

Research Article

Pharmacognostical Studies On Root Tubers Of *Chlorophytum Borivilianum* Santapau & Fernandes

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ABSTRACT

The root tubers of *Chlorophytum borivilianum* Sant & Fern (Safed Musli) (Liliaceae) are reported to have a greater medicinal value. Pharmacognostic evaluation including examination of morphological and microscopical characters, determination of ash values, swelling & foaming index, extractive values, moisture content and fluorescence characteristics of powder drug with different chemical reagents was carried out.

Keywords: Safed musli, *Chlorophytum borivilianum*, Traditional System of medicine, Aphrodisiac, Pharmacognostical.

INTRODUCTION

Chlorophytum Ker-Gawl (Liliaceae) is a genus of short rhizomatous herbs, distributed in the tropical and sub-tropical regions of the world. About 17 species occurs in India, of which some are grown for ornament purpose only¹. *Chlorophytum borivilianum* Sant. & Fern. root tubers are known as 'Safed musli' and used for rheumatic and nervous complaints and also useful in diabetes². The root is used as a tonic³. In the traditional system of medicine, Safed musli is used as tonic for general debility and also as Aphrodisiacs. Safed musali contains 39 to 42% of Carbohydrates, Proteins 8 to 12%, Saponin 2 - 4%, Sapogenin (hicoagenin) 0.18 to 0.2%; several rare elements like zinc, copper and phosperous, fibers content of the roots is about 3 to 5%⁴. A very less numbers of research findings were reported on this plant, especially no systematic Pharmacognostical studies has been reported. Therefore, present investigation was planned to study the Pharmacognostical aspects of *C. borivilianum* root tubers.

MATERIALS AND METHOD -

Authenticated planting materials were collected through NBPGR (ICAR) from NRC for M & AP, Anand, Gujrat bearing DS no. 413 dated 5th July 2004. The planting materials were used for cultivation by following the standard method and harvested in time to get better yield and more Percentage of active principles. The voucher specimen preserved in laboratory for future references. The root tubers were made free from aerial parts & wiry rootlets and thoroughly washed under running tap water to remove adherent dirt materials, then peeled & shade dried. Few samples of root tubers were stored in formalin aceto-alcohol solution and out of remaining,

few kept as such i.e. entire form and others are powdered to #40 and stored in airtight glass containers^{5,6}.

Free hand transverse sections of the root tubers were taken from the preserved material observed under microscope and photographs taken in VIVITAR camera, Japan.

Stored entire and fine powder of root tubers were taken for the studies of macroscopical & microscopical character & Fluorescence characteristics of the drug with different chemical reagents observed under day & UV light of short & long wave length.

All standard procedure were followed as per the references for studies of characteristics like presence of Total Ash, Acid insoluble Ash, Water soluble Ash, Alcohol soluble extractive value, water soluble extractive value, Swelling and foaming index, Moisture content and qualitative chemical test for presence of secondary metabolites^{7,8}.

RESULTS

Macroscopical Studies

The fresh roots are directly cylindrical, originates from the stem disc, devoid of any fibrous structure and cylindrical in shape with tapering ends. The tuber numbers are 5-20, about 6-14 cm in length and 8-12 mm in diameter. Few wiry rootlets are at the lower side and colour earthy brown externally & white to buff-white internally. The odour is faint and characteristic with mucilaginous test. (Fig-1 & 2)

The peeled and dried root is tuberous & cylindrical with tapering ends, swelling considerably when soaked in water and are white to dull white in colour. The odour is faint and characteristic with mucilaginous taste. The surface is rough showing signs

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Fig 1: Fresh root tubers of *C. borivilianum* with Crown



Fig 2: Collected fresh root tubers of *C. borivilianum*



Fig 3: Fresh peeled root tubers of *C. borivilianum*

of shrinkage when dry and texture is hard. The size of tubers are about 4-8 cm in length and 4-8 mm in diameter. (Fig-3 & 4)

Microscopical Studies

The T.S. of unpeeled root tuber shows the presence of Epiblema of single layer thin walled cells of which outer walls extended outwards and form unicellular root hairs

(Fig-5). The other characteristics are similar to peeled one.

The T.S. of preserved peeled sample devoid of epiblema shows layer of cortex consists of many layers of thin walled rounded to polygonal parenchymatous and have little or no intercellular spaces (Probably due to swelling). The inner most layer of cortex is a single



Fig 4: Dried peeled root tubers of *C. borivilianum*

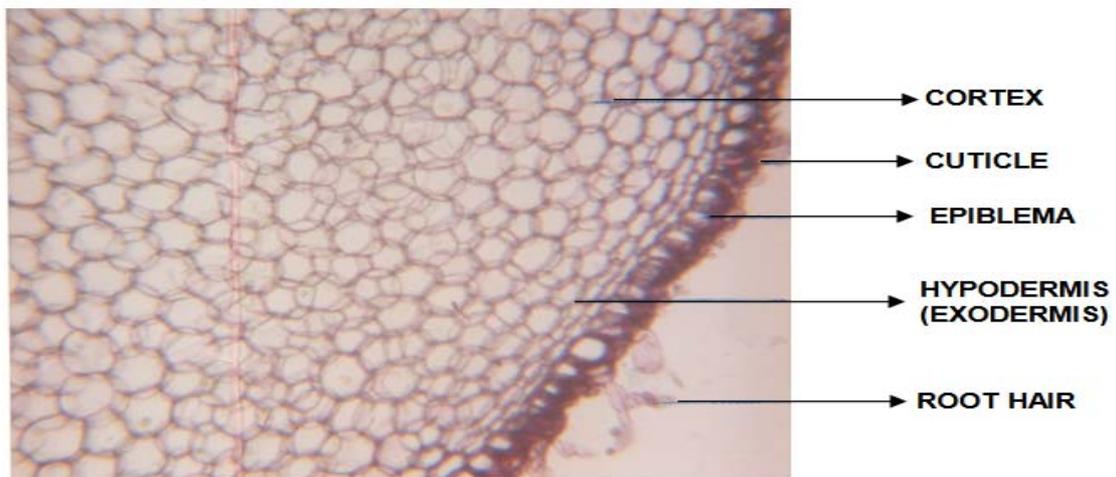


Fig 5: T.S. of *C. borivilianum* root tuber (Cortex region)

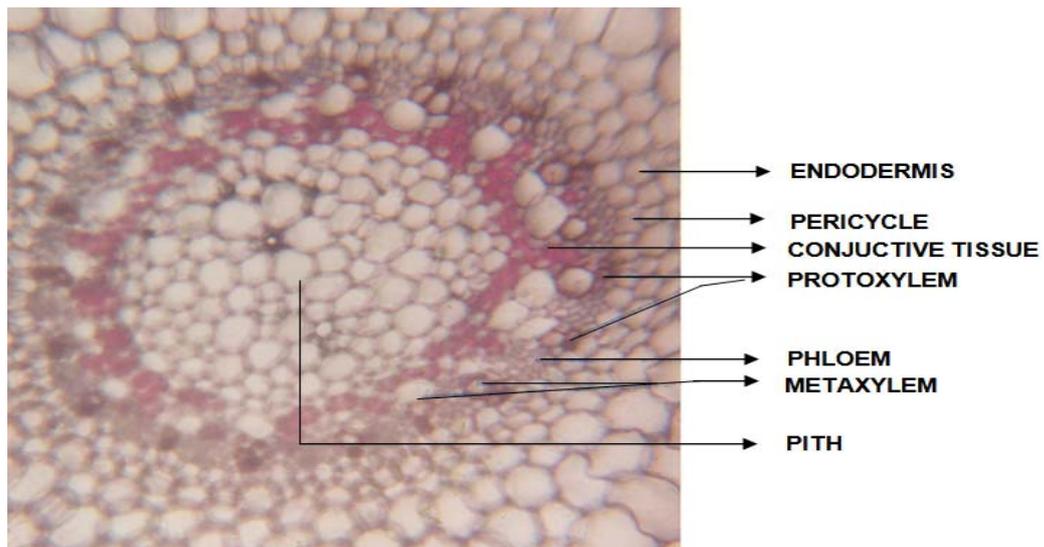


Fig 6: T.S. of *C. borivilianum* root tuber (Stele region)

layer endodermis followed by a uniseriate pericycle layer of thin walled cells.

The vascular tissue is not elaborate. The Xylem is exarch and consists of jointed vessels, 3-5 in number

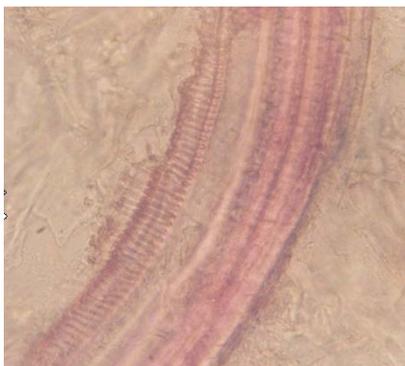


Fig 7: L.S. of *C. borivilianum* root tuber (Stele region)



Fig 8 : Fibers and vessels of *C. borivilianum* root tuber powder

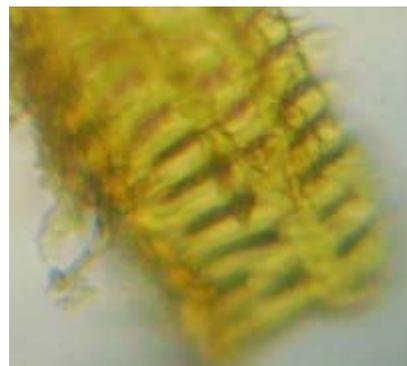


Fig 9: Vessels of *C. borivilianum* root tuber powder



Fig 10: Fibers of *C. borivilianum* root tuber powder

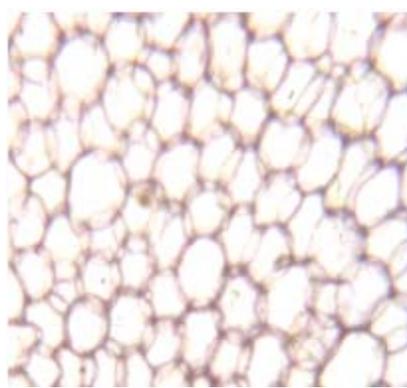


Fig 11: Cortex of *C. borivilianum* root tuber powder

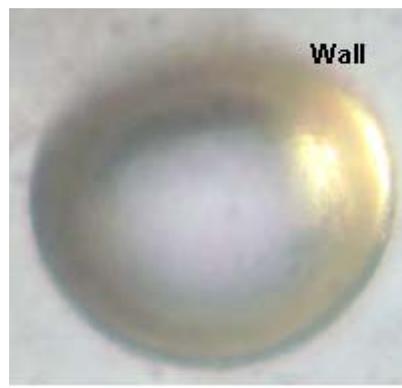


Fig 12: Stone cell of *C. borivilianum* root tuber powder

in each group. However, Xylem fibres are quite abundant, surrounding the vessels and jointed to form a more or less continuous irregular ring, xylery fibres are not uniform at all places. The phloem is grouped in between the arches of the xylery tissue along with parenchyma. The central region is occupied by a fairly large pith region, where the cells are closely packed as in cortical region and mostly of polygonal in shape^{6, 7}. (Fig- 6 & 7)

Powder Characteristic Studies

The root tuber powder of *C. borivilianum* is buff coloured having mucilaginous, salty and sticky in taste. The powder microscopical characters of *C. borivilianum* shows characters like large cortex zone, fibres in groups and associated with the vessels, thin walled & fairly large with numerous pits, vessels occur in small groups and associated with fibres, reticulately thickened and pitted and presence of stone cells with simple pits on their walls. (Fig 8 - 12).

Florescence Characteristics Studies

The behavior and florescence characteristics of *C. borivilianum* root tubers Powder with different reagents were studied under day light, U.V light at 254 nm and 365nm and observation were recorded in Table-1

DISCUSSION

The macroscopical examination of the root revealed vertical direction of the growth (positively geographic).

The drug is having adventitious roots system and having fasciculated tubers roots.

Microscopical examinations of *C. borivilianum* root tubers revealed the presence of epiblema of thickened and swollen walls due to silicious deposition and rounded in shape. This structure is absent in peeled drug. This is followed by a very large zone of cortex. The outermost layer of the cortex and just below epiblema two layers of rectangular cell found which are hypodermis much longer than wide. The rest of the cortical cells are rounded to polygonal, parenchymatous and have little or no intercellular spaces probable due to swelling. The innermost layer of cortex is a single layer endodermis.

The stellar structure shows that the endodermis is followed by a uniseriate pericycle layer. The vascular tissue is not very elaborate. The xylem is exarch and consists of jointed vessels, 3-5 in number in each group. There are about 30-35 groups of xylem. However, xylery fibers are quite abundant, surrounding the vessels and jointed to form a more or less continuous irregular Ring.

The specific characters like presence of unicellular root hairs undifferentiated cortex, radial arrangement of vascular bundles and exarches nature of xylem are the root characters and presence of more than six numbers of radial vascular bundles and presence of large & distinct pith are the characters of monocot roots.

Table-1: Behaviour and florescence characteristics of *C. borivilianum* root Tubers Powder

S.No.	Treatment	Colour of power in day light	U V light in Short (254nm)	U V light in long (356nm)
1	Powder drug as such (Untreated powder)	Whitish	Dull blue	Blue
2	Powder drug treated with saturated picric acid solution	Yellowish	Green	Violet
3	Powder drug treated with nitric acid	Light yellowish	Faint yellow	Blue
4	Powder drug treated with hydrochloric acid	Whitish buff	Dull blue	Black
5	Powder drug treated with conc. sulphuric acid	Turns chocolate brown	Black	Black
6	Powder drug treated with glacial acetic acid	Whitish	Dull blue	Black
7	Powder drug treatrd with sodium hydroxide (5N aqueous)	Chary Brown	Dull yellow	Violet
8	Powder drug treated with Iodine (N/20 aqueous)	Reddish brown	Yellow Black	Black
9	Powder drug treated with ferric chloride	Yellowish brown	Deep green to Black	Black

The microscopy findings revealed about the absence of starch grains. Further, this has been confirmed by treated the powder drug with aqueous 1N iodine solution.

While performing the fluorescence characteristics of drug powder with different chemical reagents only change in colour of the drug powder was observed when seen under UV light. This probably confirms absence of any fluorescence compound in the root.

The drug showed the presence of total ash 4.2 %, acid insoluble ash 0.8 %, water soluble ash 1.4 %, alcohol soluble extractive 1.1% , water soluble extractive 10.6%, swelling index 7.4 & foaming index 68.4% and moisture content 9.2%.

The qualitative chemicals test revealed the presence of steroids, saponin, flavonoids, tannin, amino acid, reducing sugar and mucilage.

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