

# MOISTURE CONSERVATION IN COCONUT LANDS

L V K Liyanage.

Coconut Research Institute, Lunuwila

The coconut production in the island during the last decade had reduced considerably due to the drought. Although the reduction in yield is minimal in well managed lands, the effect of drought is very evident in neglected lands.

The best method to minimise the effects of drought is to conserve soil moisture. In lands where moisture conservation practices have been carried out, soil moisture has been detected during the periods of drought. When there is soil moisture during such periods, the palms can absorb the required nutrients, thereby yielding well.

## The importance of the soil moisture conservation

Normally, young palms require about 16 litres (3½ gallons) of water per day. An adult palm loses about 40 litres a day. It is therefore necessary that the soil conserves adequate moisture to supply the requirement of the coconut palm. As coconut is a rain fed crop, soil moisture conservation is particularly important in the intermediate and dry zones of the island because these agroclimatic zones receives only a limited amount of-rainfall, which is distributed only over a few months.

## The effects of drought

Long drought periods adversely effects the growth and production in coconut. The affects are:

- (1) Drought initially affects seedlings, then young palms less than 5 years and finally adult palms.
- (2) Drought also causes a retardation of growth. During a severe drought, growth could cease completely.
- (3) Drought also affects flower production.
- (4) Pollinated flowers are also affected by drought. It causes button nut fall and immature nut fall. During long droughts, even mature nuts could fall.
- (5) Long periods of drought and recurring droughts could kill adult coconut palms.

Moisture conservation is important because of the current uncertain climatic conditions and recurrent droughts.

## The importance of soil organic matter in moisture conservation

The fertility and moisture conserving capability of the soil is partly influenced by the amount of organic matter in the soil.

Important qualities of organic matter;

- (1) Improves soil for cultivation of coconut
- (2) Organic matter could absorb water several times its weight and conserve.

- (3) Organic matter improves the physical structure and aeration in heavy soils while in light soils the small particles are bound together by organic matter to improve the moisture holding capacity.

- (4) Reduces soil erosion.

- (5) Organic matter acts as a reserve of plant nutrients. When organic matter decomposes, nutrients are released to the plant.

- (6) Organic matter prevents the accumulation of poisonous materials and also prevents deficiencies.

- (7) It enhances microbial activity, thereby improving fertility of soil.

Causes for depletion of soil organic matter:

- (1) Frequent mechanical ploughing and harrowing

- (2) Overgrazing

- (3) Clean weeding

- (4) Exposure of soil to direct sun

- (5) Regular burning of land for weed control.

## Methods of moisture conservation

There are several cultivation practices which are useful in moisture conservation. These are:

- (1) Planting on the contour. This is particularly important in slopy lands.

- (2) Weed control.

- (3) Establishment of cover crops.

- (4) Husk burying

- (5) Mulching.

- (6) Application of organic matter.

## (1) Cover Cropping:

Cover crops act as a live mulch and thereby conserve soil and moisture. The advantages of cover crops are:

- (1) improves the soil structure

- (2) improves the nitrogen content of the soil

- (3) provides a large amount of organic matter

- (4) reduces leaching of nutrients and thereby conserve them

- (5) reduces weed growth

- (6) regulates soil temperature

- (7) soil erosion is reduced

Characteristics of a suitable cover crop:

- (1) It should grow quickly and cover the soil in a short period of time, thereby controlling the weeds.

- (2) It should dry up during the drought period and should not compete for moisture. The cover crops should regenerate during rains.

- (3) It should have a fibrous root system to bind the surface soil.

- (4) It should provide a large amount of mulch to shade the soil.

- (5) It should tolerate shade

- (6) It should produce an adequate amount of seeds.

## Suitable cover crops

Creeping covers

- (1) *Pueraria phaseoloides*

- (2) *Calopogonium mucunoides*

- (3) *Macroptilium atropurpurem*

(4) *Centrosema pubescens*

(5) *Mucuna utilis*

Bush covers

(1) Ipil Ipil

(2) Gliricidia

A cover crop should be selected after considering the climate of the area and the shade in the land. Investigations carried out at the Coconut Research Institute have shown that cover crops such as *Puereria*, *Calopogonium*, *Centrosema*, *Siratro* and *Mucuna* could be established in any soil type and will cover the land quickly. It was also shown that *Puereria*, *Calopogonium* and *Centrosema* perform well in heavy lateritic soils, while *Siratro* and *Mucuna* perform well in light sandy soils. These cover crops yielded about 8 - 20 MT of dry matter per hectare at the end of the 1st year after planting. They have also yielded leaf litter of about 8 - 14 MT. It has been shown that these cover crops conserve moisture in the soil during the dry periods very satisfactorily. The bush covers such as Ipil Ipil and Gliricidia yielded 10 - 12 MT per hectare per annum. They could be harvested once in every 3 months and used as a mulch in the manure circle and also as a green manure. These cover crops improve the soil condition and also reduce the cost of fertilizer.

Establishment of Cover Crops:

The land should be ploughed, harrowed and levelled and should be free of weeds. Prior to planting, each coconut square should be given a dressing of 2 - 3 lb of Saphos phosphate, 1 - 2 lb of muriate of potash and about 1 lb of urea. The requirement of seeds for systematic planting in rows is about 5 kg per hectare.

However, if the seeds are to be broadcast, about 8 kg of seed per hectare would be required.

The seed will require hot water treatment or soaking for about 1/2 day in water for better germination.

In order to have the cover crop permanently in the land, it is necessary to maintain it properly. When planting bush covers, they could be planted along the fences or bare plots of land, at a spacing of 1 meter.

(2) Husk Burying

Burying of husk in lands which are subjected to drought is very beneficial to the coconut tree. Coconut husks absorb moisture and acts as a reservoir, thereby providing a medium for the growth of roots. The coconut husk also contains a considerable amount of potash; for instance 100,000 husks contain about 1 MT of potash.

The other important features of husks are:

- (1) It absorbs 6 - 8 times its weight of water
- (2) Potash in the coconut husk is soluble and could be easily made available to the coconut tree.
- (3) Satisfactory results could be obtained by burying husks in pits of the size 8' x 4' x 2'
- (4) When placing the coconut husk, the fibrous side of the husk should face upwards and the husks should be mixed with soil
- (5) The beneficial effects of husk burying will remain for 5 - 6 years. Initially there will be an improvement in the growth, as evident from the increase of the number of leaves and inflorescences. The actual yield increase will be seen from the 3rd year onwards.
- (6) Coconut trunks and petioles should not be put into the husk pit.
- (7) Husks should not be buried in lands subjected to water logging and in drainage canals.



Burying of husk in coconut lands

(8) Sometimes it is difficult to establish cover crops in sandy soils due to the lack of moisture. However, they could be easily established in places where husks have been buried.

An investigation was carried out to evaluate the efficiency of husks and coir dust in moisture conservation. The coconut yield in plots where husks and coir dust have been buried showed an increase. Also in this area the copra yield was high.

The results of an experiment on the use of coir dust and coconut husk in the intermediate zone are given below:

<u>Treatment</u>	<u>No. of nuts/tree/year</u>	<u>Copra/tree/year/(kg)</u>
Without husk or coir dust (control)	47.2	8.57
With husk pits	56.5	10.28
With coir dust pits	54.8	8.81

Compared with the plots which did not have either husk pits or coir dust pits, the plots which contained husk pits showed a coconut yield increase of 19.7%. The increase in copra was 19.9%. In plots with coir dust, the increase in coconut yield was 16.1%.

### (3) Mulching

Mulching enhances the moisture holding capacity of the soil and also provides organic matter to the soil.

Advantage of mulching:

- (1) conservation of moisture by applying around the base of the coconut palm (reduces soil erosion and evaporation)

- (2) keeps the top soil cool and prevents fluctuation of temperature
- (3) increases infiltration
- (4) controls weeds
- (5) conserves soil fertility

Types of Mulches:

- (1) Dead Mulches: Coconut Husks (fibrous side facing downwards)

- Coconut fronds
- Straw
- Plant debris
- Coir dust

- (2) Live Mulches: Cover Crops  
Green Manure - sun-hemp, ipil ipil etc.

**(4) Addition of Organic Manure to the Soil**

Beneficial results could be obtained by mixing about 25-50 kg of organic manure to the inorganic fertilizer that is applied to the soil. Addition of organic manure will increase the

efficiency of inorganic fertilizers (please see the Advisory Circular No A 4 for details on the use of organic manure).

Some of the organic manures are given below:

- (1) Cover crops - Provide about 10 MT of dry organic matter per hectare per year
- (2) Cow dung - Increase the moisture holding capacity of soil by 6 - 10%. Each tree would require about 50 kg.
- (3) Compost - A tree would require about 30 kg of compost. When applied at the rate of 5 MT per acre, compost would provide nitrogen equivalent to 400 lb of ammonium sulphate.

Recent droughts have reduced the coconut yields. This phenomenon is mostly evident in neglected lands. The various moisture conservation practices enumerated above will enable the grower to increase the coconut yield and thereby increase his income.

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