

PHARMACOGNOSTIC STUDY OF ROOT TUBERS OF *CYANOTIS TUBEROSA* ROXB. - A SUBSTITUTE TO "SAFED MUSALI"

D. J. AUNDHE and S. S. DEOKULE*

Dept. of Botany, Waghire College, Saswad, Pune 412301, India.

* Dept. of Botany, University of Pune, Pune 411 001, India.

Cyanotis tuberosa Roxb. is an annual herb belonging to family Commelinaceae. The tuberous roots are being used in continued fever and for killing worms in cattle. The root tubers of *Cyanotis tuberosa* Roxb. resemble with those of the "Safed Musali" (*Chlorophytum* species). Hence, a detailed pharmacognostic study is carried out to find out the adulteration. The present investigation includes macroscopic and microscopic characters, histochemistry and phytochemistry. Both these plants were screened morphologically, anatomically and phytochemically and it is proved that, root tubers of *Cyanotis tuberosa* Roxb can not be regarded as a substitute for precious Ayurvedic drug Safed musali.

Keywords : *Cyanotis tuberosa* Roxb; Pharmacognocny; Root tubers.

Introduction

The plant *Cyanotis tuberosa* Roxb. family Commelinaceae is a suberect or prostrate annual herb. It is densely villous or almost glabrous, distributed in western Peninsular India¹⁻³. The leaves are sessile, radical and few cauline, 6-10 in. X 1/3 - 1 in.; often purple beneath, linear or ensiform and villous. Upper cauline leaves are much short. A sheath of radical leaves 1 in. long and glabrous and those of cauline leave shortly silky². Tuberous roots are fusiform in shape. The roots are being used in continuous fever and for killing worms in cattle⁴⁻⁶. Since tuberous roots apparently resemble with tuberous roots of "Safed Musali" especially tuberous roots of *Chlorophytum laxum*, Br. and *Chlorophytum borivilianum*, Sath. & Fernand. Hence, detailed pharmacognostic studies have been carried out on *Cyanotis tuberosa* Roxb. for the detection of adulteration in the precious Ayurvedic drug "Safed Musali".

Material and Methods

The plant material was collected from Pune University campus, Purandhar Fort and forests of Nashik district. Efforts were made to collect this plant in flowering and fruiting conditions for correct botanical identification. For macroscopical studies free hand sections of the tuberous roots were taken from fresh material. These were further dehydrated, stained in alcoholic safranin and light green

and finally mounted in canada balsam⁷. Macroscopic and microscopic characters were studied as per Wallis⁸ and Trease and Evans⁹. Histochemical tests were carried out according to Krishnamurthy¹⁰.

Results and Discussion

Macroscopic Characters : The plant is suberect or prostrate and creeping below, densely villous or almost glabrous. The roots are tuberous and fusiform. The length is varying from 1 - 2 in. and measuring about 1/6 - 1/4 in. in diameter. It is immediately swollen near the stem base. The external color of the root is blackish while inner color of root is whitish. The tuberous roots of *Chlorophytum laxum* Br. and *Chlorophytum*, Sath and Fernand. resemble with root tubers of *Cyanotis tuberosa*.

Microscopic Characters : In transverse section root tuber shows circular outline. The outermost layer is piliferous layer (epiblema), provided with unicellular root hairs. Immediately below epiblema a massive cortex is present which is divided into two distinct zones. The peripheral zone is five layered and is made up of thin walled parenchymatous cells without intercellular spaces. The second zone of cortex is comparatively larger and made up of parenchyma cells with intercellular spaces. Starch grains are abundantly present in the cortical cells. The innermost layer of cortex, the endodermis, is composed of barrel shaped compact cells. Passage cells are

Table 1. Histochemical tests of *C. tuberosa*.

S. No.	Tests	Reagents	Results	Locations
1	Starch	Iodine	+ ve	Cortex
2	Protein	Potassium ferrocyanide and FeCl ₃	+ ve	Piliferous layer and pericycle
3	Sugars			
	Fructose	Fluckiger's	+ ve	Cork, xylem parenchyma
	Glucose	Fluckiger's	+ ve	Cork, xylem parenchyma
	Sucrose	Fluckiger's	+ ve	Cork, xylem parenchyma
4	Tannins	10% Aq. FeCl ₃	+ ve	Piliferous layer and pericycle.
5	Alkaloids	Dragendorff's	- ve	----
		Mayer's	- ve	----
		Wagner's	- ve	----

Table 2. Phytochemical tests of *C. tuberosa*.

A.) Water Extractives

S. No.	Tests	Results
1	Starch	+ ve
2	Saponins	-- ve
3	Proteins	+ ve
4	Tannins	+ ve
5	Reducing sugar	+ ve
6	Anthroquinone	-- ve

B.) Alcoholic Extractives

S. No.	Tests	Results
1	Alkoloids	
	Mayer's reagent	-- ve
	Wagner's reagent	-- ve
	Hager's reagent	-- ve
2	Flavonoids	-- ve
3	Glycosides	+ ve

Table 3. Estimation of proteins and carbohydrates.

S. No.	Items	Results - mg/g dry wt.
1	Proteins	0.057
2	Total sugars	1.46
3	Reducing sugars	1.03
4	Non reducing sugars	1.43
5	Starch	2.54

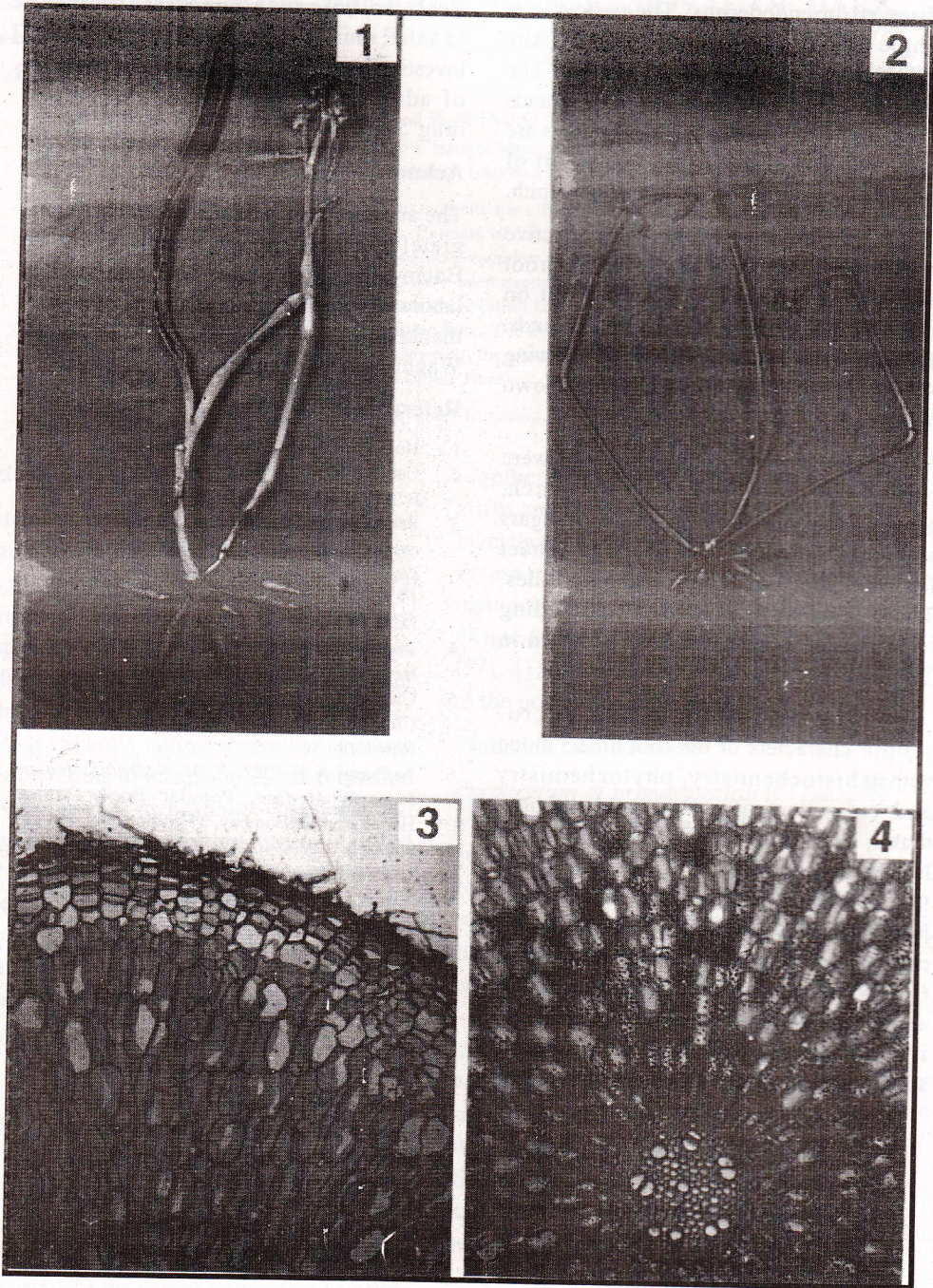


Fig. 1 Habit of *Cyanotis tuberosa* Roxb. collected from Purandhar Fort.

Fig. 2 Habit of *Cyanotis tuberosa* Roxb. collected from Pune University campus.

Fig. 3 T. S. of *Cyanotis tuberosa* Roxb. showing anatomical details of epiblema, hypodermis and outer cortex.

Fig. 4 T. S. of *Cyanotis tuberosa* Roxb. showing anatomical details of inner cortex, with ample starch grains; stele and pith.

observed in endodermis. The pericycle is single layered and interrupted by the differentiation of xylem and phloem. The vascular tissue consists of alternate strands of xylem and phloem. Vascular bundles are numerous and exarch. The central part of the stele is occupied by well-developed pith.

Histochemistry : For the detection of active principles inside the tissue or the root histochemical tests were carried out on starch, proteins, sugars, tannins and alkaloids. These tests were carried out by following Krishnamurthy¹⁰ and the results are shown in Table 1.

Phytochemistry : Phytochemical tests were carried out on water extract for starch, proteins, saponins, tannins, reducing sugars and anthroquinones and alcoholic extract for alkaloids, flavonoids and glucosides. These tests were carried out according to Harborne¹¹. The results are shown in Tables 2-3.

The macroscopic and microscopic characters of the root tubers along with its histochemistry, phytochemistry and estimations of proteins and carbohydrates, show that morphologically similar root tubers of *Cyanotis tuberosa* Roxb., *Chlorophytum laxum* Br. and *Chlorophytum borivillianum* Sath. & Fernand. are chemically different from each other. *Cyanotis tuberosa* Roxb. root tuber contains abundant starch grains while, Safed musali is very rich in proteins, raphides and spheraphides. Hence, *Cyanotis tuberosa*,

Roxb. will not serve a purpose as a substitute to safed musali. The results of the present investigation may also be helpful in detection of adulteration in precious Ayurvedic drug "Safed musali".

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