

ROOT DISTRIBUTION PATTERN OF COCONUT (*COCOS NUCIFERA* L.) IN LITTORAL SANDY SOIL

Manuscript received: 1.4.99; revised: 17.12.99; accepted: 31.3.2000

Key words: Coconut, Root distribution, Sandy Soil

The coconut palm has an adventitious root system, typical of a monocot. It produces uniformly thick roots having a diameter of 8 to 10 mm, almost throughout its life. These are the main roots which branch freely and produce numerous fine branch roots of one to 2 mm in diameter. From the agronomic point of view it is necessary to study the root distribution of any crop for efficient management of input supplied. Rooting pattern of coconut differs with age of the palm and the soil type on which it is grown. Studies on rooting pattern of coconut at different stages in littoral sandy soil is not attempted, hence this study was undertaken.

The study was undertaken in littoral sandy soil at Central Plantation Crops Research Institute, Kasaragod during October-November, 1998. The soil of the experimental field was composed of 99.1 per cent of sand, 0.2 per cent of silt and 0.7 per cent of clay. The plot which was managed with recommended package of practices, as per CPCRI recommendations under irrigated condition, was selected. For the study proposed two age groups of WCT palms viz., pre-bearing period (6 years old) and adult palm (26 years old) were selected. In each group, two palms were selected and a sector of one-sixteenth of the full circle to a distance of 4m and depth of 1.5m was separated out by excavating the soil

from the three sides of the sector. The soil was then washed away, taking care to retain the exposed roots in position. Counts were taken of the main roots at radial distances viz., near the bole, 1m, 2m, 3m and 4m away from the bole and depths viz., 0-30 cm, 31-60 cm, 61-90 cm and 121-150 cm.

The root study revealed that, the mean number of main roots produced by pre bearing palm were 2064 (129 x 16) (Table 1). Over 81.3 per cent of the roots were found in the 0-90 cm depth. Top 30 cm depth had 18.6 per cent roots whereas 62.7 per cent of the roots were found in 31-90 cm depth. Below 90 cm depth the number of roots were less. Laterally 92.1 per cent of main roots were confined to 2 m radius, however, out of this 71.2 per cent of the roots were within the 1m radius. Cintra et al. (1993) also reported that over 70 per cent of roots were found within 1m radius around the stem. By radio-isotope technique, Anilkumar and Wahid (1988) reported that over 80 per cent of the active roots were found to be confined to an area of 2m radius in 9 year old palm.

In adult palm, the mean number of roots produced were 5072 (317x16) (Table 1). Over 95.5 per cent of the roots were found in the top 0-120 cm depth. Top 0-30 cm depth had 18.9 per cent of roots and 63 per cent of roots were confined to 31-90 cm depth. With respect to lateral spread, 79.7

Table 1. Main root distribution (one-sixteenth area) of a pre-bearing (6 years old) and middle aged palm (26 years old) receiving regular management practices*

Distance from the bole/ Depth from surface (cm)	Near the bole		1m		2m		3m		4m	
	No.	%	No.	%	No.	%	No.	%	No.	%
A) Pre-bearing palm (6 years old)										
0-30	24	18.6	16	12.4	8	6.2	3	2.3	-	-
31-60	50	38.7	40	31.0	12	9.3	5	3.9	-	-
61-90	31	24.0	23	17.8	7	5.4	3	2.3	-	-
91-120	16	12.4	10	7.7	-	-	-	-	-	-
121-150	8	6.3	3	2.3	-	-	-	-	-	-
Total	129	100	92	71.2	27	20.9	11	8.5	-	-
B) Middle aged palm (26 years old)										
0-30	60	18.9	32	10.1	16	5.0	9	2.8	7	2.2
31-60	120	37.8	68	21.4	23	7.2	10	3.1	9	2.8
61-90	80	25.2	39	12.3	27	8.5	11	3.5	8	2.5
91-120	43	13.6	24	7.6	14	4.4	9	2.8	-	-
121-150	14	4.50	6	1.9	4	1.3	-	-	-	-
Total	317	100	169	53.3	84	26.4	39	12.2	24	7.5

*Mean of two palms.

**Fig. 1. Rooting pattern of middle aged (26 years old) coconut palm.**

per cent of the roots emerging from the bole were confined to 2m radius and only 12.2 and 7.5 per cent of roots were extended up to 3m and 4m radius respectively [Fig. 1]. In middle aged coconut palm Kushwah *et al.* (1973) reported that 73 per cent

of the roots were found within 2m radius and most of them were confined to the 31-120cm depth in red sandy loam soil. Sen *et al.* (1983) reported that 85.6 per cent of the 25 year old coconut roots were confined to 1.8m radius in clay loam soil.

From this study it can be concluded that the effective root zone for efficient management of agronomic inputs lies within the 1m radius in 6 year old coconut palm and within 2m radius in 26 year old coconut palm in littoral sandy soil.

ACKNOWLEDGEMENT

Authors are grateful to Dr. K.U.K. Nampoothiri, Director and Dr. C.C. Biddappa, Head, Division of Crop Production, CPCRI for the facility and encouragement provided during the study.

REFERENCES

- ANILKUMAR, K.S. and WAHID, P.A., 1988. *Oleagineux* 43(8-9): 337-342.
- CINTRA, F.L.D., PASSOS, E. E. de. M. and LEAL, M. de. L. da. S. 1993. *Oleagineux* 48(11): 458-461.
- KUSHWAH, B.L., NELLIATA, E.V., MARKOSE, V. T. and SUNNY, A.F. 1973. *Indian J. Agron.* 18(1): 71-74.
- SEN, N. L., KIKANI, K. P., UGHREJA, P. P. and VALIA, R. Z. 1983. *Indian Coconut J.* 14(1): 6-8.

Division of Crop Production
Central Plantation Crops
Research Institute, Kasaragod - 671 124.

H. P. MAHESWARAPPA
P. SUBRAMANIAN
R. DHANAPAL