

MULCHING IN COCONUT PALM DURING DRY SEASON

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It is well known fact that irrigation to all crops is of prime importance particularly during dry season starting from December to mid-March every year. Generally, irrigation technology is an engineering device which is costly for small and poor farmers in our region. Among plantation crops, coconut is one of the most important, valuable and economic crop. The fruit of the coconut palm tree has an edible pulp used as popular good food and for extraction of oil. In South India coconut oil has a great demand for culinary purposes. The tender coconut water is a good nutritious cold drinks. The coconut pulp has also great influence on social and cultural activities of Assam especially in Bihu. It also provides raw materials for cottage industries. The economy of rural areas to some extent may depend on the productivity of this crop. Unfortunately the crop is very poorly managed. Of course, this crop has been grown as a homestead garden crop traditionally. The cultivation of this crop in large scale has been noticed in few districts of Assam. However, each family of a village grow at least one or two or more coconut palm trees to meet their cultural needs with the least care regarding use of fertilizers and irrigation to this crop. During dry spell starting from December to March, the ground water table decreases or goes down as a result of which availability of soil water tends to decrease to the roots of plants. Plants suffer from water stress. During this period plants need water and it is possible to supply water to this crops through irrigation. The coconut productivity is directly related to the moisture availability. Scientists from different corners of the country have already reported the effect of moisture stress on initiation and differentiation of vegetative and reproductive primordia and cells enlargement.

The prevalent methods of irrigation like flooding, basin irrigation, drip irrigation and sprinkler irrigation are not only costlier to but also result in loss of water due to seepage, surface run off, evaporation, percolation etc. During dry spell water loss resulting from evaporation should be controlled for efficient utilization of moisture by the plant and that can be achieved by application of mulches at the base of the palm tree. It can be added that mulching may not increase the soil moisture content but conserves the same in soil by reducing the rate of evaporation loss. The influence of mulching with irrigation on soil moisture and soil temperature was

studied in a coconut plantation in littoral sandy soil (Maheswarappa *et al.* 1998). During drought period, conservation of soil moisture and minimization of evaporation loss are two main aspects in coconut plantation for higher fruit production. During rabi season, farmers obtain lots of unwanted and excess crop wastes after harvest of economic yield in their own farm and these residues may be utilized as mulch near the base of the coconut palm tree.

An observation trial was conducted at Regional Agricultural Research Station, Gossaigaon, under Assam Agricultural University during dry season starting from December to March of 2008-09 and 2009-10 on five bearing coconut palm trees to see the effect of different mulching materials on soil moisture conservation. On the fifteen day of December in each year, out of five plants four plants were mulched with grasses, chopped banana pseudostem, water hyacinth and rice straw and the fifth plant was kept without mulching. The initial soil sample was taken from each of the five plants on the same day just before treating the palm trees with mulching materials for estimation of soil moisture content. Subsequent soil samples were collected from each plant at thirty days interval *i.e.* on 15th January, 15th February and 15th March in both the years for determination of moisture content and to observe the moisture retention pattern under five different treatments. The monthly total rainfall, soil temperature and humidity during dry season starting from October, 2008 to March, 2009 and October, 2009 to March, 2010 are presented in Table 1 and daily average rainfall, rainy days, air temperature, humidity and total evaporation during dry periods are shown in Table 2.

The result of the observation trial reveals that soil moisture content decreases during dry spell in rabi season in both the years irrespective of mulching materials and without mulching the palm tree (Table 3). The per cent decrease in soil moisture content is higher in the plant without mulching (51.18%) and (43.62%) during 15th December to 15th March in 2008-09 and 2009-10, respectively than those mulched with different wastes materials. The loss in moisture content varied from 1.08% to 51.18% during 15th December, 2008 to 15th March, 2009 while it was 1.03% to 43.62% during 15th December, 2009 to 15th March, 2010. The variation in soil moisture content may be due to residual moisture

Table 1 : Monthly total rainfall, soil temperature and humidity during dry season												
Weather parameters	2008						2009					
	October		November		December		January		February		March	
	2008	2009	2008	2009	2008	2009	2009	2010	2009	2010	2009	2010
Total rainfall (mm)	114.0	308.3	0.0	0.0	1.6	0.0	0.0	0.6	0.0	0.6	36.6	100.1
Total rainy days	08	05	0.0	0.0	01	0.0	0.0	01	0.0	01	03	04
Total max. soil temp ^r °C	949.5	961.2	866.0	755.5	806.5	748.5	775.0	650.0	831.8	654.5	944.0	941
Total humidity (Morning)	2784.0	2813.0	2639.0	2686.0	2729.0	2640.0	2431.0	2758.0	2692.0	2487.0	2684.0	2753
Total humidity (Evening)	2065.0	2160.0	1652.0	1868.0	1959.0	2027.0	1327.0	1786.0	1837.0	1258.0	1217.0	1461

Table 2 : Rainfall and soil temperature during dry periods								
Dry periods	Rainfall (mm)	Rainy days	Daily air temp. (°C) average	Daily morning soil temp. (°C) average	Daily Humidity (%)		Total evaporation (ml)	
					Morning average	Evening average		
15 th December,08 to 14 th January, 09	0	0	24.49	13.85	87.25	60.61	283	
15 th January,09 to 14 th February, 09	0	0	25.36	13.55	86.48	59	254.5	
15 th February,09 to 14 th March, 09	0	0	29.52	15.90	87.60	38.25	543.5	
15 th December,09 to 14 th January, 10	0.6	01	22.62	12.34	88.22	66	260	
15 th January,10 to 14 th February, 10	0	0	25.84	9.95	88.93	47.52	256	
15 th February,10 to 14 th March, 10	9.0	02	28.31	12.04	88.25	45.10	290	

Table 3 : Effect of mulching on soil moisture content (%) in coconut plantation during dry spell season													
Mulching materials	Moisture content (%)												
	On 15 th December (Initial)		On 15 th January		On 15 th February		On 15 th March		Total loss in moisture content during 15 th December to 15 th March (%)	% soil moisture gain over no mulch			
	2008	2009	2009	2010	2009	2010	2009	2010		2008-09	2009-10	Mean	
Grasses	19.37	20.31	19.32	20.24	19.14	20.08	18.92	19.88	2.32	2.11	95.46	95.16	95.31
Banana pseudostem	19.34	20.32	19.34	20.30	19.21	20.20	19.13	20.11	1.08	1.03	97.88	97.63	97.76
Water hyacinth	19.34	20.30	19.30	20.26	19.22	20.11	19.05	20.02	1.50	1.37	97.07	96.85	96.96
Rice straw	19.35	20.32	19.34	20.31	19.26	20.24	19.12	20.10	1.18	1.08	97.70	97.52	97.61
No mulch	19.34	20.31	17.42	17.74	12.42	14.30	9.44	11.45	51.18	43.62	-	-	-

out of total amount of rainfall received (114 mm and 308.3 mm) in the month of October, 2008 and 2009, respectively. The mean per cent of soil moisture gain with mulching over that without mulching varied from 95.31% to 97.76 % irrespective of mulching materials. The soil water was recharged again after 15th March, in both the years due to rainfall.

Thus, on the basis of the finding, it is advisable to the farmers having bearing coconut palm trees to practice mulching at the base of coconut plant with different organic wastes during dry season in order to conserve soil moisture and to reduce evaporation loss. It also helps

to prevent weed growth and soil erosion besides maintaining favourable soil temperature and nutrients availability.

References:

Maheswarappa, H.P., Subramanian, P., Dhanapal, R., Gopalasundaram, P. and Hegde, M.R. (1998). Influence of irrigation and mulching on soil moisture and soil temperature under coconut in littoral sandy soil. *J. Plantn. Crops*, **26** : 93-97.

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