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FLUORESCENCE ANALYSIS OF THE HEARTWOOD OF *PTEROCARPUS SANTALINUS* L. F.

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Pterocarpus santalinus L. f. (Leguminosae: Papilionoideae), popularly known as Red Sanders or Red Sandalwood, is a medium-sized deciduous tree endemic to Andhra Pradesh and Tamil Nadu (Sanjappa, 1992; Pullaiah and Chennaiah, 1997). It is referred to as the Pride of Eastern Ghats (Hajra & al., 1996). In trade/ vernacular, it is known as Raktachandan, Raktachandanamu, Lalchandan, Yerra chandanamu, Sivapu chandanam and so on (Kirtikar and Basu, 1984). In 1998, the Government of India has placed this plant species in the Negative list of export, which bans its trade/export from wild collections.

The heartwood of *P. santalinus* is considered as astringent, tonic and is used as a external application for inflammation and headache. It is useful in bilious affections and skin diseases, in fever, boils and to strengthen the sight. It also acts as a diaphoretic and is applied to the forehead in headache. The wood, rubbed up with water, is advantageously employed as a wash in superficial excoriation of the genital organs. It is also used over swelling of eyelids for reducing the swelling (Kirtikar and Basu, 1984).

The identification of vegetable crude drugs (medicinal plants/plant parts) involves a number of methods. Fluorescence analysis is one of the useful methods in the identification of vegetable crude drugs and in detecting adulterants (Tyler & al., 1976). In fluorescence analysis, the crude drugs may be examined as such, or in their powder form or in solution or as extracts. Although in most of the cases the actual phytochemicals that are responsible for the fluorescence properties have not been known, the merits of simplicity and rapidity of the process makes it a valuable analytical tool in the identification of plant samples/crude drugs (Denston, 1946).

The present study was undertaken to examine the heartwood of this plant under ultraviolet radiation and record its characteristic fluorescent properties (colours), which will be useful to ascertain the identity/authenticity of this plant in its crude form and to distinguish it from adulterants, if any.

MATERIALS AND METHODS

The heartwood of *P. santalinus* was collected from Tirumala hills (near Sithamma Theertham) of Andhra Pradesh and its botanical identity was confirmed by consulting regional flora (Pullaiah and Chennaiah, 1997) and also by comparing with the authentic specimens deposited at the Crude Drug Museum of Pharmacognosy Section, Botanical Survey of India, Howrah.

The dried heartwood of *P. santalinus* was coarsely powdered and studied initially under daylight and then under ultraviolet radiation. Later, about 1 gm of the heartwood powder was treated with about 10 ml of various reagents such as solvents like water, hexane, chloroform, methanol and acetone; alkaline solutions like aqueous and alcoholic 1 *N* sodium hydroxide; acids like 1 *N* hydrochloric acid, 50% sulphuric acid and 50% nitric acid and are left over overnight. The next day, the residue was removed and the filtered solution was examined initially under daylight and then under ultraviolet radiation in a dark room for their characteristic fluorescent properties. The data pertaining to colours were recorded.

The Ultraviolet lamp with transmitting radiation in the range of 3600 to 4200 Angstrom units was used in this study. Standard pharmacognostic books were referred (Denston, 1946; Tyler & al., 1976). However, the methodology employed by the author (Selvam, 2005) was followed in particular in the present study.

RESULTS AND DISCUSSION

The characteristic fluorescent properties (colours) emitted by the powdered heartwood of *P. santalinus* under ultraviolet radiation and the colours observed under daylight before and after treating with various

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reagents were recorded and are presented in Table -1. The powdered heartwood of this plant appeared as reddish orange under daylight and as deep reddish orange under ultraviolet radiation.

The powdered heartwood of this plant after treating with various reagents, under daylight, showed different shades of yellow in most of the cases as described in Table 1, except hexane, methanol, acetone, aqueous and alcoholic 1 *N* sodium hydroxide extracts. The methanol and acetone extracts revealed deep brownish red and deep orange colours respectively. The aqueous and alcoholic 1 *N* sodium hydroxide extracts, showed reddish brown colours. The hexane extract revealed no colours. Though the water extract did not show any solid colour (appears almost colourless), a very pale brown with light yellow tinge is observed.

Under ultraviolet radiation, chloroform, acetone, 50% sulphuric acid and 50% nitric acid extracts fluoresced different shades of yellow. The water and methanol extracts showed pale green and magenta colours respectively. The aqueous and alcoholic 1 *N* sodium hydroxide extracts, revealed dark violet colours, but the hexane and 1 *N* hydrochloric acid extracts fluoresced no colours.

CONCLUSION

The characteristic fluorescent properties (colours) recorded through this study could be used as a standard to identify/authenticate the heartwood of *P. santalinus* in its crude form and to check any adulteration that may be used in sale/trade.

Our institution is regularly receiving number of plant samples especially heartwood of *P. santalinus* from the Forest/Customs authorities for identification/authentication which have been drawn either from an export consignment or seized from attempted smuggling of prohibited items. The data recorded from the present study are extremely useful to us in the identification/authentication of the heartwood of *P. santalinus* in its crude form.

Table 1. Fluorescence properties of the heartwood of *Pterocarpus santalinus* under Daylight vis-a-vis Ultraviolet radiation.

Sl. No.	Tests	Colours observed under daylight	Colours observed under ultraviolet radiation
1	Plant powder	Reddish orange	Deep reddish orange
2	Plant powder treated with water	Colourless (or)Very pale brown with light yellow tinge	Pale green
3	Plant powder treated with hexane	Colourless	Colourless
4	Plant powder treated with chloroform	Lemon yellow	Pale lemon yellow
5	Plant powder treated with methanol	Deep brownish red	Magenta
6	Plant powder treated with acetone	Deep orange	Deep chrome yellow
7	Plant powder treated with 1 *N* sodium hydroxide in water	Reddish brown	Dark violet
8	Plant powder treated with 1 *N* sodium hydroxide in methanol	Reddish brown	Dark violet
9	Plant powder treated with 1 *N* hydrochloric acid	Pale yellow	Colourless
10	Plant powder treated with 50% sulphuric acid	Chrome yellow	Light ochre yellow
11	Plant powder treated with 50% nitric acid	Golden yellow	Light ochre yellow

Note: The tests pertaining to the serial numbers 4, 5, 6, 7, 8, 10 and 11 showed immediate reactions by yielding colours that were observed under daylight.

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