Distribution of Microflora Population in the Rhizosphere of Arecanut*

The sampling method for the rhizosphere studies depends on the kind of crop and its rooting pattern. The rhizosphere microflora can be easily enumerated in annual crops unlike in plantation crops. Bhat and Leela (1969) reported that 60.9–66.9 per cent of major roots and 51.3–55.6 per cent of fine roots of arecanut palm were concentrated within 50 cm radius from the base. Manures and fertilisers are applied to the crop at about 75 cm radius around the palm. No information is available about the microflora in the root zone of the palm. Hence a study was made to enumerate the rhizosphere microflora at different distances and depths using various nutrient media and the results are reported here.

The rhizosphere samples were collected from the basins of pure stand of *Areca* palms of the Central Plantation Crops Research Institute, Regional Station, Vittal, Karnataka, at four lateral distances (30, 60, 90 and 120 cm) and four vertical depths (0–15, 15–30, 30–45 and 45–60 cm) for each of these lateral distance. Sampling was done in the months of February and August 1978 from the palms between the age group of 10–15 years, with the spacing of 2.7 m × 2.7 m. The soil is lateretic and the organic carbon content ranges from 0.65–1.85 per cent (pH 5.2–5.8). The dilution plating method was followed for the enumeration of microbial population (Allen, 1953). The different media used for bacteria were nutrient agar (NA), arecanut root extract agar (10% root extract + NA); Thornton's agar, soil extract agar, and tryptone–glucose agar; for fungi, potato dextrose agar, Czapek's Dox agar and Martin's rosebengal agar and for actinomycetes, Kuster's agar with glycerol/starch and dextrose-nitrate agar. The bacterial, fungal and actinomycetes populations were counted at 60, 72 and 144 hr of incubation under laboratory condition (temperature 32°±2) respectively.

Among the five media used for bacterial population, there was not much variation in the counts. But the pigmented colonies were observed in nutrient agar, arecanut root extract agar and tryptone–glucose agar medium. The qualitative bacterial flora should be enumerated using pigment and non-pigment colonies producing media. The bacterial population was counted at pH levels of 5, 6 and 7 using soil extract agar medium (0.2% glucose). No variation in the count was observed at these pH levels. The significant difference in the bacterial population was observed in 30 and 60 cm lateral distance at all depths as compared to other lateral distance and depths (Table I). No significant difference was observed between 30 and 60 cm lateral distance at all depths.

The maximum counts for fungal population was observed in Martin's rosebengal agar medium. The fungal population was more in 0–15 and 15–30 cm depths at 30 and 60 cm lateral distances (Table I). Similar trend

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Table I. *Rhizosphere microflora of arecanut*

Lateral distance from the base of arecanut palm (cm)	Organism	Microbial population in the rhizosphere** Depth (cm) 0–15	15–30	30–45	45–60	Mean	
30	F	33.0	25.1	13.6	5.8	19.4	
	B	63.9	56.4	47.0	12.3	19.7	F
	A	13.5	9.5	5.8	0.0	15.8	
60	F	34.0	22.6	16.4	5.9	6.2	
	B	63.4	45.4	30.1	13.9		
	A	13.0	10.8	5.5	0.0	44.9	
90	F	33.2	19.1	8.9	2.0	38.2	B
	B	59.1	30.4	21.5	4.5	28.9	
	A	8.8	3.0	2.0	0.0	15.3	
120	F	11.8	9.4	3.0	0.6	7.2	
	B	34.4	18.5	8.3	–	7.3	A
	A	6.8	2.3	1.0	0.0	3.9	
Mean	F	28.0*	19.1*	10.5*	3.5	2.5	
	B	55.2*	37.8*	26.7	7.6		
	A	10.5	6.9	3.3	0.0		

**Average of 8 replications

F = Fungi. B = Bacteria. A = Actinomycetes.

* Significant at 5% level

was observed in actinomycetes population. Kuster's agar with starch as carbon source has given more counts for actinomycetes. In general the microflora was less in 30–45 and 45–60 cm depth at 90 and 120 cm lateral distance. Since the soil was acidic, the bacterial population was less.

Soil extract agar with 0.2% glucose or arecanut root extract agar, Martin's rose bengal agar and Kuster's agar with starch could be used for the enumeration of bacterial, fungal and actinomycetes population respectively. The rhizosphere sample should be collected between 30 and 60 cm lateral distance at 0–30 cm depth, for studying the microbiology of root region of arecanut.

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