swamps. It is possible that the sediments are mainly derived from the inland mining rejects, and from heavy erosion due to deforestation in catchment areas of the rivers. These sediments are transported downstream as suspended matter. Under favourable hydrographic conditions, the sediments flocculate near the islands of low lying areas and give rise to submerged mud banks. As the sedimentation continues, these mud banks grow above the high tide level and are subsequently stabilized when floating vegetation hold the roots. Such mud banks thus form favourable ground for the luxurious growth of vegetation.

It is concluded from this study that i) repetitive coverage and spatial resolution of space borne data permits us to locate recently deposited alluvium and change in vegetation; ii) though constant biotic pressure is severely degrading the coastal vegetation, there are a few locations, where recent alluvium has deposited, forming favourable grounds for growth of vegetation.

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A rapid method of estimating essential oil content in heartwood of *Santalum album* Linn

Sandal (*Santalum album*) tree is mainly exploited for its scented heartwood which gives fragrant sandalwood oil upon steam distillation. Oil yield varies from 2.5 to 6.2% depending on age of the tree, soil, climatic and genetic factors. Fixative property and tenacious aroma of sandal oil are due to its major odoriferous sesquiterpenic constituents – alpha and beta santalols, forming about 90% of oil. However, alpha and beta santalenes and santalyl acetate which form about 6% of the oil also contribute to some extent to the overall characteristic odour of oil[1–4].

Sandalwood oil is generally obtained by hydro or steam distillation of powdered heartwood. A minimum quantity, 50 g of heartwood powder, is required for estimation of oil content. Estimation of oil in a small quantity of heartwood powder is difficult by the conventional steam distillation method. Two laboratory methods based on colour of wood and electrophoretic technique were developed earlier. In the first method, the colour of heartwood powder, whether light brown, yellow, brown or dark brown was determined by a tintometer and correlated with oil content[5]. Peroxidase isoenzyme activity in living bark tissue was determined by polyacrylamide gel electrophoresis and used as a marker in the second method[6]. Determination by tintometer method requires clear physical distinction of colours of heartwood powders and sometimes distinguishing colours of heartwood material in core samples taken from standing trees was found difficult.

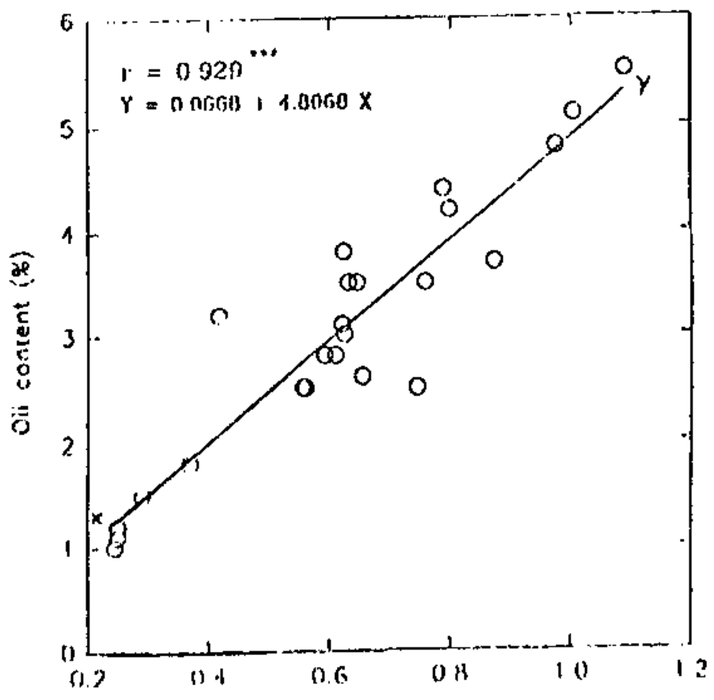

Figure 1. Relationship between oil content and optical density of hexane extract of sandalwood powder.

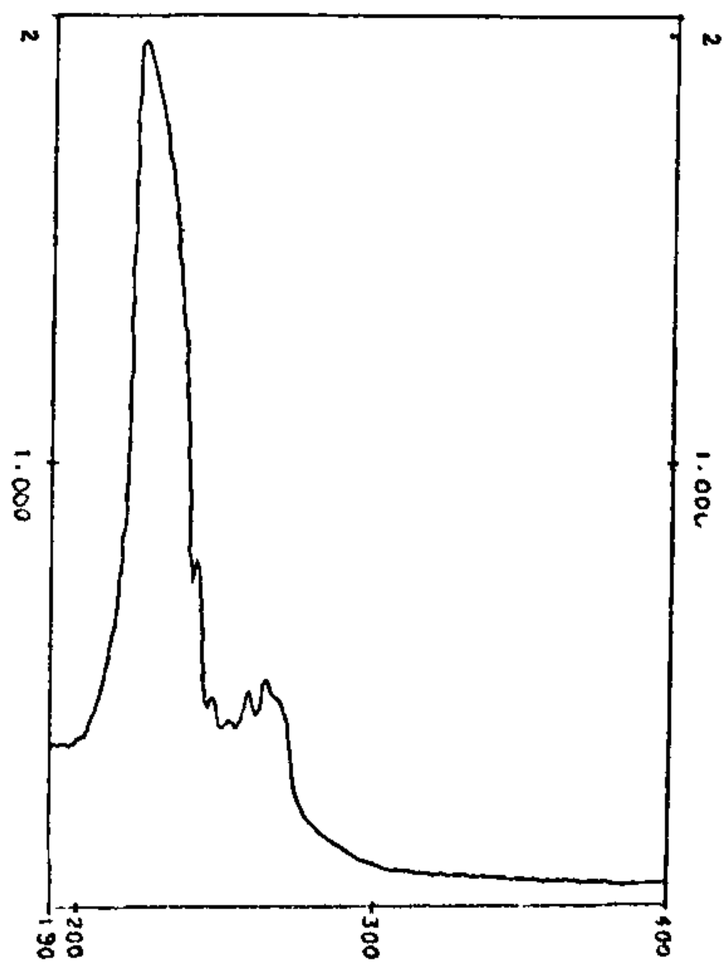

Figure 2. UV spectrum of sandalwood oil (25 mg/100 ml).

Table 1. Oil content (%) in 25 samples of sandalwood as determined by steam distillation and optical density (OD) measurement methods

OD at 219 nm	Oil content	
	Steam distillation method	By OD measurement
0.631	3.5	3.1
0.592	2.8	2.9
0.417	3.2	2.1
0.250	1.1	1.3
0.873	3.7	4.3
0.745	2.5	3.6
0.645	3.5	3.2
0.788	4.4	3.8
0.623	3.8	3.1
0.620	3.1	3.0
0.655	2.6	3.2
0.290	1.5	1.5
0.370	1.8	1.8
0.610	2.8	3.0
0.625	3.0	3.1
0.798	4.2	3.9
0.758	3.5	3.7
1.004	5.1	4.9
1.091	5.5	5.3
0.250	1.2	1.3
0.245	1.0	1.2
0.560	2.5	2.7
0.975	4.8	4.7
0.410	2.0	2.0
0.555	2.5	2.7

Determination by polyacrylamide gel electrophoresis is based on enzyme activity of living bark tissue, which needs to be estimated within a few hours of sample collection which is not feasible when the collector of samples is on tour. The method highlighted in the current paper however, can be carried out later in the laboratory at any point of time after the sample collection. Also this method is simpler and quicker than the other two.

In the present study, estimation of sandal oil in a small quantity of heartwood material containing atleast 1 mg of oil is rendered simpler, quicker and fairly accurate by using UV spectrophotometer, measuring optical density (O.D) at 219 nm (max) on hexane extract of sandal powder, whose oil content was predetermined by steam distillation method.

Twenty-five samples of sandalwood were selected from sandal depots of Karnataka and Tamil Nadu at random. Heartwood was powdered after separation of sapwood and bark. 100 mg of heartwood powder was taken in 100 ml volumetric flask, hexane (60–70°C) was added up to the mark and kept aside for 18 h with periodic shaking. The supernatant was taken in quartz cell and OD at 219 nm (max) was measured by UV spectrophotometer (SHIMADZU-240). Oil content in the same sample of wood was also estimated by steam distillation of 100 g of powder separately. By keeping the heartwood powder in hexane for 18 h, it was found that the extraction was exhaustive and durations less than 18 h were found to be insufficient. The results are presented in Table 1.

Oil content was related with OD (Figure 1) by the regression equation

$$Y = 0.0668 + 4.8068\,X$$

(X = Optical density)

Y = Oil content (%).

There was a highly significant and positive correlation between O.D and oil content ($r = 0.929$). UV spectra of sandalwood oil (25 mg/100 ml hexane) and hexane solution of one of the sandalwood powders at 219 nm (max) are presented in Figures 2 and 3. It is concluded that this method would be useful in rapid screening of sandal plants for their oil content and in selection of plus trees among different provenances.

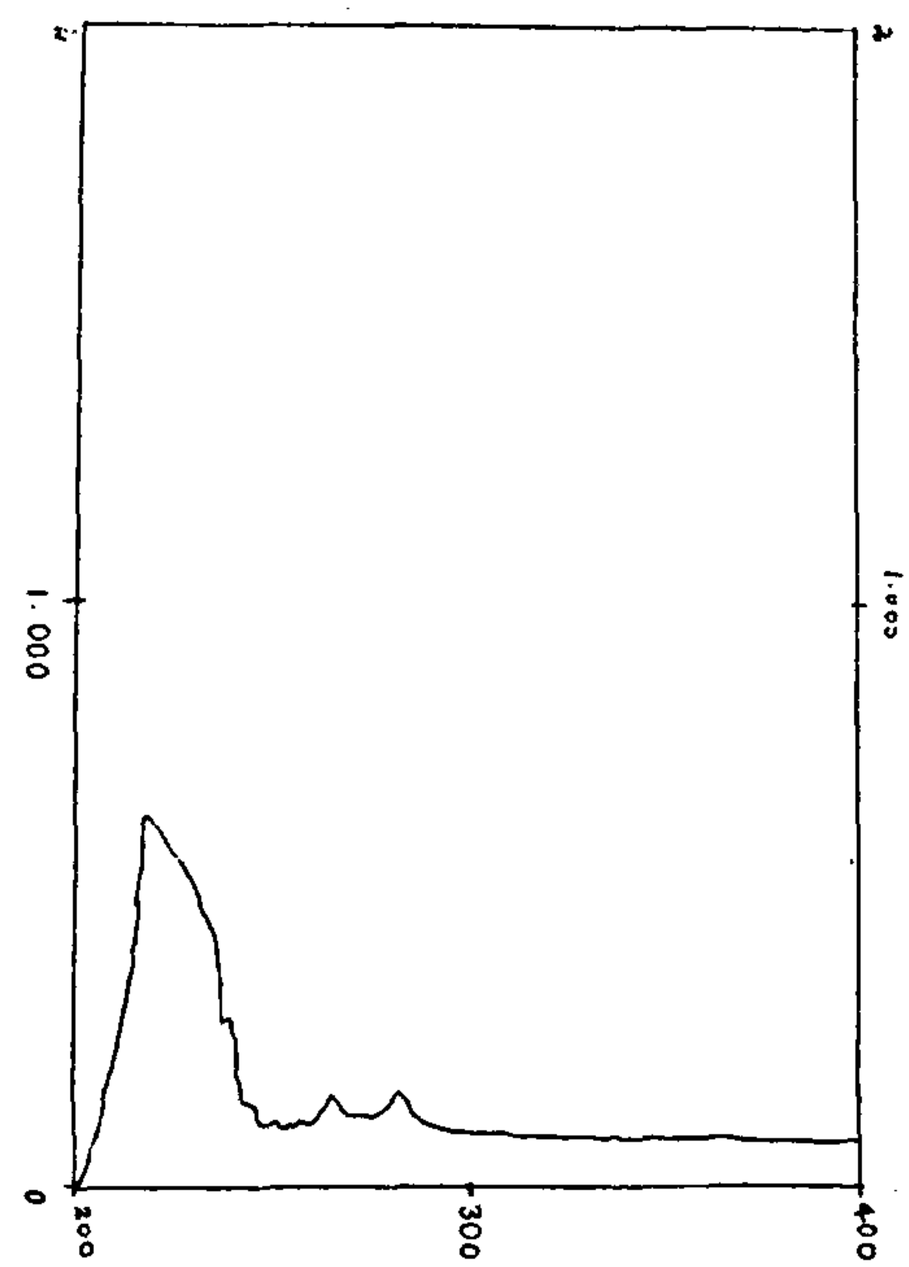

Figure 3. UV spectrum of hexane extract of sandalwood (100 mg sandal powder/100 ml).

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