Differentiation of Saraca Asoca Crude Drug From Its Adulterant

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ABSTRACT:

*Saraca asoca* commonly known as asoka, which is considered as a sacred tree by Hindus and Buddhists possesses various medicinal uses. The stem bark of the tree is the principal constituent of several ayurvedic preparations which are widely prescribed in leucorrhoea, haematuria, menorrhagia and other diseases of the female genitourinary system. Because of destructive extraction and the absence of an organized cultivation programme, the avilbility of the crude drug is diminishing and this has resulted in the sale of adulterants. The commonly used adulterant is the bark of *Polyalthia longifolia* which shows some similarity with that of asoka. Studies were conducted at Aromatic and Medicinal Plants Research station, Odakkali (Kerala Agricultural University) during 2001-2002 to evolve methods for differentiating the original drug from the adulterant species by anatomical biochemical and chromatographic techniques.

INTRODUCTION

*Saraca asoca* is a medium sized handsome evergreen tree belonging to the family Caesalpinaceae growing to a height of 9m with numerous spreading and drooping glabrous branches. The tree is distributed upto an elevation of about 750m almost throughout India except the north western part. In Ayurveda, the bark is used in dyspepsia, fever, dipsia, burning sensation, visceromegaly, colic, ulcers, menorrhagia, metropathy leucorrhoea and pimples. The well-known ayurvedic medicines ‘Ashokarishta’and Ashokaghrita’ are prepared with asoka bark as the principal raw material. The leaf juice mixed with cumin seeds is used for treating stomachalagia. The flowers are considered to be uterine tonic and are used in vitiated conditions of pitta, syphilis, cervical adenitis, hyperdipsia, burning sensation, haemorrhoids, dysentery, scabies in children and inflammation. The aerial parts of the tree show CNS depressant and diuretic activities (Warrier *et.al.*, 1996).

Asoka can be grown well under light shade in areas with well distributed rainfall. It requires a moist soil rich in organic mater. Seed is the best planting material. Seed are produced usually during February –April and they mature by April-May. They are collected when they fall down and are sown on raised beds after soaking in water for 12 hours. Seeds germinate within 20 days and can be planted in polybags. 2 –month-old seedlings are transplanted to the main field.
at a spacing of 3mx3m. Bark, the official part is extracted from tree of over 20 years of age. For the purpose, the trunk is cut at a height of 15cm from the ground and the bark removed carefully (Thomas et.al., 2000). Hardly, 5 to 10 kg of bark can be collected from a mature tree. The estimated annual requirement of asoka bark in the country is 850 tons (Tewari, 1999) which is on a steady increase. Difficulties in the commercial cultivation of this tree are its inherent slow growth rate and poor yield of bark. Because of destructive extraction and absence of an organized cultivation programme, the species is fast approaching extinction. Due to diminishing availability and increasing requirement, the ayurvedic industry is facing acute shortage of this crude drug. The original material has become scarce and the market item is often admixed with bark of other trees which pass off as asoka bark. It is usual that traders try to deceive the consumers by tendering similar bark of other trees. Since these spurious and unauthentic materials do not possess the pharmacological effects of asoka, the drugs prepared using them are liable to be non-effective, if not harmful. The most widely used adulterant is the bark of the avenue tree, *Polyalthia longifoilia*. This is a fast growing tree belonging to the family anonaceae, a large population of which is available in the wild. In the dried form, it is very difficult to differentiate it form the crude drug of asoka by examination with the naked eye. Effective and convenient methods are not available at present for distinguishing the original material form the adulterant. Investigations were carried out at the Aromatic and medicinal plants research station, Odakkali (Kerala Agricultural University) during 2001-2002 to develop suitable methods for the detection of adulteration of the crude drug of *Saraca asoca* with stem bark of *Polyalthia longifoilia*.

**MATERIALS AND METHODS**

Authentic samples of *S. asoca* and *P. longifoilia* were collected and three different studies were conducted to reveal their similarities and differences.

**2.1. Anatomical study**

Thin hand sections of prewetted dry bark samples of *S. asoca* and *P. longifolia* were prepared, stained with safranine and examined under high power microscope. Drawings on the size and structure of the cells of the two species were made for comparison.

**2.2. Biochemical study**

Samples of bark of the two species under study were processed by sun drying. The samples were ground to a fine powder and the content of tannin, an important active principle of asoka drug was analysed by standard procedure (Sadasivan and Manickam, 1992).

**2.3 Chromatographic study**

One gram each of the powdered bark samples of the two crude drugs were refluxed with 25 ml methanol on a steam bath for 30 minutes. The extract was decanted and clarified by centrifugation. The clear extract was spotted on silica 60F254 pre-coated thin layer chromatographic plates (Merck (1) Ltd., Bombay) and chromatogram developed using different solvent mixtures. The spots were visualized by spraying the plate with 5% sulphuric acid in ethanol followed by heating at 125°C for minutes. The colour, shape and Rf of the spots which developed in each sample were noted.
RESULTS AND DISCUSSION

3.1. Anatomical differences

Drawings of the transverse section views of Saraca asoca and Polyalthia longifolia as observed under the high power microscope are shown in figure 1. Difference were observed in the nature of epidermal and cortical cells of the two species. In Polyalthia longifolia, the epidermal cells were found to be smaller than those in Saraca asoca. In both the species, the cortex is differentiated into three layers- outer, middle and inner, but characteristic difference was observed in the structure of these cells. In Polyalthia longifolia, the outer layers consists of chlorophilated cells with a spars distribution of tannin cells and the inner cortical region consisted of discontinuous sclerenchymatous patches. Saraca asoca was distinct with the absence of these types of specialised cells in the cortical region. This difference in anatomical features is probably due to the fact that the two plants belong to different families.

Based on these differences in the structure of cells of the cortical region, it is possible to differentiate between dried bark of S. asoca and P. longifolia by microscopical examination.

3.2. Biochemical differences

Large difference was observed in the total tannin content of the barks of the two plants. The content of tannin in Saraca asoca was 4.63% whereas Polyalthia longifolia recorded a significantly low value of 2.45%. Saraca asoca is a better accumulator of tannin and the therapeutical value of its stem bark is partially attributed to the high tannin content. The distinctly higher tannin content of S. asoca can be reliably used for differentiating it from P. longifolia

3.3 Chromatographic differences

Methanolic extracts of the two materials under comparison were spotted side-on silica gel TLC plates and developed using different solvent mixtures. A 5:3:2 mixture of Hexane, Chloroform and methanol produced chromatogram with distinct features of the two samples and can thus be used for their TLC fingerprinting. A comparison the TLC finger prints of the two crude drugs is shown in Fig. 2.
Characteristic differences were observed in the TLC finger prints of the two crude drugs. A light green round spot is present at an Rf of 0.31 in *Saraca asoca*. Instead, a brown coloured and slightly flat spot was present at an Rf of 0.56 in polyalthia longifolia. This difference is due to the difference in the extractives present in the two plant species. Hence the TLC system developed can be effectively used for differentiating *S. asoca* from *P. Longifolia*.

The results of the above studies demonstrate characteristic differences in anatomical, biochemical and chromatographic features of the bark of the two species. One or more of these methods can be employed to distinguish the genuine drug of *Saraca asoca* from the adulterant, *Polyalthia longifolia*.

CONCLUSION

The stem bark of saraca asoca is widely used in several ayurvedic preparations. Since the availability of the crude drug is insufficient to meet the demand, it is often admixed with the bark of *Polyalthia longifolia*, the common adulterant. Use of such adulterants can reduce the efficacy of the medicines prepared. Anatomical, biochemical and chromatographic features of the two materials were compared and the results revealed large differences between the two materials with respect to these characters. These methods can be employed for assessing the genuinity of *Saraca asoca* crude drug. In order to eliminate the use of adulterants on one hand and to improve hand large scale cultivation of *Saraca asoca* has to be encouraged. Besides greater emphasis has to be given for quality control of this crude drug.

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