

Cation Exchange Capacity of Excised Roots of Coconut Seedling

A wide variation in root cation exchange capacity has been noted in monocots and dicots and in different species and varieties of plants (Drake, 1964). Possibilities of exploiting this phenomenon for screening varieties for yield potential have been indicated in the case of sugarcane (Chiranjivi Rao and Thuljaram Rao, 1971) and Corn (Perur and Balakrishna Rao, 1969).

Bajwa and Bhumbra (1971) observed that selective absorption of nutrients and sodium tolerance of different crops were associated with CEC of roots.

Screening for yield potential should be possible for coconut, if a significant correlation is found between CEC of roots and yield. Study on CEC in coconut is also important since this

CEC (me/100g dry matter) and drymatter content of different roots of coconut seedling (each value is a mean of 7 independent samples)

Distance from apex (cm)	Horizontal roots				Vertical roots				Surface mattings			
	CEC		Dry matter %		CEC		Dry matter %		CEC		Dry matter %	
	Mean	Range of variation	Mean	Range of variation	Mean	Range of variation	Mean	Range of variation	Mean	Range of variation	Mean	Range of variation
0-5	4.84	4.07-6.46	5.04	4.39-5.64	2.42	2.00-2.89	5.22	4.76-6.85	1.13	0.93-1.25	29.22	28.58-30.20
5-10	1.94	1.36-3.37	8.49	7.93-8.76	1.51	1.06-2.03	17.36	15.24-18.24	-	-	-	-
10-15	1.42	1.11-1.72	16.04	14.86-17.86	1.27	0.94-1.60	23.56	22.98-24.20	-	-	-	-
15-20	1.18	0.95-1.63	17.88	17.56-18.24	1.00	0.72-1.40	25.73	24.65-26.74	-	-	-	-
Root lets	6.16	5.00-7.55	4.34	4.00-4.86	3.74	2.69-4.66	6.47	5.96-7.02	-	-	-	-

	CEC	Dry matter
CD for difference between types of roots	0.258	0.496
CD for difference between distance	0.365	0.701
CD for difference between types of roots × distance	0.515	0.992

Surface matting omitted from the analysis

will give a clear idea of the rationale of cultural and manurial practices followed at present in coconut gardens. The results of a preliminary study on the variation of CEC in different types of roots of coconut is reported in this note.

Seven, one-year-old coconut seedlings of West Coast tall variety were taken out carefully from the nursery without damaging the root system. The roots of the seedlings were grouped into vertical roots, lateral roots, rootlets and root mattings. Four samples at 5 cm intervals from the tip were taken from the vertical and lateral roots. Samples of mattings and first 5 cm portion of the rootlets were also included in the study. The CEC was determined by the calcium exchange procedure of Carpenter and Lamberth (1967), except that calcium was determined by the versenate method. The fresh weight as well as dry weight of roots were also recorded. While preparing the roots for CEC measurements, it was observed that much care had to be taken in retaining the peripheral cells at the tip in tact. These cells, though appeared to be slimy and hairlike when roots are immersed in water, are long and multicellular under a microscope. They are very likely to be thrown off even under a moderate force of tap water while cleaning the roots free of adhered soil particles. On an observation they were found to exhibit high CEC (16 me/100 g). For facilitating easy removal of extraneous soil particles from the roots, it was found that keeping the roots in water for 15-20 minutes prior to washing is necessary. This would help detach the soil particles

quickly without damage and later washing under a tap with a very gentle force of water is only needed to make the sample completely free of external particles.

The results as given in Table 1 depicts that coconut roots, in general have low CEC, typical of monocots resulting in high absorption of monovalent cations like K and Na and low absorption of divalent cations like Ca and Mg. This may be one of the reasons for the tolerance of coconut to high salinity. The grouping of roots was found to be efficient since the mean values for the three major types of roots like lateral, vertical and surface mattings varied significantly, thereby showing that three different kinds of roots exist in coconut as regards cation uptake. The rootlets of the lateral roots exhibited the highest CEC (6.16) closely followed by the first 5 cm tip portions of the same roots (4.84). Crooke *et al.* (1960) found highest CEC exhibited by the section 0-2.5 mm from the apex in leek roots. Though the same trend as in lateral roots was noticed in vertical roots also, the values were low compared to the former. However, the difference was not very much marked in both types beyond this region irrespective of the type of root. The CEC of surface mattings was the least.

Another finding is that while expressing the CEC values on oven dry weight basis, importance should be given to the length of the roots considered. As could be inferred from the table there was a significant difference in the dry matter of root portions in all

the root types studied. Moreover, it was also found that there existed a significant negative correlation ($r = 0.714$) between dry matter per cent and CEC of the roots. Hence there is every likelihood of the comparison of CEC values between different palms being wrongly reported when unequal root lengths and root of various portions are considered for the measurement of exchange capacity. It is suggested therefore, considering all these points and the predominance of lateral roots in the coconut root system, the apical 5 cm portion of this type can be utilized for CEC studies.

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