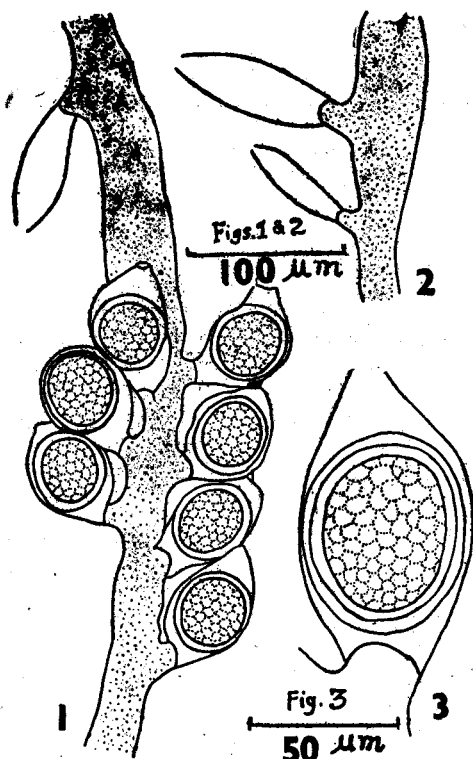


distal end. The oogonia measured 40–45 μm in breadth and 60–88 μm in length. Plants are monoecious. Antheridia may occur on separate branches (Fig. 2) or on the same branch as oogonia (Fig. 1). Antheridia are narrower, slightly inflated,



FIGS. 1–3. *Vaucheria bilateralis* Jao. Fig. 1. Bilaterally arranged oogonia in series containing globose oospores and an empty antheridium above. Fig. 2. A branch with two empty antheridia. Fig. 3. An oogonium containing a subglobose oospore. cylindrical sub-tubular structures formed singly on one side only or one on either side of the fertile axis above the series of oogonia. They possess a very short stalk, measure 17–32.5 μm in breadth and 50–92.5 μm in length and possess a terminal opening. Mostly, empty antheridia were found in the material. The oospores are globose to sub-globose in structure with a thick, three-layered outer membrane. The layers are smooth and the middle layer is yellow brown in colour. The globose oospores measure 45–48 μm in diameter while the sub-globose oospores measure 45–49 μm in breadth and 56–64 μm in length.

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RAPID BIOCHEMICAL TEST TO DETECT ROOT (WILT) DISEASE OF COCONUT

THE root (wilt) disease is the most serious malady of coconut. Its etiology is still unknown. The disease can be identified on the basis of morphological symptoms¹ and serological test². In the present study an attempt was made to develop a simple and quick biochemical test using EDTA as an extractant of biologically active organic substances/pigments present in the diseased palms.

Two hundred and forty adult palms and sixty seedlings growing in diseased zone and 105 adults and 45 seedlings growing in healthy zone, all belonging to West Coast Tall variety in three soil types, viz., sandy loam/red sandy loam, laterite and coastal sandy, were selected for this study. Equal number of palms/seedlings were selected in each category. 85 palms including seedlings, growing in diseased and healthy zones, on which serological test was performed, were also examined in this study.

0.3 M solution of ethylene diamine tetra-acetic acid-disodium salt was prepared and its pH was adjusted to 6.8–7.0 by adding NaOH solution. Two leaflets each from both sides of the rachis of spindle and root-tips from five actively growing roots were collected and kept in an ice box. 0.5 cm diameter leaf discs were cut out from top, middle and basal portions of external moisture-free leaflets with the help of a cork borer. Those discs (1 g) were transferred to a petridish containing 10 ml EDTA solution. Each disc was divided into four pieces by giving parallel 3 cuts with the help of scissors and forceps. The cut discs were steeped in the solution for 5–7 minutes with four occasional shakings. After completion of steeping, the EDTA extract was decanted and poured into a test tube. In another set, tender root tips of about 6 cm length were washed properly with water, blotted carefully and cut into small pieces to a length of about 0.5 cm. These pieces were mixed thoroughly, weighed to 1 g, transferred to EDTA solution, cut into fine pieces by a clean blade, steeped and thereafter decanted the extract as mentioned in case of spindle. The transmittance of spindle and root extracts was read using blue filter (400–450 m μ wavelength) in the Klett Summerson colorimeter. The colour of EDTA extracts was identified with the help of the 'Dictionary of Colour'. This test was performed during rainy/wet and summer/dry seasons and in each season the tissues were tested

TABLE I
Colour and transmittance values of spindle (S) and root (R) extracts and R/S transmittance ratios in healthy and root (wilt) diseased coconut palms during different seasons

Season		Healthy	Early/ Latent diseased	Advanced diseased
Summer (Dry)	Spindle	Yellowish brown (antiquigold) >140	Yellowish light brown (cloudy amber) <140	Yellowish verylight brown <100
	Root	Brown <330	Dark brown >440	Dark brown >440
	R/S Transmittance	1.86±0.57	4.19±1.17	5.01±0.99
Rainy (wet)	Spindle	Yellowish brown (antiquigold) >100 >80*	Yellowish light brown (cloudy amber) <100 <80*	Yellowish very light brown <70 <60*
	Root	Brown <300	Dark brown >400	Dark brown >400
	R/S Transmittance	1.90±1.03	4.000±1.03	5.05±0.89

C.D. for transmittance values = 6.6 (Significant at 0.1% level).

* Values recorded within 24 hours after rain.

twice. The average value in each case is presented in Table I.

The spindle and root extract of diseased palms showed yellowish light brown (cloudy amber³) and dark brown colour respectively. On the contrary, in healthy palms the spindle and root extract exhibited yellowish brown (antiquigold³) and brown colour respectively. The transmittance values recorded for spindle and root extract of diseased and healthy palms differed significantly. In apparently healthy palms (healthy palms of diseased zone), the spindle-transmittance was equivalent to that of healthy ones but the root-transmittance was found to be in between the values of healthy and early/latent diseased palms. The values recorded for adult palms and seedlings did not differ significantly even with variation in the soil types. But the transmittance values recorded for spindle and root extracts during summer/dry season reduced markedly by the onset of rains/rainy season (Table I).

With the severity of disease, the transmittance values of spindle and root extracts decreased and increased respectively. Exceptions to an extent of 15% were recorded, where the spindle-transmittance values of diseased palms did not differ significantly from that of healthy ones and root-transmittance values of healthy palms from that of diseased ones. Such cases were usually observed in those palms, where there were no traces of spindle-rot. They had severe attack of insects specially *Myllocerus curvicornis* F. However when transmittance ratio of root/spindle was worked out, it was found to be 1.86 ± 0.57, 4.19 ± 1.17 and

5.01 ± 0.99 for healthy, early diseased and disease advanced palms respectively. The corresponding ratios for rainy season differed insignificantly. The root/spindle ratio was therefore taken as another important criterion for detecting the different degrees of disease. It is evident from these results that there is some imbalance in the synthesis/distribution of organic substance/pigment in spindle and roots of diseased palms. The chemical nature of this pigment is not yet known and needs further investigation.

The values fixed for different intensity of disease by this test coincided to an extent of 85% and more, with the visual symptoms and serological test. More over, this biochemical test is simple, reliable and takes hardly 10 minutes time to distinguish between healthy and diseased palms of different degrees.

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