COVAMS

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Survey result on Soil Erosion Control Technologies in Malawi

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1. Summary

To identify practiced or recommended technologies on soil erosion control in Malawi, the project conducted a survey. This paper is a compilation of the survey results.

Land Resource Conservation Department under Ministry of Agriculture is the one which deals with soil erosion control technologies. This department has so far promoted contour ridges, marker ridges with Vetiveria grass and box ridges to agriculture extension officers who are assigned to where those technologies are required. However, it wasn't only those technologies which were developed in this country but also some other technologies are developed such as Swalles (water harvesting method), Pit planting and Infiltration trenches as well as some technologies which integrated soil fertility and land conservation methods. In the integrated methods, "Reducing tillage", "Ground cover", "Rotation" which includes agro-forestry utilization and "Manure utilization" are included.
ICRAF is particularly, dealing with soil fertility and structure improvement technologies with agro-forestry, with conviction that soil structure improvement will contribute greatly to the prevention of soil erosion.

The technologies mentioned above are currently being promoted according to the department. Nonetheless, they are not found practiced in the project target areas. The technologies appear like appropriate for the farmers to practice and could be effective for controlling soil erosion. The consequence of fewer practices of the technologies by the farmers could attribute to inadequate dissemination of the technologies. Therefore, it must be taken into account how to disseminate them to the farmers or community.
Gully prevention measure can be the same as soil erosion control measures. Unfortunately, adequate gully control measures are not mentioned by the interviewee except utilization of Vetiveria grass. However, several appropriate methods are introduced in a reference which was obtained during the survey trip. Hence, the matter is only how to disseminate the technologies to the farmers.

2. Purpose

COVAMS project aims at environmental conservation in the areas of Shire River catchment in order to promote sustainable utilization of forest resources and soil conservation through vitalizing community. Eminently, soil conservation is urgent and important issue for both the government of Malawi and the community in terms of mitigation of siltation to Shire River for protection of Nkula power plant and source of water in Blantyre, and sustainable food production respectively.

However, observing the activities of farmers in the target areas of the project, it can be said that inadequate measures for soil conservation are put into practice by them.

On that account, the project decided to collect information on the above mentioned technologies from concerned institutions so that an inventory of practical soil erosion control technologies fitting to farmers in the target areas will be produced.

3. Survey

3.1 Method

The project targeted four institutions, District Agriculture Development Office, Land Resource Conservation Department, World Agro-forestry Centre (ICRAF) and Malawi College of Forestry and Wild Life for visitation.
Interview with officers, researcher and lecturers was applied to collect information.
The points of information collection can be found in attached document.

3.2 Soil erosion control technologies

The technologies basically require construction of structures. The following technologies are under promotion currently by Land Resource Conservation Department.

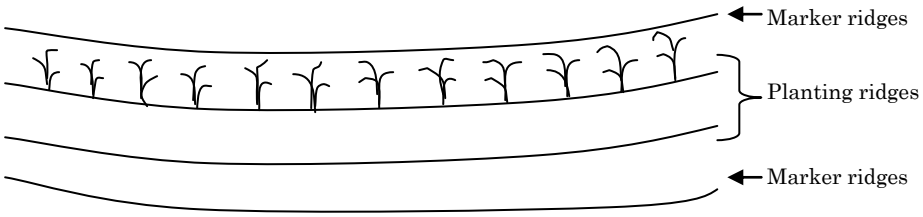
- Contour ridges

Ridges are made in alignment of contour of the place and crops are to be planted on them. This method is well disseminated in Southern region although the planting alignment is not really matching with the contour.

- Marker ridges

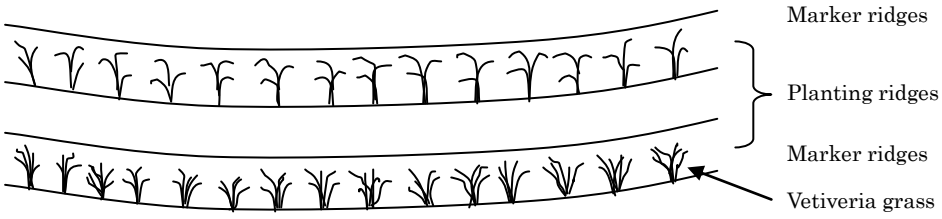
This method is used in combination with contour ridges. In this method, farmers need to construct ridges in alignment with the contour around 5m apart in between the markers although the distance depends on the angle of the inclination. Crop like maize

is to be planted in between the markers in alignment to the contour. This method can sometimes be found in the field but not so many farmers are adopting it.



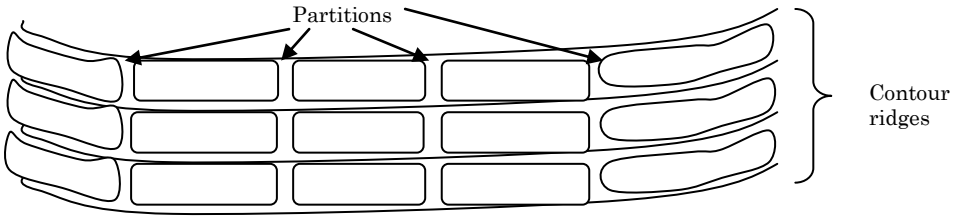
- Markers ridges with Vetiveria grass

This method is almost the same as marker ridges. The only difference is to plant Vetiveria grass on the ridges which help to control water flow in the field. The advantage of this method is that the structure becomes almost permanent and the Vetiveria can trap soil which is washed with sheet erosion. The adaptation ratio of this method by the farmers however, is very low in the target areas, despite the fact that this was introduced about 10 years ago by agriculture extension officers.



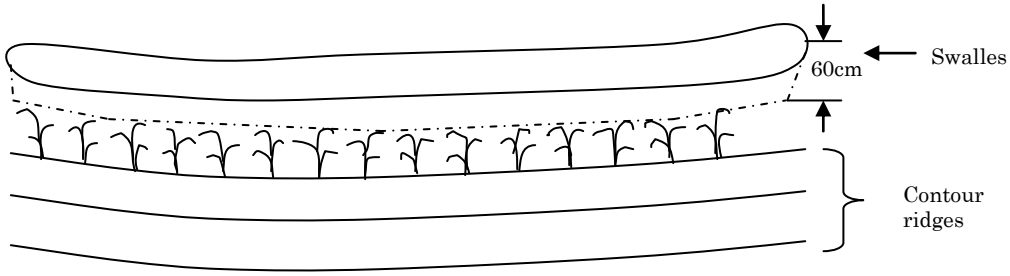
- Box ridges

This method is also usually in combination with contour ridges. Partitions in between ridges are made so that rain water can be held in the box and prevent sheet erosion which occurs in parallel direction with the ridges.



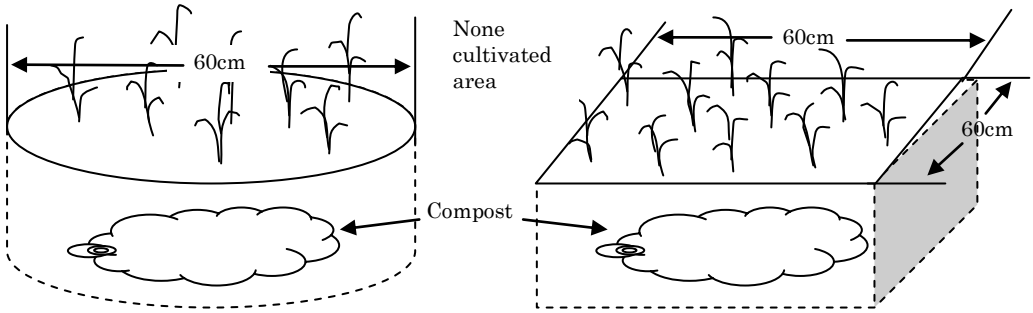
- Swalles

This is a trenched structure with about 60 cm in depth and 20 to 30 cm in width in the field in order to harvest rain water efficiently. Simultaneously, the trench will be able to trap soil washed with sheet erosion and at the same time, it works to maintain soil moisture. This structure can be made with ordinary hoe.



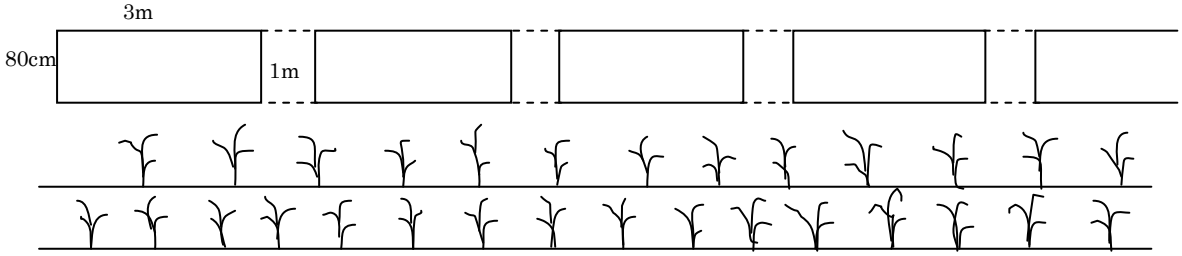
➢ Pit planting

Farmers need to make pits of 60 cm in diameter or 60cm x 60cm square with about 1m in depth. Compost should be put inside the pit and covered with soil for planting crops. The advantage of this method is that the pit will be able to break ground pan (hard soil layer of ground) so that water will be able to penetrate into deep soil. On the other hand, sheet erosion can be minimized because the farmers are not supposed to cultivate other part of the field. The disadvantage is that weed control becomes a little troublesome. It is effective if herbicide can be utilized. Another disadvantage is that digging of the pits takes time although the pits can be utilized for several years once the pits are made.



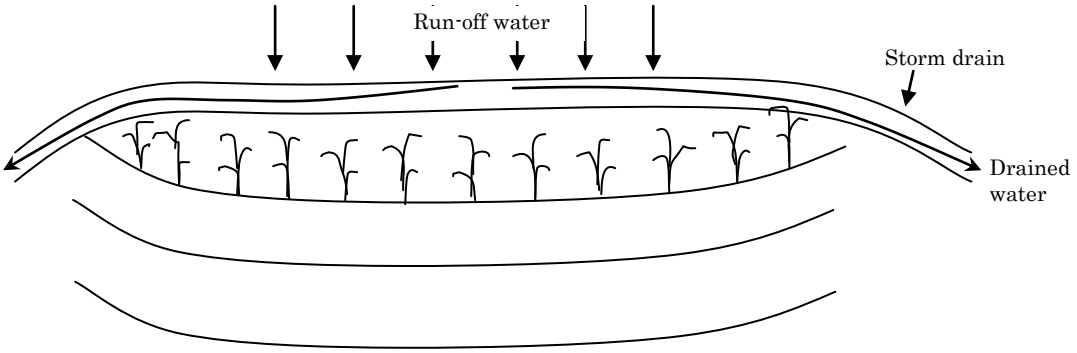
➢ Infiltration trenches

This method is also for water harvesting purpose, with a little larger scale trenches than Swalles. The ground is trenched with a size of 3m x 80cm to 100cm in width, and continues to construct the same size of water trapping structure. It depends on a decision of a famer whether to make a continuous trench or give an interval of 1m in between the structures of the above mentioned 3m x 80cm.



- Storm drain

This technology is to make a trench on the upper side of a field to drain rain water in order to protect soil of the field from run-off water coming from upper side.



3.3 Soil structure improvement technologies (integration of soil fertility and land conservation)

By improving soil structure physically, the erosion will be prevented effectively according to ICRAF staff. Methods to be introduced in this section are how to improve soil structure.

- Reducing tillage

One of the methods in this category is pit planting since it does not cultivate other places than the pit itself. There is another way of pit planting with smaller pit structure (Pot holing method in Zambia). The farmers are to make small holes in the field according to the spacing required for a crop. The rest of the field other than the holes will not be cultivated. However, this pot holing method is not recommended for the field which is on the steep slope because it is difficult for the rain water to penetrate into the soil.

- Ground cover

Residues like maize stalk can also help to prevent or minimize sheet erosion and to help to maintain soil moisture in the soil and turn into manure by using as mulching material. The field preparation in mulching must be done during dry season, putting the materials in between previous planting ridges. Seeds of maize are to be sawn at where mulch was done, in other words, saw the seeds in the furrow in between the previous ridges. As additional effects of mulching, it can be said that the materials will help to maintain soil moisture and add organic matter in the soil when they are decomposed.

Utilization of some other crops which will not grow higher may be taken into

consideration. Crop like groundnut variety which does not form any nut could be effective in erosion prevention and weed control.

- Rotation

Crop rotation and improved fallow are part of this method. Unfortunately, these methods are not fitting to the southern region because the size of the farmers' land holdings is quite small so little chance to rotate crops.
However, farmers can still consider this method through intercropping with some of agro-forestry species. Some of farmers in southern region are successfully producing crops with this method. The species which are recommended are *Tephrosia* spp., *Sesbania sesban* for shorter term and Pigeon pea for medium term, lastly *Gliricidia sepium* for longer term in utilization. *Thephrosia* spp. and *Sesbania sesban* can be incorporated into the soil after 6months, and Pigeon pea takes about 1 year while *Gliricidia sepium* takes for 2~ 3 years for its utilization.

- Manure utilization

Currently the Land Resource Conservation Department is recommending using "Chimato". With this method, soil is put between layers of organic matters and at the end; the surface of the mound is smeared with soil. On the other hand, many of farmers know how to make compost already. Hence, the matter is that farmers need to collect lots of organic matters.

4. Recommendations

In southern region, many of farmers are practicing the technologies such as contour ridges and manure application. Nonetheless, the concerned siltation to Shire River seems not effectively being reduced. After this survey, the project found more technologies which could be effective to address the problem although they are not disseminated effectively to the farmers.
Application of single technology may not be effective. Therefore, combination of those technologies should be considered to make it more effective so that they will attract more famers to practice them, especially, soil erosion control technologies with combination of soil fertility improvement species. Therefore, the project should design several methods combining some technologies in order to recommend the farmers in the target areas. During the survey, the project has found many human resources concerning soil conservation technologies. Their involvement for the designing may be significantly beneficial for both the farmers and the project.

However, farmers will not adopt any technologies without seeing tangible result or effectiveness. To break through the current situation in the target areas, development of demonstration plots of technologies in the target villages could be significant.