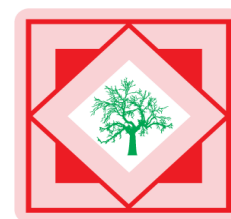




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## Pharmacognostical studies on *Tribulus terrestris* and *Tribulus alatus*

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### ABSTRACT

The Present paper deals with the pharmacognostical studies on *Tribulus terrestris* Linn and *Tribulus alatus* Delile. Fluorescence analysis has been performed and physicochemical characters such as ash values and extractive values have been performed. Preliminary phytochemical analysis and thin layer chromatographic behavior have also been performed for the various extracts.

**Keywords:** *Tribulus terrestris*, *Tribulus alatus*, Pharmacognosy, Physicochemical characters, Fluorescence analysis, thin layer chromatographic behavior.

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### INTRODUCTION

*Tribulus terrestris* is found in tropical climates of the world. It is found mainly in India, America, and Australia. *Tribulus alatus* is native to India. In Ayurveda *Tribulus terrestris* is known as Chhote or Kanti Gokhru and *Tribulus alatus* as Kalan Gokhru. Medicinal uses are more or less same for both varieties [1]. *Tribulus terrestris* plant is also called as 'Puncture Vine' has long as been used all around the world for various diseases and its fruits popularly claimed functioning to improve human sexual. It has been used for years to treat libido and infertility problems [2]. Hence, a systematic pharmacognostic study of *Tribulus terrestris* and *Tribulus alatus* have been performed first time.

### MATERIALS AND METHODS

#### Plant material

The fresh fruit of *Tribulus terrestris* was collected from Kovilpatti area of Tuticorin District and fruit of *Tribulus alatus* was collected from Viralimalai area of Pudukottai District, Tamil Nadu, India in the month of November 2010. The specimens were identified by a taxonomist Dr. V.

Chelladurai, Retired Research Officer (Botany), Survey of Medicinal Plants Unit, CCRAS, Palayamkottai, Tamil Nadu, India.

### Pharmacognosy

Pharmacognosy is the branch of science, which deals with biological and economical features of natural crude drugs of plant origin. The traditional drugs are mainly based on the plants or material of natural origin [3]. Hence in the present investigation, a systematic determination of pharmacognostical characters such as Fluorescence analysis, Loss of weight on drying, Moisture content, Total ash, Acid insoluble ash, Water soluble ash, Residue on ignition, Extractive values, Preliminary phytochemical analysis and Thin layer chromatographic studies have been performed on the two medicinal plants. Fluorescence analysis of the fruits samples and their extracts in different solvents were carried out. The ash values and the extractive values of the fruits samples were determined according to the methods of Pharmacopoeia of India [4]. The air dried fruit powders were successively extracted with Petroleum ether (60-80°C), benzene, chloroform, ethanol, water and the extracts were used for phytochemical analysis. The samples were subjected to fluorescence analysis at the light of wave length 365 nm (UV region). The samples were treated with acids and alkali before the analysis [5].

## RESULTS AND DISCUSSION

The fruits of *Tribulus terrestris* undergo fluorescence analysis; it shows green and pale green fluorescence noticed under ultraviolet light (365 nm). The crude drugs on treated with 1N NaOH and 1N HCl show dark green or green fluorescence and on treatment with 1:1H<sub>2</sub>SO<sub>4</sub> and 1:1 HNO<sub>3</sub> show dark green fluorescence when viewed under UV light (365 nm).

**Table 1. Fluorescence analysis**

Samples	Light	Powder as such	1N NaOH	1N HCl	1:1H <sub>2</sub> SO <sub>4</sub>	1:1 HNO <sub>3</sub>	Name of the extract				
							Pet. ether	Benzene	Chloroform	Ethanol	Water
<i>Tribulus terrestris</i>	Ordinary	Pale brown	Dark Yellow	Brown	Dark brown	Dark yellow	Dark yellow	Dark brown	Pale black	Pale green	Dark yellow
	Long-UV (365 nm)	Green	Dark green	Dark green	Black	Black	Red	Red orange	Orange	Pale blue	Greenish yellow
	Short-UV (254 nm)	Pale Green	Green	Green	Pale black	Dark green	Dark yellow	Pale green	Pale green	Pale green	Pale green
<i>Tribulus alatus</i>	Ordinary	Pale yellow	Dark yellow	Pale yellow	Dark brown	Pale yellow	Dark yellow	Dark brown	Pale black	Pale green	Dark yellow
	Long-UV (365 nm)	Dark green	Green	Dark green	Greenish yellow	Dark brown	Red	Red orange	Orange	Pale blue	Greenish white
	Short-UV (254 nm)	Greenish yellow	Greenish yellow	Pale brown	Dark yellow	Greenish yellow	Dark yellow	Pale green	Pale green	Pale green	Pale green

**Table 2 Physicochemical characters**

Particulars	<i>Tribulus terrestris</i>	<i>Tribulus alatus</i>
Loss of weight on drying	31.02%	35%
Moisture content	10.68%	8.05%
Total ash	12.57%	15.03%
Water soluble ash	11.00%	12.50%
Acid-insoluble ash	4.00%	5.00%
Residue on ignition	7.43%	6.97%

Table 3 Extractive values

Solvents	<i>Tribulus terrestris</i>	<i>Tribulus alatus</i>
Petroleum ether (60-80 <sup>0</sup> C)	4.18%	3.25%
Benzene	4.66%	4.07%
Chloroform	5.50%	6.12%
Ethanol	6.46%	6.96%
Water	10.52%	16.52%

Table 4 Thin layer chromatographic behavior of the fruit of *Tribulus terrestris* in Ethyl acetate: Benzene (1:9) Solvent System

Name of the Extract	R <sub>f</sub> value under UV light		R <sub>f</sub> value in iodine chamber
	Long – UV 365nm	Short – UV 254 nm	
Petroleum ether (60 – 80 <sup>0</sup> C)	*0.65	--	*0.65, <sup>®</sup> 0.52
Benzene	*0.55, <sup>®</sup> 0.48, <sup>®</sup> 0.89	--	*0.55, <sup>®</sup> 0.48, <sup>®</sup> 0.79, *0.84, <sup>®</sup> 0.89
Chloroform	--	--	*0.90, <sup>®</sup> 0.57
Ethanol	<sup>®</sup> 0.74	*0.62	*0.62, <sup>®</sup> 0.74, *0.84
Water	*0.83	*0.83	*0.83, <sup>®</sup> 0.52

\*=More intense      <sup>®</sup>=Less intense

Table 5 Thin layer chromatographic behavior of the fruit of *Tribulus alatus* in Ethyl acetate: Benzene (1:9) Solvent System

Name of the Extract	R <sub>f</sub> value under UV light		R <sub>f</sub> value in iodine chamber
	Long – UV 365nm	Short – UV 254 nm	
Petroleum ether (60 – 80 <sup>0</sup> C)	*0.75	--	*0.75, <sup>®</sup> 0.52, <sup>®</sup> 0.82
Benzene	*0.65, <sup>®</sup> 0.38, <sup>®</sup> 0.81	--	*0.65, <sup>®</sup> 0.38, <sup>®</sup> 0.79, *0.82, <sup>®</sup> 0.87, <sup>®</sup> 0.92
Chloroform	--	--	*0.86, <sup>®</sup> 0.57
Ethanol	<sup>®</sup> 0.74	*0.62	*0.72, <sup>®</sup> 0.79, *0.82, *0.94
Water	*0.83	*0.83	*0.79, <sup>®</sup> 0.92

\*=More intense      <sup>®</sup>=Less intense

The red orange fluorescence noticed for benzene and petroleum ether extracts under long –UV region. The aqueous and ethanol extracts of *Tribulus terrestris* show dark greenish white fluorescence under UV light. The *Tribulus alatus* crude drugs shows dark green fluorescence under UV light (365 nm) and on treated with 1N NaOH and 1N HCl shows green fluorescence. The petroleum ether extracts of *Tribulus alatus* shows red orange fluorescence and benzene and ethanol extracts shows dark green fluorescence under long- UV region. Loss of weight on drying ranges from 31 - 45% for both samples. The physicochemical characters such as ash values of crude drugs are minimum (12.57 %) in *Tribulus terrestris* and maximum for *Tribulus alatus* (15.03%). The acid-insoluble ash content of these drugs are less than 5 %, water soluble ash values are less than 11% and residue on ignition values are less than 9 %.

The extractive values increase as the polarity of the solvent increases. Among the extractive values, the water extract value is higher than others. In the preliminary phytochemical analysis of crude drugs, commonly both samples extracts shows the presence of saponins, reducing sugars, triterpenoids, steroids, tannins and alkaloids. The pet. ether and chloroform extract of

*Tribulus terrestris* contains flavonoids. In all the extracts of *Tribulus alatus* does not contain the flavonoids. Thin layer chromatographic behavior of the various extracts of the plants under the present investigation show very interesting results. The benzene extracts of both sample shows maximum spots in ethyl acetate: benzene (1:9) solvent system. All the pharmacognostical characters can be used as a diagnostic tool for the correct identification of the drug and also to test adulteration if any.

**Table 6.a Preliminary phytochemical screening of *Tribulus terrestris***

Extracts	Steroids	Triterpenoids	Reducing sugars	Alkaloids	Saponins	Tannins	Flavonoids
Pet. ether	+	+	+	+	+	+	+
Benzene	+	+	+	-	+	+	-
Chloroform	+	+	+	+	+	+	+
Ethanol	+	+	+	+	+	+	-
Water	-	-	+	-	+	+	-

+ = Positive    - = Negative

**Table 6.b Preliminary phytochemical screening of *Tribulus alatus***

Extracts	Steroids	Triterpenoids	Reducing sugars	Alkaloids	Saponins	Tannins	Flavonoids
Pet. ether	+	+	+	+	+	+	-
Benzene	+	+	+	+	-	+	-
Chloroform	+	+	+	-	+	+	-
Ethanol	+	+	+	+	+	+	-
Water	+	+	+	+	-	+	-

+ = Positive    - = Negative

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