SOIL CONSERVATION IN COCONUT LANDS

Soil conservation is an extremely important agricultural practice in coconut lands, and the growers should pay close attention to it in order to maintain productivity and profitability from coconut lands. The main objective of this practice is to prevent loss of fertile soil by surface run-off during rainy periods.

Coconut lands are mostly flat or have a very gentle slope and therefore it is generally believed that these lands do not suffer from soil erosion. However, heavy rains remove large amounts of fertile top soils in a relatively short time even in a land having gentle slope.

Therefore, soil conservation practices have to be essentially adopted in sloping lands. Soil conservation measures also have additional benefit of conserving soil moisture.

Agricultural practices for soil conservation in coconut lands.

1. Ground cover by coconut and other crops / grasses

Soil erosion is generally high on bare soil surface. Coconut canopy with correct density and proper inter cultivation cut down the speed of raindrops fallen on the ground. Further, the roots of those crops enhance water percolation to the deep layers of soil. Grasses, other cover crops and controlled weeds also reduce surface runoff (figuer 1).

Figure 1: Cover crop

In this regard the following practices are important

- Mulching the manure circle
- Always maintain the soil surface fully mulched with organic materials and crop residues
- Avoid burning of plant materials suitable for mulching.
- Control over grazing by cattle or any other animal.

(Cover crops such as Pueraria and Calapagonium act as live crop mulch and reduce the surface run-off and increase water infiltration percentage to the soil during the rain)

2. Contour drains

Contour drains are useful for reducing soil erosion and increasing moisture conservation in lands where the gradient is more than 1 in 10 (10%). There is evidence that in a gentle slope of 10%, a good cover crop or use of mulch could almost arrest erosion. Thus it would be seen that contour drains, which are costly, should be attempted only when required and not as a matter of routine. Contour drains should be laid carefully on the contour as otherwise the full benefit is lost.

Figure 2: Contour drain

Opening of contour drains

The contour could be traced with a simple A-frame or road tracer (figure 3). Once the path of the contour drain is traced, the drain can be cut. The contour drains should start at the upper side of the hill. The top of the drain should be 0.6 m (2 ft) wide and bottom should be 0.5 m (1.5 ft) wide. Such a drain will have slanting sides rather than vertical sides. The earth removed from the drain should be heaped up on the upper side of the drain to a height of about 0.5 m (1.5 ft) and spread over a distance of about 1 m (3 ft) (figure 4).

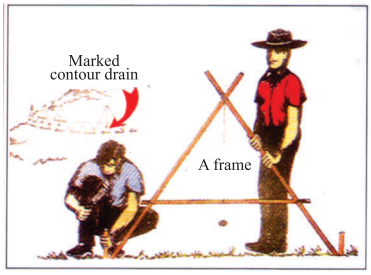

Figure 3: Marking of contour drains using A frame

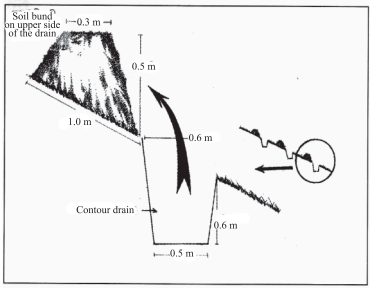

Figure 4: Cutting of contour drains

Contour drains should be perfectly flat in order to avoid lateral flow of water in the drain which will minimize soil movement. Creeping covers could be established on the bunds to preserve them.

Spacing of contour drains

Spacing of contour drains depends on the slope of the land, soil type and rainfall intensity. As a general rule, the guidelines given in the table could be used.

Slope	Intensity of slope	Distance
5%	1:20	40 m (130 ft)
10%	1:10	20 m (66 ft)
15%	1:7	15 m (50 ft)
20%	1:5	10 m (33 ft)

3. Contour bunds

Contour bunds are also useful for controlling soil erosion in sloping lands as an alternative to contour drains. Contour bunds are also built along contours with materials such as stones, husks etc. Spacing of contour bunds will be decided on the basis as for contour drains (figure 5).

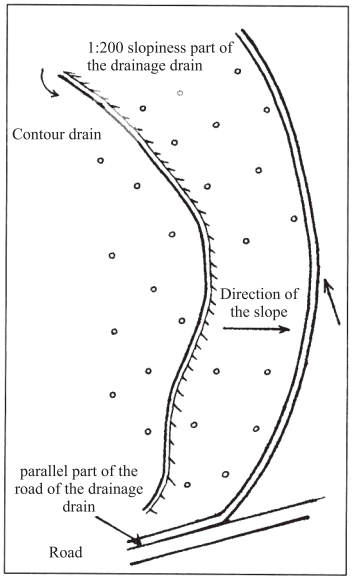

Figure 5: Line diagram of a draining system

4. Drainage drains

In areas of high rainfall such as 5 cm (2 inches) a day during the monsoon, it is not possible to stop and store all the rainwater. However, every effort should be made to conserve as much water as possible. Drainage drains should be provided for this purpose. They should be laid out with a very slight slope. If natural rain water flowing streams could be identified within the estate, drainage drains should be laid out parallel to them. The water flow in these drains should be controlled by having frequent lock and spill or stone across at the bottom of the drains. Another way to ensure complete absorption of water into the soil is to flatten out the last few hundred meters of the drain into a true contour.

5. Terracing

In steep lands, infiltration of water into the soil can be increased by terracing. This will reduce surface run-off and loss of fertilizer from the manure circle. Where terracing of the entire land cannot be done, each palm should be given a terrace with a crescent bund or husk platform. The slopes of terraces should be stonewalled or paved with a suitable cover crop or carpet grass (figure 6).

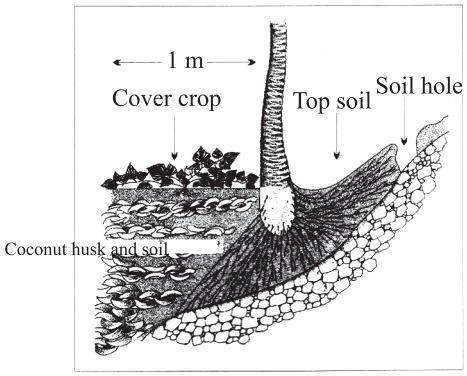

Figure 6: A terrace

6. Application of SALT (Sloping Agricultural Land Technology)

In this system, nitrogen-fixing trees such as Glircidia are closely planted in double rows following contour lines. In between those live fences coconut and other trees should be planted (figure 7).

General principles involve in this system are:

- Coconut should be planted in contour lines.
- Minimum spacing between two planting lines should be not less than 7.0 m and maximum should be not more than 10.0 m.
- A double row of Gliricidia (60 cm × 20 cm) should be planted at 30 m distance from each coconut row.
- In between two Gliricidia rows, soil bund will be formed naturally.
- Gliricidia trees have to be lopped at 4 - 6 months interval regularly and lopping may be used as a mulch for coconut and other crops.
- Complete weeding or soil disturbance should be avoided or minimized.
- Perennial intercrops should be planted in the avenue of coconut.
- Suitable intercrops are papaya, rambuton, cinnamon, pepper, coffee, cocoa, clove etc based on the climatic condition of the area.

Figure 7: Line diagram of a SALT

7. Other practices

7.1 Avoid ploughing and harrowing in sloping lands

When ploughing and harrowing are required (eg: intercropping with pineapple, ginger etc) it should only be done along the avenues of coconut, leaving 2.0 m margin from each raw of coconut. During heavy monsoon periods, ploughing and harrowing should not be practiced.

7.2 Rain Water harvesting

A small soil bund up to15cm height with a width of 20 cm at 2.0 m distance from the bole of the palm could be developed to conserve rainwater. This small bund should be much prominent in the lower part of the slope. This will serve as a basin to collect rainwater in the manure circle and enhance water infiltration (figure 8).

Figure 8: Making a small bund around the manure circle

7.3 Application of organic manure for coconut palms

This encourages root development of palms and improve soil physical conditions thereby enhance infiltration of rainwater.

7.4 Rain water collection in tanks

In some lands bunds can be built to block water flowing down the slopes, by selecting a suitable location at the bottom of slopes across two ridges (figure 9). Drainage drains should be directed to the tank. Water collected in tanks could be used for irrigating coconut.

7.5 Perennial intercropping

Particularly in sloping lands, cultivation of seasonal cash crops with coconut is not encouraged. However, perennial crops such as cocoa, pepper, coffee, cinnamon, Rambutan and cashew are recommended as ideal crops for sloping lands. These crops serve as a ground cover and soil conditioners. They also provide leaf mulch conserving both soil and moisture (Picture 10).

Figure 9: Rain water harvesting tank

Figure 10: Developing of a mulch under cover crops with fallen leaves

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