

# CONTRIBUTIONS TO THE STUDY OF SPIKE-DISEASE OF SANDAL (SANTALUM ALBUM, LINN.).

## Part IV.—Chemical composition of healthy and spiked Sandal stems.

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Sandal stems 0.20 to 0.50 cm. in diameter derived from diseased and healthy sandal trees of the same area were dried at 70° and analysed for the main mineral constituents, total nitrogen and starch. The dried substance was ground to pass through a 30-mesh sieve and preserved in stoppered bottles for subsequent analysis. Methods employed for the estimation of total nitrogen, phosphorus, sulphur, calcium and potassium were the official methods recommended by the Association of Agricultural Chemists (official and tentative methods of the A.O.A.C., Washington). Starch was estimated after thorough extraction of the weighed sample in a Soxhlet with 90 per cent. alcohol for six hours, by the taka-diestase method (Davis and Daish, *J. Agric. Sci.*, 1914, 6, 152).

From the results tabulated below it will be seen that the diseased stems have usually a low ash content, a uniformly high nitrogen value calculated on the moisture-free material, a low calcium and potash content and a higher percentage of phosphorus, all the three being calculated on the weight of ash. The starch content of the diseased stems is also higher than that of the healthy stems as already found by Coleman and his colleagues (Spike-disease of Sandal, 1917, Bulletin No. 3, Mycological Series, Department of Agriculture, Mysore).

TABLE I.

*Total Ash and Nitrogen Content of Sandal Twigs.*

Date in 1927	Total ash per cent.		Total nitrogen in mgms. per 100 gms.	
	HEALTHY	SPIKED	HEALTHY	SPIKED
<b>UTTARAHALLI AREA</b>				
July 15	2.950	2.611	554.0	887.0
August 18	2.618	3.069	752.0	1157.0
September 1	5.214	4.645	1279.0	1548.0
" 15	1.960	1.954	645.0	1021.0
Average for the season	3.186	3.070	807.5	1153.3

*Total Ash and Nitrogen Content of Twigs.—(continued).*

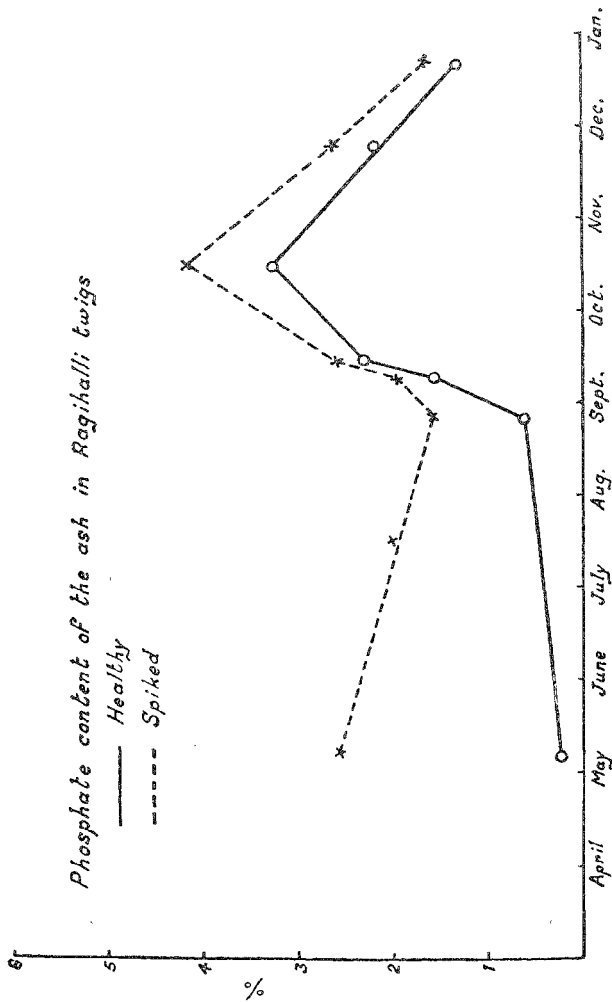
Date in 1927	Total ash per cent.		Total nitrogen in mgms. per 100 gms.	
	HEALTHY	SPIKED	HEALTHY	SPIKED
RAGIHALLI AREA				
May 5 ...	6.870	4.550	1092.0	1960.0
September 8 ...	2.177	2.050	566.0	642.0
„ 13 ...	2.598	2.348	665.0	666.0
October 14 ...	2.113	2.304	577.0	635.0
November 23 ...	2.770	2.320	651.0	724.5
December 19 ...	2.000	2.220	646.2	831.7
Average for the season ...	3.088	2.632	699.5	909.5

TABLE II.

*Ash Constituents of Sandal Twigs.*

Date in 1927	Ca per cent.		K <sub>2</sub> O per cent.		P <sub>2</sub> O <sub>5</sub> per cent.	
	HEALTHY	SPIKED	HEALTHY	SPIKED	HEALTHY	SPIKED
UTTARAHALLI AREA						
July 15 ...	31.93	17.47	13.67	12.59	2.00	5.37
August 18 ...	24.20	19.48	27.87	41.77	5.27	2.70
September 1 ...	13.75	8.21	17.63	17.20	4.43	5.22
„ 15 ...	21.43	22.82	46.22	25.44	8.06	8.15
Average for the season ...	22.83	16.99	26.35	24.25	4.94	5.36
RAGIHALLI AREA						
May 5 ...	14.78	12.18	21.84	26.52	0.24	2.55
September 8 ...	17.90	23.66	21.07	15.00	1.53	1.94
„ 13 ...	19.43	30.83	30.27	22.50	2.41	2.61
October 14 ...	1.28	1.00	27.54	22.68	3.23	4.13
November 23 ...	12.00	11.40	52.35	33.62	2.20	2.63
December 19 ...	18.20	17.30	54.50	36.50	1.31	1.67
Average for the season ...	13.92	13.11	34.60	26.14	1.82	2.59

Phosphate content of the ash in *Ragihalli* twigs



The figures indicate that the more important constituents nitrogen, calcium, phosphorus and potash in the diseased plant are equally subject to seasonal influences with the healthy plant itself; but the differences are consistently maintained throughout the season under experiment. The chart of the phosphate values brings out this point quite clearly.

A study of the figures in the two tables also shows that the average value for the season for a particular constituent, differs for different areas. Taking total nitrogen into consideration, Uttarahalli samples show a higher nitrogen content than those of Ragihalli. The ecological factors, more especially the flora associated with sandal have a distinct influence in controlling the composition of the parasitic sandal. Each area has therefore its own definite average value with regard to every one of its constituents. It would be misleading therefore to compare the values of one area with those of another.

#### SUMMARY.

Diseased sandal stems have usually a lower ash, calcium and potash content than the healthy ones, but a definitely higher nitrogen, phosphorus and starch content in any one area.

The constituents are equally subject to seasonal variations in the diseased as well as the healthy stems, there being a consistent variation between them.

The average value for the season for a particular constituent varies for different areas.

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