

RAINWATER HARVESTING AND MOISTURE CONSERVATION IN COCONUT LANDS

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Sustainable Ways to Improve the Productivity

Water is an essential component for the vegetative growth and nut production of coconut palm. Conservation of water in coconut lands is necessary to ensure availability of water throughout the year for growth and nut production. Nutrients in the soil are absorbed by root only if they are dissolved. Insufficient moisture in the soil will reduce nutrient absorption resulting in poor growth in young palms and low nut production. Clay and organic matters hold the water in the soil. Higher content of organic matter in the soil increases the moisture holding capacity. Much of the organic matter is present in the topsoil. If soil erosion is prevalent in coconut lands, the water holding capacity of the soil is reduced. Bare soils in coconut lands result in heavy erosion due to runoff. Continuous soil erosion finally results in barren land where coconut cultivation is no longer profitable.

Therefore measures have to be adopted in coconut lands to maximize the volume of rainwater to be absorbed into the soil sub layers without allowing it to run-off the land. When the rainwater collection and movement is properly managed on a land with the adoption of following measures the productivity of the land could be increased effectively.

1. Establishment of cover crops.
2. Burial of coconut husks in pits
3. Mulching on the manure circle
4. Deep planting of seedlings
5. Contour drains and bunds
6. Construction of water reservoirs along water streams in coconut estates.
7. Addition of organic and green manure.



Figure. Availability of water determines the production of a palm

1. Establishment of Cover Crops

Any crop intended to prevent soil erosion is generally known as a cover crop. One of the most effective method of conserving soil and moisture in coconut lands is the establishment of a leguminous cover crop.



Figure: Well established cover crop

Benefits of cover crop

- Cover cropping in coconut land is the best method to control surface run off and soil erosion due to complete live cover formed on the soil surface.
- They are always fast-growing creepers capable to cover the soil in a short period of time, thereby controlling weeds.
- Nitrogen fixing bacteria live in the nodules of the roots of these leguminous plants and are capable of transforming atmospheric nitrogen into nitrogenous compounds, which the plant can utilize.

- It enhances infiltration rate of rainwater into the soil during rain thereby increases water holding capacity of coconut growing soils.
- It reduces leaching of nutrients and soil temperature
- Cover crop improves the physical, chemical and biological properties of soils in coconut lands.
- Cover crops are shade tolerant surface rooters and do not compete for moisture in coconut plantations
- It dries up during the drought period and regenerates during rains and produce seeds
- It completely changes the micro climate in the coconut land

The following legume creepers are recommended grow as cover crops in coconut lands.

- *Calapogonium muconoides* (Calopo)
- *Pueraria phaseoloides* (Puero)
- *Centrosema pubescens* (Centro)

After the establishment, it should be managed well in order to obtain the expected benefits. If the growth of cover crop is thick, light harrowing should be done once or twice a year. Ploughing of alternative rows of coconut will increase humus content of soil. Ploughing should be carried out during rainy weather.

2. Burial of Coconut Husks in Pits



Figure: Cross section of a husk pit (Alternative layers of husks with soil)

Burying coconut husks in pits is one of the best methods to harvest rainwater in close proximity to coconut palm. Coconut husk acts like a sponge and can absorb and retain six times their weight of water,

which can be utilized by the palm during dry periods. Husks have manorial and other properties. The main constituent of husk is potash. On an average, about 100,000 husks contain potash equivalent to one metric ton of Muriate of Potash. This potash is in a readily available form. Although all types of soil benefit from this cultural practice, husk burial is particularly effective on lateritic gravel and cinnamon sandy soil, but it is **not** suitable for waterlogged lands with poor drainage. The beneficial effects of husk burying last for about 4 – 5 years.

Husk pits of the size 8ft long, 4ft wide and 3ft deep (8 ft. x 4 ft. x 3 ft.) are arranged alternately between palms along the row is the best method recommended for coconut lands.

3. Mulching on the Manure Circle



Figure: *Mulching around the manure circle with coconut fronds*

The effective root zone of the coconut palm **greatest concentration of roots** is found in the top one meter of soil and within a radius of 2m from the bole. Knowledge of the distribution of active root zone in the soil is important in order to understand the effects of fertilizer application and moisture conservation and other cultural practices should be carried out in this region to obtain the best results..

Mulching is low cost and important agricultural practice in soil and moisture conservation and should be carried out through out the year. In mulching layers of organic materials are placed on the manure circle up to a distance of 1.75 meters (6 ft) from the base of the palm. Mulch on the manure circle protects the effective root zone of a palm from direct expose from solar radiation resulting in low temperature in the root zone even in dry periods. It also

reduces soil and nutrient erosion, enhances water infiltration during rain and controls the growth of weeds on the manure circle.

One of the most common practices is to use coconut fronds, weed trash and lopping of trees as mulch. Other material, which can be used effectively as mulch, is coconut husk. One or two layers of husk could be used to cover the manure circle.

4. Deep Planting of Seedlings



Figure: Funnel shaped manure circle of a young palm

Deep planting could be practiced to harvest rainwater in areas with well-drain soils. With the growth of seedlings, deep manure circle should be given a shape of a funnel to collect rainwater. The funnel shaped soil preparation not only collects rainwater in the effective root zone but also reduce nutrient loss due to runoff. The funnel shaped structure could be enlarged and maintained even up to mature stage of palms. The concave surface of manure circle of mature palm brings about number of benefits. It collects canopy and stem flows of water during rain and allows plant nutrients and fertilizer applied get into the effective root zone of the palm.

5. Contour Drains and Bunds

Contour drains are essential in sloping lands to control surface runoff. This is one of the best ways to enhance the rainwater infiltration rate in shallow gravel soils, which are subjected to water stress even in a short dry spell. Contour drains should be laid carefully on the contour to reduce soil erosion, surface runoff and increase moisture conservation. When contour drains are opened excavated soil is placed above the drain in order to form a continuous soil bund across the slope.

6. Construction of Water Reservoirs in Coconut Estates



Figure: Rainwater collecting reservoirs in coconut estate

In rainy seasons runoff water in sloping coconut lands are naturally collected and flows out of the estate through lower areas forming water streams. Mostly in these streams, water flow could be seen only in rainy periods and they dry up in dry periods. Considerable amount of rainwater received by the estate is moved out of the estate through these water streams. With the construction of soil dams across these streams at different elevations with over flow floes a large capacity of rainwater could be harvested in water reservoirs. Rainwater thus collected in reservoirs at different elevation along the stream leads to uplift the ground water table which intern has beneficial effect on the nut production. At the end of stream, a large deepened water reservoir could be excavated to collect more water for irrigation. Traditionally these ponds were called as "*Pathaha*" and used to provide water for estate cattle and goats. The pond constructed in this manner could be used effectively as water sources for irrigation.

Coconut growers are requested to adopt the above practices, which would ensure sustainable improvement of productivity. These practices are regarded as solutions for the present challenges in the coconut cultivation sector.