Best Management Practice for Moisture Conservation in Coconut Garden

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Introduction

Soil and water are the natural endowments of a region deciding its productivity. Continued exploitation of these natural resources and utter ignorance on their susceptibility has already caused unimaginable damage and posed a serious threat to the future survival of mankind. Anil Agarwal, former director, Centre for Science and Environment pointed out that how much rain we get is not at all important; question is how much of it we are harvesting. He has pointed out that all the villages in India can meet the basic drinking, cooking and reasonable irrigation needs through rainwater harvesting. Identification and promotion of simple, reliable and environmental friendly technologies are necessary to overcome the above problems. Reviving the traditional practices of water harvesting by the support of scientific methods is the potential option.

In situ water conservation is more feasible and practical proposition under most situations. The amount and effectiveness of *in situ* water conservation is a function of interaction between climate, soil properties, and plant properties. Soil management is crucial for maximum water intake. By harvesting the rain at the point of its fall, run-off can be reduced considerably. So wherever rain water harvesting measures are implemented, soil erosion also stops (Patniak, *et. al.* 1986).

Gopinathan (2003), a pioneer in rain water harvesting and promoter of KRG Rain Water Harvesting Foundation argues that catching every drop of rain water where it falls and making it to percolate into the earth to reach aquifers will make Kerala self sufficient and even help to support other states since it receives about 100 lakh litres of water on every acre of its land in a year.

Even though Kerala receives 3000 mm rainfall, because of steep topography, non uniform distribution of rainfall, low water holding capacity and lesser depth of top soil; Kerala is frequently facing severe droughts followed by acute drinking water scarcity for the last two decades. Moreover, because of steep topography of Kerala, it takes only 24 to 48 hours for the run off to travel from the forests of Wayanad to Arabian Sea. Many of the rivers hardly contain any water during the six months in a year, only few reservoirs get filled up even during the monsoon season. During summer,

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water level goes down to the silted up bottoms in many cases. More and more wells are getting dry in summer. Hence, proper management of the soil and water resources of Kerala is the need of the hour to make the situation better than what it is today. As per the records of Department of Economics and Statistics, Government of Kerala; the area under coconut has increased from 4.48 lakh ha in the year 1955-56 to 8.98 lakh ha in 2005-06. If we harvest and allow percolating at least 50% of the water falling in our coconut fields, we can considerably increase our ground water level.

Micro - Catchment water harvesting (MCWH)

The technique of micro-catchment rainwater harvesting involves catching the rain from localized catchment surfaces. Micro-Catchment water harvesting (MCWH) method is suitable for areas having less quantity of annual rainfall. It involves the collection of surface runoff from a catchment area over a distance of less than 100 m and storing it in the soil profile of a basin located downstream. Crops and trees are then grown in the basins where moisture is stored. Micro-Catchment would form mini barriers across the flow path of runoff and vastly improve the detention storage and increase the opportunity time and hence the infiltration of rain water into the soil profile, where by the quantity and velocity of runoff and hence erosive potential is greatly reduced (Singh, 2000).

The study was conducted in the coconut garden of Water Management Research Unit, Vellanikkara, Kerala. Micro Catchments of size 7.5 x 7.5m was made for each coconut palm just on the commencement of monsoon rain fall. Micro Catchments is nothing but a specially contoured area provided with bund having a height of 30 cm around each catchment. Each micro catchment has to be given a mild slope towards the palm and a basin will be opened around each palm so that all the rainwater falling in the micro catchment will get collected in the basin. Even a light shower causes water to collect in the coconut basin. The basins were mulched with coconut leaves and other agricultural wastes for conserving the moisture.

The studies conducted on the yield characteristics of coconut plant revealed that yield of the plant can be increased by 72% compared to rain-fed plants and it was on par with plant provided with drip irrigation at 75% of pan evapotranspiration. The observations on the soil moisture at different horizontal and vertical distances showed that the moisture content in the basins of plants under micro catchment is higher than the rain-fed coconut palms and is almost in the same range than that of drip irrigation with 75% pan evaporation. Moisture is more uniformly distributed in the basin of the coconut palm provided with micro catchment. This reveals that micro catchment basin has very good soil moisture retention capacity. The gentle slope of micro catchment and thick mulch provided in the basin helped to catch each and every drop of rain water and to retain the moisture in the crop root zone. It also helped to check the nutrient loss from the basin of the crop. Soil moisture distribution pattern was drawn by noting the moisture content values before and after irrigation. Soil moisture distribution pattern was drawn by using the computer package surfer-6 which is shown in fig. 1.

Making rain pits in coconut fields

Coconut plant needs at least 1.5m deep loose soil with proper drainage facility. If there is hard soil or thick clay at a depth lesser than 1.5m below the soil surface, it will very much affect the growth and yield of plant. The analysis of the results of an experiment of formation of rain pits in the coconut field having bad soil condition, in Kerala Agricultural University reveals that it benefited the coconut palms. Rain pit of size 2m x 2m x 1m was made between four coconut plants. A number of rain pits were made in the field randomly. All the rain pits were filled with coconut leaves, husks and other agricultural wastes up to three forth of the pit. In the month of August, the organic residue from the pit can be used to mulch the coconut basin and the pits have to be again refilled with the available agricultural wastes like coconut leaves, husks, grasses and leaves of other plants. The first visible effect was a general improvement in the condition of the palms followed by an increase in the number of functioning leaves and in the yield. There was no visible effect on the yield in the first two years. The position changed subsequently and substantial gains became apparent from the third year onwards. Initial condition of the plant was very poor. Most of the plants showed stunted growth and doesn't bear any nuts. The texture of the soil was very poor and was

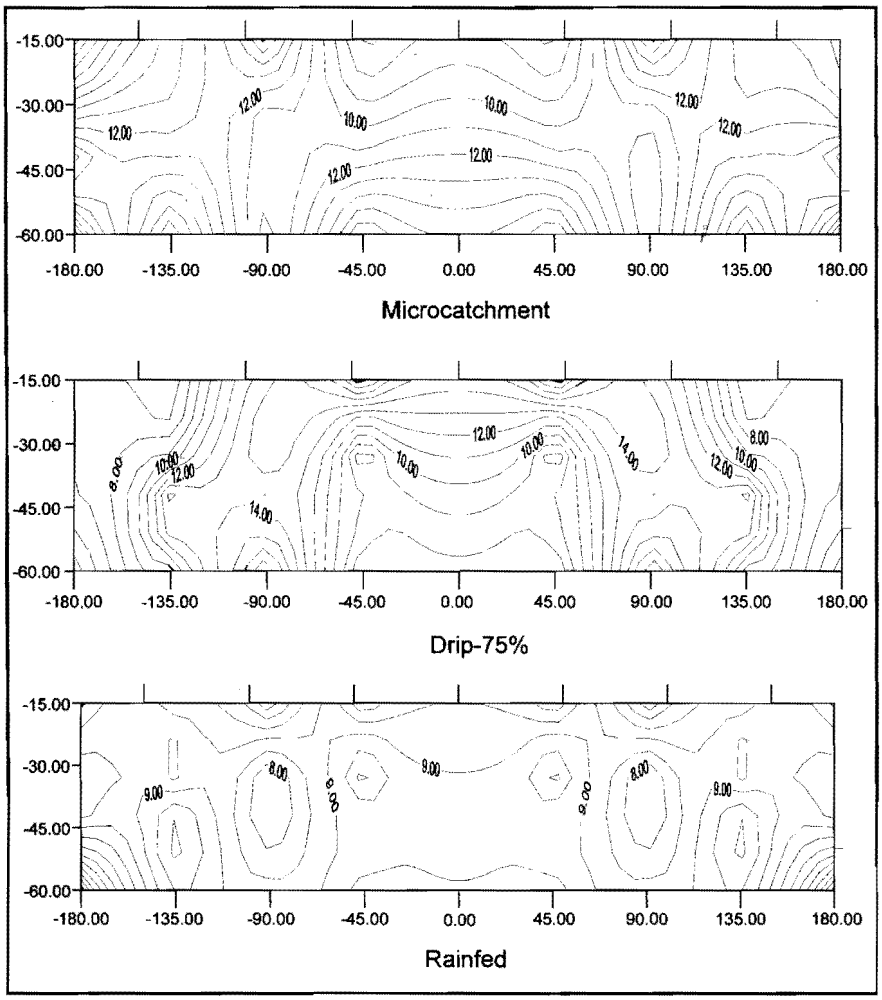

Fig. 1. Soil moisture distribution pattern

deficient in plant nutrients. Application of crop residues helped to improve the texture, structure and nutrient status of the soil. The organic residues in the basin and pit will conserve water and soil and protect the plant from summer draught. Most of the plants showed considerable increase in the yield. (60 to 500% increase in yield). Moreover, these rain pits get filled up in each rain fall and it will penetrate through the soil and ultimately reaches ground water and helps to raise the ground water table. Since the rain pits are filled with organic matter, water will never get flooded in the pit and it will also prevent silting up at the bottom of pit. This helped to maintain the efficiency of the pit as ground water recharging source. Since water gets filled up in the pit in each rain, the disintegration of organic matter occurs more rapidly and hence the soil become more porous. This in turn again supports ground water recharging process. Hence making rain pits and filling the pits with agricultural wastes not only improves the soil condition and growth & yield of coconut plant, but also helps to raise the water table of that locality, which is an added advantage.

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White Grub

Coconut Pests

The white grubs are mostly found in sandy loam tracts of Kerala and Karnataka. It damage the roots. In seedling, it tunnels in to the bole and collar region. It has an annual life cycle with a grub period of 8 months.

Control measures: Plouging and digging of soil during pre and post monsoon period will expose the insect for predation. Set up light traps to attract adult beetles. Application of phorate 10G @ 100g per palm should be mixed and raked in the top 15cm soil in May-June and Sept.-Oct. is recommended in coastal and Malanad areas. Irrigation is necessary after the pesticide application.