

STUDIES ON LEAF SPIRAL IN COCONUT

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The disposition of the leaves on the crown of a coconut palm is found to be in five spirals. In some palms the spirals will be orientated in a clock-wise or 'right-spiralled' direction, while in others these will be orientated to the left, called 'left-spiralled'. According to Patel (1938) the phyllotaxy of each spiral is nearly two-fifths, i.e. the angle of deflection between any two successive leaves in a spiral is nearly 144° . In a right-spiralled palm the coconut bunches will be found to hang toward the left side of the petiole (Fig. 1), while in the left-spiralled palm the bunch will be hanging to the right of the petiole (Fig. 2). The direction of the spiral remains the same throughout the life of a palm.



FIG. 1. RIGHT-SPIRALLED COCONUT.

FIG. 2. LEFT-SPIRALLED COCONUT.

Proportion of right-spiralled and left-spiralled palms in a population

According to Patel (1938) the left-spiralled palms are more than the right-spiralled ones. A study of 5,763 palms growing at the Central Coconut Research Station,

Kasaragod, also showed a slightly higher percentage of left-spiralled palms (51.4 per cent) than the right-spiralled ones (Table I). However, observations on 740 palms at the Central Coconut Research Station, Kayangulam, appear to have shown that right-spiralled palms are more (52.3 per cent) than the left-spiralled ones (Radha and Pandalai, 1964). The occurrence of small deviations from 50 per cent in both directions lends to the view that in a very large population of palms probably the occurrence of both types may roughly be in the proportion of 50 : 50.

TABLE I. DISTRIBUTION OF RIGHT- AND LEFT-SPIRALLED PALMS

Block	Right	Left	Left-Right	Percentage of left
Main	769	888	+119	53.59
Central	830	835	+ 5	50.15
North	562	550	- 12	49.46
South	408	438	+ 30	51.77
East	137	155	+ 18	53.08
Beach	93	98	+ 5	51.31
Total	2799	2964	+165	51.43

Inheritance of spiral character

From a preliminary study of the behaviour of this character in the progenies obtained by self-pollination, controlled cross-pollination and open pollination, it has been concluded (Madras Agricultural Stations Reports, 1951-52) that spiral character does not appear to be truly inherited because parent trees with left spiral gave rise to progenies with right spiral also, and *vice versa*. Davis (1962) also stated that the direction of the foliar spiral in *Cocos nucifera* is not determined genetically. In view of the highly heterogeneous nature of the parent palms, it is too hasty to come to such a conclusion from a study of a single generation of progenies only unless a satisfactory explanation is available for the occurrence of palms with different spiral arrangements.

Association of spiral nature of palms with their yield, and nut and copra characters

Earlier investigations at the Agricultural Research Station, Kasaragod (Madras Agricultural Stations Reports, 1940-41) show that the direction of leaf spiral has no bearing on the yield of nuts. Davis (1963) reported that the left-spiralled trees give 20.9 per cent more yield of nuts than their counterparts. The difference of kernel yield of 100 left-spiralled and an equal number of right-spiralled coconut palms on Ponape Island in 1963 is quite high (Davis, 1964), being 13.48 per cent (i.e. 14.16/12.49 kg of kernel per tree per year). That the direction of the leaf spiral has no bearing on the yield of nuts has been confirmed by Satyabalan *et al.* (1966) and Radha and Pandalai (1964). Recently, a more extensive investigation covering a total population of 4,347 palms has given results in conformity with the previous ones.

The mean yield of right-spiralled and left-spiralled palms were 50.6 and 50.9 nuts respectively (Table II).

TABLE II. MEAN YIELD OF RIGHT-AND LEFT-SPIRALLED PALMS OF DIFFERENT YIELD GROUPS

Yield group	No. of palms		Mean yield (nuts)	
	Right-spiralled	Left-spiralled	Right-spiralled	Left-spiralled
Low yield (Below 40 nuts)	637	724	27.67	28.00
Medium yield (Between 40-80 nuts)	1,280	1,343	56.97	56.66
High yield (Above 80 nuts)	153	210	92.90	92.64
Total	2,070	2,277	50.61	50.86

Studies carried out in 518 palms to determine whether there is any association between the spiral character and copra content per nut and copra outturn per tree gave the following results (Table III).

TABLE III. ASSOCIATION BETWEEN SPIRAL CHARACTER AND COPRA CONTENT AND ANNUAL OUTTURN

Yield group	Spiral nature	Mean copra content per nut (g)	Annual outturn of copra (kg)
Low (Below 40 nuts)	Left	167.0	4.22
	Right	171.9	5.03
Medium (40 to 80 nuts)	Left	169.8	11.05
	Right	170.7	11.04
High (Above 80 nuts)	Left	159.5	14.59
	Right	158.6	14.30
Overall	Left	167.5	10.7
	Right	166.6	10.7

There is no indication of any significant difference between the right-spiralled and left-spiralled palms for any of the above-mentioned characters. It is therefore safe to conclude that spiral character in coconuts of the local 'Tall' variety is not related to any character of economic significance of the palm.

SUMMARY AND CONCLUSIONS

Studies on the leaf spiral in coconut have indicated that in a very large population of palms the occurrence of left-spiralled and right-spiralled palms may roughly be 50 : 50. Further studies made on a large number of palms have confirmed the previous findings that the direction of leaf spiral has no bearing on the yield of nuts and that there is no association between spiral character and other characters of economic signi-

ficance like copra content per nut and annual copra outturn in the palms of the local 'Tall' variety.

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