

Water requirement of arecanut

A. K. SADANANDAN¹

Substation, Central Plantation Crops Research Institute, Peechi, Kerala

Received: 21 September 1972

ABSTRACT

The water requirement of arecanut (*Areca catechu* L.) was determined at the Regional Arecanut Research Station, Peechi, in 1968-69. Irrigation once in 3 days at 189.23 litres of water/palm, giving a duty of 1,309 ha/cumec, gave the maximum profit. Planting seedlings at a depth of 90 cm gave significantly more yield than plantings at depths of 60 and 30 cm. The water requirement of arecanut was 82.49 cm. For basin type of irrigation once in 3 days, the minimum moisture was 24.84% and maximum tension at the root zone was 0.139 atm.

The yield potential of arecanut (*Areca catechu* L.) can be increased considerably if the rainfall is supplemented by proper irrigation during the hot rainless months. But no information is available on the requirement of water in India. Hence the present experiment was laid out in 1962 at the Regional Arecanut Research Station, Peechi, for finding out the water requirement of arecanut.

MATERIALS AND METHODS

The trial was laid out in 1962 by adopting a 4×3×5 split-plot design on 1 ha with 4 main treatments (irrigations once in 3, 6, 9 days and the control) with 3 subtreatments (planting at 30, 60 and 90 cm). The plants were spaced 2.7 m apart. The water requirement was determined from the above experiment in 1968-69 after stabilization of yield. The yield was determined in the field immediately after harvest. For 325 palms, water was supplied continuously for 2 hr 30 min with 2 syphons each having a discharge of 3.42 litres of water/second. Thus for each palm 189.23 litres of water was given. From 20 January to 13 May 1969 water was supplied 29, 16 and 8 times for the treatments once in 3, 6 and

9 days respectively. The total rainfall received during the period of irrigation was 7.26 cm. January, February and March were rainless months. The mean monthly evaporation varied from 4.7 mm/day (May) to 6.8 mm/day (April). The humidity ranged from 69% (January) to 80% (May). The mean maximum

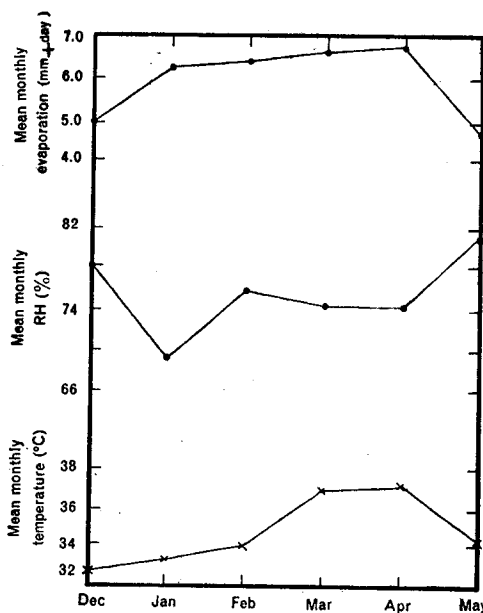


Fig. 1. Climatological particulars.

¹Present address: Junior Agronomist, Substation, Central Plantation Crops Research Institute, Port Blair, Andamans.

Table 1. Effect of intervals of irrigation and depth of planting on yield

Treatment	No. of nuts/tree			Mean	Weight of nuts/tree (kg)			Mean
	30 cm	60 cm	90 cm		30 cm	60 cm	90 cm	
No irrigation	1.73	1.62	21.89	8.41	0.05	0.04	0.72	0.27
Irrigation once in 3 days	121.66	179.80	278.49	193.32	3.56	5.49	8.27	5.77
Irrigation once in 6 days	67.35	108.53	204.84	126.91	1.82	3.09	5.99	3.63
Irrigation once in 9 days	91.64	112.89	165.89	123.47	2.74	3.57	4.64	3.65
Mean	70.67	100.71	167.78		2.04	3.05	4.91	
SEd of 2 main plots		20.67				0.54		
SEd of 2 subplots		15.00				0.39		
CD (P=0.05) for main treatments		45.04				1.18		
CD (P=0.05) for 2 subtreatments		30.60				0.79		

temperature was 37°C (April) and the mean minimum temperature 32.5°C (December) (Fig. 1). The soil was a sandy-loam with 62% sand, 30% silt and 8% clay. The soil-moisture status at effective root zone (50-cm depth) under different frequencies of irrigation was determined by the gravimetric method of analysis of Piper (1950). A porous-cup type tensiometer was used for studying the moisture tension at the active root zone (KERI, Peechi, 1970). The moisture tension so determined under the various frequencies of irrigation will enable the determination of water requirement for the crop in any other type of soil.

RESULTS AND DISCUSSION

Yield

The number of nuts/tree and the wet weight of ripe nuts/tree revealed significant differences between main and sub-treatments (Table 1). Irrigation once in 3 days gave significantly more yield (both in the number and wet weight). Under uniform irrigation, the yield increased with an increase in the depth of planting, and planting at a depth of 90 cm gave significantly more yield (both in the number of nuts and weight) than planting at depths of 60 and 30 cm. Without irrigation the mean yield of nuts was 8.41 and the mean weight of nuts was

0.27 kg. With irrigation once in 3 days, the mean yield of nuts was 193.32 and the mean weight was 5.77 kg. Thus irrigation once in 3 days increased the yield by more than 21 times. When irrigation was given once in 6 days the yield decreased to about 64%. Irrigation once in 3 days gave a net return of Rs 13,018/ha (Table 2).

Water requirement

At the rate of 189.23 litres of water to a palm under each irrigation, the duty was 1,309 ha/cumec for 114 days, each hectare containing about 1,371 palms. This is equivalent to a standing depth of 75.23 cm. The total rainfall during this period was 7.26 cm. Thus the total water requirement including rainfall during the period was 82.49 cm, which is 9.7% higher than pan evaporation for the same period.

Soil moisture and moisture tension

The minimum soil moistures under irrigations once in 3, 6 and 9 days were 24.84, 19.48 and 14.30% respectively (Fig. 2). Thus the critical moisture required to ensure maximum production in sandy-loam soils was about 24.84%. In palms that received no irrigation, the moisture content at the root zone for the period was more or less constant. The moisture

Table 2. Economics of irrigation in arecanut

Frequency of irrigation	Water requirement (cm)	Yield/kg/ha	Extra yield (kg/ha)	Value at Rs 6/kg	Cultivation charges including cost of water	Profit or loss (Rs/ha)
Nil		118		708	1,718	
Once in 3 days	82.49	2,558	2,440	15,348	2,330	13,018
Once in 6 days	41.50	1,603	1,485	8,910	2,162	6,748
Once in 9 days	20.75	1,613	1,495	8,970	1,994	6,976

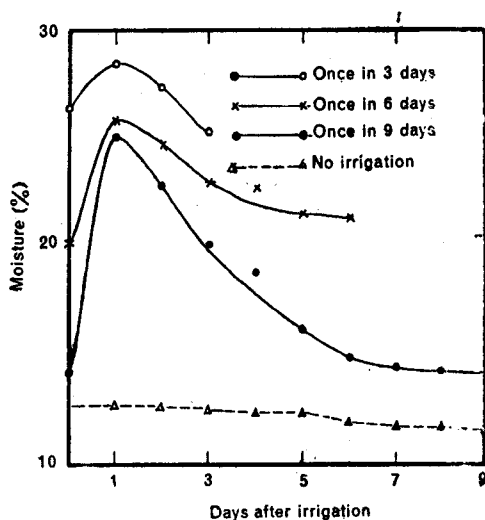


Fig. 2. Soil-moisture distribution at root zone of arecanut.

tension developed at the root zone of palms receiving irrigation once in 3 days increased up to 10.51 cm (0.139 atm)

till the time of next irrigation. The values recorded by tensiometer agreed fairly with those made by pressure-plate apparatus (CPCRI, Peechi, 1971).

ACKNOWLEDGEMENTS

Thanks are due to Mr K. V. Ahamed Bavappa, Director, Central Plantation Crops Research Institute, Kasaragod, and Mr K. Shama Bhat, Arecanut Specialist, Regional Station, Central Plantation Crops Research Institute, Vittal, for guidance and constructive criticism, and to Mr M. Parameswaran Nair, Deputy Director, Kerala Engineering Research Institute, Peechi, for help.

REFERENCES

- CPCRI, PEECHI. 1971. *Project Report of The Substation, Central Plantation Crops Research Institute, Peechi*, pp. 21-3.
- KERI, PEECHI. 1970. *Annual Report of The Kerala Engineering Research Institute, Peechi*, pp. 167-9.
- PIPER, C. S. 1950. *Soil and Plant Analysis*, pp. 56-62. Interscience Publishers, New York.