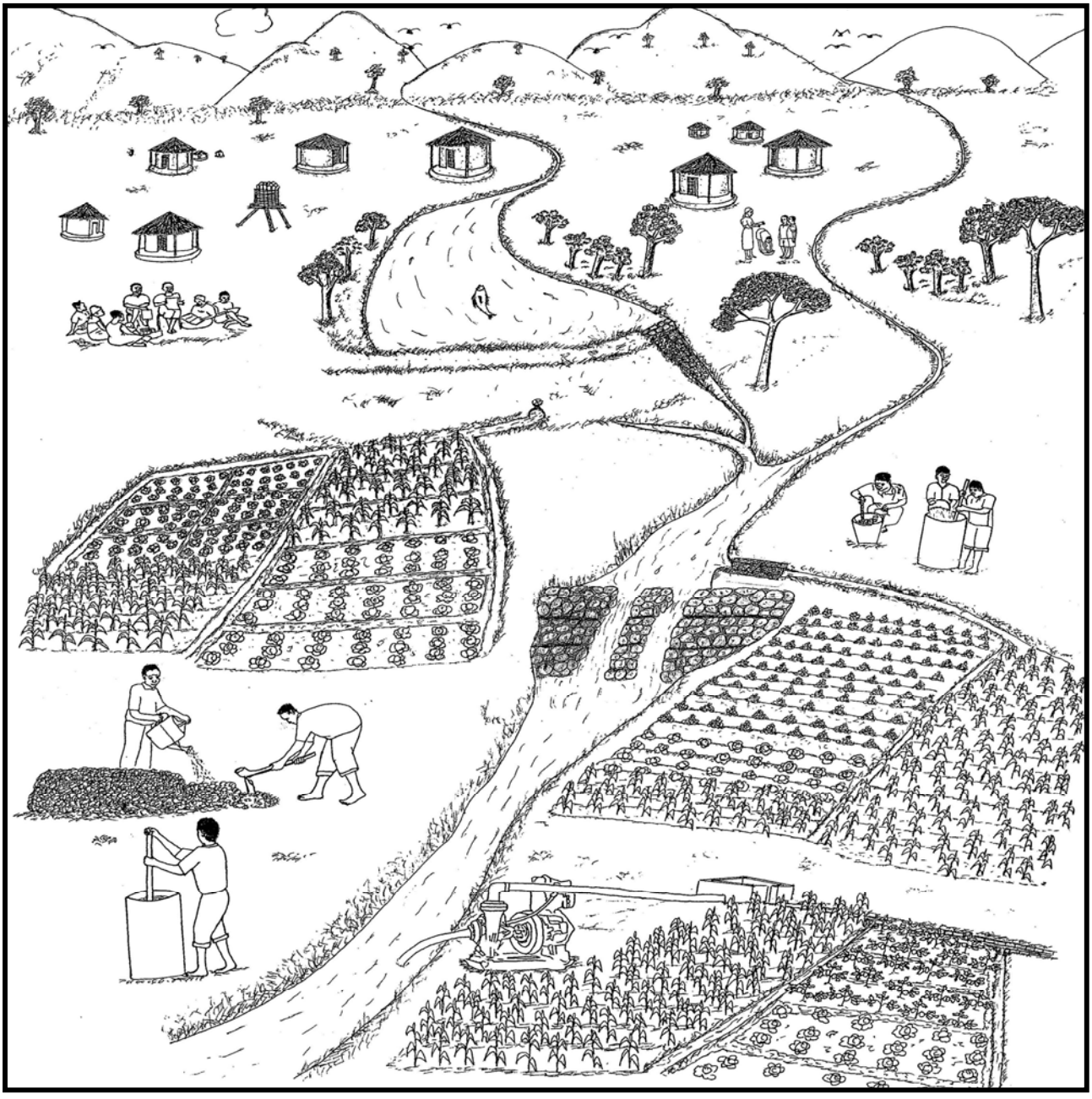
SELF-HELP IRRIGATION, A BRIDGE TO IMPROVING RURAL LIVELIHOOD

Development of Small-Holder Farmers' Capacity, a Key to Self-Reliance and Sustainability of Medium-Scale Irrigation Schemes



AUGUST, 2009

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF IRRIGATION SERVICES (DOI), MOIWD, MALAWI

DEPARTMENT OF AGRICULTURAL EXTENSION SERVICES (DAES), MOAFS, MALAWI

1. Introduction

It is not a hidden fact that irrigation has become a talk of the Nation in Malawi in the recent years. With land degradation due to over-population (about 14 million people-2008 National Statistical Office Report) coupled with climatic change, most reports have indicated that Malawi has to produce more through irrigation for its growing population.

It is therefore a general need that small-holder farmers should focus on subsistence irrigation farming for the dry season cropping in order to improve food security and their livelihood. Past experience indicates that, a number of irrigation schemes have died due to lack of CAPACITY BUILDING and TECHNOLOGY TRANSFER from Government of Malawi to FARMERS (owners of the project) with support from Donors.

In order to achieve successful and sustainable medium-scale irrigation schemes, issues highlighted above should be addressed. This should be supplemented with a combined effect smallholder farmers' self-help mentality and support of the Government of Malawi.

2. Medium-Scale Irrigation Technology

2.1. What is Medium-Scale Irrigation?

A Medium-Scale Irrigation Scheme is defined in the following;

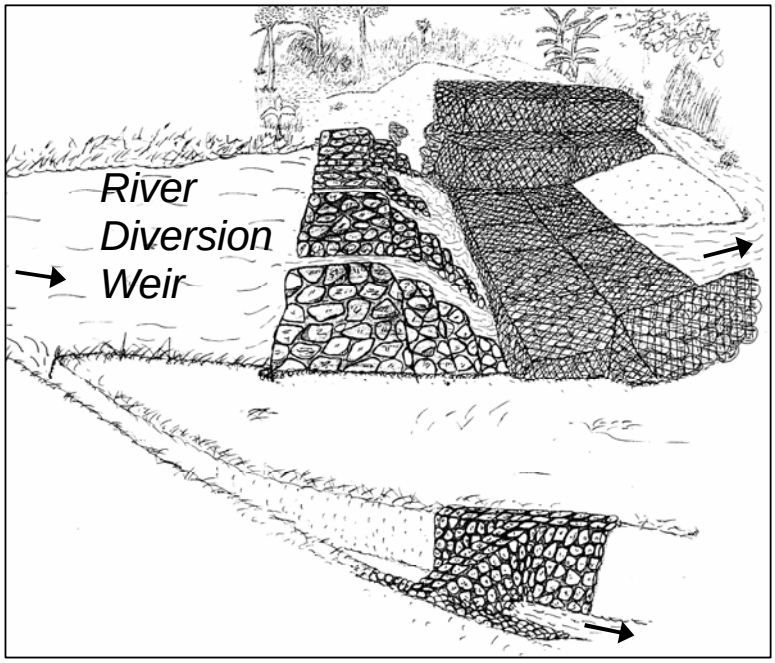
- *Irrigation service area between 10 ha and 100 ha.*
- *Intake facility which is designed by permanent structure to tap water continuously from the water source.*
- *Operation and maintenance (O&M) of irrigation facilities to be done by farmers.*

- *Available water source for a year-round irrigation practice.*

2.2. Types of Irrigation Technology under Medium-Scale

Medium-scale irrigation technologies are categorized into; 1) river diversion weir system, 2) water impounding dam system, and 3) motorized pump system.

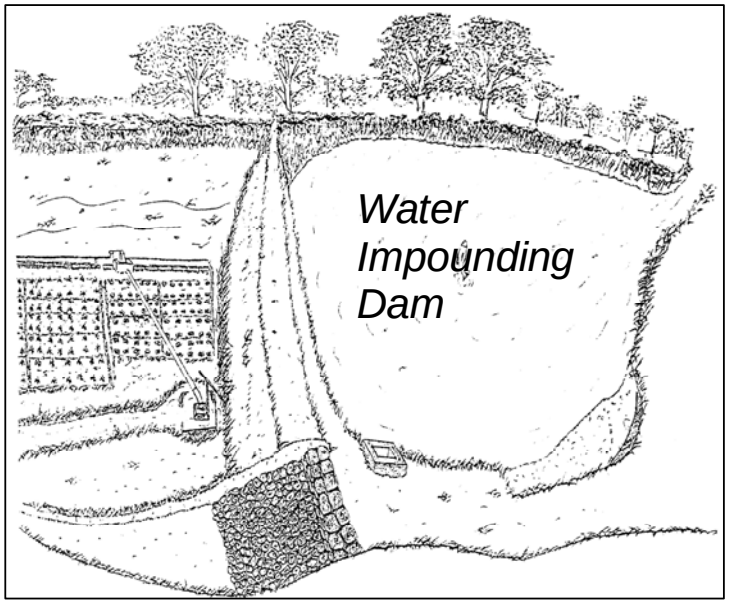
1) River Diversion Weir System



River diversion weir is one of the common irrigation systems in Malawi normally seen along rivers and streams in rural areas. This system is comprised of several structures including diversion weirs, intake structures, riverbed and riverbank protection structures and irrigation canals.

The size of diversion weirs varies according to width and slopes of rivers/streams due to topographic conditions and river basin areas. The diversion weir must be strong enough against floods that frequently occur during the wet season in Malawi.

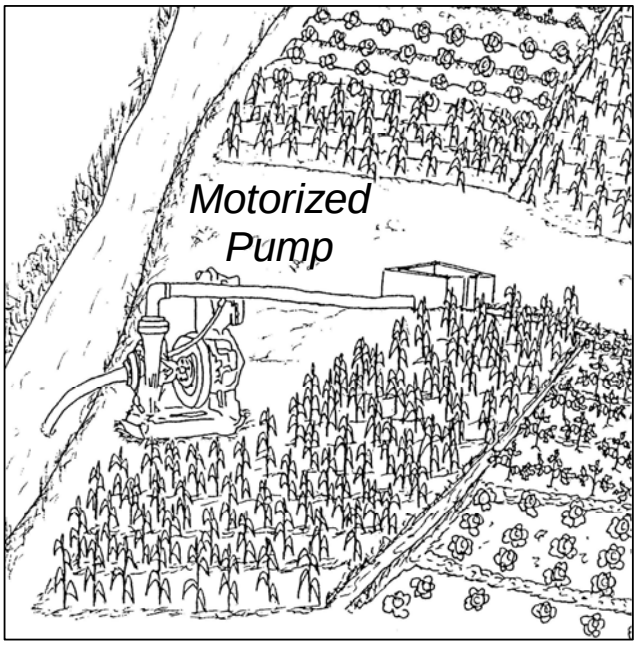
2) Water Impounding Dam System



Water impounding dam system is an irrigation type which impounds river water in a small dam to use for irrigation. In order to supply water to farmland from the dam, several methods can be applied such as gravity, treadle or motorized pump, watering can, and even residual moisture. Water management of the irrigation system becomes very vital in the dry season cropping and is done by controlling water level in the dam.

3) Motorized Pump system

The system can be used at any topographic condition as long as water source and irrigation area are favourable. However, the most critical issue with the system is irrigation fees' collection from farmers' group members for O&M of the pump facility. Most farmers also lack skills and knowledge to operate the



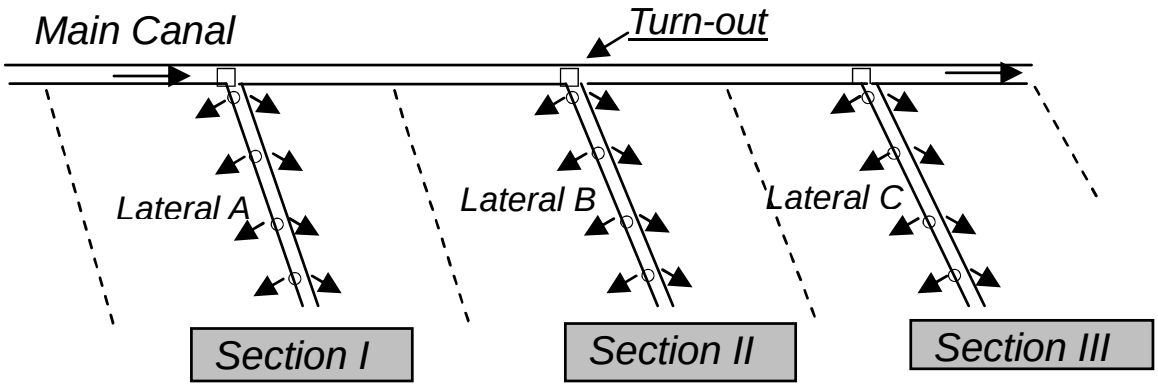
pump equipment. Therefore, the motorized pump system should be carefully selected.

3. Systems of Water Distribution to Farmland

Two types of water distribution methods are used for medium-scale irrigation scheme; a) Rotational distribution, and b) Simultaneous distribution.

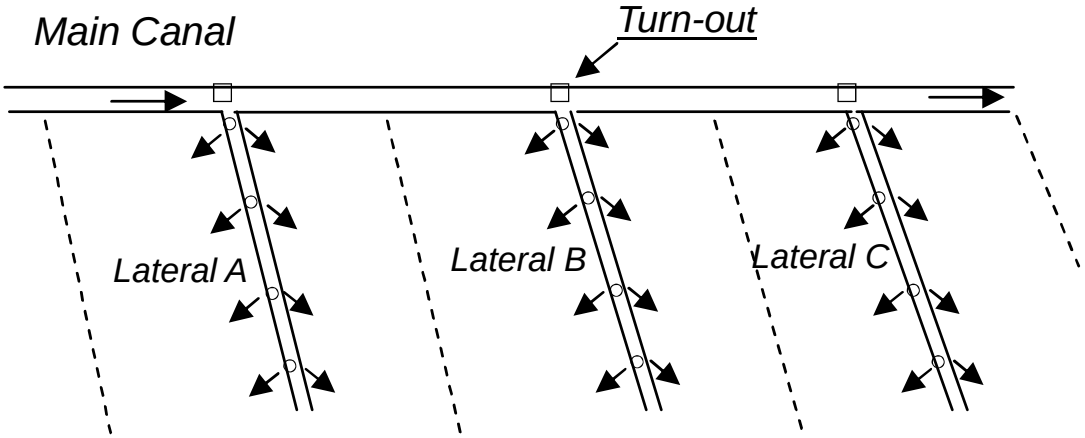
a) Rotational Distribution by Section

Irrigation water is conveyed by rotation to each section through the main canal e.g. Section I for Monday, Section II for Tuesday, and so on.



b) Simultaneous Distribution to All Sections

Water Supply to all farmland is done simultaneously



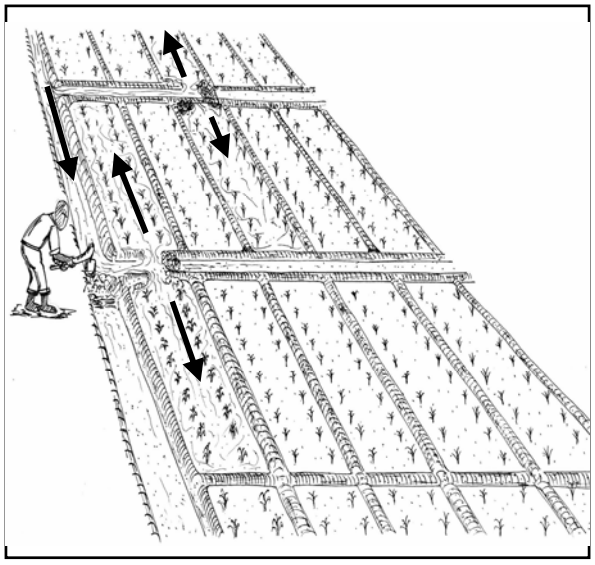
4. How to make Plot Layout for Irrigation

According to the irrigation water supply methods, plot lay-out is classified as follows, depending on the crops to be grown and topography in an area.

For upland crops; Basin irrigation and Furrow irrigation
For paddy rice; Plot-to-plot irrigation

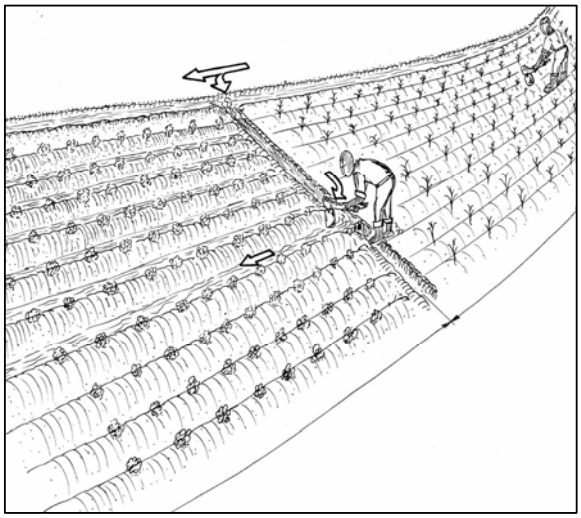
4.1 Basin Irrigation

A basin is a levelled area of land surrounded by earth embankments, which is totally flooded during irrigation. Irrigation water is held on the surface of the basin until all water infiltrates. This system is the most common method of surface irrigation, and suited for any kinds of crops.



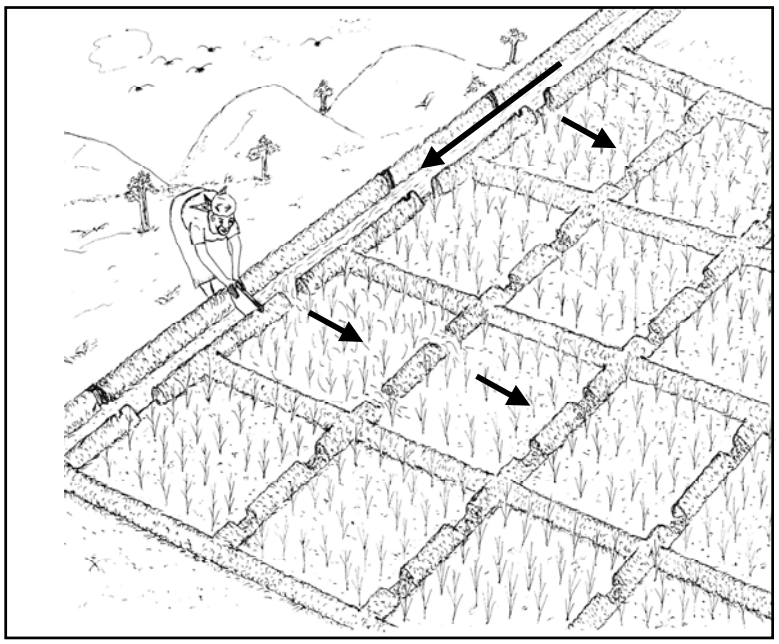
4.2 Furrow (Ridge) Irrigation

Water is led to the furrow along contours or relatively very low uniform slope. Water moves by capillary action into the ridges and then absorbed by roots. This method is best suited to row crops such as maize, beans, onions, tomatoes, potatoes, etc. Furrows are mostly used in water logged



conditions to avoid rotting of the roots during wet season.

4.3. Plot-to-Plot Irrigation



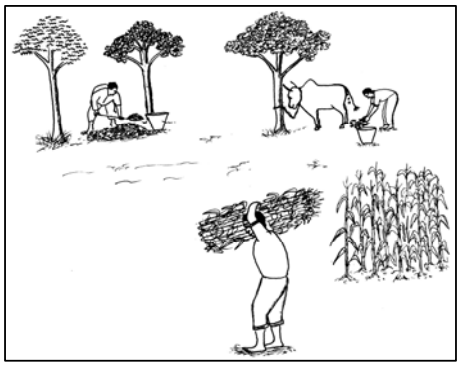
Irrigation water is conveyed through small on-farm ditches and diverted to each field close to the on-farm ditches. Water in the fields is then supplied continuously from upper portion fields to lower portion fields through notches provided on the levee by the form of plot-to-plot irrigation. The method is applied to the paddy crop cultivation.

5. New Organic Farming Technology

5.1. Windrow Compost for Basal Dressing

“Windrow Compost (here-in-after referred to as Windrow)” is a kind of efficient made and quick effect compost, suitable for a Medium-Scale Schemes. Windrow is made by laying different materials into a heap of 1m width by 1m height. There is no limit to the length of the heap and depends on the availability of raw materials. The compost is ready for application between 2-3 months. Windrow contains almost same levels of nitrogen and other nutrients like that of Bocashi compost.

5.1.1. Materials to Make Windrow



Materials required include; water, animal manure, virgin soil, ant-hill soil, crop residues, Legume crop residue or Legume tree leaves, maize husk and wood ash.

5.1.2. Steps to Make Windrow Making

(a) Initial Site Preparations

Chop the crop and legume crop residues and grasses into small pieces in order to increase surface area for microbial activities for fast decomposition and to ease mixing process. Flatten wider space that the heap will cover.

(b) Heap Making

<u>Layer Formation</u>; lay the following materials in the following order, on top of each other; (i) Un-chopped maize stover (ii) Green Leaves (iii) Maize stover pieces, (iv) Moisten maize husks, (v) Animal manure, (vi) Legume crop residue (vii) Moisten wooden ash. (viii) Virgin soil

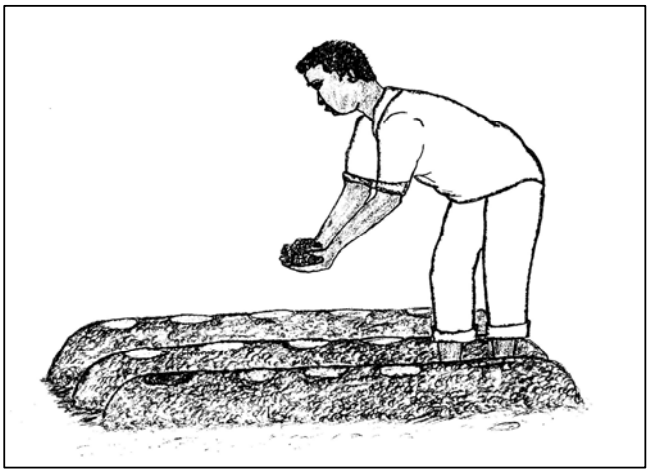
<u>Water Addition and Compression</u>; before step (iv) and (vii), add at least 4 watering cans of water and trampled on the layers to reduce pore spaces. After compression, each layer reduces almost by half.

<u>Covering</u>; repeat the process until a

height of 1m is attained after which cover the heap with 5cm of anthill soils. Then cover the heap with a polyethylene plastic paper to keep the moisture of the heap and maintain the heap for further 30 days.

Mixing; mix the heap after 30 days and cover the mixed heap with the plastic sheet again and maintain for additional 30 to 60 days to ensure complete decomposition of the mixed heap materials.

5.1.3. Application of Windrow



Dig holes of about 10-15cm depth. Apply two handfuls per planting station as basal dress soil nutrient for maize and most kinds of vegetables. Incorporate Windrow with soils and plant crops a week before planting.

5.2. Liquid Bocashi for Top- dressing

Liquid Bocashi is a unique organic nutrient supplier, which can be applied as a top dressing fertilizer for vigorous and healthy plant growth. Liquid Bocashi needs only 10-12 days to mature as liquid type. Factors that reduce maturity period for Liquid Bocashi are: 1) Incorporated yeast and wood ash which

facilitate decomposition of plant residues 2) keeping the temperature at less than 50 centigrade during the decomposition process.

5.2.1. Materials for making Liquid Bocashi

Materials required include; 200lit drum, water, animal dropping wood ash, maize husks, and commercial yeast. Absence maize husks ingredient requires longer period to reach maturity.

5.2.2. Steps to make Liquid Bocashi

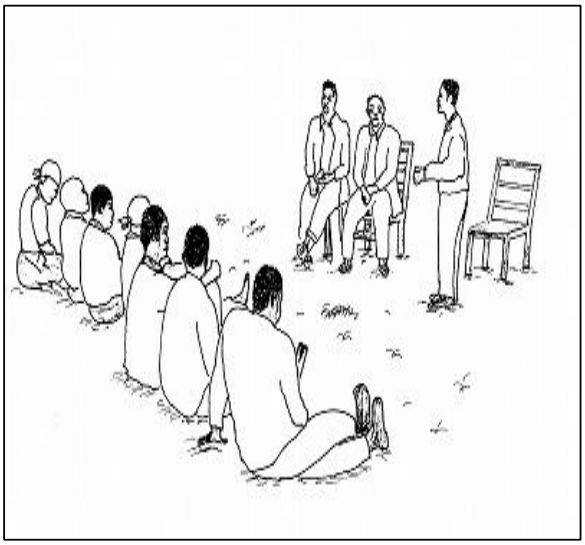
Fill drum with 150lit of water. Mix 1 pail of maize husk with 80g of yeast and moisten the mixture. Pour the mixture into the drum of water and stir thoroughly. Add 1 pail of wood ash and any kind of animal droppings, then cover the drum with Hessian sack and stir twice a day for 10-12 days until they ferment.

5.2.3. Application of Liquid Bocashi.

It is recommendable that farmers apply Windrow Compost as basal dressing (before planting) then Liquid Bocashi as top-dressing every two weeks after planting. Dig holes of about 10cm depth between planting stations with a wooden stick and fill 100ml of Liquid Bocashi. If there is a fear of rain within 30 minutes, cover the hole about 3cm depth of soils on top of

Liquid Bocashi not to be lost by infiltration.

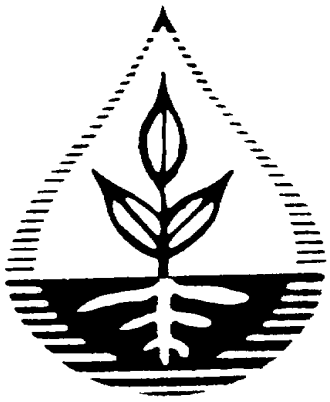
6. Formation of Water User Association



In order to achieve an efficient and systematic Medium-Scale irrigation in dry/wet season cropping, farmers are advised to formulate a Water Users Association (WUA). This is done by the selecting a committee from the participating farmers. The main activities of WUA are shown below:

- *To establish and amend, if necessary, the rules and regulations of the WUA.*
- *To have periodical meetings to discuss about management of their irrigation scheme.*
- *To collect membership, water fee to function the committee's activities.*
- *To keep records of finance and cropping data to use for future decision making and improvement.*

AEDC/AEDO, Irrigation Officer, and other relevant officers should provide the committee members with a practical training regarding those activities so that the WUA are more activate and sustainable.



JICA

This leaflet was prepared under:

THE STUDY ON THE CAPACITY DEVELOPMENT OF SMALLHOLDER FARMERS FOR THE MANAGEMENT OF SELF-HELP IRRIGATION SCHEMES (MEDIUN-SCALE) IN THE REPUBLIC OF MALAWI

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