

## A NEW SOURCE FOR ALKALOID EPHEDRINE HYDROCHLORIDE FROM THE SEEDS OF *SIDA ACUTA*, BURM. F.

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The drug *Sida acuta*, Burm. f. bala is sold in the various drug markets of Maharashtra. It is used in Ayurvedic preparation for increasing strength of muscles. Despite being a precious Ayurvedic drug it has not been studied so far. To facilitate enforcement of quality control of drug bala, present phytochemical study has been carried out. The present study includes TLC, IR and NMR studies and quantitative estimation of alkaloid ephedrine hydrochloride.

**Keywords :** Botany; Pharmacognosy; Phytochemistry.

### Introduction

The *Sida acuta*, Burm. f. (Malvaceae) commonly known as 'Bala Phanijivika', is occurring throughout tropical and subtropical regions of both the hemispheres. It is very common in both hemispheres as well as in India. Roots are bitter, tonic, stomachic, diaphoretic and antipyretic. They are useful in form of decoction or infusion in febrile affections and some forms of dyspepsia and in mild cases of debility due to various illnesses. Infusion of root with little ginger is given in intermittent fever and chronic bowel complaints. Expressed juice of the roots in the form of electuary is employed for the removal of intestinal worms. Roots of *Sida acuta*, Burm. f. are made in to smooth paste with sparrow's dung and applied for the bursting of boils and abscesses. Leaves warmed, moistened with a little gingely oil and are applied to abscesses so as to hasten suppuration. The drug is used as diuretic in rheumatic affections and as a demulcent in gonorrhoea and chronic dysentery<sup>1,2,3,4</sup>. The present study includes TLC, IR and NMR studies and quantitative estimation of alkaloid.

### Material and Methods

For Phytochemical study, freshly collected seeds of *Sida acuta*, Burm. f. have been used. The healthy seeds were dried in shade so as to prevent decomposition of active principles, and made into fine powder in blender for phytochemical screening.

Extraction and detection of alkaloid

ephedrine has been carried out according to given methods<sup>5,6,7</sup>. After detection of ephedrine by thin layer chromatography (TLC), preparatory thin layer chromatography (PTLC) is performed. The silica gel of known  $R_f$  value is eluted. It is dissolved in chloroform and lot of such material collected from many PTLC and dissolved in chloroform. Ephedrine extract is then dried and dissolved in  $CdCl_2$ . This is used for nuclear magnetic resonance (NMR) studies. Sample is dissolved in chloroform and used for infrared spectroscopical study. Infrared spectroscopy (IR) is a reliable and sensitive method to identify the functional groups present in the samples. The definite categorization is possible by comparing the peaks with the standard ephedrine hydrochloride. IR Spectra were taken on FTIR - 8201 PC of Shimadzu - Japan following Dyer<sup>8</sup>, Khandpur<sup>9</sup>, Ewing Galen<sup>10</sup>. Further this study was supported by <sup>1</sup>H NMR spectroscopy<sup>10,11</sup>.

### Observations

Spot and  $R_f$  value obtained by standard ephedrine hydrochloride (Standard) and seeds of *Sida acuta*, Burm. f. (Sample A) are nearly same on TLC.

Infra - red spectroscopy (IR) peaks are obtained by standard ephedrine hydrochloride (Fig. A) and seeds of *Sida acuta*, Burm. f. (Fig. B) are also nearly of same wavelength and wave number/cm. The results are depicted in table no.1.

<sup>1</sup>H Nuclear Magnetic Resonance

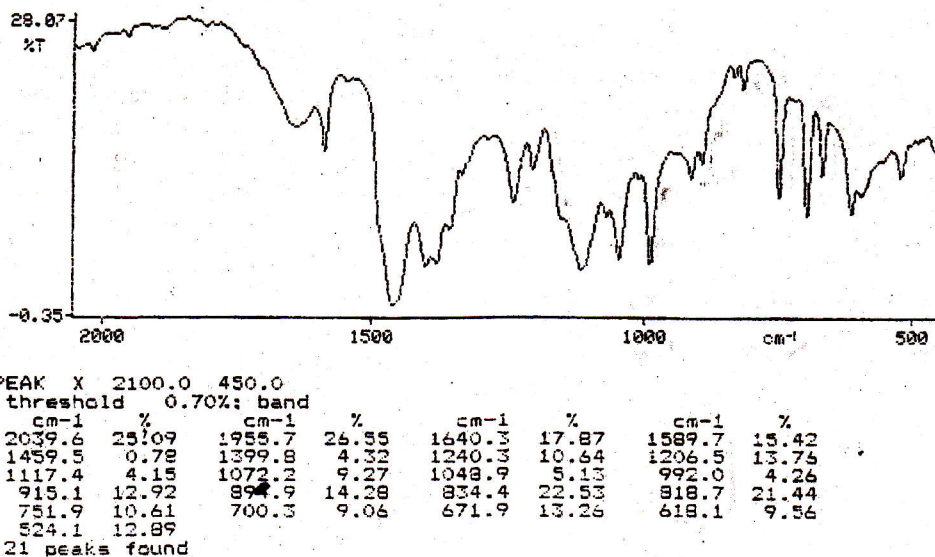
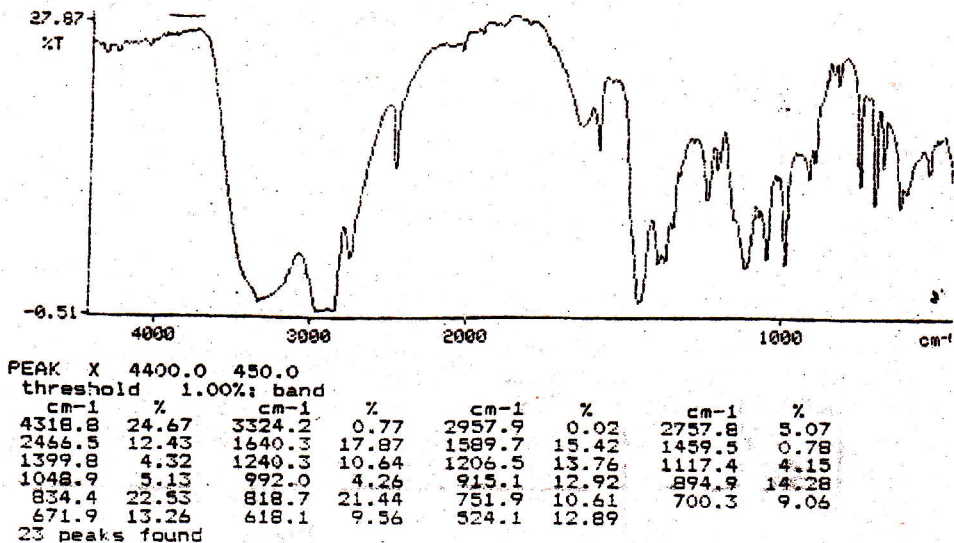
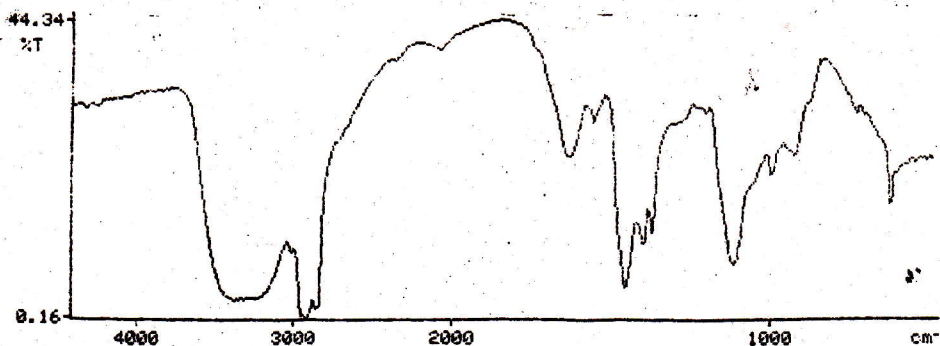


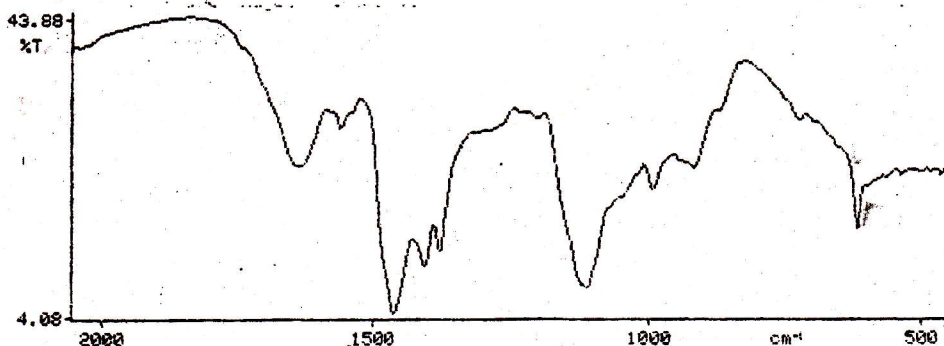
Fig. A. Infrared Spectrum of standard ephedrine hydrochloride.



PEAK X 4400.0 450.0  
 threshold 2.00%; band

cm-1	%	cm-1	%	cm-1	%	cm-1	%
3379.5	3.02	2924.8	0.16	1637.9	24.28	1560.0	29.33
1462.0	4.70	1404.6	11.06	1377.4	12.82	1113.2	8.05
994.4	21.06	618.0	15.99				

10 peaks found



PEAK X 2100.0 450.0  
 threshold 0.20%; band

cm-1	%	cm-1	%	cm-1	%	cm-1	%
2081.9	40.04	1637.9	24.28	1560.0	29.33	1462.0	4.70
1404.6	11.06	1377.4	12.82	1200.2	30.71	1113.2	8.05
994.4	21.06	918.4	24.14	830.3	38.16	721.3	30.45
618.0	15.99	579.0	21.50	563.8	22.80	537.7	23.23
501.6	23.33	484.8	23.71	466.0	23.10	455.9	23.34

20 peaks found

Fig. B. Infrared Spectrum of Seeds of *Sida acuta*, Burm. F.



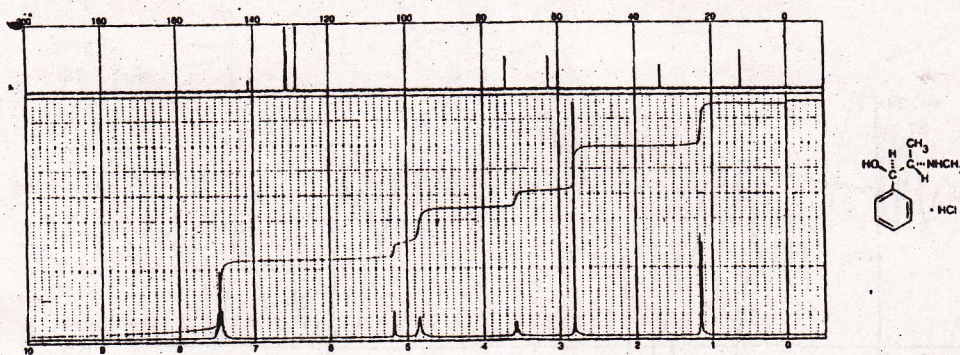


Fig. C. <sup>1</sup>H NMR spectrum of standard ephedrine hydrochloride from Aldrich catalogue.

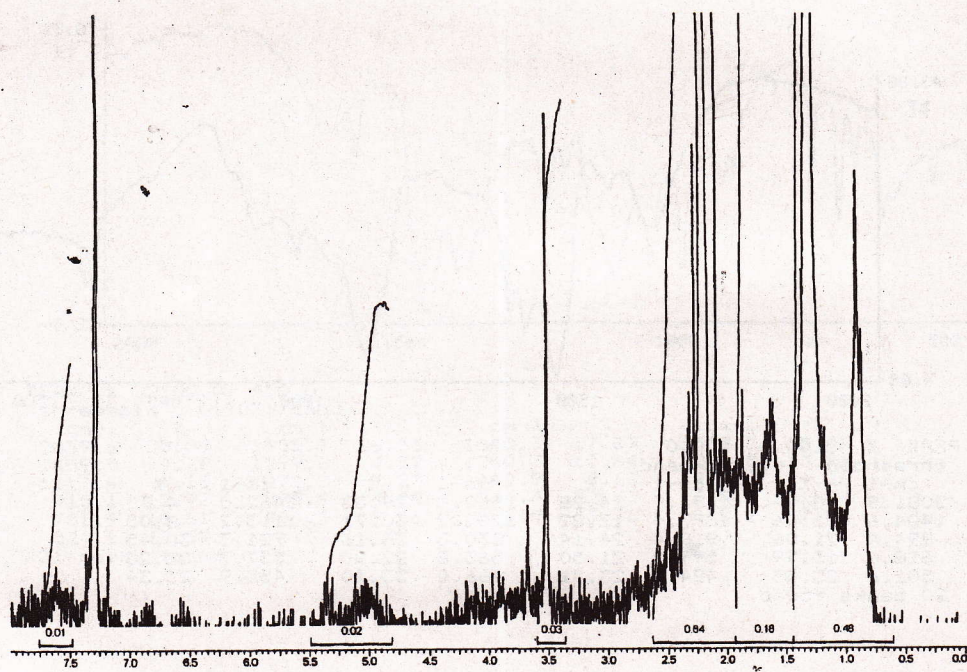


Fig. D. <sup>1</sup>H NMR spectrum of Seeds of *Sida acuta*, Burm. F. in CdCl<sub>2</sub>



**Table 1.** Peak table of IR Scanning.

Functional group	Standard Ephedrine hydrochloride		Seeds of <i>Sida acuta</i> , Burm. F.	
	Position cm <sup>-1</sup>	Intensity %T	Position cm <sup>-1</sup>	Intensity %T
OH - Stretch, N - H Stretch	3324	0.7	3379	3.02
N - H bending	1640	17.8	1637	24.2
Aromatic	1399	4.3	1404	11.06

(NMR) study shows five proton signals, which appeared as a multiplet in its <sup>1</sup>H NMR spectrum. It clearly indicates that only one carbon atom is substituted. Further, the <sup>1</sup>H NMR shows the presence of 2 -methyl group appeared as doublet at  $\delta$  1.25 and singlet appeared at  $\delta$  2.78.

The <sup>1</sup>H NMR spectrum shows signal at  $\delta$  3.5, that indicates the presence of NH in the seed sample of *Sida acuta*, Burm. f.

The signal appeared at  $\delta$  5.4 (br) indicated, the presence of hydroxyl group. The above spectral data clearly indicated the presence of ephedrine in the sample of seeds of *Sida acuta*, Burm. f, (Fig. C). In addition, quantitative estimation of ephedrine hydrochloride in seeds of *Sida acuta*, Burm. f. has been carried out and found to be 0.0070 mg/g.

### Discussion

In the present investigation alkaloid ephedrine hydrochloride is detected and confirmed in the drug of seeds of *Sida acuta*, Burm. f. This is further detected qualitatively and estimated quantitatively. This investigation is supported by thin layer chromatography (TLC), infrared spectroscopy (IR), nuclear magnetic resonance (NMR) techniques.

Thus it is clear that seeds of *Sida acuta*, Burm. f. consists of ephedrine alkaloid. This is a new source for ephedrine alkaloid.

### Acknowledgements

The authors are grateful to the head of the department of Botany, Pune University, Pune for providing necessary facilities and

thankful of Dr. G. T. Panse, Dr. S. R. Rozatkar of National Chemical Laboratory, Pune. Second author is thankful to the Principal and head of Botany department, S.P. College, Pune, for providing constant encouragement, and also thankful to the authorities of UGC for financial assistance.

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