa niyog, tubong asukal, basura ng asukal, tira-tirang gulay, mga tira-tira mula sa kusina at mga dahon	*Mula sa halaman: mga dahon ng kakawate at ipil-ipil, monggo, mani, kudzu, baging ilog, mirasol (sunflower), mga dahon ng katuray, azolla, iba pang parte ng mga halamang leguminous (halimbawa: mga parte ng halaman ng mani at sampalok)* *Mula sa hayop: dumi ng baka, kambing, kalabaw, manok, paniki at kuneho*

3. Kung mahaba ang mga tira-tira ng mga halaman, maaari itong gutay-gutayin o putul-putulin ng tiglilima hanggang tigsasampung sentimetro (5 – 10 cm) upang mas mabilis itong mabulok.
4. Ilagay nang maayos ang pinaghalong mga materyales sa *vermi-bed*. Sa kada metro kwadrado bahagi ng *vermi-bed* ay maglagay ng 50 kg ng pinaghalong mga materyales (50 kg/m^2).
5. Haluan ito ng 10 *sachet* (katumbas ng 1 kg kada 1,000 kg ng pinaghalong materyales) ng *trichoderma harzianum* upang mapabilis ang pagkakabulok nito.
6. Takpan ang *vermi-bed* gamit ang piraso ng plastik o ilang patong ng dahon ng saging upang masimulan ang dalawang linggong *thermophilic o anaerobic* na pagkakabulok nito.

Paggugutay-gutay ng tangkay ng saging (ibaba) at Ang mga nagutay na mga materyales (kanan)

(3) Pag-iimbak ng *African Night Crawler*

1. Matapos ihanda ang mga materyales para sa pag-aabono, suriin ang temperatura nito. Bago lagyan ng *African Night Crawler* (ANC) ang higaang dumi ng bulate ay dapat siguraduhing ang temperatura nito ay di lalampas ng 30°C at ang lebel ng kahalumigmigan nito ay nasa pagitan ng 60 at 80 porsyento.
2. Kinakailangang mabango ang mga materyales at hindi masangsang sa ilong.
3. Diligan ang higaang dumi ng bulate ng tubig upang bumaba lalo ang temperatura nito.
4. Ang angkop na dami ng ANC sa higaang dumi ng bulate ay nasa 1 kg/ m^2. Ang presyo ng 1 kg ng ANC ay nasa Php 1,000.
5. Lalaki ang isang (1) kilo ng bulate ng hanggang 30 kg pagkatapos ng 6 na buwan kung lumaki ang mga ito sa maayos na kondisyon.

(4) Pag-aalaga ng *vermi-bed*

1. Matapos malagyan ng ANC ang *vermi-bed*, takpan ito gamit ang mga piraso ng plastik. Maaari ring takpan ito gamit ang mga dahon ng saging o dahon ng niyog.
2. Parating diligan ang *vermi-bed* upang manatili ang lebel ng kahalumigmigan nito sa 60 hanggang 80 porsyento lalung-lalo na tuwing tag-init. Maaaring masuri ang kahalumigmigan nito sa pamamagitan ng pagpiga ng substrate mula sa *vermi-bed* gamit ang isang kamay at tingnan kung ilang patak ng tubig ang tumulo mula rito. Katamtaman ang kahalumigmigan nito kapag tatlo (3) hanggang limang (5) beses pumatak ang tubig mula sa *substrate sample*.

Pagsasala ng vermicompost (kaliwa) at inaning vermicast (kanan)

(5) Pag-aani, pagpoproseso, at pagtatago

1. Ang pag-aani ng ANC sa tamang oras ay mahalaga upang maiwasan ang pagkamatay ng mga ito dahil nagtipon-tipon na ang dumi at nagsialisan na ang mga ANC dahil sa kakulangan ng *substrates*.
2. Huwag diligan ang *vermi-bed* mga 5-10 araw bago ang ani.
3. Maaaring anihin ang *vermicompost* sa loob ng 30-45 araw matapos itong inimbak o kapag mayroon nang namuong mga butil-butil ng *vermicast*. Ngunit ito ay nakadepende sa dami ng naimbak na *biomass* (bagay na mula sa buhay na mga organismo) at sa kalidad ng mga materyales na ginamit.
4. Anihin at hukayin ang *vermicast* na namuo sa ibabaw ng *vermi-bed* sa pagsapit ng bukang-liwayway at ilagay ito sa isang lalagyan.
5. Maaaring mano-mano o de-makina ang pagsasala sa *vermicompost* upang ihiwalay ang ANC sa *vermicompost* na maaaring gawing pataba. Maaaring magamit muli ang ANC sa mga susunod pang mga pag-aabono.
6. Ang unang *vermicast* ay maaaring ilatag ng dalawang linggo sa *tarpaulin* o sa kongkretong sahig. Kinakailangang takpan ito gamit ang lambat upang matuyo ito.
7. Ihiwalay ang pagbalot sa *vermi-cast* at *vermicompost* sa kani-kanilang mga plastik na bag at ilagay sa mga sako para maitago at magamit sa hinaharap.

5-3 Paggawa ng *vermi-tea*

Ang *vermi-tea* ay isang organikong likidong pataba na gawa sa dahon. Ginagamit ito na pandilig sa mga halaman upang palakasin ang resistensya ng mga ito. Ginagamit din itong pamatay ng salot dahil sinusugpo nito ang mga sakit at parasito sa mga halaman. Pinapabuti rin nito ang paglago ng mga halaman. Ginagamit ang *vermi-tea* bilang pamalit sa *slurry production* at ginagamit ang mga katutubong materyales na makikita sa sakahan. Ang mga materyales na ginagamit sa paggawa ng *vermi-tea* at ang proseso nito ay ipapaliwanag sa mga susunod na pahina.

Materyales

- 12 kg ng *vermicast*
- 500 ml ng pulot (molasses)
- 100 ml ng *Indigenous Microbial Organism* (IMO, sumangguni sa 5-4 *Concoction*)
- 200 litro ng tubig
- Dram na may kapasidad na 200 litro
- De-kuryenteng *aireador* o *aerator* (bagay na naghahalo ng hangin sa isang pang bagay gaya ng likido) na may diligan *(hose*) at hiringgilya (*syringe*)
- *Net bag*

Proseso

1. Punuin ang ¾ na bahagi ng dram ng tubig
2. Buksan ang *aerator* at i-*aerate* ang tubig sa dram sa loob ng 30 minuto.
3. Punuin ang *net bag* ng *vermicast* at ibabad ito sa ibabaw ng tubig ng "2"
4. Dagdagan ng 500 ml ng pulot ang tubig na nasa "3"
5. I-aerate muli ang "4" ng 30 minuto
6. Dagdagan ng 100 ml ng IMO ang "5" (sumangguni sa 5-4 Mga samu't sari)
7. Takpan ang dram at hayaang mahilab (*ferment*) ng 24 oras gamit ang *aeration*

Sa paglalagay ng *vermi-tea*, ihalo ang 8 litro ng *vermi-tea* at 8 litro ng tubig at diligan ang lupa at ang mga halaman gamit ang *knapsack sprayer* o pambomba.

5-4 *Concoction* (*bio-fertilizers* at organikong pamatay-peste)

Ang mga concoction ay isang artipisyal na likidong pataba, panaboy ng peste at pampatubo na direktang dinidilig sa mga halaman o dinidilig sa lupa. Ipinapakita ng gabay na ito ang 7 halimbawa ng mga samu't saring *concoction*

- *Indigenous Microbial Organism* (IMO),
- *Fermented Plant Juice* (FPJ),
- *Fermented Fruit Juice* (FFJ),
- *Fermented Fish Amino Acid* (FAA),
- *Oriental Herbal Nutrients* (OHN) / *Herb Medicine Nutrient* (HMN),
- *Calcium Phosphate* (Ca Phos), at
- *Lactic Acid Bacteria Serum* (LABS).

Ipapaliwanag sa mga susunod na pahina kung paano ginagawa at ginagamit ang mga nasabing *concoction*.

(1) *Indigenous Microbial Organism* (IMO)

Ang IMO ay isang biolohikong *inoculant* (bakuna o isang bagay na ipinasok sa katawan ng isang tao, hayop o halaman upang pagtibayin ang resistensya nito laban sa sakit) na pang-agrikultura na nakakatulong sa pagpapasigla at pagpapabuti sa katabaan ng lupa. Dahil diyan, pinapalago nito ang mga halaman. Pinapabilis din nito ang proseso ng pag-compost at pinalalakas ang mga halaman laban sa sakit at damo.

Materyales

- Tubong kawayan, banga o palayok
- Manila *paper*
- Palanggana
- Kanin
- Limang (5) kg ng asukal na Muscovado
- Salaan
- Apat (4) na litro ng malinis na tubig
- Plastik na pantali

Proseso

1. Ihalo ang 1 kg ng kanin at 1 kg ng asukal na Muscovado
2. Ilagay ang "1" sa lalagyan sa tubong kawayan, banga o palayok
3. Takpan ito gamit ang Manila paper at isara gamit ang plastik na pantali
4. Ibaon ang nasabing lalagyan sa lupa at hayaang mahilab ito sa loob ng 7-14 na araw at.
5. Ihiwalay at isala ang katas sa isang malinis na lalagyan gamit ang salaan at isara ito. Maaari na siyang gamitin.

Dami at paraan ng paglalagay

Ihalo ang 5 hanggang 10 ml ng IMO sa 1 litrong ng tubig at maaari na itong idilig sa lupa malapit sa ugat ng halaman. Maaari rin itong idilig sa kakasibol na halaman. Huwag diligan nang direkta ang tanim dahil nakakasama ito sa halaman.

(2) *Fermented Plant Juice* (FPJ)

Maaaring gawing *foliar fertilizer* (pataba na direktang ididilig sa dahon) o *drench fertilizer* (pataba na direktang ididilig sa paanan ng halaman) para sa mga punla ang FPJ. Mayaman ito sa *enzymes* at *growth hormones apex* (pampatubo) ng mga dahon. Dahil dito, mapapabilis ang pagtubo ng mga halaman at mas mapapabilis ang *photosynthesis* (ang proseso kung saan ang enerhiya mula sa araw ay magiging enerhiyang magagamit ng halaman sa pang-araw-araw nitong mga gawain) nito.

Materyales

- Limang (5) kg ng alinman sa mga sumusunod na halaman: dahon ng Trichanthera, kangkong, tangkay ng saging, talbos ng kamote, damong kalabaw (*carabao grass*), puno ng hagonoy (*Chromolaena odorata* – ginamit lamang sa mga tanim), alugbati, at iba pa. Palayok na maaaring paglagyan ng 10 kg / litro ng likido, banga or tubong kawayan
- Manila *paper*
- Plastik na pantali
- Limang (5) kg ng asukal na Muscovado
- Malinis na tubig

Proseso

1. Ihalo ang 1 kg ng hiniwang tangkay ng saging na may habang dalawang (2) talampakan sa pinakaitaas na bahagi ng halaman. Kinakailangang putulin ito pagsapit ng bukang-liwayway o dapit-hapon.
2. Ihalo ang 1 kg ng asukal Muscovado o pulot at ang "1".
3. Ilagay ang "2" sa tubong kawayan.
4. Takpan ito gamit ang Manila *paper* at selyohan gamit ang plastik na pantali.
5. Ibaon ang "4" sa lupa at hayaang mahilab sa loob ng 7-14 na araw.
6. Pigain ang katas mula sa "5".

Dami at paraan ng paglalagay

Ihalo ang 5 – 10 ml FPJ sa 1 litro ng tubig. Direktang diligan ang mga dahon ng halaman kapag di gaanong mainit ang sikat ng araw, bago sumikat ang araw o kapag magdadalawang oras na bago magtakipsilim. Maaari itong idilig nang direkta sa mga bagong sibol na halaman.

(3) *Fermented Fruit Juice* (FFJ)

Maaari ring gawing *foliar fertilizer* o *drench fertilizer* para sa mga punla ang FFJ. Gamit ang *potassium factor,* patatamisin nito ang mga prutas bilang pagpapahusay ng nutrisyon ng mga ito.

Materyales

- 5 kg ng alinman sa mga sumusunod na prutas: mangga, papaya, marang, langka o saging (pero hindi maaaring gumamit ng pinya)
- Palayok na maaaring paglagyan ng 10 kg o litro ng likido, banga, o tubong kawayan
- 5 kg ng asukal Muscovado o pulot
- Manila *paper*
- Plastik na pantali
- Malinis na tubig

Proseso

1. Ihalo ang 1 kg ng hiniwang prutas (maliban sa sitrus) at ang 1 kg ng Muscovado.
2. Ilagay ang "1" sa tubong kawayan, banga o palayok.
3. Takpan ang "2" gamit ang Manila *paper* at selyohan ito gamit ang plastik na pantali.
4. Ibaon ang "3" sa lupa at hayaang mahilab ito sa loob ng 7-14 na araw.
5. Salain ang nilalaman ng lalagyan at ilagay ang nasalang katas sa isang malinis na lalagyan. Isara at selyohan ang lalagyan.

Dami at paraan ng paglalagay

Ihalo ang 5 – 10 ml FFJ sa 1 litro ng tubig. Direktang diligan ang mga dahon ng mga halaman bago sumikat ang araw o bago lumubog ang araw. Ihalo ang FPJ sa FFJ at sabay na didiligan ang mga dahon ng mga namumungang puno at ang lupang nakapalibot nito o diligan ang mga malapit nang mamunga ang mga halaman.

(4) *Fermented Fish Amino Acid* (FAA)

Maaaring gawing *foliar fertilizer*, pampalaki, panaboy-insekto (insect repellant) at pamatay-fungus *(fungicide)* ang FAA. Mayroong *nitrate* na itong mula sa isda. Mayaman ito sa nutrisyon at iba't ibang uri ng amino acid.

Materyales

- 5 kg ng hiniwang isda o mga tira-tirang piraso ng isda gaya ng hasang, lamang-loob, suso na tinanggalan ng punlo o mga tira-tirang karne
- Palayok na maaaring paglagyan ng 10 kg o litro ng likido, banga, o tubong kawayan
- Manila *paper*
- 5 kg ng asukal na Muscovado
- Plastik na pantali
- Malinis na tubig

Proseso

1. Hiwain, dikdikin o pukpukin ang isda at ang *herbal mix*
2. Ihalo ang 1 kg ng "1" sa 1 kg ng Muscovado
3. Ilagay ang "2" sa palayok, banga o tubong kawayan
4. Takpan ang "3" gamit ang Manila *paper* at selyohan ito gamit ang plastik na pantali.
5. Ibaon ito sa lupa at hayaang mahilab ng 15-30 araw
6. Paghalu-haluin ang mga materyales bawat limang (5) araw.
7. Pigain ang katas nito at ilagay sa isang malinis na lalagyan at selyohan muli.
8. Kolektahin ang mga buto ng isda na gagamitin sa paggawa ng *calcium nutrient* na pandilig para sa mga halaman

Dami at paraan ng paglalagay

Ihalo ang 5 – 10 ml ng FAA sa 1 litro ng tubig. Direktang diligan ang lupa kung saan itinanim ang halaman. Huwag direktang diligan ang mga halaman. Maaaring diligan ang mga namumungang mga halaman. Ilagay ang FAA sa lalagyan at itago ito sa isang tuyo at preskong lugar.

(5) *Oriental Herbal Nutrients (OHN) / Herb Medicine Nutrient* (HMN)

Maaaring gamiting pamatay-insekto at fungus ang OHN. Ito ay itinuturing na natural na panaboy sa peste. Maaari rin itong gamitin sa bawat yugto ng buhay ng halaman mula sa unang pagsibol nito hanggang sa pamumunga nito ng mga prutas. Nililinang nito ang resistensya (*immune system*) ng mga halaman.

Materyales

- 1 kg ng luya
- 1 kg ng bawang
- 1 kg ng sibuyas
- Banglay (*turmeric*) (opsyonal)
- Dahon ng *neem* (opsyonal)
- Manila *paper*
- Palayok na maaaring paglagyan ng 10 kg ng likido, banga, o tubong kawayan
- Plastik na pantali
- 5 kg ng asukal Muscovado
- 3 litro ng sukang tuba
- Isang maliit na bote ng *gin* o tuba

Proseso

1. Ihalo ang 1 kg ng luya, 1 kg ng bawang at 1 kg ng sibuyas at dikdikin gamit ang bato o kahoy na pandikdik.
2. Ihalo ang "1" sa 3 litro ng sukang tuba at ilagay sa banga o tubong kawayan at iiwan ito ng 12 oras.
3. Ihalo ang "2" sa 1 kg ng asukal Muscovado.
4. Takpan ang bukana ng banga o tubo gamit ang Manila *paper*. Selyohan ito gamit ang plastik na pantali.
5. Iiwan ang "4" sa loob ng 4-5 araw. Matapos nito ay buksan ang banga o tubo at haluan ito ng isang botelya ng *gin*. Takpan muli ito.
6. Hayaang mahilab ito sa loob ng 7-14 na araw.

Dami at paraan ng paglalagay

Ihalo ang 3 ml ng OHN sa 1 litro ng tubig. Diligan ang mga dahon at lupa bawat linggo.

(6) *Calcium Phosphate* (Ca Phos)

Hihikayatin ng Ca Phos ang pamumulaklak ng halaman at pipigilan ang sobrang paglaki ng halaman lalung-lalo na ng kamatis, pepino at talong. Madaragdagan din ng *calcium* ang mga ugat at dahon.

Materyales

- 2 kg ng alinman sa mga sumusunod: buto ng isda o baka, balat ng itlog, punlo ng kuhol o anumang balat o punlo
- Palayok na maaaring paglagyan ng 10 kg o litro ng likido
- Manila *paper*
- Plastik na pantali
- 5 litro ng sukang tuba
- Parilya *(Griller)*

Proseso

1. Ihawin ang dalawa (2) kg ng buto ng hayop sa parilya hanggang sa maging uling ito. Matapos nito ay palamigin muna ito. Hindi dapat mapasobra ang pagsunog sa buto.
2. Ilagay ang mga buto sa isang plastik na lalagyan at ibuhos ang 5 litro ng sukang tuba. Takpan ito gamit ng Manila *paper* at iwan ito ng 30 araw.
3. Salain ito at ilagay ang nasala na likido sa hiwalay na lalagyan.

Dami at paraan ng paglalagay

Maaaring diligan ang mga halamang malapit nang mamulak gamit ang Ca-Phos. Diligan ang mga ito sa unang pagsibol ng mga bulaklak.

(7) *Lactic Acid Bacteria Serum* (LABS)

Pinalalakas ng LABS ang resistensya ng mga mahihinang halaman, pinalalaki ang mga bungang prutas at pinoprotektahan ang mga ito laban sa *fungus* at *virus* upang mas lumaki ang mga halaman. Maaari rin itong gamitin bilang *soil conditioner* o pataba ng lupa. Maaari ring ihalo ang LABS kasama ng iba pang *microorganisms* (maliliit na mga organismo) bilang *inoculant* sa pag-aabono at pinoprotektahan din nito ang mga halaman mula sa sakit.

Materyales

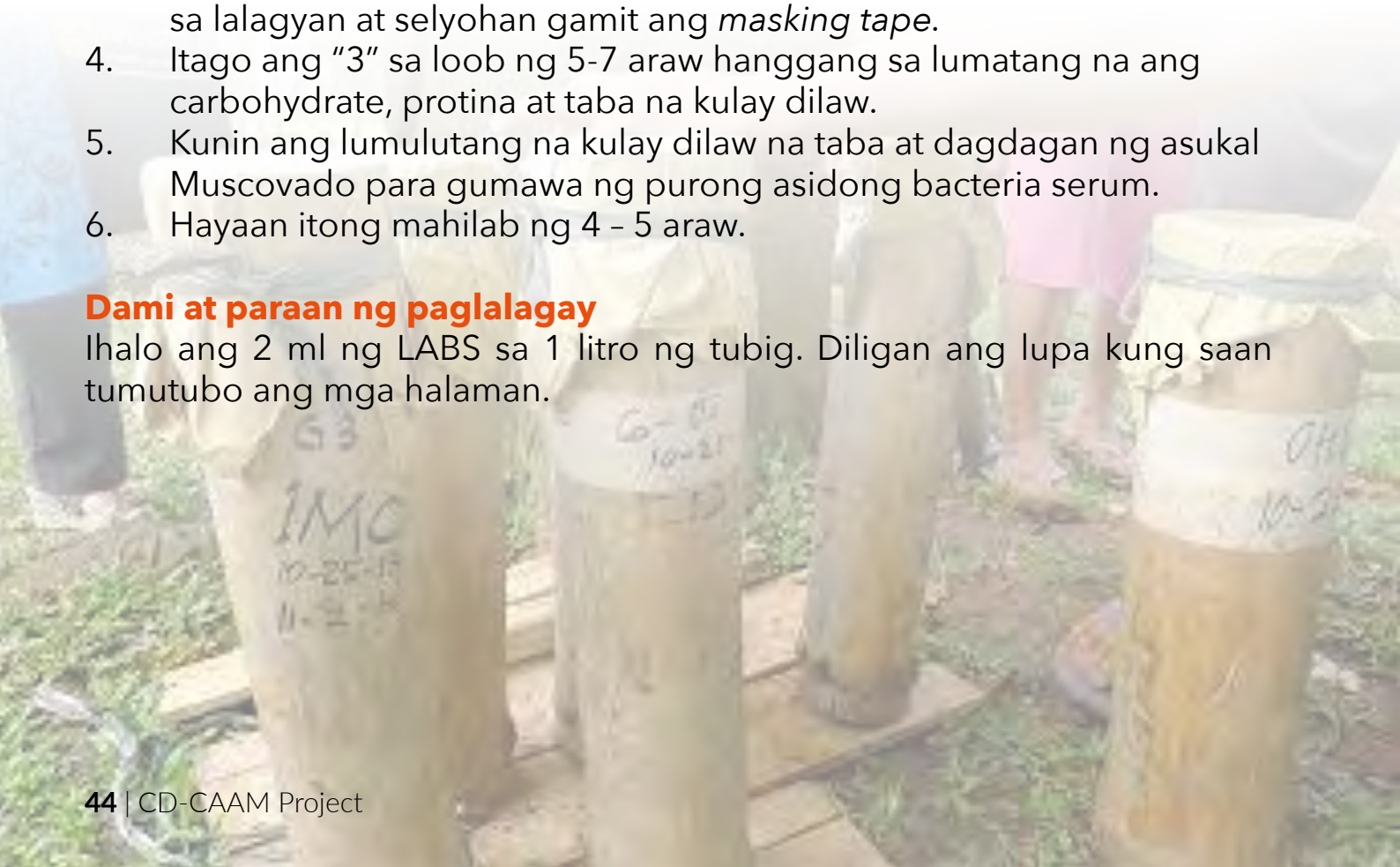
- 1 litro ng tubig na ginamit na panlinis ng bigas
- 1 litro o kg ng sariwang gatas *(fresh milk)*, *skimmed* or pulbura.
- Palayok na maaaring paglagyan ng 10 kg o litro ng likido
- *Masking tape*
- 1 kg ng asukal Muscovado
- Hiringgilya (syringe) at plastik na tubo

Proseso

1. Isantabi ang isang baso ng tubig na ginamit na panlinis ng bigas at ibuhos ito sa lalagyan.
2. Iiwan ang "1" ng 5 – 7 araw hanggang sa lumutang ang *lactic acid bacteria* at nangangamoy maasim.
3. Kumuha ng 10 ml ng "2" gamit ang hiringgilya (*syringe*) at tubo at ihalo ito sa 1 litro ng sariwang gatas. Ilagay ang hinalong "2" at gatas sa lalagyan at selyohan gamit ang *masking tape*.
4. Itago ang "3" sa loob ng 5-7 araw hanggang sa lumatang na ang carbohydrate, protina at taba na kulay dilaw.
5. Kunin ang lumulutang na kulay dilaw na taba at dagdagan ng asukal Muscovado para gumawa ng purong asidong bacteria serum.
6. Hayaan itong mahilab ng 4 – 5 araw.

Dami at paraan ng paglalagay

Ihalo ang 2 ml ng LABS sa 1 litro ng tubig. Diligan ang lupa kung saan tumutubo ang mga halaman.

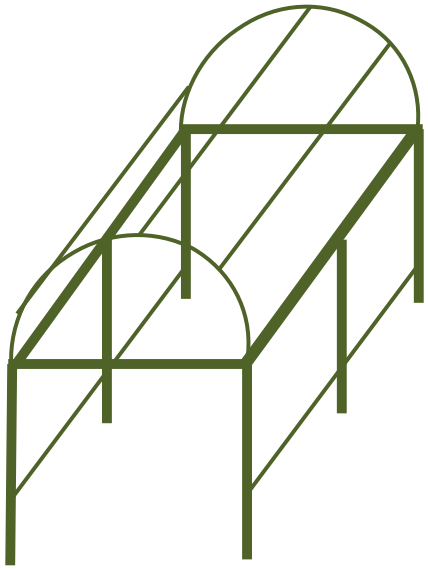


Sa loob ng rainshelter

rain shelter

6. Paggawa ng *rain shelter*

Hindi regular ang pag-ulan sa Mindanao. Sa tuwing bumabagyo rito ay nagdudulot ito ng malakas na pag-ulan na nakakasira sa mga gulay. Nagdudulot din ng salot at sakit ang pag-ulan dahil mananatiling basa ang mga halaman at nagdudulot din ito ng mahalumigmig (*humid*) na panahon. Upang maiwasan ito, kinakailangang mayroong *rain shelter* o silungan na panangga sa ulan upang maprotektahan ang mga gulay mula sa ulan. Ang *rain shelter* ay isang *vinyl house* kung saan ang kisame lamang ang nakatakip gamit ang *vinyl film* habang ang apat na sulok nito ay mananatiling bukas at walang takip.



Maaaring magtayo ng balangkas ng *rain shelter* gamit ang kawayan. Ang laki nito ay nakadepende sa kung gaano kataas at kalapad ang mga halaman, sa dami ng tagaytay (*ridges*) nito at sa haba at lapad ng PVC *film*.

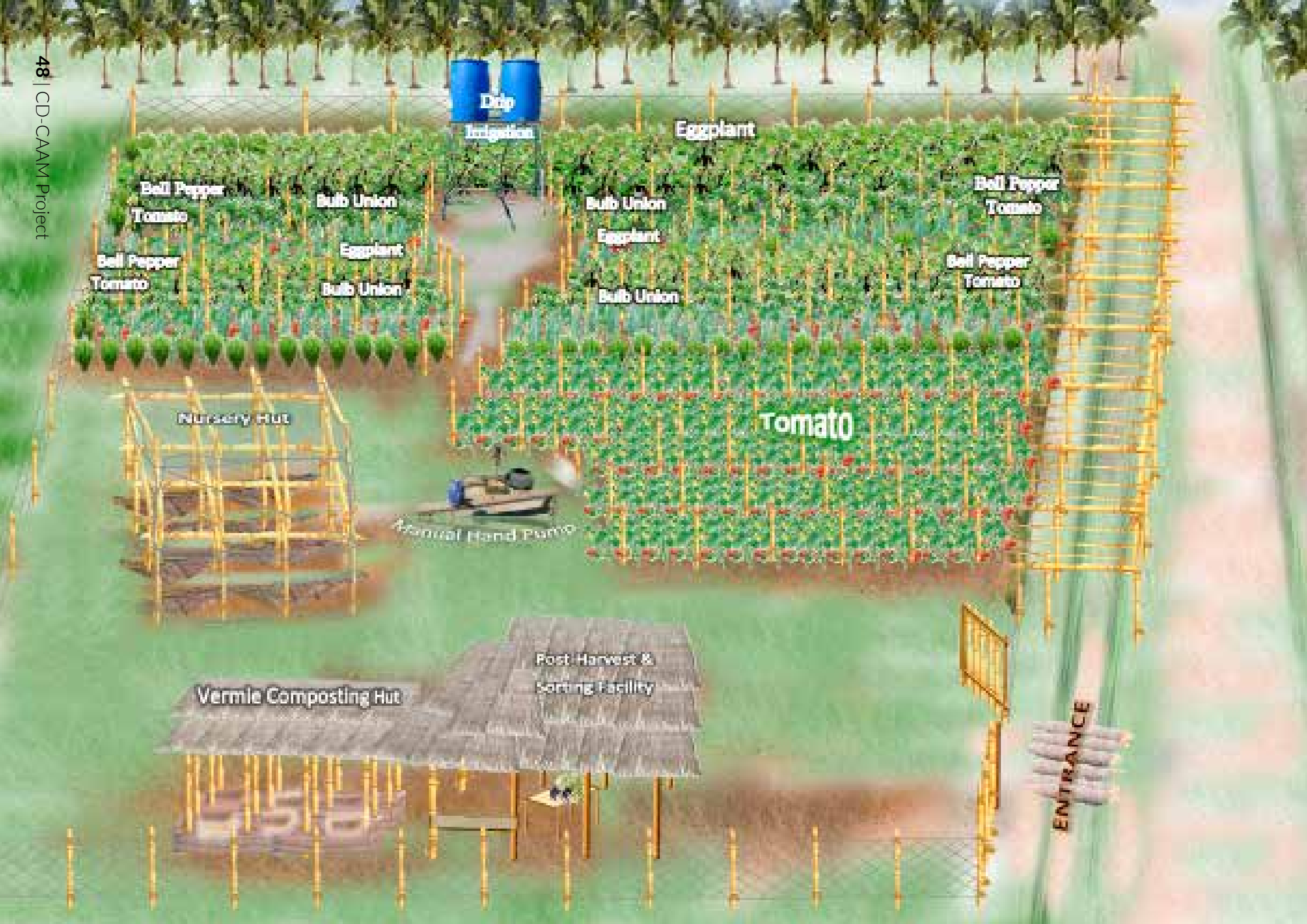
Frame ng rain shelter

7. Pagdisenyo ng *demonstration farms*

Dalawang (2) klaseng disenyo ng *demonstration farms* ng gulay ang ipinapakita dito (tingnan ang sumusunod na dalawang pahina). Ang kabuuang laki ng mga nasabing disenyo ay nasa 1,000 m^2. Mayroong mga lupain at tagaytay na maaaring tamnan ng iba't-ibang mga gulay, kubo pang-*vermicomposting,* mga pasilidad ng patubig, punlaan (*nursery)*, *rain shelter*, at bakod. Ipinapakita ng unang disenyo ang iba't-ibang mga lupaing pagtatamnan ng iba't ibang uri ng halamang gulay. Habang ang ipinapakita ng ikalawang disenyo ang mga gulay na tinanim sa mga tagaytay gamit ang *intercropping* (ang magkakalapit na pagtatanim ang iba't ibang uri ng halaman).

Demonstration farm ng Matungao (kabilang pahina)
Demonstration farm ng Macabiso (pahina 48)


Cucumber
Okra
Rain Shelter
Ampalaya
Tomatoes
String Beans
Leafy Vegetables
Water Reservoir
Vermie Composting Hut
Meeting Area
Nursery Hut
Storage Hut
ENTRANCE


Drip
Irrigation
Eggplant
Bell Pepper
Tomato
Bulb Union
Eggplant
Bell Pepper
Tomato
Bulb Union
Bell Pepper
Tomato
Eggplant
Bulb Union
Bell Pepper
Tomato
Bulb Union
Nursery Hut
Tomato
Manual Hand Pump
Post Harvest &
Sorting Facility
Vermie Composting Hut
ENTRANCE

8. Pamamahala ng negosyo sa produksyon ng gulay

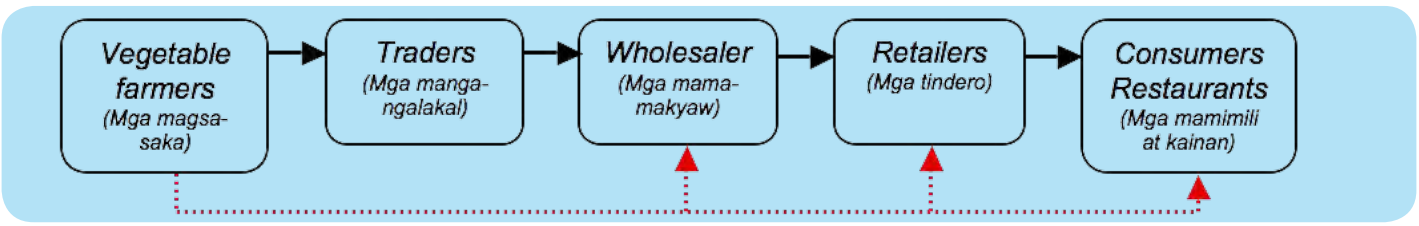
8-1 Pagbebenta

(1) Pag-saliksik at pag-aaral ng merkado (*market survey*)

Ang pag-aaral ng merkado ay isa sa mga pinakamahalagang gawain para sa mga magsasaka ng gulay upang malaman nila kung ano ang kanilang ibebenta, saan nila ito ibebenta, kailan nila ito ibebenta, paano nila ito ibebenta at magkano ang presyo nito upang lumaki ang kita nila. Sa madaling salita, bibigyan nila ng konsiderasyon ang mga sumusunod: ang mga produktong ibebenta, ang presyo, ang dami ng mga mamamakyaw, tindero at mamimili, lokasyon at iba pang kadahilanan. Upang malaman ang mga ito, kinakailangan ang *market survey*.

Ang kalakalan ng gulay o *marketing channel* ay ipinapaliwanag nang mas madali sa susunod na paglalarawan. Ipinapakita ng paglalarawan sa baba na mula sa mga magsasaka hanggang sa mga mamimili, palaki nang palaki ang tubo ng mga nasabing produkto dahil sa presensya ng mga negosyante, mamamakyaw at tindero. Siguradong darating sa mga mamimili ang mga gulay. Ngunit maliit lamang ang makukuhang kita ng mga magsasaka sa malaking itinubo sa presyo ng kanilang mga gulay.

Dahil diyan, maaaring maghanap ng iba pang maaaring bentahan (*channel*) ang mga magsasaka upang mas mapadali ang pagbebenta ng kanilang mga produkto sa mga mamimili sa pamamagitan ng pag-iwas sa mga mangangalakal (*traders*). Maaari itong mangyari sa pamamagitan ng paggamit ng mga sumusunod na *marketing channel*: (1) ang pagbenta ng mga produkto sa mga tindero, (2) ang pagbenta ng mga produkto sa mga mamamakyaw, at (3) ang direktang pagbenta ng mga produkto sa mga mamimili at mga kainan.



Pigura 8.1 Kalakalan ng gulay (Marketing channel)

Ang mga sumusunod na dalawang talaan ay ang *survey format* na may kalakip na pangunahing impormasyong kinakailangang kolektahin:

Talaan Blg. 8-1 Impormasyong kinakailangang kolektahin mula sa mga tindero

Pangalan ng Tindero / Kainan	Pangalan ng gulay	Presyo	Kinakailangang dami bawat bili	Dalas ng pagbili	Araw / Buwan	Kabuuang dami (kg) kada buwan	Kabuuang kita kada buwan

Talaan Blg. 8-2 Impormasyong kinakailangan kolektahin kasama ng mga mamamakyaw at mga pamilihan

Pamilihan	Layo	Pangalan ng gulay	Presyo	Iba pang obserbasyon

(2) Pag-aanalisa ng pangmerkado sa pagbebenta ng mga produkto (halimbawa)

Dito ipapakita ang aktwal na pag-aanalisa na may kasamang mga datos at impormasyon na nakuha mula sa *pilot project* sa Sultan Mastura, lalawigan ng Maguindanao. Ang Sultan Mastura ay may layong 20 km mula sa Lungsod ng Cotabato.

Ang pagpili ng pamilihan ay ang pinakamahalagang konsiderasyon. Isinasaalang-alang kung gaano kadali mapuntahan ng publiko ang mga pamilihan. Kung malapit-lapit ang mga pamilihan sa mga matataong lugar, may malaking posibilidad na marami ang bibili ng gulay. Ang isa pang konsiderasyon ay ang presyo ng mga produkto at ang halaga ng transportasyon sa pagkukumpara ng mga pamilihan. Ginanap ang survey sa mga malalapit na mga mamimili sa Lungsod ng Cotabato gaya ng mga tindero sa palengke at mga kainan. Ipinapakita ito sa Talaan Blg. 8-3.

Para sa mga mamimili, magkakaiba ang presyo nila sa isa't isa. Ngunit kinakailangan ding isaalang-alang ang dami ng binibiling produkto at gaano kadalas binibili ang mga ito mula sa mga magsasaka. Samakatuwid, makakalkula ng mga magsasaka kung magkano ang kanilang kikitain sa loob ng isang buwan kung magbebenta sila nang tuluy-tuloy.

Talaan Blg. 8-3 Halimbawa ng mga resulta sa ginanap na survey sa mga tindero at mga kainan (Lungsod ng Cotabato, 2014)

Tindero / Kainan	Pangalan ng gulay	Presyo	Kinakailangan dami bawat bili	Dalas ng pagbili	Araw / Buwan	Kabuuang dami (kg) kada buwan	Kabuuang kita kada buwan
Tindero A	Siling-pula	60	2	kada 2 araw	12	24	1,440
	Kamatis	28	2	kada 3 araw	12	24	672
	Talong	35	2	kada 4 na araw	12	24	840
	Cauliflower	120	2	kada 5 araw	12	24	2,880
	Pipino	20	2	kada 6 na araw	12	24	480
Tindero B	Siling-pula	100	1	kada araw	28	28	2,800
	Talong	25	10	araw-araw	28	280	7,000
	Pipino	25	5	araw-araw	28	140	3,500
	Sibuyas	120	3	araw-araw	28	84	10,080
Tindero C	Siling-pula	70	5	araw-araw	28	140	9,800
	Kamatis	30	2	araw-araw	28	56	1,680
Tindero D	Siling-pula	90	1	araw-araw	28	28	2,520
	Kamatis	16	8	araw-araw	28	224	3,584
	Talong	25	5	araw-araw	28	140	3,500
Tindero E	Siling-pula	50	1	araw-araw	28	28	1,400
	Kamatis	20	15	araw-araw	28	420	8,400
	Talong	30	10	araw-araw	28	280	8,400
Tindero F	Siling-pula	25	300	kada 3 araw	8	2,400	60,000
	Kamatis	15	500	kada 3 araw	8	4,000	60,000
	Talong	10	1,000	kada 3 araw	8	8,000	80,000
	Cauliflower	45	200	kada 3 araw	8	1,600	72,000
Kainan A	Siling-pula	60	2	araw-araw	28	56	3,360
	Kamatis	28	1	araw-araw	28	28	784
	Talong	30	4	araw-araw	28	112	3,360
	Cauliflower	120	2	araw-araw	28	56	6,720

Mula sa: CD-CAAM 2014

Pinili ng mga magsasaka si Tindero B, E at F na magbenta ng kanilang mga produkto. Ayon sa kanila:

- Kahit limitado lang ang dami ng gulay na binibili ng mga tindero sa isang transaksyon, maaaring bibili pa rin sila ng mas maraming gulay mula sa kanila sa susunod;
- Hindi na sila humihingi ng mga papeles bago bilhin ang mga produkto dahil unang subok pa lang ang pagbebenta ng mga masasaka sa kanila; at
- Parating ibebenta ng mga tindero ang mga produktong mula sa mga magsasaka. Ibig sabihin nito ay kapag nag-aani ang mga magsasaka ay tinatawagan agad nila ang mga tindero upang mapadala nila ang mga gulay sa kanila.

Survey sa mga mamamakyaw at tindero (shopping mall)

Dagdag pa rito, nagsagawa ang CD-CAAM ng survey sa mga pamilihan sa Kabacan, Kidapawan at Davao. Nakita rito na ang presyo ng mga gulay ay hindi magkakapareho sa mga nabanggit na mga pamilihan. Mataas ang presyo ng kamatis at siling-pula sa Kabacan kumpara sa ibang pamilihan dahil nagmula ang mga gulay sa Davao at Makilala. Pinagbabawalan ang direktang pagbenta sa palengke ng Kidapawan. Ang mga presyo ng bilihin sa Davao ang pinakamura sa lahat ng nasabing palengke. Dahil sa mga sagabal sa transportasyon, maraming mga tindero mula sa Lungsod ng Cotabato ang dumadayo sa mga nasabing palengke upang bumili ng mga gulay.

Talaan Blg. 8-4 Halimbawa ng resulta sa survey na ginanap sa mga mamamakyaw sa mga pamilihan

Pamilihan	Layo (km)	Gulay	Presyo (Php/kg)	Iba pang obserbasyon
Kabacan		Kamatis	25	-Nagmula ang mga gulay sa Makilala at Davao -Araw ng pamamalengke: Huwebes at Linggo -Gastos sa transportasyon : 100 – 120 Php kada tao -Bayad sa pag-arkila ng trak: 4,500 Php / araw -Bayad sa pag-arkila ng multicab: Php 2,500 kada araw
		Atsal	80	
		Talong	15 – 20	
		Pipino	10	
		Cauliflower	120	
Kidapawan	120	Kamatis	10 – 15	-Ipapadala ang mga produkto sa mga Bagsakan -Ipinagbabawalan ang direktang pagbenta sa mga pamilihan -Kinakailangan ang pagga-grado ng mga gulay -Nagmula ang mga gulay sa karatig-bayan.
		Atsal	40	
		Talong	20	
		Pipino	20	
Davao	260	Kamatis	8 – 10	-Nagmula ang mga produkto sa loob ng rehiyon ng Davao -May pinakamababang presyo sa lahat ng mga pinuntahang mga pamilihan
		Atsal	15 – 25	
		Sibuyas	70 – 80	
		Talong	25	

(3) Modelo sa pagbebenta (halimbawa)

Naranasan din ng mga magsasakang nasa ilalim ng CD-CAAM project ang mga modelo sa pagbebenta (*selling patterns*) ng mga produkto gaya ng pagbebenta sa mga tindero o mamamakyaw, at ang direktang pagbenta sa mga mamimili.

Pagbebenta sa mga tindero

Base sa pag-aaral na nabanggit , ang grupo ng mga magsasaka sa Sultan Mastura na nasa ilalim ng CD-CAAM ay nagsimula nang magbenta ng kani-kanilang mga produkto kay tindero F na nasa pamilihan ng Lungsod ng

Cotabato. Nagbenta sila ng maramihang kamatis. Tuwang-tuwa si tindero F sa kalidad ng mga nasabing produkto at paminsan-minsan ay bumibisita pa siya sa sakahan ng mga magsasaka upang matingnan kung paano itinatanim at inaani ang mga nasabing gulay. Maayos ang komunikasyon sa pagitan ng magsasaka at ng tindero kung kaya't garantisadong maayos ang pagkakalakal sa pagitan ng dalawa.

Pagtitinda sa supermarket ng shopping mall

Nagbenta ang grupo ng mga magsasaka na nasa ilalim ng CD-CAAM mula sa Matungao, Lanao del Norte sa Gaisano Mall. Napili ang nasabing *mall* sa survey dahil bumibili ito ng maramihan, katanggap-tanggap ang presyong kanilang pinapataw sa kanilang mga produkto, nagbibigay sila ng *cash on delivery* at maraming bumibili roon. Dagdag pa nito, ayon sa *marketing head* nito, mayroong 11 sangay ang Gaisano sa Hilagang Mindanao. Pwedeng ibenta ng mga magsasaka ang kanilang mga gulay sa mga nasabing sangay kapag hinihiling ng Gaisano ang mga ito.

Walang tiyak na batayan ang Gaisano Mall sa pagbili ng gulay maliban sa kinakailangang dekalidad ang ani, hindi ganoon kahinog o kahilaw ang ani, at hindi bulok at walang sira ang mga ito. Tumatanggap din ang Gaisano Mall ng mga organikong gulay. Tumatanggap ito ng mga gulay na may timbang na di bababa ng 20 kg.

Mga tindero sa pamilihan ng Lungsod ng Cotabato

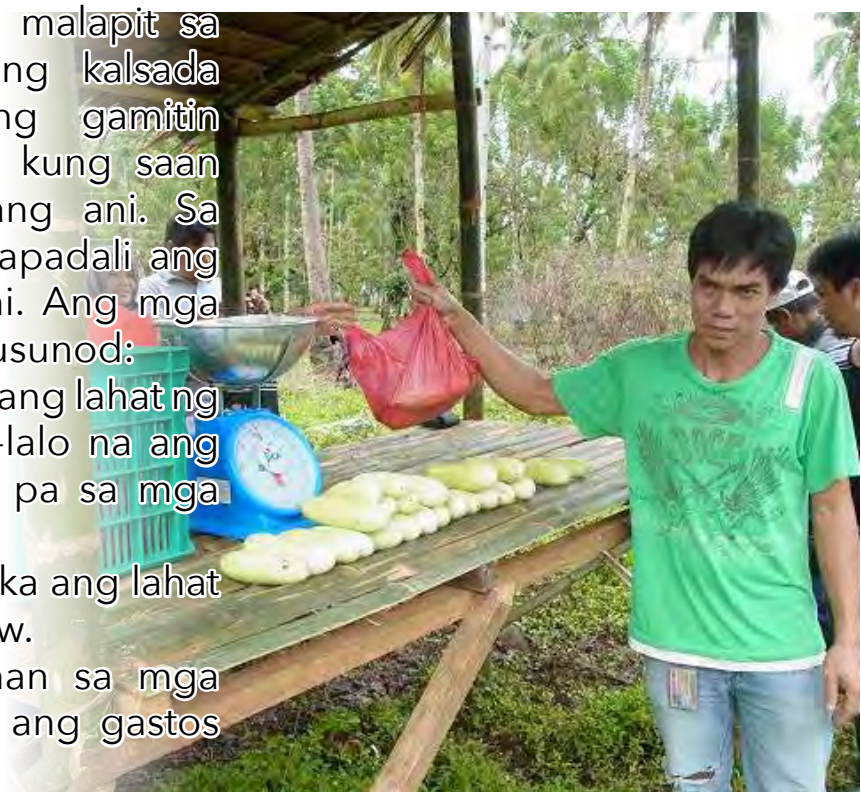
Pagtitinda ng mga produkto sa supermarket ng shopping mall (receiving section ng supermarket)

Bago kukuha at bibili ng mga gulay ang nasabing mall, kinakailangang dalhin ng mga magsasaka ang kanilang ani sa *marketing manager* ng Gaisano Mall upang matingnan ang kalidad nito. Ipapaalam ng tauhan ng *Mall* ang presyo kada kilo ng gulay sa mga magsasaka. Kapag mapagkasunduan ng dalawang partido ang presyo, maaari nang ipadala ng mga magsasaka ang mga gulay sa pinagkasunduang araw. Ang mga magsasaka na ang bahala sa transportasyon.

Pagtitinda sa kubo ng magsasaka

Mahalagang mayroong kubo na malapit sa sakahan at sa mga pangunahing kalsada ang mga magsasaka. Maaaring gamitin ang kubo bilang puwesto (*stall*) kung saan pwede nilang ilatag ang kanilang ani. Sa ganitong pamamaraan, mas mapapadali ang pagbebenta ng kanilang mga ani. Ang mga kalamangan nito ay ang mga sumusunod:

- Mabebenta ng mga magsasaka ang lahat ng kanilang mga produkto lalung-lalo na ang mga di na maaaring mabenta pa sa mga palengke.
- Maaaring mabenta ng magsasaka ang lahat ng ani niya sa loob ng isang araw.
- Kung malapit lang ang sakahan sa mga pangunahing kalsada, bababa ang gastos sa pagpapadala ng mga ani.
- Lahat ng taong dadaan sa kubo ay magiging potensyal na mga mamimili. Kakailanganin lang ng mga magsasaka na ihanda ang timbangan, *calculator* at plastik na supot kung saan maaari nilang ilagay ang mga gulay.



Pagtitinda sa kubo ng magsasaka

8-2 Pagtatala (*bookkeeping o recordkeeping*)

Ang layunin ng bahaging ito ay ang matutunan kung papaano suriin ang produksyon ng gulay mula sa pananaw ng *agri-business* upang masustentuhan at mapabuti ang pangkabuhayan ng mga maliliit na mga magsasaka.

Dapat maintindihan at malaman ng magsasaka kung mayroong siyang kita mula sa kanyang pagsasaka. Dapat din niyang malaman kung magkano ang kanyang kita o pagkalugi at kung bakit nagkaganoon. Ang kaalaman sa gastusin at kita ay makakatulong sa magsasaka na mapabuti ang kanyang produksyon upang ito ay mas lumago sa pamamagitan ng paglinang sa pagsasaka. Samakatuwid, mahalaga ang pagtatala (*recordkeeping/bookkeeping*) ng gastusin at kita upang mas madaling makita kung magkano ang kita o pagkalugi sa pamamagitan ng paggamit ng mga bilang o numero. Ang proseso ng pagtatala ay ang mga sumusunod: (1) pagtatala sa mga gastusin sa produksyon, (2) pagtatala sa mga nabenta, (3) pagkalkula sa kita, (4) tubo ng puhunan, at (5) ang natipid mula sa kita.

(1) Pagtatala sa mga gastusin sa produksyon (unang kwaderno)

Sa produksyon ng gulay, kinakailangang itala lahat ng gawain sa sakahan at lahat ng gamit-paggawa (*input*) na may kasamang gastusin sa bawat araw mula sa simula hanggang sa pagtatapos ng produksyon. Halimbawa, isa sa mga gastusin ay ang halaga ng buto ng mga gulay at ang bayad sa pag-aarkila ng kalabaw.

Ang naitala ay magiging Kwadernong Talaan ng mga Gastusin (*Record Expense Notebook*) (unang kwaderno). Ipinapakita dito sa talaan ang halimbawa ng mga gawain na may kasamang petsa at gastusin. Ang layunin ng talaang ito ay upang kunin ang kabuuang gastusin ng lahat ng gawain na may kinalaman sa produksyon ng gulay.

Talaan Blg. 8-5 Kwadernong Talaan ng mga Gastusin (unang kwaderno)

Petsa	*Gawain*	Halaga (Php)
10/2/13	Paglilinis	1,500
10/9/13	Pag-aararo at pagbubungkal	2,600
11/18/13	Pagbabakod ng nursery	1,000
11/26/13	pagbili ng mga buto at paggawa ng *nursery*	1,600
12/12/13	Transplanting	1,500
…	…	…
…	Pag-aani	…
	Kabuuan gastos	8,200

Ipinakita ng talaan sa itaas ang tatantiyahin na mga gastusin ng mga magsasaka ng sibuyas sa Sultan Mastura, Maguindanao. Ililista ng magsasaka ang lahat ng gawain mula sa paghahanda sa lupain hanggang sa pag-aani at ililista ang tiyak na petsa ng bawat gawain kasama ang katumbas na halaga ng gastusin. Sa huli ay kukunin ang kabuuang gastusin.

(2) Pagtatala ng mga nabenta (ikalawang kwaderno)

Pagdating ng panahon na ng ani ay kinakailangang kumuha ng ikalawang kwaderno upang itala ang mga nabenta. Hatiin ang bawat pahina sa dalawang bahagi at isulat ang "Benta" sa kaliwang bahagi at "Gastusin" sa kanang bahagi para sa pang-araw-araw na mga transaksyon. Huwag kakalimutang isulat ang petsa ng transaksyon sa kaliwang itaas na bahagi. Kunin ang kabuuang benta and gastusin sa pang-araw-araw.

Pagkatapos ay kunin ang kabuuang gastusin sa produksyon mula sa unang kwaderno o sa "Kwadernong Talaan ng mga Gastusin" at isulat ito sa kanang itaas na bahagi ng ikalawang kwaderno. Ipinapahiwatig ng halagang nakapaloob sa loob ng panaklong "( ) "ay ang lugi o gastusin sa produksyon. Ipinakita ito sa Talaan Blg. 8-6. Ang layunin ng nasabing talaan ay ipakita ang araw-araw na daloy ng pera (*cash flow*) at ang mga gastusin.

Talaan Blg. 8-6 Daloy ng pera sa unang araw ng pagbebenta

Disyembre 18, 2013	(8,200)
Benta (Php)	**Gastusin (Php)**
Talong 3,200	Transportasyon 400
Kamatis 2,900	Gawa 350
	Pagkain 150
Kabuuang Kita 6,100	**Kabuuang Gastusin 900**
Cash on Hand (COH)	6,100 - 900 = 5,200

Pagkatapos nito ay ibawas ang COH mula sa kabuuang gastusin sa produksyon. Kaya, (8,200) + 5,200 = (3,000). Ang (3,000) ay gagamiting pambayad sa mga transaksyon sa susunod na araw. Ito ay pinakita sa Talaan Blg. 8-7.

Talaan Blg. 8-7 Daloy ng pera sa ikalawang araw ng pagbebenta

Disyembre19, 2013	(3,000)
Benta (Php)	**Gastusin (Php)**
Talong 3,500	Transportasyon 100
Kamatis 950	Gawa 200
	Pagkain 150
Kabuuang Kita 4,450	Kabuuang Gastusin 450
Cash on Hand (COH)	4,450 - 450 = 4,000

Ibawas muli ang COH sa nasabing araw mula sa natitirang gastusin sa produksyon. Makikita ng magsasaka kung kalian niya mababawi ang kanyang gastusin sa produksyon. Kaya, (3,000) + 4,000 = 1,000. Ang 1,000 ay magsisilbing kita na gagamiting pambayad sa mga transaksyon sa susunod na araw. Ito ay pinakita sa Talaan Blg. 8-8.

Talaan Blg. 8-8 Daloy ng pera sa ikatlong araw ng pagbebenta

Disyembre 20, 2013	1,000
Benta (Php)	**Gastusin (Php)**
Talong 2,900	Transportasyon 200
Kamatis 1,900	Gawa 200
	Pagkain 150
Kabuuang Kita 4,800	Kabuuang Gastusin 550
Cash on Hand (COH)	4,800 - 550 = 4,250

Ngayon, idagdag ang COH sa dating kita na 1,000. Kaya, 4,250 + 1,000 = 5,250. Ang kitang ito ay gagamiting pambayad sa mga transaksyon sa susunod na araw. Ipagpatuloy ito hanggang sa mabenta lahat ng produkto.

(3) Pagkakalkula ng kita

Samakatuwid, ang gastusin sa produksyon ay dapat ibawas mula sa kabuuang kita sa araw na iyan. Ang maiiwang halaga ay ang tinatawag na *cash on hand* (COH) sa araw na iyan. Pagkatapos nito ay idadagdag ang COH na nailikom sa araw na iyan sa kabuuang gastusin sa produksyon na nakatala sa Kwadernong Talaan ng mga Gastusin. Ang resulta nito ay ang tinatawag na Balanse ng Pera (*cash ending*).

Talaan Blg. 8-9 Kuwenta ng daloy ng pera

Particulars	*Dis. 18*	*Dis. 19*	*Dis. 20*
Kita	6,100	4,450	4,800
Gastusin	900	450	550
COH sa Kasalukuyan kita – Kabuuang gastusin)	5,200	4,000	4,250
Ipagsama ang netong kita at kabuuang gastusin sa produksyon (Netong kita – Kabuuang gastusin sa produksyon)	(8,200)	(3,000)	1,000
Balanse ng pera *(Cash ending)*	(3,000)	1,000	5,250

Makikita ng magsasaka sa nasabing daloy ng pera kung kailan niya mababawi ang kanyang ginastos o puhunan. Ang inaasahang daloy ng pera ay makakatulong sa mga magsasaka sa pagbabadyet at sa pagpaplano para sa susunod na ani.

(4) Balik-Puhunan (*Return of Investment*)

Kapag nabenta na ng magsasaka ang lahat ng kanyang inani, maaari na niyang matiyak ang proporsyon ng kabuuang netong kita sa tubo ng puhunan. Sa madaling salita, ito ay ang kahusayang kumita ng pera.

Ipalagay nating ang balanse ng pera ng magsasaka ay Php 5,250. Kunin ang porsyento ng kita sa kabuuang gastusin sa produksyon mula sa "Kwadernong Talaan ng mga Gastusin".

Kita o tubo ng puhunan = Php 5,250 / Php 8,200 x 100% = 64%

Ibig sabihin nito ay sa kada Php 1.00 gastusin ng magsasaka ay kikita siya ng Php 0.64.

Ang mga detalye tungkol sa tubo ng puhunan ng magsasaka ay ang mga sumusunod:

- Sa bawat Php 1 gastos, may Php 0.64 kita ang magsasaka.
- Sa bawat Php 100 gastos, may Php 64 na kita ang magsasaka.
- Sa bawat Php 200 gastos, may Php 128 kita ang magsasaka.
- Sa bawat Php 1,000 gastos, may Php 640 kita ang magsasaka.
- Sa bawat Php 8,000 gastos, may Php 5,120 kita ang magsasaka.
- Sa bawat Php 8,200 gastos, may Php 5,250 kita ang magsasaka.

(5) Natipid mula sa kita

Ang balanse mula sa produksyon ng gulay ay maaaring pangalagaan nang mabuti. Halimbawa, maaaring isantabi at iimpok ang 25 porsyento ng balanse. Kinakailangang may tiyak na halagang ilalaan mula sa inimpok para sa patuloy na pamumuhunan sa *agribusiness* gaya ng pamumuhunan sa ikalawang pagtatanim. Higit pa rito ay maaaring mas lumaki ang inimpok na pera sa pamamagitan ng pag-iwas na gumastos ng labis.

Halimbawa, gamit ang balanseng Php 5,250, kinakailangan iimpok ng magsasaka ang di bababa sa 25 porsyento ng kanyang kita. Ang balanse ng kita at ng inimpok ang magiging badyet ng magsasaka para sa kanyang mga gastusin sa pang-araw-araw. Kung kaya't ang inimpok ng magsasaka ay nagkakahalaga ng Php 1,312.50, 25 porsyento ng Php 5,250. Mahalagang ilaan nang mabuti ng magsasaka sa iba't ibang paglalaanan ang kanyang naimpok. Pinakita ito sa Talaan Blg. 8-10. Napakahalaga ng mga nasabi

paglalaanan. Maaaring magdagdag ang magsasaka ng iba pang paglalaanan. Pero ang pangunahing layunin ng Talaan Blg. 8-10 ay upang masigurong mayroong sapat na puhunan ang magsasaka sa hinaharap upang magkaroon siya ng karagdagan kita na maidadagdag sa negosyo. Kung patuloy itong gagawin ng magsasaka ay magiging nakagawian na niya ito.

Talaan Blg. 8-10 Paglalaan ng mga naimpok

	PARTICULARS	Porsyento (%)	Kinakailangang Halaga (PhP)
1	Zakat *(alms/donation)/ tithe*	3.0	157.50
2	Puhunan *(investment fund)*	10.0	525.00
3	Reserbang pondo *(reserve fund)*	5.0	262.50
4	Pondo sa panahon ng pangangailangan *(emergency fund)*	5.0	262.50
5	Pondo sa samu't saring pangangailangan *(miscellaneous fund)*	2.0	105.00
	Kabuuan (Total)	**25.0**	**1,312.50**

The Project for

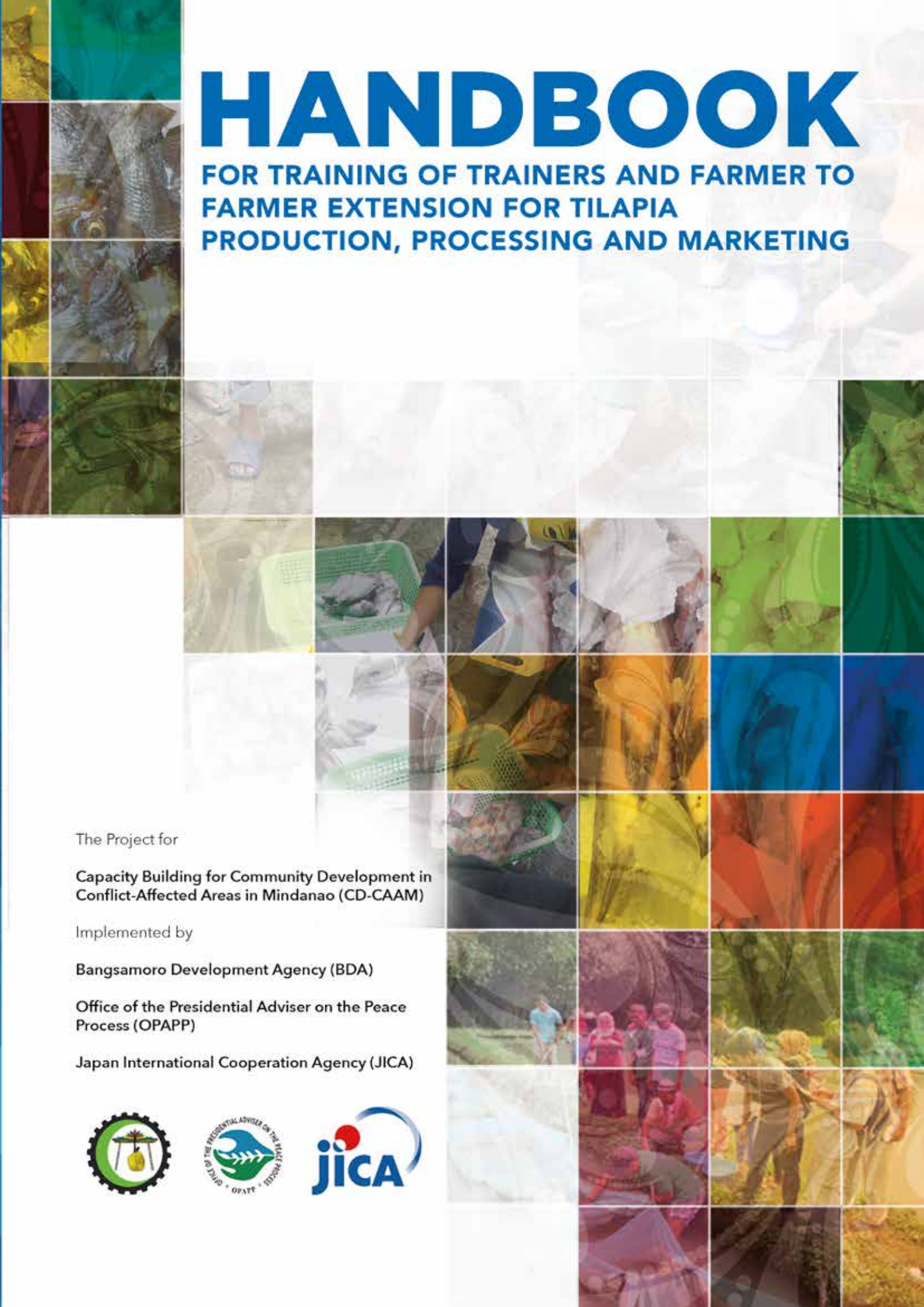
Capacity Building for Community Development in Conflict-Affected Areas in Mindanao (CD-CAAM)

Implemented by

Bangsamoro Development Agency (BDA)
Office of the Presidential Adviser on the Peace Process (OPAPP)
Japan International Cooperation Agency (JICA)

HANDBOOK

FOR TRAINING OF TRAINERS AND FARMER TO FARMER EXTENSION FOR TILAPIA PRODUCTION, PROCESSING AND MARKETING



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Foreword

This Handbook for Training of Trainers and Farmer to Farmer Extension for Tilapia Production, Processing, and Marketing was formulated under the Project for Capacity Building for Community Development in Conflict-Affected Areas in Mindanao (CD-CAAM) of the Japan International Cooperation Agency (JICA) in partnership with Bangsamoro Development Agency (BDA). The project was carried out in 15 months from May 2015 to July 2016 in the municipalities of Sultan Mastura, Maguindanao and Matungao, Lanao del Norte, Mindanao, Philippines.

The handbook is designed for use of fish farmers, extension workers, managers, and NGOs who would like to conduct a Training of Trainers for utilization of potential farmers as extension workers in order to carry out technology dissemination to a wider populace especially in areas where access to technology is quite difficult.

The project team is thankful for the technical assistance extended by the professors and researchers of Mindanao State University in Maguindanao and Naawan, and to BDA CMO and RMO staff for their contribution in facilitating the TOT and FTF in close coordination with JICA Expert team.

Finally, to the Municipal Local Government Units of Sultan Mastura and Matungao for their full support during field works conducted and their continuous guidance and motivation to the 1st and 2nd beneficiaries for the smooth implementation of the project.

July 2016
Fishery Sector
CD-CAAM Project

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How to use this handbook

This handbook has been produced to equip farmer trainers in fishery sector with the basic understanding of the process in conducting Farmer-to-Farmer training in the field. The main focus of this book is the skills transfer process at farmers' level through providing skills training to other farmers. Local trainers on fish farming need to carry out capacity development process to effectively transfer basic technology to other farmers, therefore, it is imperative to hone farmer trainers to spread good aquaculture practices utilizing basic manual formulated during the pilot phase.

The handbook is designed for use of fish farmers, extension workers, managers, and NGOs who would like to conduct training of trainers' for utilization of potential farmers as extensionists in order to carry out technology dissemination to a wider populace especially in areas where access to technology is quite difficult.

This handbook will help

- Improve the knowledge of fish farmers, extension workers, managers, Local Government Units, and NGOs on the training of trainers and farmer to farmer extension approach;
- BDA personnel as they train farmers and communicate their knowledge to others; and
- Planners and administrators working together with the vision ofdeveloping farmer trainers in community development projects.

This handbook is divided into four basic parts: (1)Introduction; (2) Conducting the Training of Trainers (TOT), (3) Carrying out Farmer-to-Farmer Extension (FTF) activities, and (4) Managing the Trainings. The first part discusses how tilapia farming is introduced in the Philippines, as well as its contribution to food security and economy. The second part on the TOT offers a guide on the objectives, contents, and methodology in the conduct of the TOT for farmers are described based on the experience in CD-CAAM. The part on carrying out the FTF shows the objectives and purpose of FTF in this project, the tools applied, and the steps in conducting FTF at field level. Lastly, the part on trainings management touches on the preparations needed to be carried out before and during the training.

I. Introduction

Tilapia *(Oreochromis spp.)* production in freshwater ponds, pens and cages has been gaining popularity in the Philippines[1]. Tilapia's tolerance to a wide range of environmental factors is another reason for its ease in culture. This makes the fish a potential source of cheap protein and supplemental income. In Mindanao, particularly the Bangsamoro region, there exist bodies of freshwater that have not been properly utilized for income generating activities like fish culture. Insufficient access to technology and start-up capital are identified as possible factors to the sluggish development of this important sector in this part of the region.

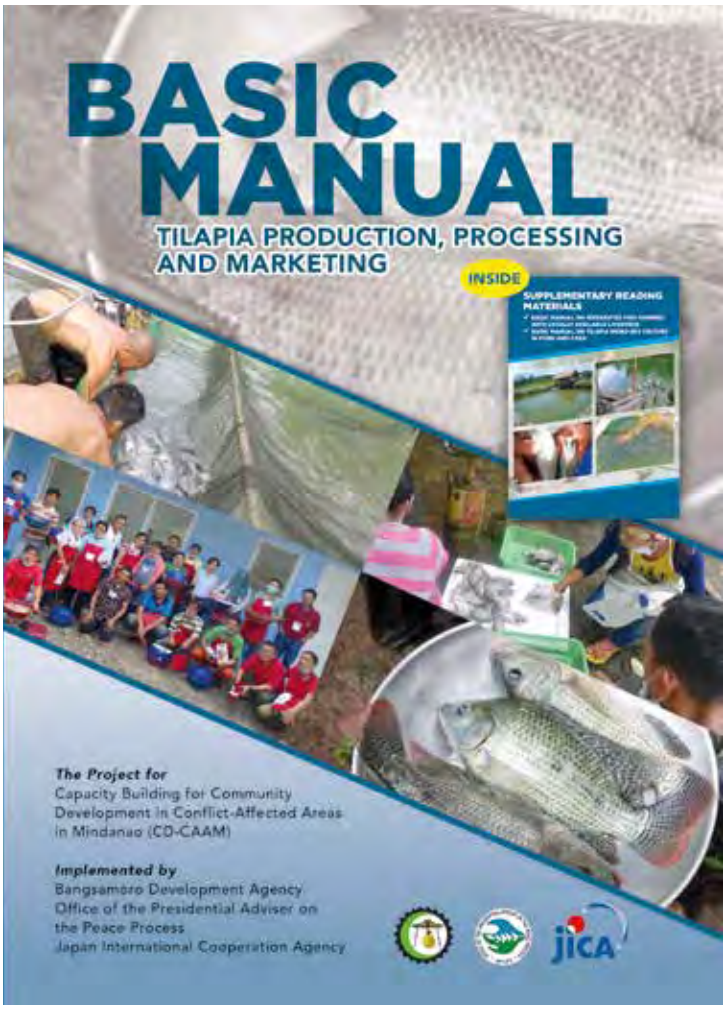


Figure 1: Basic Manual for Tilapia Production, Processing, and Marketing

The CD-CAAM implemented the pilot project on tilapia production, processing and marketing to build the capacity of the BDA counterparts on managing community development projects through on-the-job training (OJT) approach, and to formulate a basic manual based on actual practices and experiences in the CD-CAAM. The project was carried out for three(3) years from 2013 to 2015,in cooperation with Bangsamoro Development Agency (BDA) and funded by the Japan International Cooperation Agency (JICA). Subsequently, the project was extended for another fifteen months

[1] *SEAFDEC AQD. 2000. Tigbauan, Iloilo, Philippines.*

and during the implementation of the Extension phase, the fishery sector utilized the basic manual (Figure 1) developed during pilot phase and adopted according to social situations in the Conflict-Affected Areas of Mindanao.

In the extension phase, the farmers who were 1st beneficiaries underwent the Training of Trainers (TOT) to become Farmer Teachers (FTs) for the 2nd beneficiaries. Under the TOT, the farmers' skills on the tilapia culture based on their experience in CD-CAAM were further strengthened. They were also trained on simple lecture preparation and delivery. Simultaneously, the Bangsamoro Development Agency and LGU personnel were also capacitated on designing and organizing training programs for the conduct of FTF at field level.

Moreover, the Farmer-to-Farmer (FTF) extension approach is recognized as an effective approach to maximize the conduct of technology transfer to other communities in other barangays through having the 1st beneficiaries trained on tilapia culture serve as Farmer Teachers to other communities. This was first tried during the pilot phase.

To carry out the FTF extension approach, Farmer Teachers (FTs) first have to be trained through the Training of Trainers (TOT). The TOT covers subject matter such as: i) Contents of TOT, ii) Conducting TOT, iii) Building training team, preparation of teaching materials, and mentoring, iii) Practice teaching and critiquing, iv) Selection of farmer trainers, and v) Planning of FTF activities. The TOT is mainly managed by BDA in collaboration with the MLGU officials. The lecturers of the training are sourced from technical resource organizations.

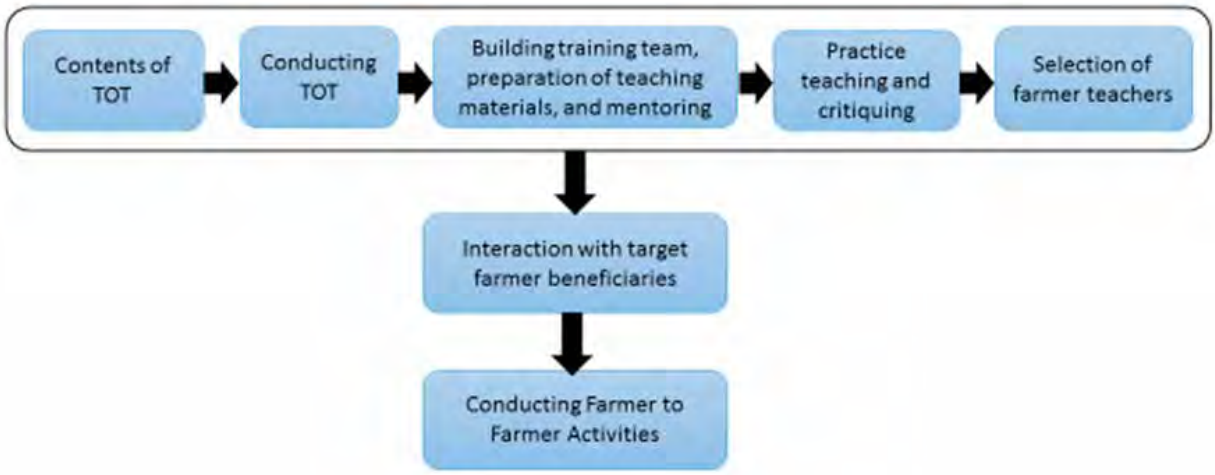


Figure 2. Flow of TOT to FTF

At field level, selected Farmer Teachers conducted FTF activities to 2nd beneficiaries in other barangays after the TOT. Before actual FTF activities, FTs conduct dry-run activities mainly managed by BDA for further mastery of their assigned topics. By far, FTs are seen to be more efficient in hands-on transfer of technology to other farmers rather than during lectures. It is also observed that the level of learning is high with this approach.

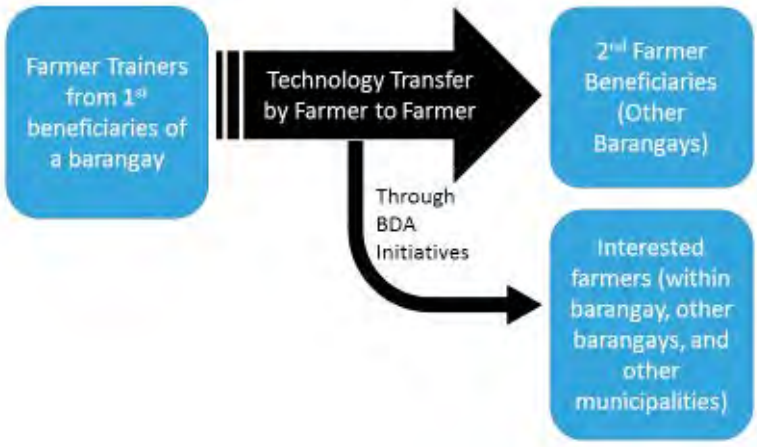


Figure 3. Flow of techno-transfer from 1st beneficiaries to 2nd beneficiaries and other communities

The TOT and FTF activities work hand in hand to develop and further strengthen the skills of the Farmer Teacher. Table 1 shows a sample program for the TOT and FTF activities showing the general contents and the number of days allocated for the topics.

Table 1. Sample TOT and FTF activities and schedule of fishery sector

Topic	No. of days	Contents	Materials	Facilitator
A) Training of Trainers (TOT)				
1. Preliminaries	1	Registration, opening prayer, messages, presentation of participants, and reading of house rules	Prepared attendance sheet, hand-out	BDA
2. Training of Trainers (Introduction)		Discuss the following; (1) Concept and meaning of ToT, (2) Objectives, and (3) Expected benefits	Hand-out	RP
3. The trainer and his/her role		Explain the many role of a trainer, and add the core values of BDA (vicegerency, transparency, trustworthiness, and inclusiveness)	Hand-out	BDA
4. TOT Teaching method		Discuss teaching method "adult learners-facilitation" which includes, (1) Learning through seeing, doing, and thinking (2) Guidelines for appropriate teaching aids, and (3) Facilitation skills	Hand-out	RP
5. Review lecture of tilapia production technology	0.5	Explain technicalities about pond/ cage construction, grow-out operation and the importance of sampling and feed management	Basic manual on tilapia production, processing, and marketing	RP, BDA
6. Record keeping		Explain sample of record keeping from pilot phase (Materials cost, feed cost, fingerlings cost, and other expenses)	Record template	RP
7. Practicum	0.5	Practice on (1) sex identification for breeding and mono-sex culture, (2) Water and feed management, and record keeping	Live tilapia, water measuring apparatus, pelletized feed	RP, BDA
8. Topic selection by FTs	1	Farmer trainers select their own topic of interest	Basic manual on tilapia production, processing, and marketing, notebook, ballpen	BDA, FTs

9. Mentoring/ Peer Teaching	1	Farmer teacher mentoring, preparation of teaching aid	Manila paper, pentel pen, crayon, ruler, plastic tape, push pin	RP, BDA, FTs
10. Practice teaching by Farmer Trainers and Critiquing		Practice teaching, critiquing	Prepared teaching aid	RP, BDA
11. Evaluation of Training		Feed backing by RPs	Evaluation form	RP, BDA
12. Closing program		Closing remarks, distribution of completion certificates	Evaluation form	RP, BDA
B) Farmer to Farmer (FTF)				
1. Building core training team and plan for FTF	0.5	Strengthen training team and plan to implement the FTF	Evaluation form	RP, BDA, FTs
2. Preparation of teaching materials	0.5	Preparation of simple teaching aid, and cage miniature	Manila paper, pentel pen, crayon, ruler, plastic tape, push pin, bamboo stick	BDA, FTs
3. Dry-run for FTF Training	1.0	Practice teaching and critiquing by RP and BDA	Prepared teaching aid, megaphone	BDA, FTs
4. Conduct of FTF	1.0	Conduct lecture on-site using local dialect utilizing prepared simple teaching aid, hands-on	Prepared teaching aid, megaphone, miniature, hands-on	FTs, BDA

1.1. Role of Stakeholders

In the design of the Training of Trainers to the Farmer-to-Farmer extension technology, all stakeholders have a role to play inorder to ensure the success of the project implementation.

a) Farmer trainers

- Plan extension activities together with BDA, LGU, and RPs
- Teach tilapia farming technologies using Basic Manual on Tilapia Production, Processing and Marketing as reference to other farmers under supervision of BDA and RPs.
- Provide on-site technical guidance to other farmers in and out of project sites under the supervision of BDA and RPs.
- Participate in activities of other farmers to establish for more cohesive relationship among themselves

b) BDA

- Prepare activity plan in consultation with other stakeholders and FTs.
- Prepare report after every field activity such as main output, lessons learned, issues and concern, solution to the problem if there is any and most importantly production data.
- Monitor progress of tilapia culture regularly, report observation pertaining to water quality, and resolve social issues to maintain good relation among FTs and learners.
- Facilitate visit of partners and guests and sill provide project briefings if necessary.
- Assist beneficiaries in market linkages, as well as collaborate with related government and non-government agencies for further assistance.

c) LGU (MAO, Councilor, Committee Chair of Fisheries and Agriculture)

- Coordinate with LGU officials and BDA for FTF and other field activities
- Assist beneficiaries in linking with other agencies (BFAR) for technical and funding assistance

d) RPs

- Provide technical support to FTs to make sure that tilapia production, processing and marketing are carried out efficiently upon request of BDA.

II. Conducting the Training of Trainers (TOT)

In this Chapter, the objectives, contents, and methodology in the conduct of the TOT for farmers are described based on the experience in CD-CAAM. Even though the TOT is facilitated by the resource organization, it will be helpful for BDA and MLGUs to understand its coverage as they are the ones who will plan and implement the activities at field level using the FTF approach.

2.1. Concept and Meaning of ToT

The Training of Trainers is a form of training imparted to an individual to prepare him/her for his/her future role as a trainer. With the ToT, the participants will be able to develop their capabilities and capacities to train others as skilled professionals and help organizations build their own cadre of trainers.

Key Elements of a ToT:

- Training goal
- The trainer/resource person
- Target group, the trainees
- Training course
- Training approach

2.2. Objectives of TOT

With the TOT, the participants will be able to:

- Help organizations/agencies in their efforts of human resource development for accelerating growth-oriented participatory action at the local level.
- Promote the activity of training as an integral element of people's organization.
- Prepare the participants as trainers for the field level training activities.
- Develop necessary skills in designing and organizing training programs.
- Provide an understanding of the principles and practices of the training process.
- Sharpen communication skills as trainers
- Build the trainer's skills regarding the organizational management aspect of the training program.

2.3. Expected Benefits

2.3.1. Knowledge Retention. People tend to pay attention in class when they know that next time they will be the Instructor.

2.3.2. Learning by Teaching. To teach is to learn twice over. (Joseph Joubert)

Teaching a topic is the best way to reinforce your knowledge. By encouraging your staff to teach, you encourage them to become experts.

2.3.3. Creating Leaders. When you teach, it builds your creative skills.

2.3.4. Cost Reduction. All training can be expensive. By using some beneficiaries themselves as Instructors training expenditures are reduced.

2.3.5. Training Follow Up. When the Trainers are some member-beneficiaries themselves there are increased opportunities for follow-ups.

2.3.6. Social reinforcement. There's evidence to suggest that people are more likely to retain knowledge when they know the Teacher.

2.3.7. Skill Retention. By building a culture of teaching you can achieve a greater depth of skill retention for your organization.

2.4. Contents and Schedule of TOT

The contents of TOT should be discussed with the time frame among BDA, Resource Persons, and MLGU Officials. As an example, an outline of TOT that CD-CAAM recommends is tabulated in Table 2. A more detailed outline is presented in Annex 1 showing the time allocated for each topic for each day.

Table 2. Sample Outline of TOT

Topic	No. of days	Contents
Introduction to TOT and TOT Teaching Methods	1.0	Discuss the following; (1) Concept and meaning of ToT, (2) Objectives, and (3) Expected benefits Discuss teaching method "adult learners-facilitation" which includes, (1) Learning through seeing, doing, and thinking (2) Guidelines for appropriate teaching aids, and (3) Facilitation skills
Introduction to TOT and TOT Teaching Methods	1.0	Explain technicalities about pond/cage construction, grow-out operation and the importance of sampling and feed management ; sample of record keeping from pilot phase (Materials cost, feed cost, fingerlings cost, and other expenses)

Practicum	0.5	Practice on (1) sex identification for breeding and mono-sex culture, (2) Water and feed management, and record keeping
Topic selection by FTs;Mentoring/Peer Teaching; Practice Teaching by Farmer Teachers; Evaluation	1.0	Farmer teachers select their own topic of interest; Mentoring, preparation of teaching aid, practice teaching, critiquing, feedbacking

2.5. The Trainer and his/her Role

A lot is expected of a trainer. As a trainer, he fulfills several roles: as a position of authority, as a mentor/coach, and as a technical trainer. The participants need to be aware that they are expected to become role models as Farmer Teachers and share their knowledge to other farmers. This endeavor is seen to help encourage other farmers to go into tilapia production and hasten the replication of tilapia culture technology to other Bangsamoro communities.

In addition, the BDA organizational core values of vicegerency, transparency, trustworthiness, justice, inclusiveness, excellence, piety, and accountability are also seen as essential as well for a trainer to become model trainers in the community.

2.6. TOT Teaching Method

The section discusses the role of a facilitator and the teaching guide to help communities on how technology transfer being done at field level the effective and easy way.

(1) Purpose

1) To let the participants be equipped with knowledge, draw from each other's strength, and strengthen each other's weakness.

2) To let the participants explore the relationship between process and content of the training prior to teaching other farmers, and to promote an understanding of how participants continue to learn and develop their capacity building on tilapia production, farm management and effective marketing strategy.

(2) Contents
The contents discuss Adult Learners' facilitation of teaching method based on evaluation that farmer trainers and learners are adults and prefer active participation based on their stored knowledge and experience. This is aimed to help promote participatory and productive learning for the farmer trainers.

2.6.1. Facilitation Skills

For this section, it is important to emphasize your crucial role as the facilitator and what it takes to be a good facilitator.

In trainings, you are an instructor and a facilitator. There is a whole lot of knowledge that you bring to your participants as an instructor and at the same time you have a responsibility to facilitate an environment and a process that promotes effective adult learning. It is important to remember both of these roles; both are essential for ensuring a positive learning experience in your trainings.

Facilitation is not only applicable in trainings but also in meetings. Having good facilitation skills enables the participants to work together more effectively to achieve a common objective.

2.6.2. Presentation Skills

Presenting information clearly and effectively is a key skill to get your message across and nowadays, presentation skills are required in almost every field.

A presentation is a means of communication which can be adapted to various speaking situations, such as talking to a group, addressing a meeting, or briefing a team. To be effective, step-by-step preparation and the method and means of presenting the information should be carefully considered.

NOTES TO THE TRAINER

- *Based on CD-CAAM experience, farmer participants prefer active participation based on their stored knowledge and experience*
- *Use participatory activities which enable dynamic reviews of what has been learned*
- *Increase group activity so that workshop participants can expand on the new knowledge and localize that knowledge*

2.6.3 Preparing simple teaching materials and visual aids

Well-prepared training materials help in conducting both the entire training and each individual session. To get started, begin with the end in mind. Think about the farmers you are imparting your knowledge to. What should your participants know? What materials are necessary to support the learning process?

In the preparation of teaching aids, it is recommended to guide trainers and attract audiences and draw interest on specific topics discussed by presenters. Teaching is very important because 97% of learning is achieved through simultaneous appeal to the eye and the ear.

The following are the guidelines in the preparation for appropriate teaching aids:

(1) Whenever possible, make your own teaching aids, using low-cost materials, and can be seen from all areas in the room.

(2) Use and build on skills the participants already have

(3) Look for ways to use real objects instead of drawing things, e.g. miniature etc.

(4) Use your imagination, and encourage learner to use theirs.

(5) Keep teaching aids relatively simple, so that learners can easily adapt.

(6) Training aids can be in the form of charts, slides, videos, drawing, miniature, replica etc.

Figure 4. Simple visual aid used by FTs during lecture to 2nd beneficiaries

Figure 5. Replica of floating cage utilized as teaching materials

2.7. Reviewing the Tilapia Production Technology

To ensure the effective and efficient implementation of the Farmer-to-Farmer activities, it is necessary to review the important topics in the Basic Manual for Tilapia Production, Processing, and Marketing. Table 3 below shows the topics for review and the estimated time allocated for each.

Table 3. Topics reviewed during TOT

Topic/s	Estimated duration
1 Biology/ General • Introduction to aquaculture • Biology and taxonomy of tilapia	1.0 hours
2 Site Selection • Topography • Soil texture • Water source • Flood/ disaster • Security • Road access	0.5 hours
3 Pond/ cage construction • Water holding capacity • Inlet/outlet • Pond design • Cage design • Soil excavation/ manual digging	0.5 hours
4 Grow-out operation • Pond/ cage preparation • Stocking • Water management • Feeding • Fertilization – Integrated fish farming • Backyard pond/ No feeding	1.0 hours
5 Harvest and Transport	1.0 hours
6 Community-based Seed production • Seed source • Seed production • Selective breeding • Harvest and transport of fingerlings/fry	1.0 hours
7 Nursery: mono-sex culture/hand sorting to select male	1.0 hours
4.2 Record keeping (Simple) • Grow-out • Seed production a. Marketing/ sale	1.0 hours
Total	6.0 hours

This session is a combination of lecture and discussion with questions being raised for the participants to answer to confirm if the participants understand the purpose, principles and theories, methods and procedures, and tools and materials used for respective technological topics explained in the Manual.

This review serves as a refresher course because the participants have already acquired the technology previously. The challenge for the participants now is for them to be able to clearly explain about the topics verbally to that they will be effective and be understood by their future trainees when they become Farmer-Teachers.

Another part of the review is the hands-on training for the following topics:

- Sex identification of tilapia
- Water management
- Feed management
- Pond and cage preparation
- Record keeping

Figure 6. Hands-on review on fingerlings collection and water management at MSU-Maguindanao campus.

After reviewing the basic manual (Figure 1), FTs are brought to field to verify actual activities to enhance their skills further on farm management and water management, the two very important components of fish farming.

2.8. Topic selection by FTs and Mentoring

FTS are divided into groups of four and are assigned a particular topic based on their interest and confidence. Each group should have a facilitator, secretary and reporter. The participants will base their lectures on the basic manual. A mentor has to be assigned to each group to assist the participants on their preparations. Necessary materials such as manila paper, meta strips, markers, and others must be provided for them to carry out the task.

Figure 7. Mentoring during TOT

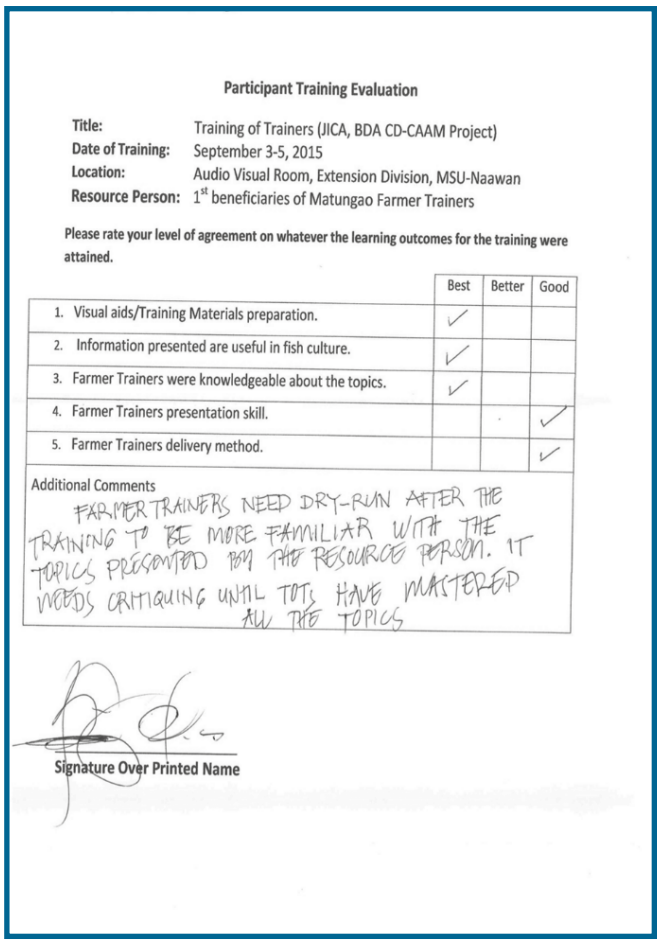
2.9. Practice Teaching by FTs and Critiquing

After preparation of teaching aids, each of the groups shall present their outputs with the Resource persons and other participants as their audience.

Figure 8. Practice teaching by FTs after Preparation of respective visual aids

A Participant Training Evaluation form is used to assess the group presentations. The presentations were assessed on the following areas:

- Visual aids/ training materials preparation
- Information presented is useful in fish culture
- Knowledge about the topics
- Presentation skills
- Method of delivery



Participant Training Evaluation

Title: Training of Trainers (JICA, BDA CD-CAAM Project)
Date of Training: September 3-5, 2015
Location: Audio Visual Room, Extension Division, MSU-Naawan
Resource Person: 1st beneficiaries of Matungao Farmer Trainers

Please rate your level of agreement on whatever the learning outcomes for the training were attained.

	Best	Better	Good
1. Visual aids/Training Materials preparation.	✓		
2. Information presented are useful in fish culture.	✓		
3. Farmer Trainers were knowledgeable about the topics.	✓		
4. Farmer Trainers presentation skill.			✓
5. Farmer Trainers delivery method.			✓

Additional Comments
FARMER TRAINERS NEED DRY-RUN AFTER THE TRAINING TO BE MORE FAMILIAR WITH THE TOPICS PRESENTED BY THE RESOURCE PERSON. IT NEEDS CRITIQUING UNTIL TOTs HAVE MASTERED ALL THE TOPICS

Signature Over Printed Name

Figure 9. Sample evaluation sheet for FTs during TOT.

Critiquing is done right after each presentation to provide timely constructive feedback which leads to enhanced learning and mastery of presentation content. The BDA and Resource Persons are the ones who give their feedback on the group's delivery of their presentation.

Below are the constructive feedbacks by the RPs to Farmer Teachers during critiquing in the Training of Trainers carried out during the implementation of CD-CAAM:

- The visual aids should be prepared in a way that could be read by the participants at the back of the room
- Refrain from reading what was written on visual aids because it only serves as a guide to organize the topics. Therefore, trainers should be well prepared in delivering lectures.
- During delivery, the voice should be loud enoughto be heard by the participants at the back and clear enough to be understood by everybody.
- Avoid unnecessary body movement and gestures as it may sometimes be distractive; body language is helpful in effectively conveying thetrainer's idea to the participants.
- During implementation, FTs should have their guide notes onhand to keep their lectures on tract.

III. Carrying out Farmer-to-Farmer (FTF) Extension Activities

Farmer-to-Farmer extension activities are managed by BDA and MLGU while those who are trained to become Farmer Teachers become resource persons who will do technology transfer to other farmers. This chapter discusses how the activities are planned, implemented, and evaluated by the BDA and the MLGU.

3.1. Purpose of FTF

Farmer to Farmer approach is the main approach in conducting extension activities in fishery sector wherein knowledgeable and experienced farmers (1st beneficiaries of CD-CAAM) transfer technology to other beneficiary farmers (2nd beneficiaries) under the support and supervision of BDA and the MLGU.

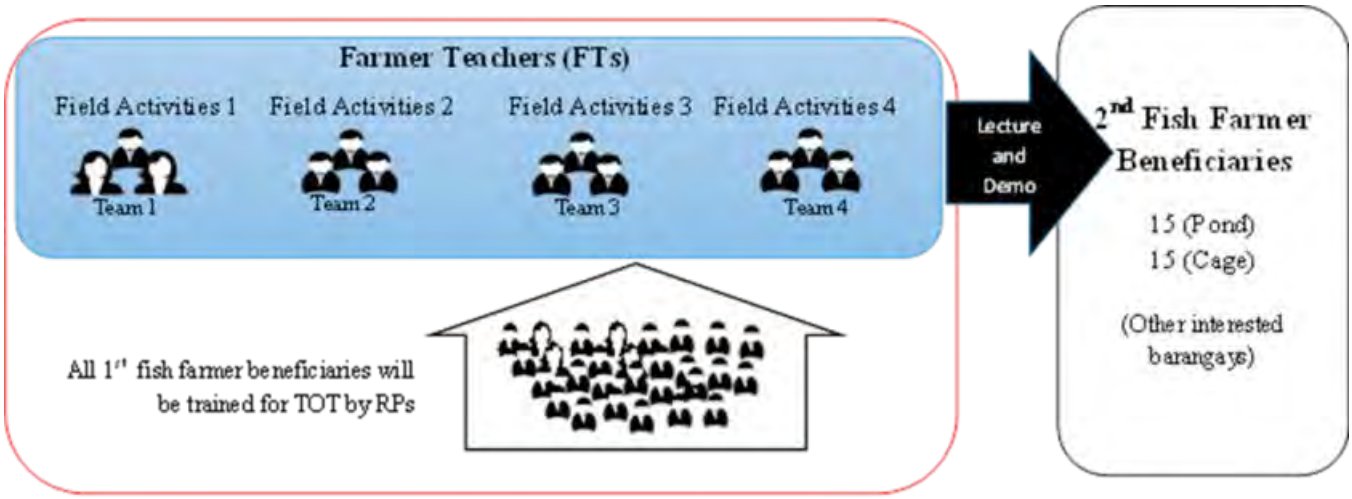


Figure 10. Flow of Farmer to Farmer (FTF) approach of technology transfer to 2nd beneficiaries

The basic material used in FTF activities by the Farmer Teachers is the Basic Manual on Tilapia Production, Processing and Marketing developed by CD-CAAM during pilot phase. New technical guides on integrated fish farming

and mono-sex tilapia culture are likewise introduced to improve profitability of the fish farming enterprise for small-holder farmers.

A lecture series is formulated and standardized from the basic manual during TOT according to the learning capacity of Farmer Teachers. In addition, utilizing miniature or replica is also deemed an effective tool especially for cage construction.

3.2. Implementation Mechanism of FTF

Shown in Figure 11 below is the project implementation mechanism of fisheries sector in extension phase. It is divided into three levels, each of which has distinctive roles and responsibilities to further ensure smooth and effective project implementation.

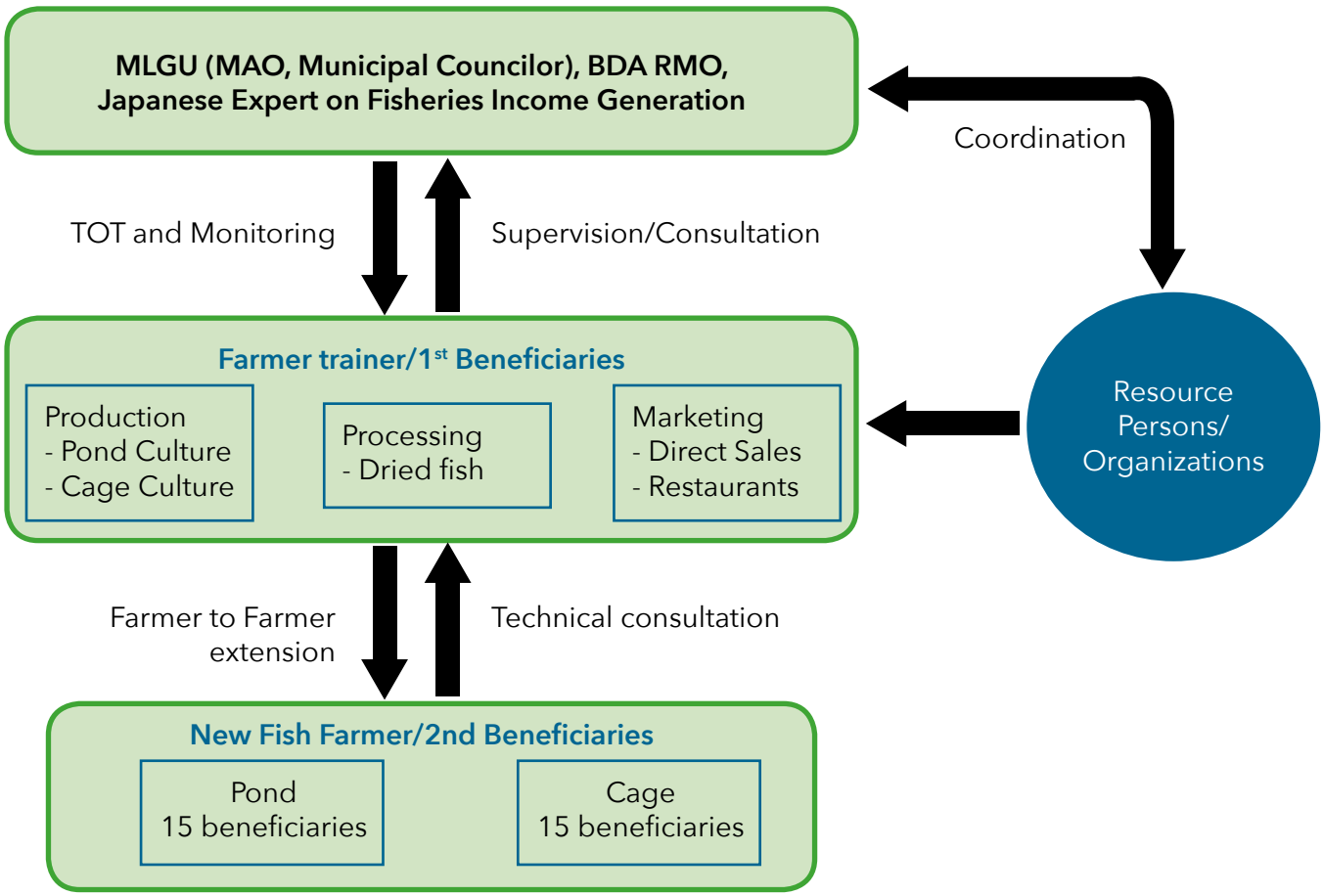


Figure 11.: Implementation mechanism of TOT and FTF

Distinctive roles/ responsibilities of stakeholders in the FTF:

a) BDA RMO: 1) RMOs especially RPOOs and COs shall closely monitor the project implementation. 2) Do the ground/leg work in the community as part of community organizing and carefully supervise FTF implementation. 3) RPOOs will share and provide technical know-how to FTs in coordination with RPs and LGUs. 4) Plan the FTF activities in coordination with Expert team, and will submit to CMO for review and approval. 5) Facilitators of activities, and shall resolve all issues and concerns, however if issues and concerns need attention of the top management, RMO will raise it to CMO.

b) LGU: 1) Monitor all the activities and outcome of the implementation and will feedback/report to the chief executive. 2) Coordinate/monitoring regular project updates.

c) Farmer Teacher (FT): 1) Call 1st beneficiaries that will relay learned/ acquired technical knowledge on tilapia production, processing and marketing to 2ndbeneficiaries, 2) Do planning of activities for FTF, together with BDA, RP and Expert team, 3) Utilizes basic manual on tilapia production, processing and marketing, as well as prepare simple visual aids in teaching to 2ndbeneficiaries.

d) Resource Person (RP): 1) Provides technical guidanceto FTs through TOT in close coordination with BDA, 2) Provide support to Farmer Teachers to make sure that Basic Manual on Tilapia Production, Processing and Marketing are understood and carried out, and 3) Provide technical support on tilapia culture upon the request by BDA.

e) 2nd beneficiaries: 1) Main technology receiver from 1st beneficiaries through farmer to farmer approach 2) Will consult 1st beneficiaries for technical advice, and shall provide labor counterparts in the project implementation of extension phase.

3.3. Steps in Conducting FTF in Fishery Sector

Table 4 shows the steps in conducting FTF extension activities in the fishery sector which starts from building the core training team who will plan for future conduct of FTF under the guidance of BDA in coordination with RPs and MLGU. The team is also tasked to prepare its own teaching materials which will be used during dry-run and actual conduct of FTF at field level.

Table 4. Inclusive activities of FTF in fishery sector

Topic	No. of days	Contents	Materials	Facilitator
1. Building core training team and plan for FTF	0.5	Strengthen training team and plan to implement the FTF		RP, BDA, FTs
2. Preparation of teaching materials	0.5	Preparation of simple teaching aid, and cage miniature	Manila paper, pentel pen, crayon, ruler, plastic tape, push pin, bamboo stick	BDA, FTs
3. Dry-run for FTF Training	1.0	Practice teaching and critiquing by RP and BDA	Prepared teaching aid, megaphone	BDA, FTs
4. Conduct of FTF	1.0	Conduct on-site lecture using local dialect utilizing prepared simple teaching aid, hands-on	Prepared teaching aid, megaphone, miniature, hands-on	FTs, BDA

3.3.2. Building Core Training Team and Planning

The Farmer Teachers, under the close supervision of BDA and the Resource Persons, and in collaboration with MLGU, do the planning on how to interact with 2nd beneficiaries. Field exposure of 2nd beneficiaries to pilot site for first-hand information should also be carried out to actually see image of fish pond and fish cage.

A good start for planning is to discuss with stakeholders involved and find out about Farmer Teachers' interest in testing the training approach.

BDA takes the lead in the planning of FTF. First to be discussed by the core training team is the preparation and modification of training materials previously prepared during TOT in order to fit the needs of 2nd beneficiaries. Issues on a limited number of FTs who could participate in the training has come out and need to be considered, therefore BDA may select the most qualified ones to deliver lectures while others are in charge of the hands-on training. Other problems which could be the difficulty in writing their own visual aids because they are no longer used to it, so BDA has to guide the Farmer Teachers to comply the given tasks.

The roles and responsibilities of FTs discussed during TOT shall be reiterated in the planning session to give emphasis and to recognize how big the roles of the FTS are to help fellow farmers. However, the most common roles discussed that they have to play are: training, mentoring, conducting demonstration, providing technical guidance and sometimes serving as liaison between other farmers and BDA. Table 5 shows activities undertaken during FTF activities.

Table 5. Activities undertaken during preparation of the FTF in Sultan Mastura Maguindanao

Major activities	Contents	Issues	Action taken
Preparation of training materials (visual aids, miniature, manual)	Prepare visual aids using local materials	- Limited number of FTs allowed by project - Difficulties in writing visual aids	- BDA selected most qualified FTs to deliver the lectures, while others are selected for hands-on based on current capacity - BDA led to prepare the visual aid based on their stored knowledge - Writing their own visual have boosted their confidence to present their work compared to ready made
Dry-run in delivery of topics	Attended by RPs, BDA, LGU, Fishery expert team, FTs	- Capacitated FT's explained topics according to his learning and skills, but RPOO insisted to follow what was written in the presentation. - Some FTs are not well prepared - Some FTs could not expressed well the topics assigned Some FTs explaining away from assigned topic	- RPs provided common suggestion to resolve the issue for both RPOO and - FT's. Likewise, BDA provided continuous guidance and reminders to be prepared always. - BDA encouraged them that they should have confident because they are the main in this FTF, to speak and share what they have learned. - BDA reminded to give focus in giving explanation to the topic
Critiquing after dry-run	Critiquing by BDA and RPs	- FTs explained too much on the topics. - Giving unfriendly critiques - Low voice tone of some - FTs they could not be heard and understood by listeners	BDA and RPs recommended to summarize the explanation within allotted time. RPs further explained giving critiques within topic scope BDA advised to raise volume of their voice in order to be heard from the backseat

3.3.2. Preparation of teaching materials

BDA guides the FTs in making their own teaching materials utilizing the ones prepared using the basic manual as reference during TOT. FTs review the selected topics assisted by BDA and RPs and rewrite the topics on a manila paper according to FTs' current capacity and stored knowledge about the topics. BDA and RPs are always on their side mentoring and providing guidance. Most common errors by FTs in the preparation of teaching materials are writing too many irrelevant words, small fonts, and unorganized visual aids. Hence, BDA is always there to guide, giving comments and advices to revise the materials because this is a tool for effective communication to 2nd beneficiaries during FTF.

Figure 12. Writing of visual aid by FT from Matungao, Lanao del Norte

3.3.3. Dry-run for FTF Training

Before the trained FTs start training other farmers, a dry-run should be held for the FTs to have a feel of how it is to lecture, using the teaching aids they have prepared.

One by one, FTs present their own topic in front of BDA, RPs and some community member as learners. FTs explain topics according to his learning and skills; for example, there are instances that FTs talk too much out of context so BDA advises to just follow what was written in the visual aid as the guide to keep the lecture on tract. Some FTs may not be able to express well the topic being discussed; therefore, continuous guidance and motivation to boost farmers' confidence is required because they are the main actors during FTF to speak and share what they have learned about tilapia farming. Lastly, everybody should have focus to deliver the topic with ease and confidence.

Use of local dialect is encouraged as a medium of communication except technical terms which have to be explained further so that the farmer easily understands.

Figure 13. BDA providing guidance during dry-run for FTF training

3.3.4. Implementation of FTF Activities

The first step in implementation is to explain the objectives of the activity before the start of any activities in the field. Through this practice, the farmer-participants will understand what to do, what it is that they will accomplish, how they will do it, and when it will be accomplished. After giving instructions, FTs immediately implement by demonstrating thereafter to the trainees. This approach was found efficient in absolute transfer of technology at farmer's level during the implementation of the CD-CAAM project.

The Fishery sector promotes the utilization of local materials, and strives to keep the technologies simple, practical and inexpensive as much as possible for higher replicability and sustainability. Therefore, FTs must be presented in the simplest possible manner its respective topics under the technical supervision of BDA.

The project provides FTs with daily allowances based on their individual days of engagement to compensate for their efforts. FTs work well even without compensation but this approach has to be observed to boost their morale and motivate them to perform even better.

Figure 14. Sample hands-on FTF extension activities

FT (Mr. Kambak Batao) demonstrates soil blocking during pond construction Brgy. Balut, Sultan Mastura, Maguindanao

FT (Datu Akmad Labungan) demonstrates proper technique of tying bamboo cage frame with monofilament nylon at Brgy. Tapayan, hm, Sultan Mastura, Maguindanao

NOTE TO THE TRAINERS

- *To maintain and further improve the capacities of the Farmer-Teachers, they should undergo periodic training in both technical aspects (e.g. tilapia farming, processing, and marketing) and continue to develop communication skills. BDA in collaboration with MLGU should also capacitate FTs on how to access essential information from agencies by themselves; likewise, communication and consultation should be open amongst project players and FTs.*

3.3.5. Costs in conducting FTF Extension

The main costs in implementing Farmer to Farmer extension activities under CD-CAAM are:

(1) Training of Trainers (TOT) for 3 days which includes costs for food, transportation, accommodation, training materials and RPs' Professional Fees.

(2) Farmer to Farmer (FTF) extension activities conducted for about 41 days at field level which includes FTs' allowance, training materials, and food allowance for 2nd beneficiaries, BDA and MLGU.

3.3.6. Outcome of FTF

The outcome of the TOT and FTF is manifested in BDA's extension program on fishery sector which utilizes Farmer trainers to provide lectures and hands-on training to interested communities in Brgy. Katipunan, Carmen, South Cotabato. Another case was the FTs' engagement as local technical consultants by fish farmers in SitioPahm, Brgy. Tambu, Sultan Mastura. Not only have the Farmer Teachersprovided technical guidance but they also provided fingerlings produced in own hatchery.

Figure 15. Photos of FTs Assisting sites in Carmen, North Cotabato and Sitio Pahm, Sultan Mastura

FT (Mr. Esmael Panansaran) teaches tilapia farmers in Carmen, North Cotabato on installation of hapa net

FT (Mr. Tinga Panansaran) teaches tilapia farmer in SitioPahm, Sultan Mastura on feeding and water management

IV. Trainings Management

4.1. Logistics arrangements for Training

Apart from being mindful of the contents, methodology to be used and the process, the Trainer should not forget the logistical aspect of the training. Although this is not the core objective of the activity, but, it is a crucial part of the training program. Therefore, the trainer needs to carefully consider the organization of training activities, no matter how big or small they are. One has to consider that the venue should be conducive for learning and it has to be properly coordinated among stakeholders for a smooth and efficient implementation.

4.1.1. Before the training program

(a) Organize training staff, materials required, resource persons, participants and financial matters. On the process of planning, resource persons and participants' attendance shall be confirmed.

(b) Ensure to arrange venue and facilities in such a way that the place be guaranteed as conducive to learning. If there are no available training centers, training staff has to look for facilities with support system which is at least away from noise and disturbances during training.

(c) The date and time should be decided upon and announced earlier at least a week before the activities. Participants on the other hand should familiarize or clarify the venue ahead of time.

(d) Pamphlet, modules, or any learning materials prepared may be distributed prior to the training.

4.1.2. During the training program

Based on the experience in CD-CAAM, logistics arrangement has to be handled properly; otherwise, it would create negative impact at the start of the activities. Once it is being taken care of it builds inclusivity in the learning program.

Below are the things which need to be carefully considered during the training program:

(a) It is important to be mindful of gender upon arrangement of accommodation for the trainees and other participants.

(b) Preparation for food is very important. It should be according to religious belief especially if the trainees are Muslims.

(c) There should be a standby vehicle in case of any accidents, and first aid kit should likewise be available.

4.2. Evaluation of Training

The effective transfer of technology of FTs to 2nd beneficiaries through Farmer to Farmer activities is the main point evaluated in this project.

Like other programs, the FTF extension program in fishery sector is evaluated based on effectiveness of technology transfer based on combine lecture and hands-on to 2nd beneficiaries adopting technical subject in tilapia farming activities. Basic evaluation is conducted to assess effectiveness of FTs in delivering lecture and hands-on during FTF, and the actual result/ impact to 2nd beneficiaries of the technology taught and shared by FTs.

Evaluation and assessment is an essential tool to guide and help FTs to improve their skill by knowing their strengths and weaknesses. Likewise, on the part of implementers they could determine whether or not further capacity building is needed.

The training program is evaluated on the level of effectiveness of the contents of the training such as methodology applied, duration of training program, and logistical supports which is conducted at the end of the activities utilizing questionnaires and observations/feedbacks (Annex 3). There are two (2) essential techniques being applied in the evaluation such as questionnaires, and through observation/feedbacks. The first technique is a series of simple questions prepared in order to rate the level of achievement of the FTs from the training conducted, while the latter is useful in gathering essential information about individual performance, group participation and interaction and organizational culture[2].

[2] *Training of Trainers (ToT) Manual. Ministry of Rural Rehabilitation and Development (MRRD). Islamic Republic of Afghanistan*

Furthermore, it is important to conduct evaluation after the program is over in order to analyze the impact on the FTs whether learning and changes has been actually achieved. Likewise, evaluation on the 2nd beneficiaries will be conducted to measure their technical achievement level as well as teaching efficiency and the level of improvement of the FTs (see Annex 4. Self-evaluation survey of 2nd beneficiaries).

Utilizing FTs in extension can be helpful especially in areas where government assistance is limited. It can complement if not substitute the extension workers of the government: therefore, it is important to consider time in implementing FTF as well as to determine which areas they are good at in terms of technical transfer or which farmer sectors they could perform well. Hence, there should be follow-up activities in case FTF be fully utilized by partners in the future.

Appendix 1. Sample Training Schedule for TOT

A. ToT for Sultan Mastura 1st beneficiaries

Day / Time	Activities	Remarks and Responsible Persons
Day 1		
7:00 AM - 10:00 AM	Travel Time	BDA, 1st Beneficiaries
	Registration	BDA, Resource persons, IC Net
	Opening Ceremonies	
	Words of wisdom	
	Welcome address	
	Introduction of participants	
10:00AM – 11:00AM	Signing of Memorandum of Partnership Agreement between BDA and MSUM [snacks]	BDA, Resource persons, IC Net
11:00AM – 11:30AM	1) Training of Trainers (Introduction) • Concept and meaning of ToT • Objectives of ToT • Expected benefits of ToT • Training manual (income generating Activities (guidelines)	Resource persons
11:30AM – 12:00NN	2) The trainer and his/her roles • Understanding the roles of farmer trainers	BDA
12:00NN – 1:00PM	[Lunch break/Prayer]	
12:00NN – 1:00PM	3) ToT Teaching Method • Facilitation skill • Presentation skill • How to prepare simple training materials and visual aid	Resource persons
	4) Review lecture of tilapia production technology	
2:00PM – 2:30PM	4.1 Biology/ General • Introduction to aquaculture • Biology and taxonomy of tilapia	Resource persons

Day / Time	Activities	Remarks and Responsible Persons
2:00PM – 2:30PM	4.1 Biology/ General • Topography • Soil texture • Water source • Flood/ disaster • Security • Road access	Resource persons
2:00PM – 2:30PM	[Snacks/prayer]	
2:00PM – 2:30PM	4.3 Pond/ cage construction • Water holding capacity • Inlet/outlet • Pond design • Cage design • Soil excavation/ manual digging	Resource persons
4:30PM - 5:30PM	4.4 Grow-out operation • Pond/ cage preparation • Stocking • Water management • Feeding • Fertilization – Integrated fish farming • Backyard pond/ No feeding	Resource persons
Day 2		
10:00AM – 11:00AM	4.5 Harvest and Transport	Resource persons , BDA
10:00AM – 11:00AM	4.6 Community-based Seed production • Seed source • Seed production • Selective breeding • Harvest and transport of fingerlings/fry • Nursery: mono-sex culture/hand sorting to select male	Resource persons
10:00AM – 11:00AM	4.7 Record keeping (Simple) • Grow-out • Seed production • Marketing/ sale	Resource persons, BDA
10:00AM – 11:00AM	Practicum • Sex Identification (male & female tilapia)	Resource persons, BDA

Day / Time	Activities	Remarks and Responsible Persons
2:00PM – 2:30PM	4.8 Evaluation of Training • Questionnaire • Practical	Resource persons
1:00PM – 5:00PM	Practical/ Participatory • Water management • Feed management • Pond/ cage preparation • Record keeping	Resource persons , BDA (university fish farm/ hatchery facilities)
5:00PM – 5:30PM	Topic selection by TOT participants	BDA, Farmer trainers
Day 3	Practice teaching by Farmer Trainers	
1:00PM – 5:00PM	• Team 1 • Team 2 • Team 3 • Team 4 [snacks]	Resource persons, BDA, Farmer trainers
2:00PM – 2:30PM	Evaluation of Training • Questionnaire • Practicum	Resource persons
10:00AM – 11:00AM	[Lunch/prayer]	
2:00PM – 2:30PM	Closing programt • Messages • Distribution of certificates	Resource persons, BDA, Farmer trainers, ICNet
3:00PM – 5:00PM	Travel time	Farmer trainers

Appendix 2. Presentation Materials for Training of Trainers

Annex 2-2. Examples of Powerpoint Presentations used in the TOT

TRAINING OF TRAINORS (TOT)

- Concept and Meaning
  - Teaching is key to learning
  - Train the trainer is a learning technique that teaches students to be teachers themselves
- Relation to lectures that will follow

OBJECTIVES OF TOT

- To develop a pool of experts in the ARMM that will facilitate the transfer of their expertise to the people in that area.
- To provide the people in the ARMM the opportunity for economic development and self sufficiency

EXPECTED BENEFITS OF TOT

1. Knowledge Retention. People tend to pay attention in class when they know that next time they'll be the instructor.

2. Learning by Teaching. To teach is to learn twice over. (Joseph Joubert)
Teaching a topic is the best way to reinforce your knowledge. By encouraging your staff to teach, you encourage them to become experts.

3. Creating Leaders. When you teach, it builds your leadership skills.

4. Cost Reduction. All training can be expensive. By using some beneficiaries themselves as instructors training expenditures are reduced.

5. Training Follow Up. When trainers are some member-beneficiaries themselves there are increased opportunities for follow ups

6. Social Reinforcement. There's evidence to suggest that people are more likely to retain knowledge when they know the teacher.

7. Skill Retention. By building a culture of teaching you can achieve a greater depth of skill retention for your organization.

TRAINING MANUAL

RESOURCES:

- **Facilitator Manual**: contains all of training information, including preparation and material lists, step-by-step instructions for leading training sessions, pre- and post-tests, and all content from the Participant Handbook.
- **Participant Handbook**: contains all of the training contents that participants are trained on (text and illustrations) and also any case studies, scenarios, small group discussion questions, or role plays needed for training sessions. Participants use the handbook during training sessions and afterwards for review.

THE TRAINER'S ROLE

• A POSITION OF POWER

When you become a trainer, you receive a position of authority. Part of this can be:

- Defining the trainee's tasks
- Assigning tasks to trainees
- Taking tasks from a trainee
- Assigning and distributing tasks between several trainees
- Making judgments relevant for the trainee's future

• RESPONSIBILITIES

- He/she is a mediator
- Ensures professional progress and the well-being of the trainees.
- Prevents:
  - Discrimination of any kind
  - Bullying and/or sexual harassment
  - Abuse of alcohol, medicine or any other substance
  - Physical dangers (accidents etc.)
  - Overstepping the apprentice's physical capacity
  - Infringement of rights of participants and violation of regulations neither by you nor by the trainee.

• IN BETWEEN

Discusses with the management the following ideas:

- Which information must be told to management?
- What is confidential between the trainer and the trainee? (For the trainee, the trainer is a confidant)
- What is confidential between the trainer and the management?

• MENTOR/COACH

- In your relationship to the trainee, you play different roles - instructor, mentor and coach.
- Depending on the role you choose, you can:
  - Support the trainee
  - Inspire the trainee
  - Motivate the trainee
  - Challenge the trainee

*****This is decisive for what the trainee will gain from your training***.**

• EVALUATOR

This is a four step model for evaluating trainee's skills:

1. Beginner
2. Experienced
3. Advanced
4. Expert

- In consultations with the trainee, you can use the categories from the four step model to give feedback about his/her progress (or lack thereof).
- The trainee's performance should be evaluated regularly, if the trainee is to get a sense of his/her learning and progress.
- Evaluation also helps to teach the trainee the standards of quality that apply to the specific area.

- TECHNICAL TRAINER
- There can be work processes where technical training is necessary.
- To decide whether training be in a specific way, the following questions can be considered:
  - Is the work normally done too quickly or the use of manuals impossible?
  - Is the work process complicated?
  - Is there a need for extensive demonstration or explanations before the task?
  - Is great accuracy necessary due to serious consequences?
  - Does the process involve many choices and/or decisions?

TOT TEACHING METHOD

METHODS OF TRAINING
(Adult learners-facilitation)

- Lecture
- Lecture/discussion
- Skill lesson
- On-the-job training

- SELECTING THE RIGHT METHOD
- Questions to consider in selecting method and presenting your material.
  - What is the ability and level of knowledge of the group?
  - How many trainees are in the group?
  - How much time is allotted?

- Continuation..selecting
- What training aids are required?
- Do you have the experience to use these aids with confidence?
- Are you aware of the limitations of aids?
- All resources within your command must be used to enhance your facilitation to the benefit of the trainees

DELIVERY (PRESENTATION)

- ESSENTIALS OF GOOD DELIVERY:
  - Utterance of words must be clear
  - Must be spoken at a suitable pace
  - Pauses should occur at logical occasions
  - Variety should be used: emphasizing important points in a deliberate manner, connecting parts and using illustrations in a conversational way

PREPARATION AND LECTURE NOTES

- **Preparation is important.** The lecturer's notes should facilitate efficient delivery. Distinction is needed between lecture outlines (showing substance only) and lecture notes (showing substance and method).
- **Notes too brief/ extensive?**. The lecturers must improvise to make his notes neither brief nor extensive. If brief, may miss important information, if extensive, tendency is to read.

GIVEN AN OUTLINE OF THE MATERIAL, PREPARE THE NOTES BY ASKING THESE QUESTIONS:

- What should everyone learn at the end?
- Is it safe to assume that the listeners know?
- What are they likely to find difficult?
- What will require special care or illustration?
- What illustrations to use to enhance learning?
- What demonstrations will be appropriate?
- What new terms that need to be explained.

STRUCTURE

- **INTRODUCTION:**
  - Statement of aims
  - Relation of this lecture to those that came before and are to follow
  - Establishment of goals (purpose and direction) by linking with participant needs
  - Outline of thoughts that are to be developed

Body of lecture:

- Step-by-step building up of subject matter
- Logical development
- A few well-developed steps, strongly made are more effective than many steps)
- Appropriate use of aids and questions to stimulate trainee's interest and activity
- Appropriately spaced summaries of material covered

CONCLUSION

- Summary of lecture
- Restatement of the relationship of this lecture to others in the series
- Reference to additional material that should be read or seen

TRAINING AIDS?: WHY USE?

·**All learning is through the senses**. 97 percent of learning is achieved through simultaneous appeal to the eye and ear

• **Effective use of audiovisual aids can be included in any sort of presentation**. Charts, slides, videos, overhead transparencies and films can be used to add interest as well as supplement verbal explanations.

Continuation..why aids?

- Proper use of instructional aids saves time, adds interest, helps trainees learn and makes your job easier.
- Trainers should use training aids to supplement their training rather than to replace all or part of it.

CLASSIFICATION OF INSTRUCTIONAL AIDS

- **Projective**
  - Videos
  - Color slides
  - Overhead projector transparencies
- **Non-projective**
  - Chalkboard
  - Whiteboard
  - Charts and diagrams
  - Models
  - Exhibits
  - Handouts
  - Tape recorder

- **SELECTION OF AIDS: Factors**
  - Practicability
  - Attractiveness and interest
  - Suitability
  - Clarity
  - Portability
  - Serviceability
  - Availability
  - Location
  - Time factor

TIPS IN PRESENTATION OF YOUR VISUALS

- Make your visuals visible
- Use color for headings
- Make them simple; eliminate details
- Ensure the key feature occupies a prominent part of the screen or display
- Minimize reflection

Continuation..tips

- Show all the key points (oral presentations sell the key points through the ears; visual presentations sell the key points through the eyes)

Whatever instructional aid(s) you choose to use as a trainer, it is important to remember practise....practise....practise*

- **PREPARATION**
  - Plan carefully the use of instructional aids
  - Make sure that the aids can be seen clearly from all areas of the room
  - If you write, write clearly
  - Use color for emphasis

AND MOST IMPORTANTLY:

LOOK HANDSOME AND BE ENTERTAINING

DAGHANG KAAYONG SALAMAT!!

Appendix 2-2. The Trainer and his/her Roles

1) A position of power

When you become a trainer, you receive a position of authority. Part of this can be ; a) defining the trainee's tasks, b) assigning tasks to other trainees, c) taking tasks from a trainee, d) assigning and distributing tasks between several trainees, and e) making judgments relevant to the trainee's future.

2) Responsibilities

The trainer is a mediator to ensure professional progress and the well-being of the trainees. As a trainer, you must prevent the following; a) discrimination of any kind, b) bullying and/or sexual harassment, c) abuse of alcohol, medicine or any other substance, d) physical dangers (accidents etc.) , e) overstepping the apprentice's physical capacity, and f) infringement of rights of participants and violation of regulations neither by you nor by the trainee.

3) Mentor/coach

In your relationship with the trainee, you have to play different roles like instructor, and mentor and coach. As a trainer, you can: a) support the trainee b) Inspire the trainee, c) motivate the trainee, and d) challenge the trainee.

The trainer can also be an evaluator for what the trainee will gain from your training. The Four-step Model can be used in evaluating trainee's skills in consultations with the trainees. You can use the categories (Beginner, Experienced, Advanced, and Expert) from the four step model to give feedback about the trainee's progress (or lack thereof). The trainee's performance should be evaluated regularly, if the trainee is to get a sense of his/her learning and progress. Evaluation also helps to teach the trainee the standards of quality that apply to the specific area.

4) Technical trainer

There can be work processes where technical training is necessary to decide whether training be in a specific way or not, so the following questions can be considered:

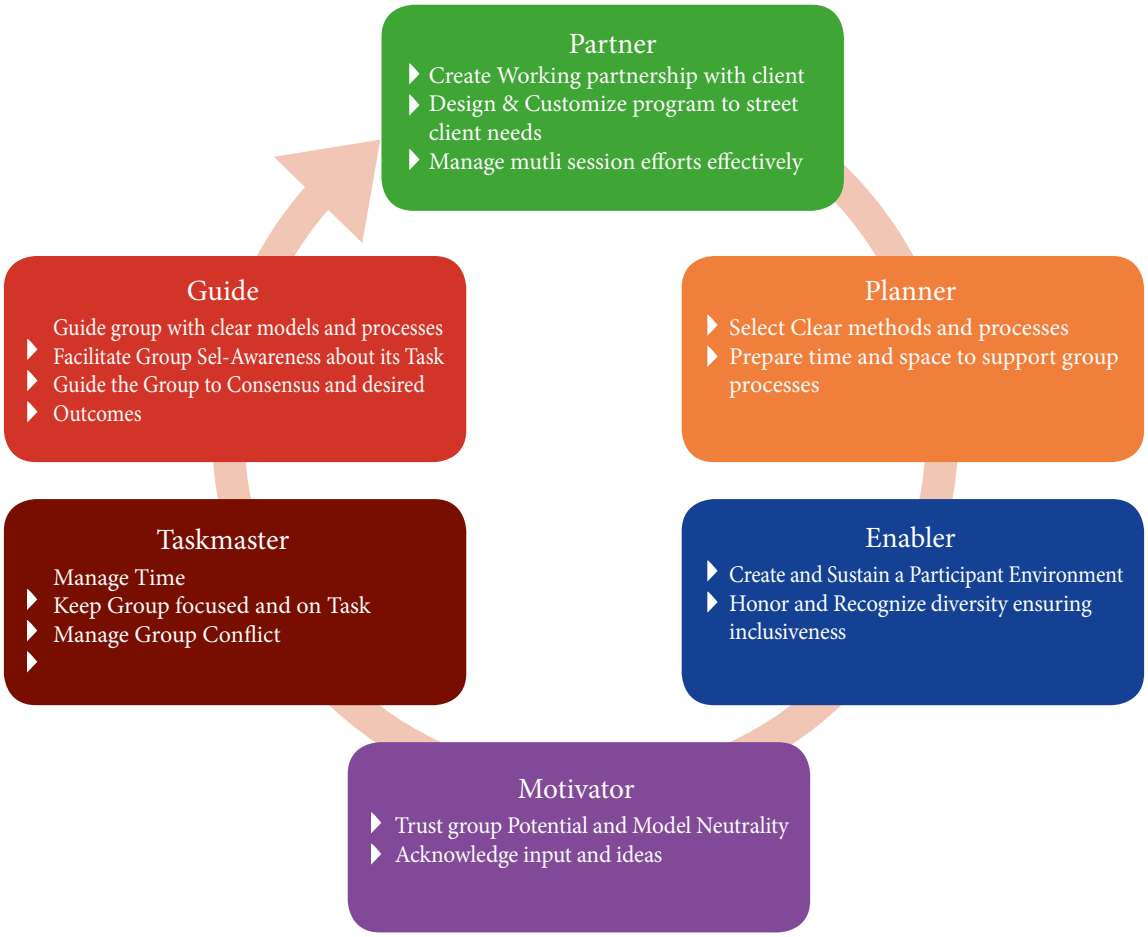
(a) Is the work normally done too quickly or the use of manuals impossible?
(b) Is the work process complicated?
(c) Is there a need for extensive demonstration or explanations before the task?
(d) Is great accuracy necessary due to serious consequences?
(e) Does the process involve many choices and/or decisions?

Appendix 2-3. Facilitation Skills

1) The Many Roles of a Facilitator

A facilitator guides people in defining the objective as well as in guiding an event through a successful conclusion. As a facilitator, he/she helps a group of people understand their common objectives and assists them on planning how to achieve these objectives. In doing so, the facilitator remains neutral, which means he/she does not take a particular position in the discussion.

Figure 1.: The Many Roles of a Facilitator



2) Basic Roles and Responsibilities

What are the facilitator's basic roles and responsibilities?

1. Arriving early
   Be at the venue at least an hour before the start of activity to prepare materials and equipment

2. Preparing Self
   Take at least 15 minutes to prepare yourself physically and mentally before the start of the activity.

3. Maintaining Focus
   Keep the participants on track with the information or task at hand

4. Enhancing Participation
Encourage all participants to engage in the learning process

5. Maintaining the Environment
Create and maintain a safe, positive learning environment

6. Being Neutral
Treat all contributions from participants fairly and equally; ensure participants are not favored or ignored and the that the information they have presented is correct

7. Offering Encouragement
Encourage participants to actively participate in the activities and contribute during the discussions

3) Facilitation Techniques

Good facilitation techniques should:

- Help the participants to be comfortable with each other
- Create a fun and interesting learning environment
- Boost the energy levels of workshop participants
- Organize interesting and productive group work activities

4) Characteristics of a Good Facilitator

What makes a good facilitator? Recall from your own experience examples of the good, the bad, and the great. There are many different characteristics of a good facilitator, and some include:

- being well prepared for each class
- clearly explaining the objectives of the course
- presenting material in an interesting way
- ensuring content is relevant
- having a thorough knowledge of the subject
- giving clear explanations
- acknowledging participants when they contribute to the discussions
- stressing important points in lectures/discussions
- being enthusiastic, friendly, flexible
- being able to handle unexpected questions
- treating participants with respect
- encouraging constructive criticism
- supporting a lot of classroom discussion
- managing and using time well

Appendix 2-4 Presentation Skills

Delivery and presentation skills are the skills necessary in delivering effective presentations to a variety of audiences. It covers a variety of areas such as:

(1) Utterance of words must be clear

(2) Words must be spoken at suitable pace

(3) Pauses should occur at logical occasion

(4) Emphasizing important points must be in a deliberate manner, connecting parts and using illustrations in a conversational way.

(5) Local language/ dialect must be used.

(6) Whatever instructional aid/s you choose to use as a trainer, it important to remember: Practice…Practice…Practice.

Preparing for a presentation is the most important part in having a successful presentation. Here are some tips in giving a presentation:

- Know your audience

  The core message may be about the same for everyone but knowing your audience will allow you to slant the information so that the audience feels it was prepared just for them

- Aim to give a clear, well-structured delivery

  No matter if the occasion is formal or informal, you should know exactly what to say and the order in which you want to say it. Clarity of ideas and good organization should result in a lively, logical and compelling message.

- Responding to questions

  No matter if the occasion is formal or informal, you should know exactly what to say and the order in which you want to say it. Clarity of ideas and good organization should result in a lively, logical and compelling message.

- Apply the Lighthouse Technique

  1. Sweep the audience with your eyes, staying only 2-3 seconds per person;

  2. Give participants the impression that you are speaking to them personally; and

  3. Avoid looking at and zeroing in one (friendly-looking) participant or at a fixed (non-threatening) point on the wall or floor

(1) Methods of Presentation

1) Lecture/ discussion

a) ***Illustrative Lecture*:** The lecturers should illustratively discuss the topics and presented in Power point presentations (if available) to the farmer trainers, for this is very useful in improving the learnings of the participants while listening.

b) Interactive Talk: The lecturer in this way should try asking questions to the participants and should practically answers question from the facilitators. This is sharing of experiences during the implementation pilot project in Fishery Sector.

2) On-the-Job Training: As part of review, field practicum should be introduced to apply the learning through seeing, doing, and thinking, as adult learners prefer to actually do the job rather than stay in the classroom for a long time.

3) ***Selecting the right method:*** There are questions to be considered in selecting the right method and presenting the material as follows:

(1) What is the ability and level of knowledge of the group?

(2) How many trainees are in a group?

(3) How much time allotted?

(4) What training aids are required?

(5) Do you have the experience to use these teaching aid with confidence?

(6) Do you are of the limitation of teaching aids?

(7) Are all resources within your command must be used to enhance your facilitation to the benefit of the trainees?

Appendix 3. Farmer Teachers Evaluation Sheets

Appendix 3.a. Evaluation Form on Level of Achievement of Farmer Teacher

(Conducted every after training/ activities by beneficiaries)

Date of training:
Title of training:
Location:
Name of Farmer Trainer (FT):

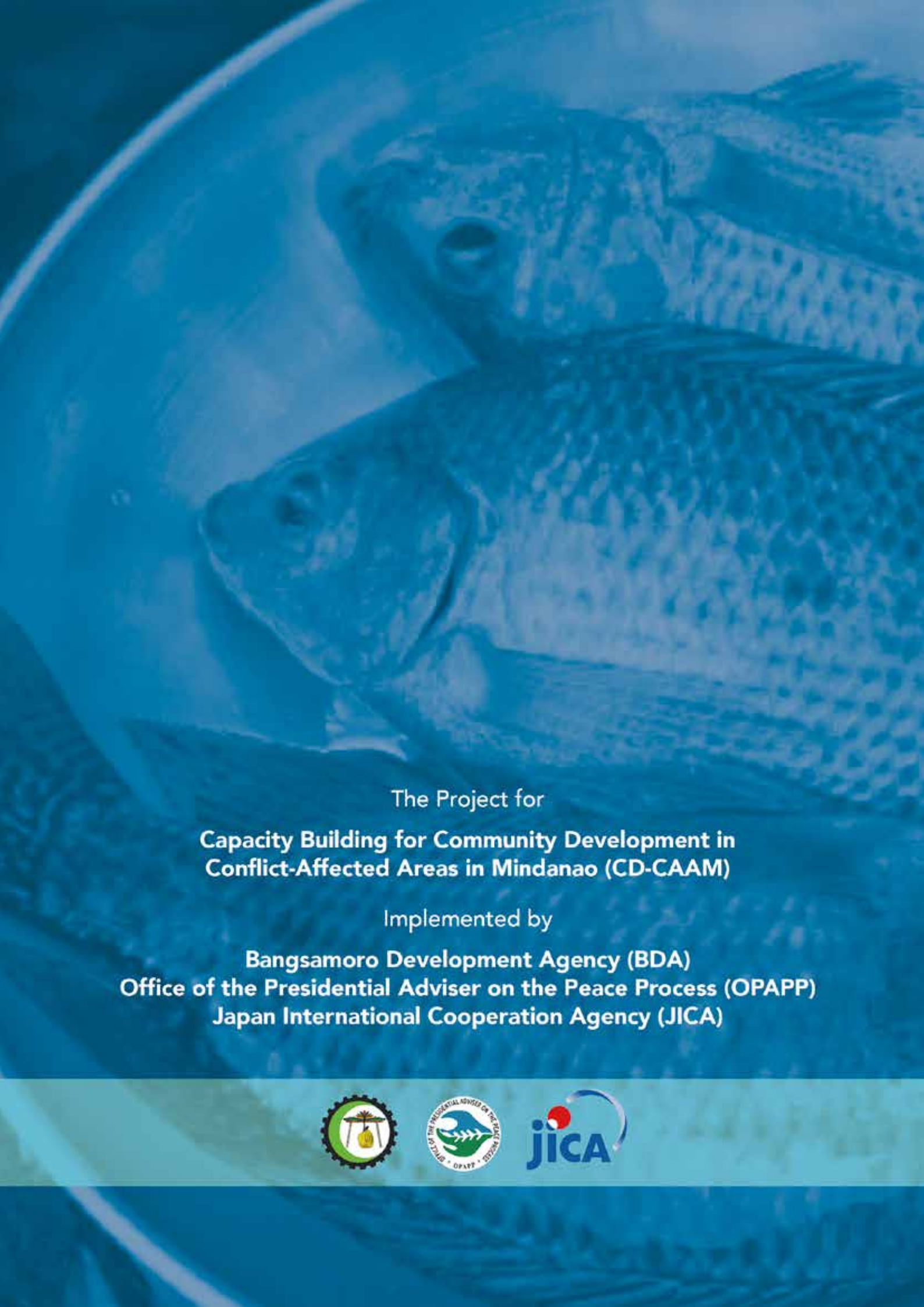
Please rate your level of agreement on whatever the learning outcomes for the training were attained.

Major Items for Evaluation	Best	Better	Good	Needs Improvement
Preparation of visual aids/ training materials				
Usefulness of Information presented for Fish Farming				
Farmer trainer presentation skill				
Farmer trainer delivery method				

Please give your additional comments:

Appendix 3.b. Self-Evaluation Survey for 2nd Beneficiaries

Technical Subject	Technical Achievement Level				Average Achievement Score
	A: We can practice by ourselves	B: We can practice with guidance	C: We have only basic skills	D: We have no skills	
Pond/ Cage Construction					
Fingerlings Transport and Stocking					
Conduct of Sampling					
Feeding Management					
Harvesting					
Processing of dried fish					
Marketing					
Tilapia breeding					



The Project for

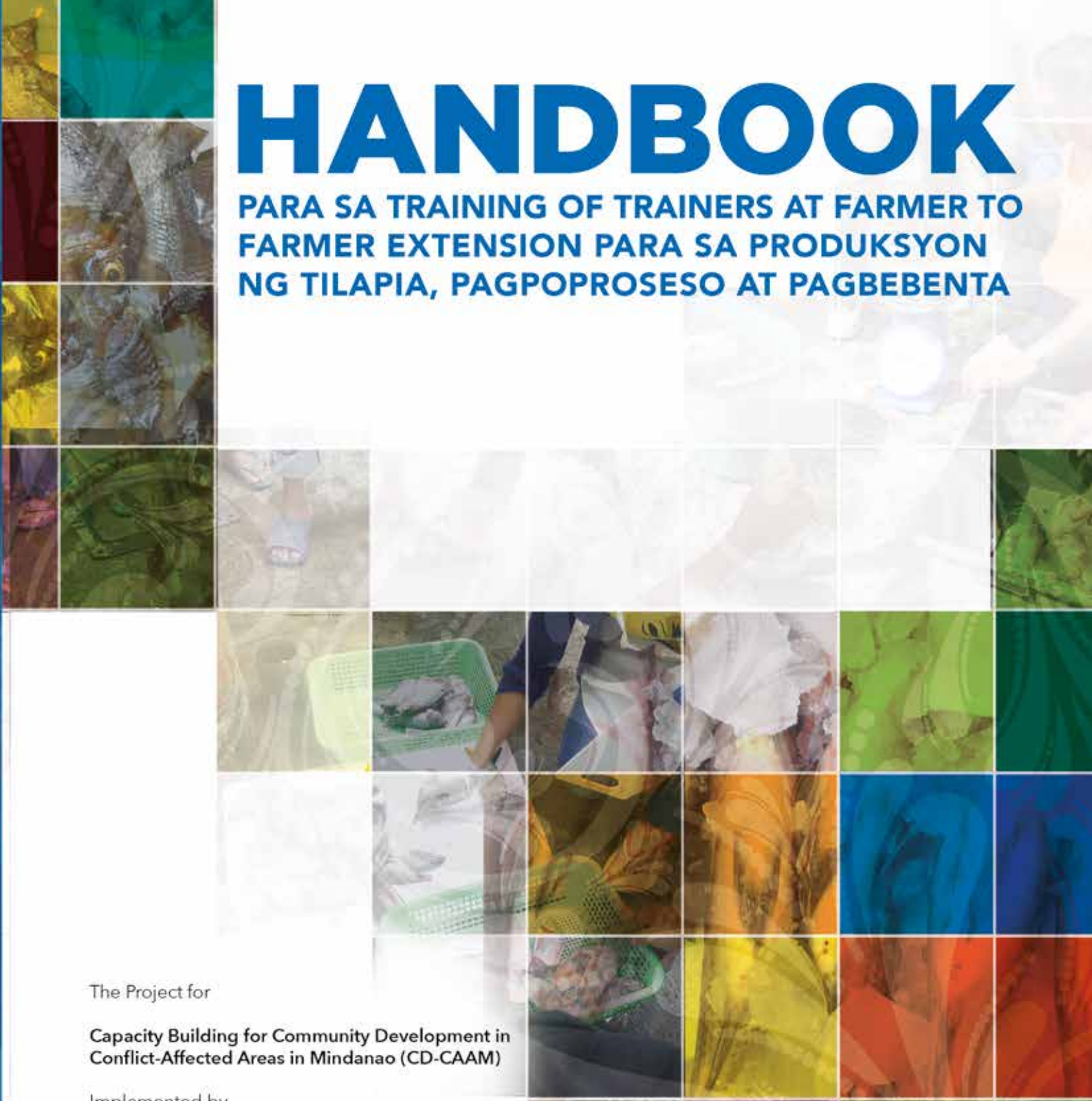
Capacity Building for Community Development in Conflict-Affected Areas in Mindanao (CD-CAAM)

Implemented by

Bangsamoro Development Agency (BDA)
Office of the Presidential Adviser on the Peace Process (OPAPP)
Japan International Cooperation Agency (JICA)

HANDBOOK

PARA SA TRAINING OF TRAINERS AT FARMER TO FARMER EXTENSION PARA SA PRODUKSYON NG TILAPIA, PAGPOPROSESO AT PAGBEBENTA



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Paunang Salita

Itong Handbook para Training of Trainers at Farmer to Farmer Extension para sa Produksyon, Pagpoproseso at Pagbebenta ng Tilapia ay binuo sa The Project for Capacity Building for Community Development in Conflict-Affected Areas in Mindanao (CD-CAAM) ng Japan International Cooperation Agency (JICA) katuwang ng Bangsamoro Development Agency (BDA). Sultan Mastura, Maguindanao at Matungao, Lanao del Norte, Mindanao, Philippines.

Ang handbook na ito ay dinesenyo para sa gamit ng mga magsasaka, mga extension workers, at mga NGOs na ninanais magtanghal ng Training of Trainers para makatulong ang mga potensiyal na mga mangingisda na maging extension workers at upang maisagawa ang paglipat ng teknolohiya sa mas marami pang tao lalo na sa mga lugar na di gaanong naaabot ng mga bagong teknolohiya sa paglilinang ng isda.

Ang project team ay lubos na nagpapasalamat sa tulong teknikal ng mga professors at mga mananaliksik sa Mindanao State University sa Maguindanao at sa Naawan, at sa mga tauhan ng Bangsamoro Development Agency Central Management Office at Regional Management Office para sa kanilang kontribusyon sa pagpangasiwa sa TOT at FTF kasama ng JICA Expert Team.

Dagdag pa dito, nagpapasalamat din sa Municipal Local Government ng Sultan Mastura and Matungao para sa kanilang buong pagsuporta sa mga ginanap na aktibidad at sa gabay at pagganyak sa mga benepisyaryo para sa maayos na pagsasakatuparan ng proyekto.

July 2016
Fishery Sector
CD-CAAM Project

Talaan ng mga Nilalaman

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Appendix 1. Halimbawa ng Training Schedule para sa TOT

Appendix 2. Mga Presentation Materials para sa Training of Trainers

Appendix 3. Farmer Trainers Evaluation Sheets

Paano gamitin itong handbook

Ang handbook na ito ay ginawa para matulungan ang mga farmer trainers sa fishery sector na may pangunahing kaalaman sa proseso ng pagsasagawa ng Farmer-to-Farmer training. Ang paglilipat ng kaalaman sa antas ng mga magsasaka ang pangunahing tinututukan ng handbook sa pamamagitan ng pagbibigay ng mga kasanayan sa paggawa (skills training) sa iba pang magsasaka. Kailangan ng mga lokal na trainers na mga fish farmers na isagawa ang proseso sa paghubog ng kakayahan para epektibong mailipat ang pangunahing teknolohiya sa iba pang magsasaka. Dahil dito, mahalagang hubugin ang mga farmer trainers sa pagkalat ng mabuting gawa sa aquaculture na gumagamit ng pangunahing gabay na nabuo noong pilot phase.

Ang handbook ay ginawa para gamitin ng mga fish farmers, extension workers, managers, at mga NGO na nais magsagawa ng training of trainers' para magamit ang mga magsasakang may kakayanan bilang 'extensionist' para maisagawa ang pagkalat ng teknolohiya sa mas malawak na populasyon lalung lalo na sa mga lugar na kung saan mahirap marating ng teknolohiya.

Tutulong ang handbook na ito

- Na dagdagan ang mga kaalaman ng mga fish farmers, extension workers, managers, Local Government Units, at NGO tungkol sa training of trainers at farmer to farmer extension approach;
- Sa mga tauhan ng BDA sa kanilang pagturo sa mga magsasaka sa paglalahad ng kanilang nalalaman sa iba;
- Sa mga planners at administrators na naglalayong makikipagtulungan sa isa't isa sa mga proyekto na magbubuo ng mga farmer trainers ukol sa pag –unlad ng pamayanan.

Itong handbook ay nahahati sa apat na pangunahing bahagi: (1) Panimula; (2) Pagsasagawa ng Training of Trainers (TOT), (3) Pagsasagawa ng mga aktibidad ng Farmer-to-Farmer Extension (FTF), at ang (4) Pangangasiwa ng mga Training. Pinag –uusapan sa unang bahagi ang kung paano napakilala ang paglilinang ng tilapia dito sa Pilipinas at kung ano ang naiambag nito sa seguridad sa pagkain at ekonomiya. Tinatalakay ng ikalawang bahagi ang tungkol sa TOT at nagbibigay ng batayan sa mga layunin,

nilalaman, at metodolohiya sa pagsasagawa ng TOT sa mga magsasaka tulad ng nailarawan na karanasan ng CD-CAAM. Ipinapakita sa bahagi ng pagsasagawa ng FTF ang mga layunin at ninanais ng FTF sa proyektong ito, mga ginamit na sangkap at ang mga hakbang para isagawa ang FTF. Bilang panghuli, tinatalakay ng bahagi ng pangangasiwa ng training ang mga paghahanda na kailangan bago at habang isinasagawa ang training.

I. Panimula

Ang produksyon ng Tilapia, (*Oreochromis spp.*) sa mga tubig-tabang na ilog, pens at kulungan ay dahan dahang sumisikat sa Pilipinas[1]. Dahil ang mga tilapia ay hindi madaling maapektuhan ng sobrang daming problema sa kapaligiran, madali itong paramihin. Dahil dito, ang isda ay maaring panggalingan ng murang protina at pandagdag kita. Sa Mindanao, partikular na sa Bangsamoro region, maraming tubig-tabang na ilog ang hindi nagagamit ng maigi para maitaguyod ang mga pandagdag kita sa mga gawain tulad ng paglilinang ng isda (fish culture). Ang kakulangan sa paraan ng pagkuha ng teknolohiya at panimulang capital sa bahagi nito sa rehiyon ay puwedeng mga dahilan kung bakit mabagal ang pagtataguyod ng mahalagang sektor na ito.

Figure 1: Pangunahing Gabay sa Pag-aalaga ng Tilapia, Pagpoproseso at Pagbebenta ng Tilapia.

Nagsagawa ang CD-CAAM ng paunang proyekto sa produksyon, pagproseso at pagbebenta ng tilapia para itaguyod ang kakayahan ng mga kasama ng BDA sa pamamagitan ng on-the-job training (OJT) approach, at ang pagbuo ng isang pangunahing manual na base sa mga aktwal na gawain at karanasan. Ang proyekto ay isinagawa ng tatlong (3) taon (2013 to 2015) sa ugnayan ng Bangsamoro Development Agency (BDA) at Japan International Cooperation Agency (JICA). Higit pa rito, sa pagsasagawa ng Project Extension Phase, ginamit ng fishery sector ang pangunahing gabay (Figure 1) na ginawa noong pilot phase at ginamit base sa mga aktwal na kaganapan sa mga Conflict-Affected Areas ng Mindanao.

[1] *SEAFDEC AQD. 2000. Tigbauan, Iloilo, Philippines.*

Sa proyektong ito, sinasadyang sanayin ng TOT ang mga magsasaka mula sa mga unang beneficiaries para maging farmer teacher para sa mga ikalawang beneficiaries gamit ang FTF approach. Naglalayong itaguyod ang mga kinakailangang kakayahan ng mga magsasaka sa pagpaparami ng tilapia base sa mga karanasan ng CD-CAAM pati na rin paggawa at paglalahad ng mga simpleng lecture. Sa kabilang dako, itinataguyod din nito ang kakayahan ng BDA at LGU sa paggawa at pagbuo ng mga training programs para isagawa ang FTF sa mga kabukiran.

Ang Farmer to Farmer (FTF) extension approach ay unang sinubukan noong pilot phase. Ito ay kinikilala bilang isang epektibong paraan upang mapalawig ang pagsasagawa ng paglipat ng teknolohiya sa mga pamayanan sa ibang mga barangay sa pamamagitan ng mga nahasang farmer teachers (FTs) mula sa mga unang beneficiaries noong pilot phase.

Para isagawa ang FTF extension approach, kinakailangan munang sanayin ang mga Farmer trainers (FTs) sa pamamagitan ng TOT. Ang TOT ay tumatalakay sa mga paksang tulad ng: i) Nilalaman ng TOT, ii) Pagsasagawa ng TOT, iii) Pagbuo ng training team, paghahanda ng mga kagamitan sa pagtuturo (teaching materials), at pagtuturo (mentoring); iii) Pagsasanay sa pagtuturo at pagsusuri; iv) Pagpili ng mga farmer teachers, at v) Pagaplano ng mga aktibidad ng FTF. Ang TOT ay pangunahing pinamumunuan ng BDA sa tulong ng mga opisyales ng MLGU. Ang mga tagapagturo para sa pagsasanay ay galing sa mga technical resource organizations.

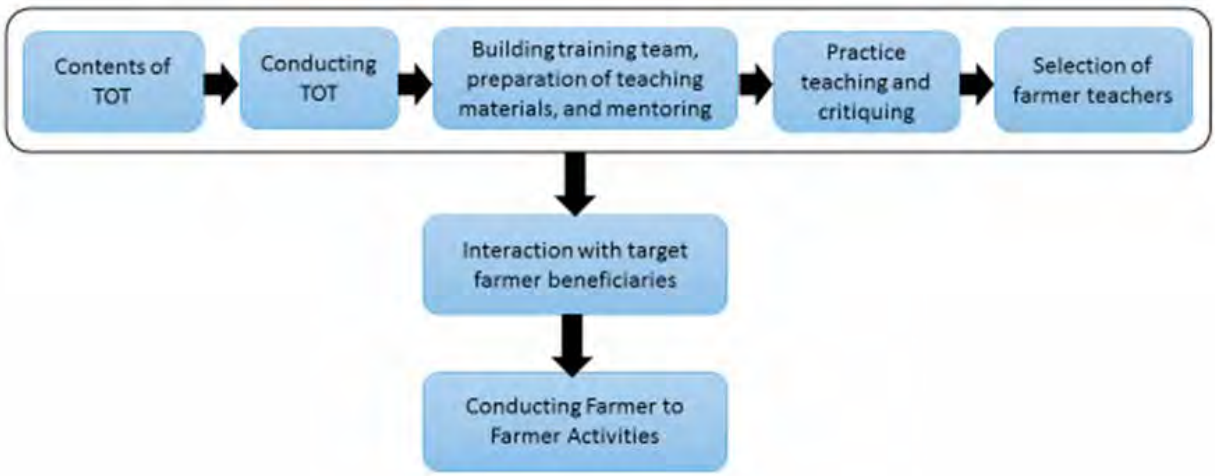


Figure 2. Daloy ng TOT patungong FTF

Pagkatapos ng TOT, isinasagawa ng mga napiling farmer trainers ang FTF sa ikalawang beneficiaries mula sa ibang barangay. Bago ang aktwal na pagsasagawa ng mga aktibidad ng FTF, ang mga FTs ay nagsasagawa ng mga pagsasanay (dry-run) na pangunahing pinangungunahan ng BDA para mas lalo pa silang mahasa sa kanilang kaukulang mga paksa. Nakita na ang mga FTs ang pinakaepektibo sa hands-on na paglilipat ng teknolohiya sa ibang magsasaka kaysa sa mga lecture, napansin din na mataas ang antas na sila ay matututo sa paraang ito.

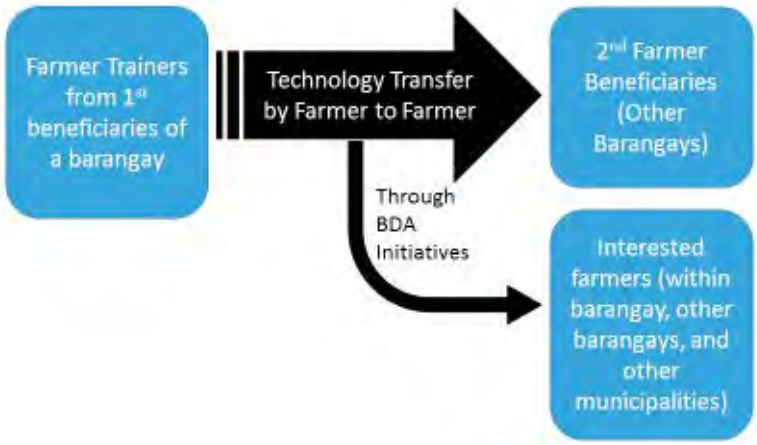


Figure 3. Daloy ng techno-transfer mula sa mga unang beneficiaries patungo sa mga ikalawang beneficiaries at iba pang komunidad

Ang mga aktibidad ng TOT at FTF ay parehong tumutulong sa pagbuo at pagpapatibay sa kakayahan ng mga Farmer-Teacher bilang trainer. Ipinapakita sa Table 1 ang halimbawa ng training design na may nilalaman at ilang araw ang gugulin kada paksa para sa mga gawain para TOT at FTF

Table 1. Halimbawa ng mga aktibidad at iskedyul ng TOT at FTF para sa fishery sector

Topic	No. of days	Contents	Materials	Facilitator
A) Training of Trainers (TOT)				
1. Preliminaries	1	Registration, opening prayer, messages, presentation of participants, and reading of house rules	Prepared attendance sheet, hand-out	BDA
2. Training of Trainers (Introduction)		Discuss the following; (1) Concept and meaning of ToT, (2) Objectives, and (3) Expected benefits	Hand-out	RP
3. The trainer and his/her role		Explains the many roles of a trainers, and adding the core values of BDA (vicegerency, transparency, trustworthiness, and inclusiveness)	Hand-out	BDA
4. TOT Teaching method		Discuss teaching method "adult learners-facilitation" which includes, (1) Learning through seeing, doing, and thinking (2) Guidelines for appropriate teaching aids, and (3) Facilitation skills	Hand-out	RP
5. Review lecture of tilapia production technology	0.5	Explain technicalities about pond/ cage construction, grow-out operation and the importance of sampling and feed management	Basic manual on tilapia production, processing, and marketing	RP, BDA
6. Record keeping		Explain sample of record keeping from pilot phase (Materials cost, feed cost, fingerlings cost, and other expenses)	Record template	RP
7. Practicum		Practice on (1) sex identification for breeding and mono-sex culture, (2) Water and feed management, and record keeping	Live tilapia, water measuring apparatus, pelletized feed	RP, BDA
8. Topic selection by FTs		Farmer trainers select their own topic of interest	Basic manual on tilapia production, processing, and marketing, notebook, ballpen	BDA, FTs

9. Mentoring/ Peer Teaching	1	Farmer teacher mentoring, preparation of teaching aid	Manila paper, pentel pen, crayon, ruler, plastic tape, push pin	RP, BDA, FTs
10. Practice teaching by Farmer Trainers and Critiquing		Practice teaching, critiquing	Prepared teaching aid	RP, BDA
11. Evaluation of Training		Feed backing by RPs	Evaluation form	RP, BDA
12. Closing program		Closing remarks, distribution of completion certificates	Evaluation form	RP, BDA
B) Farmer to Farmer (FTF)				
1. Building core training team and plan for FTF	0.5	Strengthen training team and plan to implement the FTF	Evaluation form	RP, BDA, FTs
2. Preparation of teaching materials	0.5	Preparation of simple teaching aid, and cage miniature	Manila paper, pentel pen, crayon, ruler, plastic tape, push pin, bamboo stick	BDA, FTs
3. Dry-run for FTF Training	1.0	Practice teaching and critiquing by RP and BDA	Prepared teaching aid, megaphone	BDA, FTs
4. Conduct of FTF	1.0	Conduct lecture on-site using local dialect utilizing prepared simple teaching aid, hands-on	Prepared teaching aid, megaphone, miniature, hands-on	FTs, BDA

1.1. Mga Tungkulin ng Stakeholders

Sa disenyo ng Training of Trainers hanggang sa Farmer-to-Farmer extension technology, lahat ng mga stakeholders ay may papel na gagampanan para masiguro ang matagumpay na pagsasagawa ng mga proyekto.

a) Farmer trainers

- Sila ang nagpaplano ng mga extension activities kasama ng BDA, LGU, at RPs
- Nagtuturo sa mga magsasaka ng mga teknolohiya para sa pagsasaka ng tilapia gamit ang Basic Manual on Tilapia Production, Processing and Marketing bilang sanggunian sa ilalim ng gabay ng BDA at RPs.
- Nagbibigay ng 'on-site technical guidance' sa ibang magsasaka sa loob at labas ng mga project sites sa ilalim ng gabay ng BDA at RPs.
- Nakikilahok sa mga gawain ng ibang magsasaka para makabuo ng mas matibay na relasyon sa isa't isa

b) BDA

- Naghahanda ng activity plan na ikinunsulta sa iba pang stakeholders at FTs.
- Naghahanda ng report pagkatapos ng bawat gawain. Ito ay may pangunahing nilalaman, mga natutunang leksyon, mga isyu at mga nakakabahala, mga solusyon sa mga problema kung meron man, at ang pinakamahalaga, ang datus sa produksyon.
- Regular na binabantayan ang progreso ng pagpapadami ng tilapia, paguulat sa mga napansin na may kinalaman sa kalidad ng tubig, at mga sosyal na isyu para mapanatili ang magandang relasyon ng mga FTs at mga mag – aaral.
- Pinapangunahan ang pagbisita ng mga partners at mga bisita at nagbibigay sila ng project briefing kung kinakailangan.
- Tumutulong sa mga beneficiaries magkaroon ng ugnayan sa merkado, pati na rin sa pakikipagtulungan ng mga may kinalamn na ahensiya ng gobyerno at mga non-government agencies para sa karagdagan pang tulong.

c) LGU (MAO, Councilor, Committee Chair of Fisheries and Agriculture)

- Nakikipag – ugnayan sa mga opisyales ng LGU at BDA para sa FTF at iba pang mga aktibidad
- Tumutulong sa mga beneficiaries na makipag-ugnay sa iba pang ahensya (BFAR) para sa tulong teknikal at pinansyal

d) RPs

- Nagbibigay ng teknikal na suporta sa mga FTs para siguraduhin na ang produksyon ng tilapia, ang pagpoproseso at pagbebenta nito ay magagawa sa mabisang paraan sa kahilingan ng BDA.

II. Pagsasagawa ng Training of Trainers (TOT)

Sa kabanatang ito, ang mga layunin, nilalaman at metodolohiya sa pagsasagawa ng TOT para sa mga magsasaka ay inilarawan base sa karanasan ng CD-CAAM. Kahit na ang TOT ay pinangunahan ng resource organization, makakatulong kung naiintindihan ng BDA at MLGU ang nilalaman nito dahil sila ang mga magpaplano at magsasagawa ng mga aktibidad sa field level gamit ang FTF approach.

2.1. Konsepto at Kahulugan ng ToT

Ang Training of Trainers ay isang uri ng training na ibinibigay sa mga indibidwal para maihanda siya sa kanyang magiging papel bilang trainer. Sa pamamagitan ng ToT, maaaring umusbong ang kakayahan at kapasidad ng mga kalahok para magturo sa iba bilang mga skilled professionals at tulungan ang mga organisasyon na magbuo ng sarili nilang grupo ng trainers.

Mga Pangunahing Elemento ng isang ToT

- Layunin ng Training (goal)
- Ang trainer/resource person
- Target na grupo, mga trainees
- Patutunguhan ng training (course)
- Pagsasagawa ng training (approach)

2.2. Layunin ng TOT

Sa pamamagitan ng TOT, ang mga kalahok ay:

- Tutulong sa mga organisasyon/ahensya sa kanilang mga pagsisikap para sa pagpapaunlad ng kakayahang pantao para maiangat ang 'growth-oriented participatory action' sa lokal na antas.
- Itaguyod ang mga aktibidad ng training bilang mahalagang bahagi ng mga people's organization.
- Ihanda ang mga kalahok bilang trainors para sa mga aktibidad ng field level training.
- Linangin ang mga kinakailangang kakayahan sa pagdisenyo at pagsasaayos ng mga training program.
- Unawain ang mga prinsipyo at mga pagsasanay ng training process.
- Hasain ang galing sa pakikipag – usap bilang trainers
- Linangin ang kakayahan ng trainer tungkol sa aspeto ng pamamahala ng organisasyon na nakasaad sa training program.

2.3. Inaasahang Benepisyo

2.3.1. Mapapanatili ang mga Kaalaman. Ang mga tao ay mas aktibo sa klase kung alam nila na sa susunod, sila ang magiging mga guro.

2.3.2. Learning by Teaching. "To teach is to learn twice over." (Joseph Joubert)

Ang pagtuturo ay ang pinakamabisang paraan para madagdagan ang iyong nalalaman. Sa pamamagitan ng paghimok sa iyong mga tauhan na matuto, hinihimok mo silang maging dalubhasa.

2.3.3. Lumilikha ng mga Lider. Kapag ikaw ay nagturo, nahahasa ang iyong galing sa paggawa.

2.3.4. Papapababa ang Gastos. Lahat ng training ay magastos. Sa pamamagitan ng paggamit ng mga beneficiaries bilang mga guro, nababawasan ang gastos para sa training.

2.3.5. Pagsasanay sa Pag-Follow Up. Kung ang ilan sa mga trainers ay member-beneficiary rin, mas dumadami ang pagkakataon para sa follow-up.

2.3.6. Social reinforcement. May mga ebidensyang nagsasabi na mas napapanatili ng mga tao ang kanilang natutunan kapag kilala nila ang guro.

2.3.7. Mapapanatili ang Kakayahan. Sa pamamagitan ng pagbuo ng kultura ng pagtuturo, puwedeng makamit ang mas malalim na pagpapanatili ng kakayahan sa iyong organisasyon.

2.4. Mga Nilalaman at Iskedyul ng TOT

Ang mga nilalaman ng TOT at ang nakalaang oras para dito ay dapat pag-usapan ng BDA, Resource Persons, at ang mga MLGU Officials. Bilang halimbawa, ang outline ng TOT na ginamit sa CD-CAAM ay ipinapakita sa Table 2. May mas detalyadong outline na matatagpuan sa Annex 1 kung saan ipinapakita ang inilalaang oras sa bawat paksa kada araw.

Table 2. Halimbawang Outline ng TOT

Paksa	Bilang ng Araw	Mga Nilalaman
Training of Trainers (TOT)		
Introduction to TOT and TOT Teaching Methods	1.0	Discuss the following; (1) Concept and meaning of ToT, (2) Objectives, and (3) Expected benefits Discuss teaching method "adult learners-facilitation" which includes, (1) Learning through seeing, doing, and thinking (2) Guidelines for appropriate teaching aids, and (3) Facilitation skills

Review Lecture of tilapia production technology	0.5	Explain technicalities about pond/cage construction, grow-out operation and the importance of sampling and feed management ; sample of record keeping from pilot phase (Materials cost, feed cost, fingerlings cost, and other expenses)
Practicum	0.5	Practice on (1) sex identification for breeding and mono-sex culture, (2) Water and feed management, and record keeping
Topic selection by FTs; Mentoring/Peer Teaching; Practice Teaching by Farmer Teachers; Evaluation	1.0	Farmer teachers select their own topic of interest; Mentoring, preparation of teaching aid, practice teaching, critiquing, feedbacking

2.5. Ang Trainer at ang kanyang Papel

Napakarami ng inaasahan mula sa isang trainer. Bilang trainer, may iba't ibang tungkulin siyang ginagampanan: bilang nasa posisyon ng kapangyarihan, bilang *mentor/coach*, at bilang isang *technical trainer*. Ang mga kalahok ay inaasahan na maging modelong farmer-teachers at ibahagi ang kanilang nalalaman sa mga magsasaka. Ito ay nakikitang paraan upang matulungang mahikayat ang ibang magsasaka na subukan ang produksyon ng tilapia at para bilisan ang pagsasagawa ng teknolohiya sa pagpapadami ng tilapia sa iba pang Bangsamoro communities.

Sa karagdagan, ang mga core values ng BDA - *vicegerency, transparency* (walang tinatago), *trustworthiness* (mapagkakatiwalaan), *justice* (hustisya), *inclusiveness* (lahat ay napapabilang), *excellence* (kahusayan), *piety* (paggalang), at *accountability* (may pananagutan) ay nakikita din na mahalaga para rin sa mga trainers para maging modelong trainers sa komunidad.

2.6. Mga Pamamaraan ng Pagtuturo ng TOT

(1) Layunin

1) Para magkaroon ang mga kalahok ng kaalaman sa iba't ibang pamamaraan ng pagtuturo,at para sila ay kumuha ng lakas sa isa't isa, at palakasin ang kahinaan ng isa't isa.

2) Para hayaan ang mga kalahok na siyasatin ang relasyon sa pagitan ng proseso at nilalaman ng training bago ituro ito sa ibang mga magsasaka at para itaguyod ang pag-intindi kung paano ipinagpapatuloy ng mga kalahok ang kanilang pag – aaral at paghubog ng kanilang kakayahan sa produksyon ng tilapia, pamamahala ng isdaan at epektibong estratehiya sa pagbebenta.

(2) Nilalaman

Ang nilalaman ng bahaging ito ay ang pagpapakilala ng mga bagong pamamaraan ng pagtuturo na ang pangunahing hangarin ay makuha ang interes at masiglang mag-aral ang mga nakatatandang mag-aaral na mas ninanais ang aktibong partisipasyon base sa kanilang kaalaman at karanasan. Ang mga sumusunod na mga pamamaraan ay tinangkilik upang maisulong ang *participatory* at *productive* na pag-aaral ng mga Farmer Teachers.

2.6.1. Facilitation Skills (Husay sa Pagtuturo)

Para sa bahaging ito, mahalaga na bigyang diin ang mahalagang papel ng facilitator at kung ano ang mga aspeto para maging magaling na facilitator. Sa mga trainings, ikaw ang guro at ang facilitator. Marami kang dalang kaalaman para sa iyong mga kalahok bilang guro at sa parehong dako, mayroon kang responsibilidad na magturo sa isang kapaligiran at proseso na nagtataguyod ng epektibong pag-aaral para sa mga nakatatanda. Mahalagang tandaan ang parehong papel dahil pareho silang mahalaga para masiguro ang positibong karanasan sa pag-aaral sa iyong mga training.

Ang pagtuturo ay hindi lang para sa mga training pero para din sa mga pulong – pulong. Ang pagkakaroon ng husay sa pagtuturo ay makatulong para mas epektibong makipagtulungan ang mga kalahok para makamtan ang karaniwang layunin.

2.6.2. Presentation Skills (Husay sa Paglalahad)

Ang malinaw at epektibong paglalahad ng impormasyon ay isang mabuting pamamaraan para mailahad ang iyong mensahe sa lahat. Sa ngayon, ang husay sa paglalahad ay kinakailangan sa lahat ng aspeto. Ang 'presentation' ay isang paraan ng paikipagtalastasan na puwedeng gawin sa iba't ibang sitwasyon tulad ng pag–uusap sa grupo, pagsasalita sa pulong, o pagbibigay ng impormasyon sa pangkat. Para maging epektibo, may mga hakbang ng paghahanda at pamamaraan ng paglalahad na maaring isaalang–alang.

MGA GABAY PARA SA TRAINER

- *Base sa karanasan ng CD-CAAM, mas gusto ng mga kalahok na magsasaka ang aktibong pakikipagtalastasan ng kanilang mga kaalaman at karanasan*
- *Gumamit ng mga aktibidad na kung saan puwedeng makilahok at mabalikan ang mga tinalakay sa masigasig na paraan*
- *Damihan ang mga gawain para sa grupo upang mapalawak ng mga kalahok ang kanilang bagong kaalaman at gamitin ito sa kanilang lokal*

2.6.3 Paghahanda ng mga simpleng kagamitan sa pagtuturo at visual aids

Ang maayos na pagkahanda ng mga kagamitan sa pagtuturo ay nakakatulong sa pagsasagawa ng parehong kabuuan na training at mga indibidwal na sesyon. Sa pag-umpisa, magsimula na ang pangwakas ang nasa isip. Isipin ang mga magsasaka na pagbabatidan mo ng iyong kaalaman. Ano ang mga alam ng mga kalahok? Ano ang mga materyales na susuporta sa proseso ng kaalaman?

Sa paghahanda ng mga gamit sa pagtuturo, inirerekomenda na gabayan ang mga trainers at hikayatin ang mga tagapakinig at kunin ang kanilang interes sa mga kaukulang paksa na tinatalakay ng mga taga-lahad. Ang pagtuturo ay mahalaga dahil 97% ng pag–aaral ay nakakamit kapag sabay naakit ang mata at tenga.

Ang mga sumusunod ay ang mga alituntunin sa paghahanda ng mga naayon na gamit sa pagtuturo:

(1) Kapag posible, gumawa ng sarili niyong gamit sa pagtuturo. Gumamit ng mga murang materyales at siguraduhin na ito ay makikita kahit nasaan ka man sa silid – aralan.

(2) Gamitin at linangin ang mga kakayahan na meron ang mga kalahok

(3) Humanap ng mga paraan para makagamit ng mga totoong bagay kaysa sa pagguhit ng mga ito, halimbawa miniature, atbp.

(4) Gamitin ang inyong imahinasyon at hikayatin ang mga kalahok na gamitin ang sa kanila.

(5) Gawing simple ang mga gamit sa pagtuturo para mas madaling magamit ng mga kalahok.

(6) Ang mga kagamitan sa pagtuturo ay maaaring nasa porma ng charts, slides, videos, drawing, miniature, replica atbp.

Figure 4. Simpleng visual aid na gamit ng FT habang naglecture sa 2nd beneficiaries

Figure 5. Replica ng floating cage na ginamit sa pagtuturo

2.7. Pagbabalik-aral sa Teknolohiya sa Produksyon ng Tilapia

Para masiguro ang epektibo at mabisang pagsasagawa ng Farmer-to-Farmer na mga gawain, mahalagang pag-aralan ang mga mahahalagang paksa sa Pangunahing Gabay sa Pag-aalaga, Pagpoproseso at Pagbebenta ng Tilapia. Ipinapakita sa Table 3 na nasa ibaba ang mga paksa para sa pag-aaral at ang tinatayang oras na gugugulin para rito.

Table 3. Mga paksa sa pagbabalik-aral habang TOT

Topic/s	Estimated duration
1. Biology/ General • Introduction to aquaculture • Biology and taxonomy of tilapia	1.0 hours
2. Site Selection • Topography • Soil texture • Water source • Flood/ disaster • Security • Road access	1.0 hours
3. Pond/ cage construction • Water holding capacity • Inlet/outlet • Pond design • Cage design • Soil excavation/ manual digging	0.5 hours
Grow-out operation • Pond/ cage preparation • Stocking • Water management • Feeding • Fertilization – Integrated fish farming • Backyard pond/ No feeding	1.0 hours
5. Harvest and Transport	1.0 hours
6. Community-based Seed production • Seed source • Seed production • Selective breeding • Harvest and transport of fingerlings/fry • Nursery: mono-sex culture/hand sorting to select male	1.0 hours
7. Record keeping (Simple) • Grow-out • Seed production a. Marketing/ sale	1.0 hours
Total	6.0 hours

Ang sesyon na ito ay pinagsamang lecture at pagtatalakay na may kasamang mga tanong galing sa mga kalahok para masagutan at para makumpirma kung naintindihan ng mga kalahok ang layunin, prinsipyo at teorya, pamamaraan at alituntunin, at mga kagamitan at materyales na gagamitin sa mga kaukulang teknolohikal na paksa na ipinaliwanag sa Pangunahing Gabay.

Ang pag-aaral ay magsisilbing 'refresher course' dahil ang mga kalahok ay natuto na noon ng mga teknolohiya. Ang hamon para sa mga kalahok ay kung paano nila ipapaliwanag ng mabuti ang mga paksa para sila ay maging epektibo at maintindihan ng mga susunod na trainees kung sila ay maging Farmer-Teachers.

Ang isa pang bahagi ng pag-aaral ay ang hands-on training sa mga sumusunod na paksa:

- Pagkilala sa kasarian ng tilapia
- Water management
- Feed management
- Paghahanda ng Pond at kulungan
- Record keeping

Figure 6. Hands-on review sa fingerlings collection at water management sa kampus ng MSU-Maguindanao

Pagkatapos pag-aralan ang Pangunahing Gabay (Figure 1) ang mga FT ay dinala para beripikahin ang mga aktwal na aktibidad para mas mapahusay ang kanilang kaalaman sa *farm management* at *water management*, ang dalawang mahalagang sangkap ng fish farming.

2.8. Pamimili ng Paksa ng FTs at ang Pagmentoring

Ang mga FT ay ginrupo sa apat at binigyan nga partikular na paksa base sa kanilang interes at pagtitiwala sa sarili. Ang bawat grupo ay may *facilitator*, *secretary* at *reporter*. Ibabase ng mga kalahok ang kanilang lecture sa pangunahing gabay. Kailangang magtalaga ng mentor kada grupo para tumulong sa mga kalahok sa kanilang paghahanda. Bigyan sila ng mga kinakailangang materyales tulad ng manila paper, meta strips, markers, at iba pa para magawa nila ang kanilang gawain.

Figure 7. Mentoring habang TOT

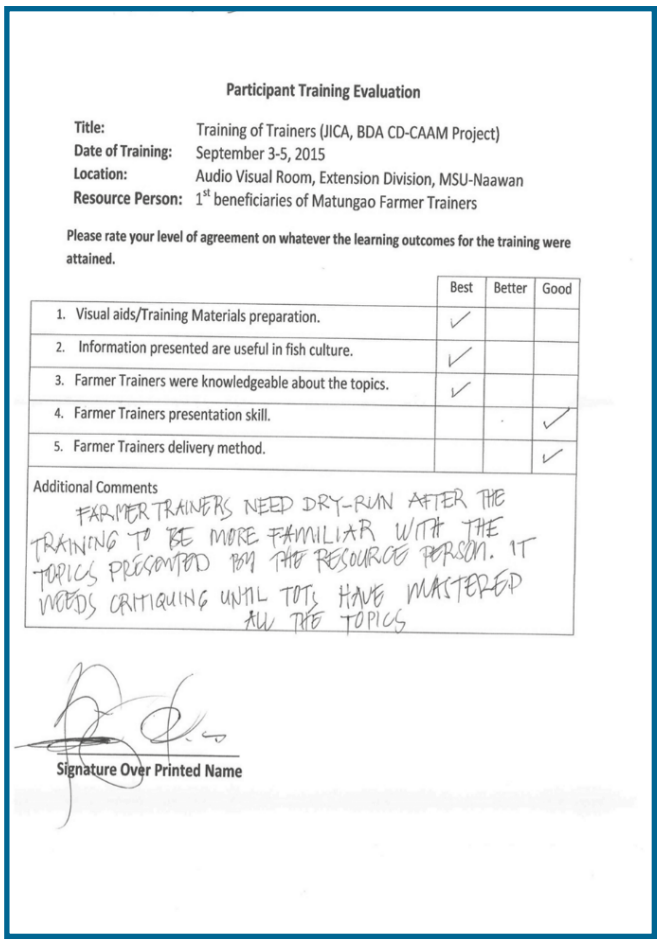
2.9. Practice teaching ng FTs at Critiquing

Pagkatapos ang paghahanda ng mga gamit sa pagtuturo, ang bawat grupo ay magprepresenta ng kanilang nagawa sa harap ng mga Resource persons at iba pang mga kalahok.

Figure 8. Pagsubok sa pagtuturo ng FTs pagkatapos nilang ginawa ang kanilang mga visual aids

Ang Participant Training Evaluation form ay ginagamit para masuri ang mga presentasyon ng mga grupo. Ang mga presentasyon ay susuriin sa mga sumusunod na dako:

- Paghahanda ng Visual aids/ training materials
- Ang mga inilahad na impormasyon ay magagamit sa fish culture
- Kaalaman sa mga paksa
- Presentation skills
- Paraan ng paglalahad



Participant Training Evaluation

Title: Training of Trainers (JICA, BDA CD-CAAM Project)
Date of Training: September 3-5, 2015
Location: Audio Visual Room, Extension Division, MSU-Naawan
Resource Person: 1st beneficiaries of Matungao Farmer Trainers

Please rate your level of agreement on whatever the learning outcomes for the training were attained.

	Best	Better	Good
1. Visual aids/Training Materials preparation.	✓		
2. Information presented are useful in fish culture.	✓		
3. Farmer Trainers were knowledgeable about the topics.	✓		
4. Farmer Trainers presentation skill.			✓
5. Farmer Trainers delivery method.			✓

Additional Comments
FARMER TRAINERS NEED DRY-RUN AFTER THE TRAINING TO BE MORE FAMILIAR WITH THE TOPICS PRESENTED BY THE RESOURCE PERSON. IT NEEDS CRITIQUING UNTIL TOTs HAVE MASTERED ALL THE TOPICS

Signature Over Printed Name

Figure 9. Halimbawa ng evaluation sheet para sa mga FT habang TOT.

Ang 'critiquing' ay ginagawa pagkatapos ng bawat presentasyon upang mabigyan ng oras para makabigay ng mga nakakatulong na mga komento para mapabuti ang kaalaman at mapaigi ang nilalaman ng presentasyon. Ang BDA at Resource Persons ang mga magbibigay ng komento sa paglalahad ng grupo sa kanilang presentasyon. Tandaan na mas gusto ng mga adult learners ang malumanay na pagbibigay ng mga nakakatulong na komento para magabayan silang itama ang kanilang mali at maisagawa ang tamang paglalahad.

Ang mga sumusunod ang mga komento na natanggap ng mga Farmer Teachers mula sa mga RPs nang nagcritiquing noong isinagawa ang Training of Trainers noong implementasyon ng CD-CAAM

- Dapat nababasa ang mga visual aids hanggang sa mga kalahok na nasa likuran na ng silid.
- Iwasan ang pagbabasa ng lahat ng mga nakasulat sa visual aids dahil ito ay dapat na magsisilbi lamang na gamay upang maorganisa ang mga paksa. Dahil dito, kinakailangang nakapaghanda ng mabuti ang mga trainer bago magbigay ng kanilang lecture.
- Sa pagsasalita sa harap ng mga mag-aaral, ang boses ng trainer ay dapat may katamtamang lakas at linaw na maririnig ng lahat ng mga kalahok.
- Iwasan ang di kailangang mga kilos at galaw dahil paminsan ito ay nakakaabala; gumamit ng mga kilos na makakatulong sa pagpapaliwanag ng ideya nais na maituro sa mga kalahok
- Sa pagsasagawa na ng TOT, mas mainam kung may guide notes na dala-dala ang mga FTs para hindi sila mailto at magiging maayos ang kanilang lecture.

III. Pagsasagawa ng mga Aktibidad ng Farmer-to-Farmer Extension (FTF)

Ang mga aktibidad sa Farmer-to-Farmer extension ay pinapangasiwaan ng BDA at ng MLGU habang yung mga magsasaka na tinuruang maging Farmer Teachers ay naging lokal na Resource Persons na siyang magsasagawa ng paglilipat ng teknolohiya sa ibang mga magsasaka. Ang kabanatang ito ay nagpapakita kung paano pinlano, isinagawa at sinuri ng BDA at ng MLGU.

3.1. Layunin ng FTF

Ang Farmer-to-Farmer (FT) approach ay ang pangunahing pamamaraan na ginagamit sa pagsasagawa ng extension activities sa fishery sector kung saan ang mga sinanay at maalam na mga magsasaka na noon ay kasali sa CD-CAAM pilot phase ay magtuturo sa mga bagong beneficiaries ng produksyon, pagpoproseso at pagbebenta ng tilapia sa ilalim ng suporta at gabay ng BDA at ng MLGU.

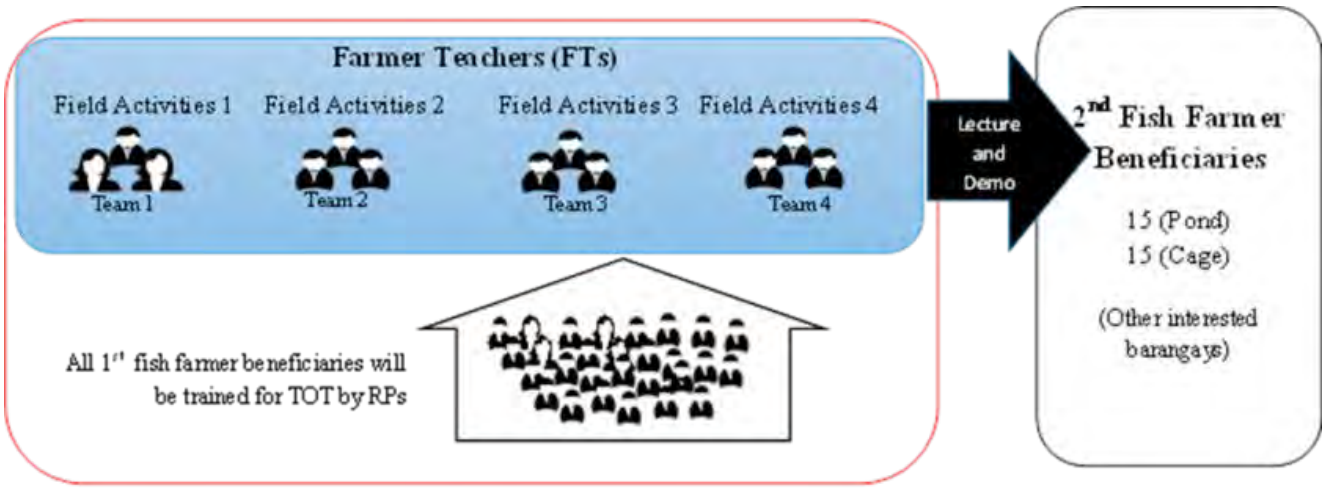


Figure 10. Daloy ng Farmer to Farmer (FTF) approach sa paglilipat ng teknolohiya sa mga ikalawang beneficiaries

Ang pangunahing materyal na ginamit sa FTF ng mga farmet trainers ay ang Pangunahing Gabay sa Produksyon, Pagproseso, at Pagbebenta ng Tilapa na ginawa ng CD-CAAM noong pilot phase. May mga naipakilala din n a makabagong pamamaraan sa integrated fish farming at mono-sex tilapia culture ang mga dalubhasa mula JICA para sa mas mapabuti ang kita ng mga fish farming enterprise para sa mga small-holder na mga magsasaka.

Isang serye ng lecture ang isinagawa at isinaayos mula sa gangunahing gabay habang TOT batay sa pag-unawa sa antas ng kaalaman ng mga farmer trainers. Ang paggamit ng mga miniature o replica ay isang mabisang paraan din lalung lalo na sa pagtatayo ng kulungang lambat o cage.

3.2. Implementation Mechanism ng FTF

Pinapakita sa Figure 11 sa baba ang *project implementation mechanism* ng fisheries sector sa extension phase. Ito ay may tatlong antas, at ang bawat antas ay may kanya-kanyang natatanging tungkulin at resposibilidad para masiguro ang maayos at epektibong implementasyon ng proyekto.

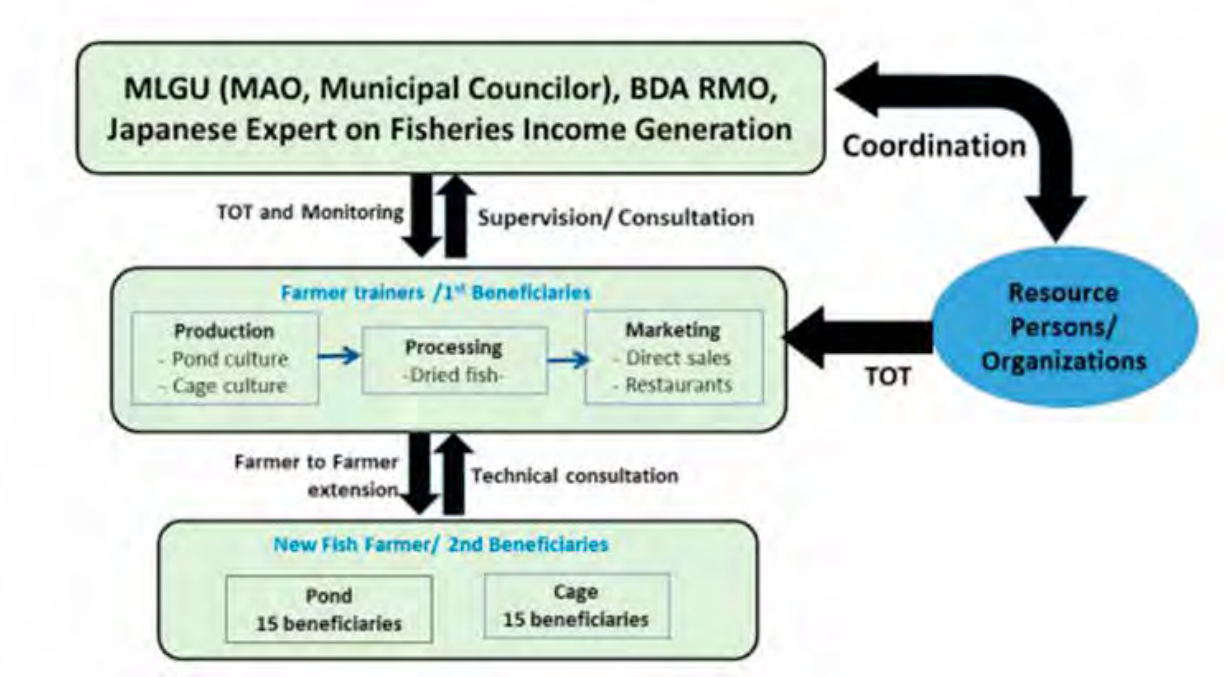


Figure 11.: Implementation mechanism ng TOT at FTF

Mga natatanging tungkulin at responsibilidad ng mga stakeholders sa FTF:

a) BDA RMO: 1) Ang mga tauhan ng RMO lalo na sa RPOOs and COs ay dapat palaging nagsusubaybay sa implementasyon ng proyekto. 2) Ang makikipag-ugnayan sa mga tao sa komunidad bilang bahagi ng kanilang community organizing at maayos na pangasiwaan ang pagsasagawa ng FTF. 3) Ang mga RPOOs ay magbabahagi at magbibigay ng teknikal na kaalaman sa mga FTs kasama ng RPs at ng LGU. 4) Magplano ng mga aktibidad sa FTF pagkatapos masuri at maaprubahan ng CMO at ng koordinasyon sa Expert team. 5) Pagpangasiwa ng lahat ng aktibidad, at subukang tugunan ang lahat ng mga isyu at mga katanungan ng mga benepisyaryo pero kung may mga katanungan na nangangailangan ng sagot sa management ay ipasa ito sa CMO.

b) LGU: 1) Subaybayan ang lahat ng mga aktibidad at ang kinalalabasan ng implementasyon ng proyekto at ito ay ibalita sa kanyang Mayor, 2) Alamin ang mga nangyayari tungkol sa proyekto

c) Farmer Trainer (FT): 1) Tawagin ang ibang 1st beneficiaries na maaring makapagbahagi ng kanilang kaalaman sa mga 2nd beneficiaries tungkol sa pag-aalaga, pagpoproseso at pagbebenta ng tilapia. 2) Pagplanohan ang pagsasagawa ng FTF kasama ang BDA, RP at Expert team, 3) Gamitin ang pangunahing gabay sa sa pag-aalaga, pagpoproseso at pagbebenta ng tilapia, pati ang paghahanda ng mga simpleng visual aids na gagamitin sa pagtuturo sa mga 2nd beneficiaries.

d) Resource Person (RP): 1) Magbigay ng teknikal na gabay sa mga FTs sa pamamagitan ng TOT kasama ang BDA, 2) Magbigay suporta sa Farmer Trainers para masiguradong naintindihan at naisagawa ang kaalaman mula sa Pangunahing Gabay, at 3) Magbigay ng teknikal na suporta sa paglilinang ng tilapia kung ito'y hihilingin ng BDA.

e) 2nd beneficiaries: 1) Ang pangunahing tatanggap ng kaalaman mula sa mga 1st beneficiaries sa pamamagitan ng farmer to farmer na pamamaraan 2) Hihingi sa mga 1st beneficiaries ng gabay teknikal, at ang magtatrabaho sa mga gawin sa implementasyon ng proyekto sa extension phase.

3.3. Hakbang sa Pagsasagawa ng FTF sa Fishery Sector

Ipinapakita sa Table 4 ang mga hakbang sa pagsasagawa ng FTF sa fishery sector simula sa pagbuo ng *core training team* na magpaplano kung paano isasagawa ang FTF sa ilalim ng patnubay ng BDA kasama ang mga RPs at MLGU. Sila din ay inaatasan na maghanda ng kanilang sariling kagamitan sa pagtuturo na magagamit nila sa dry-run at aktwal na pagsasagawa ng FTF sa field level.

Table 4. Mga Napapaloob na Aktibidad ng FTF sa Fishery Sector

Paksa	Bilang ng mga araw	Nilalaman	Materyales	Facilitator
1. Building core training team and plan for FTF	0.5	Strengthen training team and plan to implement the FTF		RP, BDA, FTs
2. Preparation of teaching materials	0.5	Preparation of simple teaching aid, and cage miniature	Manila paper, pentel pen, crayon, ruler, plastic tape, push pin, bamboo stick	BDA, FTs
3. Dry-run for FTF Training	1.0	Practice teaching and critiquing by RP and BDA	Prepared teaching aid, megaphone	BDA, FTs
4. Conduct of FTF	1.0	Conduct lecture on-site using local dialect utilizing prepared simple teaching aid, hands-on	Prepared teaching aid, megaphone, miniature, hands-on	FTs, BDA

3.3.1. Pagbuo ng *core training team* at pagpaplano para sa FTF

Ang mga Farmer Teachers, sa masusing patnubay ng BDA at RPs kasama ang MLGU ay magsasagawa ng pagpaplano kung paano makikipag-ugnayan sa mga ikalawang beneficiaries. Pagpunta ng mga ikalawang beneficiaries sa pilot site para makakuha ng first-hand na impormayon at para makita ang aktwal na imahe ng fish pond at fish cage ay kailangan din isagawa.

Isang magandang panimula para sa pagpaplano ay ang pagusapan, kasama ang mga stakeholders, ang mga interes ng mga farmer trainers sa pagsubok sa pamamaraan ng pagtraining.

Ang BDA ang mangunguna sa pagpaplano ng FTF. Paguusapan ng core *training team* ang paghahanda at pagbabago ng mga training materials na naihanda noong nakaraang TOT para akma ito sa pangangailangan ng mga ikalawang beneficiaries. Ang mga isyu sa kakulangan ng FTs na lumabas sa nakaraang training ay dapat ikonsidera. Pipiliin ng BDA ang pinaka kwalipikado upang magbigay ng mga lecture samantalang ang iba ay tutulong sa 'hands-on'. Kailangan ding gabayan ng BDA ang pagsusulat ng sarili nilang visual aids para maiwasan ang mga problema tungkol sa hirap ng paggawa nito,

Ang tungkulin at responsibilidad ng mga FT ay pinaguusapan sa TOT at uulitin uli sa sesyon ng pagpaplano para mabigyan ito ng diin at para kilalanin ang kanilang malaking papel sa pagtulong sa kapwa magsasaka. Ang mga pangunahing papel na meron sila ay: training, mentoring, pagsasagawa ng demonstration, technical guidance at paminsan – minsan nagiging ugnayan sa pagitan ng mga magsasaka at BDA.

Ipinapakita ng Table 5 ang mga aktibidad tuwing FTF.

Table 5. Mga isinagawang aktibidad sa preparasyon ng FTF sa Sultan Mastura at Maguindanao

Pangunahing aktibdad	Nilalaman	Isyu	Mga ginawang aksyon
Paghahanda ng mga training materials (visual aids, miniature, manual)	Ihanda ang mga visual aids gamit ang mga lokal na materyalesusing local materials	- Kakukangan ng mga FT na pinayagan para sa proyekto - Hirap sa pagsusulat ng visual aids	Pinili ng BDA ang pinaka – kwalipikadong FTs para pagbigay ng lectures, samantalang ang iba ay napili para sa hands-on base sa kanilang kakayahan - Nanguna ang BDA sa paghahanda ng visual aid base sa kanilang angking kaalaman - Kumapara sa ready made, ang pagsusulat ng kanilang sariling visual aid ay nakatulong sa pagsulong ng kanilang kompiyansa para mailahad ang kanilang nagawa
Dry-run sa paglalahad ng mga paksa	Dinaluhan ng RPs, BDA, LGU, Fishery expert team, FTs	Ipinaliwanag ng mga sinanay na FT ang mha paksa sa pamamagitan ng kanyang kaalaman at kahusayan pero pinilit ng RPOO na sundin ang nakasulat sa presentasyon. Ang ibang FT ay hindi handa Ang ibang FT ay hindi kayang ipahayag ang mga paksang binigay sa kanila Malayo ang paliwanag ng ibang FTs sa kanilang kaukulang paksa	- Nagbigay ng karaniwang mungkahi ang RP para matugunan ang isyu ng RPOO at ng mga FT. Sila rin ay nagbigay ng patuloy na patnubay at pagpapaalala na maging handa parati. - Hinikayat ng BDA ang lahay na magkaroon ng kompiyansa sa sarili dahil sila ang pangunahing actor dito sa FTF, na sabihin at ibahagi ang kanilang natutunan - Pinaalala ng BDA na tumutok sa paksa na ipinapaliwanag
Critiquing pagkatapos ng dry-run	Critiquing ng BDA at RPs	Mahaba ang pagpapaliwanag ng mga FT sa mga paksa Pagbibigay ng hindi nakakatulong na mga komento Mababang tono ng boses ng ilang mga FT na hindi marinig at maintindihan ng mga tagapakining.	Inirekomenda ng BDA at RP na paiklihin ang mga paliwanag at gawin ito sa itinakdang oras. Ipinaliwanag sa mga RP na magbigay lang ng komento tungkol sa pinaguapang paksa. Nagpayo ang BDA na lakasan ang boses hanggang sa sila ay marining sa likuran.

3.3.2. Paghahanda ng mga kagamitan sa pagtuturo

Pinapatnubayan ng BDA ang mga FT sa paggawa ng kanilang sariling kagamitan sa pagtuturo gamit ang mga naihanda na noong nakaraang TOT na binase sa basic manual, pinag-aralan nila ang mga kaukulang paksa sa tulong ng BDA at RPs at isinulat nilang muli ang mga paksa sa manila paper base sa kakayahan at kaalaman ng mga kasalukuyang FT.

Ang BDA at RP ay laging nasa tabi nila para magbigay ng gabay. Ang karaniwang pagkakamaling nagawa ng mga FT sa paghahanda ng mga kagamitan sa pagtuturo ay ang pagsusulat ng sobrang daming salita, maliit na pagkakasulat, at hindi maayos ang paggawa. Dahil dito, ang BDA ay laging nagbabantay sa kanila para magbigay ng mga komento at payo para baguhin ang mga materyales dahil ito ay gagamitin para sa mabisang pakikipagugnayan sa mga ikalawang beneficiaries sa FTF.

Figure 12. Pagsusulat ng visual aid ng FT mula Matungai, Lanao del Norte

3.3.3. Dry-run para FTF Training

Bago magsimula ang mga sinanay na FT sa kanilang pagtuturo sa ibang magsasaka, kailangang magsagawa ng dry-run para maranasan ng mga FT kung paano ba ang magturo gamit ang kanilang mga inihandang teaching aids.

Kada isa, ang mga FT ay maglalahad ng kanilang sariling paksa sa harap ng BDA, RPs at ilang miyembro ng komunidad na magsisilbi na tagapakinig. Ipapaliwanag ng mga FT ang mga paksa batay sa kanilang kaalaman at kahusayan. Halimbawa, may mga pagkakataon na maraming sinasabi ang FT na labas sa paksang tinatalakay, papayuhan siya ng BDA na sundin ang nakasulat sa visual aid bilang gabay para masiguro na ang lecture ay hindi lalabas sa paksa. Ang ilan sa mga FT ay hindi kayang ipahayag ng mabuti ang kanilang mga paksa kaya kailangan ng walang patid na gabay at pagganyak para magkaroon sila ng kompiyansa sa sarili dahil sila ang pangunahing actor sa FTF dahil sila ang magsasabi at magbabahagi bg kanilang natutunan tungkol sa tilapia farming. Sa huli, dapat ang lahat ay magpokus sa paglalahad ng kanilang paksa na may kaluwagan at kompyansa.

Hinihikayat na gamitin ang lokal na diyalekto sa paglalahad maliban lang sa mga teknikal na salita na kailangang ipaliwanag pa upang madaling maintindihan ng mga magsasaka.


Figure 13. Ang BDA ay nagbibigay ng patnubay habang nasa dry-run para FTF training

3.3.4. Pagsasagawa ng FTF Activities

Ang unang hakbang sa pagsasagawa ng FTF ay ang pagpapaliwanag sa layunin nito bago pa man magsimula sa ibang gawain. Sa pamamagitan nito, maiintindihan ng mga the farmer-participants kung ano ang gagawin, ano ang kanilang makukuha, paano ito kukunin at kailan ito magagawa. Pagkatapos magbigay ng mga tagubilin, isinasagawa agad ito ng mga FT sa pamamagitan ng pagpapakita nito sa mga trainees. Ang pamamaraan na ito ay nakitang mabisa sa paglilipat ng teknolohiya sa antas ng mga magsasaka sa pagsasagawa ng proyekto ng CD-CAAM.

Iminumungkahi ng Fishery sector ang paggamit ng mga lokal na kagamitan at ang pagpapanatili na gawing simple, praktikal at hindi mahal ang teknolohiya para mas malaki ang posibilidad na ito ay magaya at tumagal. Kaya ang mga FT ay pinakitaan sa pinaka-simpleng paraan ng mga paksa na may teknikal na gabay ng BDA.

Ang proyekto ay nagbibigay sa mga Farmer Trainers ng pang-araw-araw na panggastos base sa kanilang naiukol na mga araw sa training para pambayad sa kanilang mga pagsisikap. Maaring magtratrabaho pa rin ng mabuti ang mga FT kahit walang bayad. Ngunit ang paraan na ito ay nakitang nakakatulong sa pagpapalakas ng kanilang sigla at nag-uudyok sa kanila na magtrabaho ng mas mabuti.

Figure 14. Halimbawa ng mga hands-on FTF extension activities

Pinapakita ni FT (Mr. Kambak Batao) ang soil blocking habang ginagawa ang pond sa Brgy. Balut, Sultan Mastura, Maguindanao

Pinapakita ni FT (Datu Akmad Labungan) ang maayos na pagtatala ng mga kawayan para sa frame ng cage gamit ang monofilament nylon sa Brgy. Tapayan, hm, Sultan Mastura, Maguindanao

PAALALA SA MGA TRAINERS

- *Para mapanatili at mas mapabuti ang kakayahan ng mga farmer-trainers, sila ay dapat dumaan sa paulit-ulit na pagsasanay sa parehong aspetong teknikal (hal. tilapia farming, pagpoproseso, at pagbebenta) at pagpapabuti ng kakayahan nila sa pakikipagtalastasan. Ang BDA, sa tulong ng MLGU, ay dapat tumulong sa pagtuturo sa mga FT kung paano makakuha ng mga mahahalagang impormasyon mula sa mga ahensiya, pati na rin ang pagpapanatili na bukas sila sa pakikipagtalastasan at konsultasyon sa mga kalahok sa proyekto at mga FT.*

3.3.5. Gastos sa pagsasagawa ng FTF Extension

Ang mga pangunahing gastos sa pagsasagawa ng gawain sa Farmer to Farmer extension sa ilalim ng CD-CAAM ay:

(1) Ang Training of Trainers (TOT) na isasagawa ng 3 araw ay may kaukulang gastos para pagkain, pamasahe, tutuluyan, materyales para sa training at Professional Fee ng mga RP.

(2) Ang Farmer to Farmer (FTF) extension activities na isasagawa ng humigit kumulang 41 araw sa field level ay may kaukulang gastos para allowance ng mga FT, materyales para sa training, at allowance para sa pagkain ng mga ikalawang 2nd beneficiaries, BDA at MLGU.

3.3.6. Kinalabasan ng FTF

Ang kinalabasan ng TOT at FTF ay naipapakita sa mga extension program sa fishery sector ng BDA kung saan tumutulong ang mga Farmer Trainers na magbigay ng lecture at hands-on training sa mga interesadong mga komunidad sa Brgy. Katipunan, Carmen, South Cotabato. Isa pang halimbawa ay ang pagiging lokal na technical consultant ng mga FTs sa mga farmers sa Sitio Pahm, Brgy. Tambu, Sultan Mastura. Di lang teknikal na gabay ang binibigay ng mga Farmer Teachers kungdi namimigay din sila ng mga fingerlings mula sa kanilang sariling hatchery.

Figure15. Mga larawan ng mga FT na tumutulong sa mga komunidad sa Carmen, North Cotabato at Sultan Mastura, Maguindanao

Tinuturuan ng FT (Mr. Esmael Panansaran) ang mga tilapia farmers ng Carmen, North Cotababato sa paglalagay ng hapa net

Tinuturuan ng FT (Mr. Tinga Panansaran) ang mga tilapia farmers sa Sitio Pahm, Sultan Mastura ng feeding at water management

IV. Pangangasiwa ng mga Training

4.1. Pagsasa-ayos ng logistics para sa training

Maliban sa pagaasikaso sa nilalaman, metodolohiyang gagamitin at proseso, dapat hindi makalimutan ng trainer ang logistical na aspeto ng pagsasanay. Kahit na hindi ito parte ng mga pangunahing layunin ng aktibidad, ito ay napakahalagang parte ng programa sa pagsasanay. Kaya dapat isaalang-alang ng trainer ang pagsasa-ayos ng mga gawain sa training, malaki o maliit man ito. Kailangan ding isaalang-alang kung saan ito gaganapin dahil ang lugar na gagamitin ay dapat nakakatulong sa proseso ng pag-aaral at ito ay kailangang nakoordina sa iba pang kasama para maipatupad ang programa ng maayos at mabisa.

4.1.1. Bago ang training program

(a) Magbuo ng training staff, ihanda ang mga materyales na kailangan, resource persons, mga kalahok at mga usapang pinansyal. Sa proseso ng pagpaplano, ang attendance ng mga resource persons at kalahok ay dapat kompirmado.

(b) Siguraduhin na maayos ang lugar at pasilidad ng pagdadausan sa layong makakatulong ito sa pag – aaral. Kung walang magagamit na training center, kailangan maghanap ng mga training staff ng ibang pasilidad na may support system na malayo sa ingay at distorbo habang may training. Kailangan ito ng seryosong pagtugon.

(c) Ang araw at oras ay dapat masang–ayonan at maibalita ng mas maaga – isang lingo bago ang aktibidad. Ang mga kalahok ay dapat maging pamilyar sa lugar na pagdadausan sa maagang panahon.

(d) Maaaring makatulong kung ang mga pamphlet, modules, o kahit na anong materyales sa pag –aaral na naihanda ay maibigay bago idaos ang pagsasanay

4.1.2. Habang isinasagawa ang training program

Base sa karanasan ng CD-CAAM, ang logistical na ayos ay dapat maisagawa ng mabuti dahil kung hindi, ito ay magbibigay ng negatibong mensahe sa simula pa lang ng aktibidad. Kapag ito ay naayos ng mabuti, mararamdaman ng mga kalahok na sila ay kabilang sa programa.

Ang mga nasa ibaba ang mga kailangang isaalang – alang habang isinasagawa ang training program;

(a) Mahalagang isaalang-alang ang kasarian sa pag-aayos ng tutuluyan ng mga trainees at iba pang kalahok.

(b) Ang pagsasaayos ng pagkain ay mahalaga, ito ay dapat naaayon sa relihiyon at paniniwala lalung lalo na kung ang mga trainees ay mga Muslim.

(c) Dapat may naka- standby na sasakyan sa mga kaso na magkakaroon ng aksidente. Dapat mayroon ding nakahandang first aid kit para sa paunang lunas

4.2. Ebalwasyon ng training

Ang epektibong paglipat ng teknolohiya ng mga FTs sa mga 2nd beneficiaries sa pamamagitan ng farmer-to-farmer na mga aktibidad ang pangunahing bagay na titingnan sa proyektong ito.

Tulad ng sa ibang sector, ang FTF ay sinusuri kung epektibo ba ang paglilipat ng teknolohiya base sa pinagsamang lecture at hands-on sa mga ikalawang beneficiaries sa paggamit ng tilapia sa mga farming activities. Ang pangunahing ebalwasyon ay ginagawa para suriin kung mabisa ang mga FT sa pagbibigay ng mga lecture at hands-on tuwing FTF, at ang mga aktwal na resulta sa mga ikalawang beneficiaries ng teknolohiyang itinuro at ibinahagi sa kanila ng mga FT.

Ang ebalwasyon at assessment ay mahalagang paraan upang magabayan at matulungan ang mga FT na mapabuti ang kanilang kaalaman sa pamamagitan ng pagkilala sa kanilang mga kalakasan at kahinaan. Gayon din sa mga implementers, malalaman nila kung kailangan pa ba o hindi ang karagdagang capacity building.

Pagkatapos ng training, sinusuri ang antas ng pagiging epektibo ng mg nilalaman sa training gaya ng ginamit na pamamaraan sa pagturo, ang nagugol na oras sa training, at ang mga suporta sa logistics na naibigay sa pamamagitan ng pagbigay ng mga questionnaire na humihingi ng obserbasyon at feedback mula sa mga kalahok (Annex 3).May dalawang klaseng mabisang pamamaraan sa ebalwasyon at ito ay ang paggamit ng questionnaire at ang pag-obserba or pagtatanong sa mga nakasali sa training. Sa unang *assessment tool*, ay may listahan ng mga katanungan

na inihanda kung saan tinatanong ang antas ng pagsasagawa ng FT sa ginawang training habang ang pangalawang *assessment tool* ay ginagamit sa pagkuha ng importanteng mga impormasyon tungkol sa pagganap ng bawat isa, ng partisipasyon ng lahat, at ang pakikitungo ng isa't isa sa kapwa. Sa ganitong sitwasyon ay kailangang maayos na obserbahan at itala ang mga kinakailangang impormasyon.

Dagdag pa dito, mahalaga na gawin ang ebalwasyon pagkatapos ng buong program upang masuri ang epekto sa mga FT kung talaga bang sila ay natuto o may pagbabago ba. Gagawin din ang ebalwasyon sa mga 2nd beneficiaries upang masukat ang kanilang natutunan at ang pagiging epektibo ng kanilang FT (tingnan ang Annex 4)

Ang paggamit ng mga FT sa extension ay nakakatulong lalung lalo na sa mga lugar na limitado ang nakakarating na tulong ng gobyerno. Puwede itong pandagdag o pamalit sa mga extension workers ng pamahalaan kaya mahalagang isaalang-alang ang oras sa pagsasagawa ng FTF pati na rin ang pagpapasiya kung saang mga lugar ang mainam para sa paglilipat ng teknolohiya o anong sektor ng mga magsasaka ang mahusay sa paggawa. Dahil dito, dapat may mga follow-up na mga aktibidad ng FTF para buong magamit ito ng mga kasama sa hinaharap.

Appendix 1. Halimbawa ng Training Schedule para sa TOT

A. ToT for Sultan Mastura 1st beneficiaries

Day / Time	Activities	Remarks and Responsible Persons
Day 1		
7:00 AM - 10:00 AM	Travel Time	BDA, 1st Beneficiaries
	Registration	BDA, Resource persons, IC Net
	Opening Ceremonies	
	Words of wisdom	
	Welcome address	
	Introduction of participants	
10:00AM – 11:00AM	Signing of Memorandum of Partnership Agreement between BDA and MSUM [snacks]	BDA, Resource persons, IC Net
11:00AM – 11:30AM	1) Training of Trainers (Introduction) • Concept and meaning of ToT • Objectives of ToT • Expected benefits of ToT • Training manual (income generating Activities (guidelines)	Resource persons
11:30AM – 12:00NN	2) The trainer and his/her roles • Understanding the roles of farmer trainers	BDA
12:00NN – 1:00PM	[Lunch break/Prayer]	
12:00NN – 1:00PM	3) ToT Teaching Method • Facilitation skill • Presentation skill • How to prepare simple training materials and visual aid	Resource persons
	4) Review lecture of tilapia production technology	
2:00PM – 2:30PM	4.1 Biology/ General • Introduction to aquaculture • Biology and taxonomy of tilapia	Resource persons

Day / Time	Activities	Remarks and Responsible Persons
2:00PM – 2:30PM	4.1 Biology/ General • Topography • Soil texture • Water source • Flood/ disaster • Security • Road access	Resource persons
2:00PM – 2:30PM	[Snacks/prayer]	
2:00PM – 2:30PM	4.3 Pond/ cage construction • Water holding capacity • Inlet/outlet • Pond design • Cage design • Soil excavation/ manual digging	Resource persons
4:30PM - 5:30PM	4.4 Grow-out operation • Pond/ cage preparation • Stocking • Water management • Feeding • Fertilization – Integrated fish farming • Backyard pond/ No feeding	Resource persons
Day 2		
10:00AM – 11:00AM	4.5 Harvest and Transport	Resource persons , BDA
10:00AM – 11:00AM	4.6 Community-based Seed production • Seed source • Seed production • Selective breeding • Harvest and transport of fingerlings/fry • Nursery: mono-sex culture/hand sorting to select male	Resource persons
10:00AM – 11:00AM	4.7 Record keeping (Simple) • Grow-out • Seed production • Marketing/ sale	Resource persons, BDA
10:00AM – 11:00AM	Practicum • Sex Identification (male & female tilapia)	Resource persons, BDA

Day / Time	Activities	Remarks and Responsible Persons
2:00PM – 2:30PM	4.8 Evaluation of Training • Questionnaire • Practical	Resource persons
1:00PM – 5:00PM	Practical/ Participatory • Water management • Feed management • Pond/ cage preparation • Record keeping	Resource persons , BDA (university fish farm/ hatchery facilities)
5:00PM – 5:30PM	Topic selection by TOT participants	BDA, Farmer trainers
Day 3	Practice teaching by Farmer Trainers	
1:00PM – 5:00PM	• Team 1 • Team 2 • Team 3 • Team 4 [snacks]	Resource persons, BDA, Farmer trainers
2:00PM – 2:30PM	Evaluation of Training • Questionnaire • Practicum	Resource persons
10:00AM – 11:00AM	[Lunch/prayer]	
2:00PM – 2:30PM	Closing programt • Messages • Distribution of certificates	Resource persons, BDA, Farmer trainers, ICNet
3:00PM – 5:00PM	Travel time	Farmer trainers

Annex 2. Mga Presentation Materials para sa Training of Trainers

Annex 2-1. Mga Halimbawa ng mga Presentasyon na Ginamit sa TOT

TRAINING OF TRAINORS (TOT)

- Concept and Meaning
  - Teaching is key to learning
  - Train the trainer is a learning technique that teaches students to be teachers themselves
- Relation to lectures that will follow

OBJECTIVES OF TOT

- To develop a pool of experts in the ARMM that will facilitate the transfer of their expertise to the people in that area.
- To provide the people in the ARMM the opportunity for economic development and self sufficiency

EXPECTED BENEFITS OF TOT

1. Knowledge Retention. People tend to pay attention in class when they know that next time they'll be the instructor.

2. Learning by Teaching. To teach is to learn twice over. (Joseph Joubert)
Teaching a topic is the best way to reinforce your knowledge. By encouraging your staff to teach, you encourage them to become experts.

3. Creating Leaders. When you teach, it builds your leadership skills.

4. Cost Reduction. All training can be expensive. By using some beneficiaries themselves as instructors training expenditures are reduced.

5. Training Follow Up. When trainers are some member-beneficiaries themselves there are increased opportunities for follow ups

6. Social Reinforcement. There's evidence to suggest that people are more likely to retain knowledge when they know the teacher.

7. Skill Retention. By building a culture of teaching you can achieve a greater depth of skill retention for your organization.

TRAINING MANUAL

RESOURCES:

- **Facilitator Manual**: contains all of training information, including preparation and material lists, step-by-step instructions for leading training sessions, pre- and post-tests, and all content from the Participant Handbook.
- **Participant Handbook**: contains all of the training contents that participants are trained on (text and illustrations) and also any case studies, scenarios, small group discussion questions, or role plays needed for training sessions. Participants use the handbook during training sessions and afterwards for review.

THE TRAINER'S ROLE

• A POSITION OF POWER

When you become a trainer, you receive a position of authority. Part of this can be:

- Defining the trainee's tasks
- Assigning tasks to trainees
- Taking tasks from a trainee
- Assigning and distributing tasks between several trainees
- Making judgments relevant for the trainee's future

• RESPONSIBILITIES

- He/she is a mediator
- Ensures professional progress and the well-being of the trainees.
- Prevents:
  - Discrimination of any kind
  - Bullying and/or sexual harassment
  - Abuse of alcohol, medicine or any other substance
  - Physical dangers (accidents etc.)
  - Overstepping the apprentice's physical capacity
  - Infringement of rights of participants and violation of regulations neither by you nor by the trainee.

• IN BETWEEN

Discusses with the management the following ideas:

- Which information must be told to management?
- What is confidential between the trainer and the trainee? (For the trainee, the trainer is a confidant)
- What is confidential between the trainer and the management?

• MENTOR/COACH

- In your relationship to the trainee, you play different roles - instructor, mentor and coach.
- Depending on the role you choose, you can:
  - Support the trainee
  - Inspire the trainee
  - Motivate the trainee
  - Challenge the trainee

*****This is decisive for what the trainee will gain from your training***.**

• EVALUATOR

This is a four step model for evaluating trainee's skills:

1. Beginner
2. Experienced
3. Advanced
4. Expert

- In consultations with the trainee, you can use the categories from the four step model to give feedback about his/her progress (or lack thereof).
- The trainee's performance should be evaluated regularly, if the trainee is to get a sense of his/her learning and progress.
- Evaluation also helps to teach the trainee the standards of quality that apply to the specific area.

- TECHNICAL TRAINER
- There can be work processes where technical training is necessary.
- To decide whether training be in a specific way, the following questions can be considered:
  - Is the work normally done too quickly or the use of manuals impossible?
  - Is the work process complicated?
  - Is there a need for extensive demonstration or explanations before the task?
  - Is great accuracy necessary due to serious consequences?
  - Does the process involve many choices and/or decisions?

TOT TEACHING METHOD

METHODS OF TRAINING
(Adult learners-facilitation)

- Lecture
- Lecture/discussion
- Skill lesson
- On-the-job training

- SELECTING THE RIGHT METHOD
- Questions to consider in selecting method and presenting your material.
  - What is the ability and level of knowledge of the group?
  - How many trainees are in the group?
  - How much time is allotted?

- Continuation..selecting
- What training aids are required?
- Do you have the experience to use these aids with confidence?
- Are you aware of the limitations of aids?
- All resources within your command must be used to enhance your facilitation to the benefit of the trainees

DELIVERY (PRESENTATION)

- ESSENTIALS OF GOOD DELIVERY:
  - Utterance of words must be clear
  - Must be spoken at a suitable pace
  - Pauses should occur at logical occasions
  - Variety should be used: emphasizing important points in a deliberate manner, connecting parts and using illustrations in a conversational way

PREPARATION AND LECTURE NOTES

- **Preparation is important.** The lecturer's notes should facilitate efficient delivery. Distinction is needed between lecture outlines (showing substance only) and lecture notes (showing substance and method).
- **Notes too brief/ extensive?.** The lecturers must improvise to make his notes neither brief nor extensive. If brief, may miss important information, if extensive, tendency is to read.

GIVEN AN OUTLINE OF THE MATERIAL, PREPARE THE NOTES BY ASKING THESE QUESTIONS:

- What should everyone learn at the end?
- Is it safe to assume that the listeners know?
- What are they likely to find difficult?
- What will require special care or illustration?
- What illustrations to use to enhance learning?
- What demonstrations will be appropriate?
- What new terms that need to be explained.

STRUCTURE

- **INTRODUCTION:**
  - Statement of aims
  - Relation of this lecture to those that came before and are to follow
  - Establishment of goals (purpose and direction) by linking with participant needs
  - Outline of thoughts that are to be developed

- **Body of lecture:**
  - Step-by-step building up of subject matter
  - Logical development
  - A few well-developed steps, strongly made are more effective than many steps)
  - Appropriate use of aids and questions to stimulate trainee's interest and activity
  - Appropriately spaced summaries of material covered

- **CONCLUSION**
  - Summary of lecture
  - Restatement of the relationship of this lecture to others in the series
  - Reference to additional material that should be read or seen

TRAINING AIDS?: WHY USE?

- **All learning is through the senses**. 97 percent of learning is achieved through simultaneous appeal to the eye and ear
- **Effective use of audiovisual aids can be included in any sort of presentation**. Charts, slides, videos, overhead transparencies and films can be used to add interest as well as supplement verbal explanations.

Continuation..why aids?

- Proper use of instructional aids saves time, adds interest, helps trainees learn and makes your job easier.
- Trainers should use training aids to supplement their training rather than to replace all or part of it.

CLASSIFICATION OF INSTRUCTIONAL AIDS

- **Projective**
  - Videos
  - Color slides
  - Overhead projector transparencies
- **Non-projective**
  - Chalkboard
  - Whiteboard
  - Charts and diagrams
  - Models
  - Exhibits
  - Handouts
  - Tape recorder

- **SELECTION OF AIDS: Factors**
  - Practicability
  - Attractiveness and interest
  - Suitability
  - Clarity
  - Portability
  - Serviceability
  - Availability
  - Location
  - Time factor

TIPS IN PRESENTATION OF YOUR VISUALS

- Make your visuals visible
- Use color for headings
- Make them simple; eliminate details
- Ensure the key feature occupies a prominent part of the screen or display
- Minimize reflection

Continuation..tips

- Show all the key points (oral presentations sell the key points through the ears; visual presentations sell the key points through the eyes)

****Whatever instructional aid(s) you choose to use as a trainer, it is important to remember practise....practise....practise*****

- **PREPARATION**
  - Plan carefully the use of instructional aids
  - Make sure that the aids can be seen clearly from all areas of the room
  - If you write, write clearly
  - Use color for emphasis

AND MOST IMPORTANTLY:

LOOK HANDSOME AND BE ENTERTAINING

DAGHANG KAAYONG SALAMAT!!

Annex 2-2. Ang Trainer at ang kanyang Iba't ibang Papel na Ginagampanan

1) Posisyon ng Kapangyarihan

Kapag ikaw ay naging trainer, magkakaroon ka ng posisyon ng kapangyarihan. Parte nito ang: a) pagtatakda ng mga gagawin ng mga trainee b) pagtatakda nga mga gawain sa iba pang trainee, c) bawiin ang mga gawain sa mga trainee, d) pagtatakda at pagtatalaga ng mga gawain sa iilang mga trainees, at e) pagsasagawa ng mga desisyon na may kinalman sa kinabukasan ng trainee.

2) Mediator

Ang mga trainer ay mga tagapamagitan para masiguro ang propesyonal na progreso at kabutihan ng mga trainees. Kailangan nilang pigilan ang mga sumusunod: a) diskriminasyon sa ano mang uri b) bullying at/o sexual harassment, c) pagaabuso ng alcohol, medisina atbp, d) pisikal na panganib (aksidente, atbp), e) isawalang bahala ang pisikal na kakayanan ng apprentice, at f) paglabag sa mga karapatan ng mga kalahok at paglabag sa mga regulasyon.

3) Mentor/coach

Sa iyong relasyon sa mga trainee, kailangan mong gumanap ng iba't ibang papel tulad ng guro at mentor/coach. Pero, ito ay depende sa pinili mong papel na gagampanan, pwede kang: a) sumuporta sa trainee/ maging inspirasyon sa trainee, b) humikayat sa trainee, c) hamunin ang trainee. Ang trainer din ay puwedeng tagasuri kung ano ang makukuha ng trainee mula sa training. Puwedeng gamitin ang modelong 'four steps' sa pagsusuri sa kakayahan ng trainee (Beginner, Experienced, Advanced, at Expert). Puwedeng gamitin ang mga kategorya mula sa modelong four step para magbigay ng feedback tungkol sa kanyang progreso. Dapat regular na suriin ang pagganap ng trainee para makita ang kanyang kaalaman at kung may progreso ba ito. Ang pagsusuri at nakakatulong din sa pagtuturo sa mga traineeng mga pamantayan ng kalidad na isinasagawa sa mga kaukulang dako.

4) Technical trainer

May mga proseso sa trabaho na kung saan ang teknikal na training ay kailangan para mapagpasiyahan kung ang training ang isasagawa sa partikular na pamamaraan. Ang mga sumusunod na tanong ay puwedeng isaalang – alang:

(a) Karaniwan bang ginagawa ang trabaho ng mabilis o imposible ba ang paggamit ng mga manwal?
(b) Komplikado ba ang proseso ng trabaho?
(c) Kailangan ba ang malawakang pagpapakita o pagpapaliwanag bago ang gawain?
(d) Kailangan ba pagiging tumpak para maiwasang ang mga seryosong kinahihinatnan?
Kasali ba sa proseso ang mga pagpipilian at/o mga desisyon?
(e) Does the process involve many choices and/or decisions?

Annex 2-3. Facilitation Skills

1) Ang Maraming Papel ng Facilitator

Ang facilitator ang gumagabay sa mga tao sa pagtatakda ng mga layunin at sila rin ang gumagabay sa mga kaganapan na base sa matagumpay na konklusyon. Bilang isang facilitator, siya ang tumutulong sa grupo ng tao na maintindihan ang kanilang karaniwang layunin at tumutulong sa kanila sa pagpaplano kung paano makamit ang mga layunin, Habang gingawa ito, ang facilitator ay mananatiling walang kinikilingan, ibig sabihin ay hindi siya papanaig sa isang posisyon sa mga pag – uusap.

Figure 1. Ang papel ng facilitator

2) Mga pangunahing tungkulin at responsibilidad ng Facilitator

Ano ang mga karaniwang papel at responsibilidad ng isang facilitator?

1. Dumating ng maaga

Ang Facilitator ay dapat dumating ng maaga sa lugar ng pagdadausan isang oras bago mag – umpisa ang aktibidad para ihanda ang mga materyales at mga kagamitan

2. Paghahanda sa Sarili

Maglaan ng 15 minuto bago magsimula ang aktibidad para ihanda ang iyong sarili – pisikal at pangkaisipan

3. Panatilihin ang Focus

Para ang mga kalahok ay nasa ayos para sa mga impormasyon at mga gawaing ibibigay

4. Palawakin ang Partisipasyon
Himukin ang lahat ng mga kalahok na sumali sa proseso ng pag –aaral

5. Panatilihin ang Kapaligiran
Gumawa at panatilihin ang ligtas at positibong kapaligiran para sa pag – aaral

6. Walang Pinapanigan
Tratuhin ang lahat ng kontribusyon galing sa mga kalahok ng patas at pantay – pantay; siguraduhin na walang kalahok ang nabigyan ng pabor o hindi pinapansin at na ang impormasyon ay inilahad ng tama

7. Himukin na Makilahok
Himukin ang mga kalahok na aktibong sumali sa mga aktibidad at sa mga pagtatalakay

3) Mga pangunahing tungkulin at responsibilidad ng Facilitator
Ang mahusay na paraan sa pagtuturo ay dapat:
- Tumutulong sa mga kalahok para sila ay maging komportable sa bawat isa
- Gumagawa ng masaya at kawili–wiling kapaligiran sa pag–aaral
- Pataasin ang antas ng enerhiya ng mga kalahok sa workshop
- Magsagawa ng mga kawili-wili at may bungang mga aktibidad

4) Mga katangian ng isang mahusay na facilitator
Ano ang mga katangian ng mahusay na facilitator? Balikan ang iyong mga maganda, hindi maganda at magaling na mga karanasan bilang halimbawa. May iba't ibang katangian ang mahusay na facilitator, ang ilan dito ay:
- pagiging handa sa bawat klase
- malinaw na ipinapaliwanag ang layunin ng kurso
- ilahad ang leksyon sa kawili–wiling paraan
- siguraduhin na may kaugnayan ang nilalaman ng leksyon
- may malawak na kaalaman sa paksa
- malinaw ang mga paliwanag
- pinupuri ang mga kalahok na naka–ambag sa mga pagtatalakay
- pagbibigay diin sa mga mahahalagang punto ng lecture/pagtatalakay
- pagiging masigasig, magiliw at marunong makibagay
- may kakayahang sumagot ng mga hindi inaasahang mga tanong
- trinatrato ang mga kalahok ng may respeto
- hinihikayat ang mga mungkahi para mapagbuti ang pagtuturo
- sinusuportahan ang maraming pagtatalakay sa klase
- nagagamit ang oras ng mabuti

Appendix 2-4. Presentation Skills (Husay sa Paglalahad)

Ang husay sa paglalahad ay kailangan upang epektibong mailahad ang mga mensahe sa iba't ibang mga kalahok. Ito ay sumasaklaw sa iba't ibang aspeto tulad ng:

- malinaw na pagsasalita
- ang pananalita ay nasa tamang bilis
- humihinto (pause) kapag kinakailangan
- sinasadyang bigyang diin ang mga mahahalagang punto, inuugnay ang mga iba't ibang parte at mabisang gumagamit ng mga paglalarawan
- ginagamit ang lokal na lengwahe/dyalekto
- kahit ano pa man ang gagamitin mo sa pagtuturo, laging tandaan: Praktis… Praktis…Praktis.

Ang paghahanda sa paglalahad ang pinakamahalagang aspeto para sa matagumpay na presentasyon. Ito ay ilan sa mga paraan sa pagbibigay ng presentasyon:

- Kilalanin ang iyong mga tagapakinig

  Maaring pareho ang pangunahing mensahe para sa lahat pero kapag kilala moa ng iyong mga tagapakining, maari mong baguhin ng bahagya ang mga impormasyon para maramdaman nila na ito ay inihanda lamang para sa kanila

- Layuning makabigay ng malinaw at maayos na paglalahad

  Kahit na ang okasyon ay pormal o hindi, dapat alam mo kung ano ang iyong eksaktong sasabihin at ang ayos ng pagkakasabi nito. ang malinaw na ideya at mabuting pagkakaayos ay magreresulta sa masigla, lohikal at nakakahimok na mensahe.

- Sagutin ang mga tanong

  Kung ang mga tanong ay maikli, direkta at may kaugnayan – sagutin ang tanong ng maigsi; wag ng hihigitan pa ito. Kung ang tanong ay nasa labas ng sakop ng presentasyon – sabihin na dahil ito ay labas sa paksang pinag-uusapan, puwede itong talakayin ng sesyon.

- Isagawa ang 'Lighthouse Technique'

  1. Daanan ang mga tagapakining gamit ang inyong mata, tignan ang bawat tao ng 2 – 3 segundo lamang;
  2. Bigyan ang mga kalahok ng impresyon na personal mo silang kinakausap; at
  3. Iwasang tumingin lang sa iisang kalahok o tumitig sa isang punto ng dingding o sahig

(1) Mga pamamaraan ng paglalahad

Ang mga sumusunod ay mga paraan para itaguyod ang produktibong pag-aaral sa pamamagitan ng pakikilahok para sa mga farmer trainers:

1. Lecture/ pagtatalakay

1.1. Illustrative Lecture: Dapat isalarawan ng mga tagapag-turo ang kanilang mga paksang tinatalakay at gumamit ng power point presentations (kung maari) para sa mga farmer trainers, ito ay magiging mahalaga upang hasain ang mga natutunan ng mga kalahok habang sila ay nakikinig.

1.2. Interactive Talk: ang tagapagturo, sa paraang ito, ay susubok magtanong sa mga kalahok at sasagutan ang mga tanong ng mga facilitators. Heto ay pagbabahagi ng karanasan noong naisagawa ang pilot project ng Fishery Sector.

2. On-the-Job Training: bilang bahagi ng pag-aaral, ang field practicum ay dapat maisagawa upang ang pangangalap ng kaalaman ay sa pamamagitan ng pagtingin, paggawa at pag-iisip, na mas gustong gawin ng mga adult learners kaysa sa mamalagi ng matagal sa mga silid – aralan

3. Selecting the right method: may mga tanong na dapat isaalang-alang sa pagpili ng tamang paraan at tamang paglalahad ng mga impormasyon:

(1) Ano ang kakayahan at antas ng kaalaman ng grupo?

(2) Ilang trainees ang nasa grupo?

(3) Ilang oras ang gugugulin?

(4) Anong mga kagamitan sa training ang kailangan?

(5) Meron ka bang karanasan sa paggamit nitong mga kagamitan sa pagtuturo na may kompiyansa?

(6) Alam mo ba ang limitasyon ng mga kagamitan sa pagtuturo?

(7) Lahat ng mga kagamitan na nasa iyo ay dapat magamit para mapahusay ang pagtuturo upang makabenepisyo ang mga trainees.

Appendix 3. Farmer Trainers Evaluation Sheets

Appendix 3.a. Evaluation Form para sa Level of Achievement ng Farmer Trainer

(Isinasagawa pagkatapos ng kada training/aktibidad ng mga beneficiaries)

Petsa ng training:
Title ng training:
Lokasyon:
Pangalan ng Farmer Trainer (FT):

Paki – markahan ang antas ng inyong pag – ayon sa kung ano mang learning outcomes ang nakamit mula sa pagsasanay.

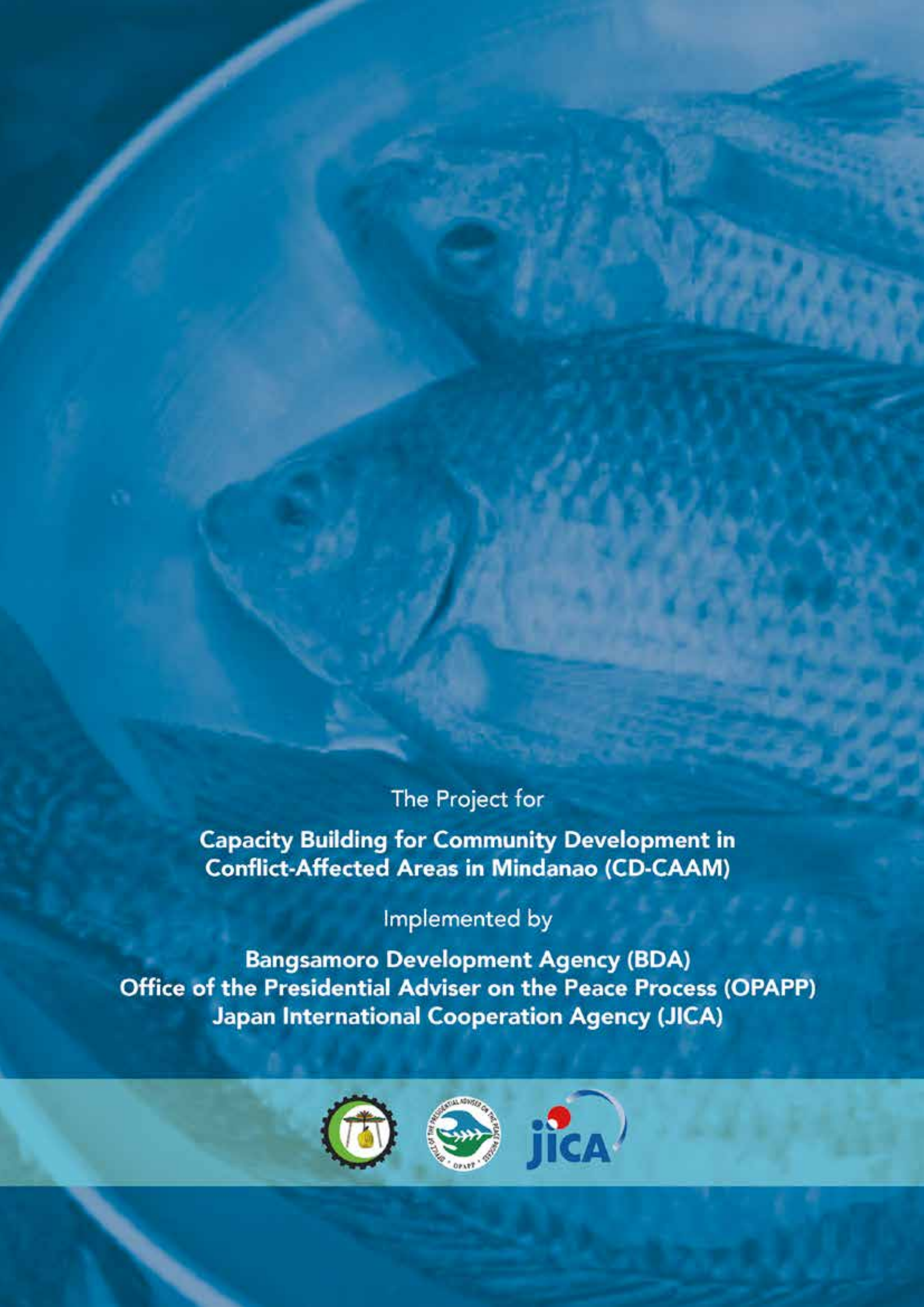
Pangunahing Bagay para sa Ebalwasyon	Pinaka mahusay	Mas Mahusay	Mahusay	Kailangan ng Pagbabago
Paghahanda ng visual aids/ training materials				
Magagamit ang impormasyong inilahad tungkol sa Fish Farming				
Farmer trainers presentation skill				
Farmer trainer delivery method				

Magbigay pa ng mga karagdagang komento:

Appendix 3.b. Pansariling Ebalwasyon para sa mga 2nd Beneficiaries

Technical Subject	Technical Achievement Level				Average Achievement Score
	A: Kaya naming gawin ng mag - isa	B: Kaya naming gawin ng may patnubay	C: Meron lamang kaming kaunting nalalaman	D: Wala kaming kaalaman	
Pond/ Cage Construction					
Fingerlings Transport and Stocking					
Conduct of Sampling					
Feeding Management					
Harvesting					
Processing of dried fish					
Marketing					
Tilapia breeding					

[2] *Taken from final report of pilot project in fishery sector.*



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