PHARMACOGNOSTICAL EVALUATION OF CHLOROPHYTUM BORIVILIANUM ROOT

Deepak Kumar¹ and S.P. Bhatnagar²
¹Shivalik College of Pharmacy, Nangal, Ropar (Pb.) 140126.
²Department of Pharmaceutical Sciences, B.T. T. Mesra, Ranchi – 835215.

ABSTRACT

Chlorophytum borivilianum Santapan and Fernandes is an important medicinal Plant in Ayurveda and it is used mainly for its aphrodisiac activity. It is very closely related to other species also. The present work attempts to identify the Chlorophytum borivilianum from other allied species in general by pharmacognostical, preliminary phytochemical and fluorescence analysis methods.

INTRODUCTION

Chlorophytum borivilianum Santapan and Fernandes is an annual herb belongs to the family liliaceae. It is found mainly in, M.O., Maharashtra and Jharkhand. It’s root is a reputed rejuvenating drug that endows the user with enduring vitality, youthfulness, cognitive ability and conjugal capability. This species has been recently introduced in farming system to meet the increasing demand of the root and to stop indiscriminate exploitation of its natural resource. It has a worldwide great demand in ayurvedic and allopathic system of medicine and to meet this demand similar morphological characteristic herbs are used as its substitutes. They have also acquired the synonym of safed musali and used as the genuine drug. Hence, these drugs are rightly stamped as “Sandigda Dravyas” (or drugs of doubtful identity). The present investigation was undertaken to identify the root of Chlorophytum borivilianum by carrying out various pharmacognostical characteristics.

MATERIALS AND METHODS

Collection and identification of plant

The roots of Chlorophytum borivilianum were collected from commerce and were authenticated by Professor of pharmacognosy, Department of Pharmaceutical Sciences, B.I.T. Mesra, Ranchi. The peeled roots were allowed to dry in the shade. The dried peeled root was cylindrically flat, straight or curved, white to buff colored with longitudinal ridges. The taste was mucilaginous, sticky while fracture was splintery.

HISTOLOGICAL STUDIES OF ROOT

A thinnest possible section of the root was treated with chloral hydrate solution to make it clear. The sections were also treated with phloroglucinol: hydrochloric acid (1:1) to study lignified tissues.

Microscopic characters:

AT.S. of root is mainly differentiated into three regions. (Fig-1).

(1) Epidermis
(2) Cortex
(3) Endodermis

1. **Epidermis:** It is a single layers outermost cell containing unicellular root hairs.

2. **Cortex:** Cortex contains many layers of round or oval parenchymatous cells with intercellular spaces and starch.

3. **Endodermis:** It is the innermost layer of the cortex that forms a ring. Radial wall were rectangular; barrel shaped. Endodermis is further differentiated into three regions.

   (i) **Pericycle**
   (ii) **Pith**
   (iii) **Vascular bundle**

i) **Pericycle:** This layer lies just below the endodermis.

ii) **Pith:** It is parenchymatous mass of cells present in the central portion of the endodermis. The cells are well developed and round or oval in shape.

iii) **Vascular bundle:** It consists of xylem and phloem and their arrangement is radial. Vascular bundles are abundant in number.

(a) **Xylem:** Xylem consists of protoxylem that lies on the pericycle and metaxylem towards the center.

(b) **Phloem:** Phloem consists of companion cells and phloem parenchyma.

**POWDER CHARACTERISTICS**

The powder is buff coloured having mucilaginous, sticky in consistency. The powder that was sieved through No.40 and 60 sieve was cleared in chloral hydrate solution and stained with phloroglucinol: hydrochloric cid (1:1) and iodine solution. Examinations of powder showed the following characters. (Fig-2)

1. **Vessels:** Vessels were well developed, annular and few were attached with others. Size: 40-70 µm.

2. **Fibre:** Fibres occur lengthwise singly. Size: 35-30 µm.

3. **Starch granules:** Starch granules were spherical with mostly indistinct helix. Compound in nature. Size: 3-10 µm.

4. **Parenchyma:** Parenchymatous cells were rectangular and pitted. Size: 4-6 µm.

5. **Cork cells:** The cork cells were oval or flattened rectangular in shape. Cell walls of the cork were thickened. Size 2-8 µm.
Physico chemical studies:

The properties like loss on drying at 110°C, ash value, and acid insoluble ash were determined. The ash was analyzed for inorganic constituents. These values are recorded in Table -1

Table No -1
Physico – chemical characters

| S.N. | Type of characters              | % W/w values |
|------|---------------------------------|--------------|
| 1.   | Moisture content at 110°C       | 8.5%         |
| 2.   | Total ash                       | 10.85%       |
| 3.   | Acid insoluble ash              | 1.55%        |
Now the air-dried drug was extracted with petroleum ether, chloroform and methanol successively using a soxhlet apparatus. Each time before extracting with next solvent the marc was dried in the air and repacked. The extract were centrifuged and concentrated under reduced pressure at low temperature. These values are recorded in Table-2.

**Table No: 2**

Extractive value

| S.No. | Solvent used      | Wt. of air dried drug (g) | Extractive value (g) | % Extractive value |
|-------|-------------------|----------------------------|-----------------------|--------------------|
| 1.    | Petroleum ether (40-60) | 100g (Hot extraction)     | 0.0136                | 0.0148%            |
| 2.    | Chloroform        | 100 g (Hot extraction)    | 0.0125                | 0.0136%            |
| 3.    | Methanol          | 5g (Cold maceration)      | 0.212                 | 4.24%              |

The above three extracts were screened for their phytochemical constituents and TLC profile. These results are recorded in Table – 3 & 4 respectively.

**Table No – 3**

PRELIMINARY PHYTOCHEMICAL CONSTITUENTS

| S.N. | Phytoconstituents | Petroleum ether | Cholorform | Methanol |
|------|-------------------|-----------------|------------|----------|
| 1.   | Carbohydrate      | -               | +          | +        |
| 2.   | Steroid           | +               | -          | +        |
| 3.   | Alkaloid          | -               | -          | -        |
| 4.   | Glycoside         | +               | +          | +        |
| 5.   | Tannin            | -               | -          | -        |
| 6.   | Saponin           | -               | +          | +        |
| 7.   | Protein           | -               | +          | -        |

**Table No.4**

TLC profile of successive extracts of Chlorophytm borivilianum.

| S.No | Extract      | Solvent system                  | R<sub>f</sub> Values       |
|------|--------------|---------------------------------|----------------------------|
| 1    | Pet-ether    | n-Hexane: Acetone 4: 1           | 0.268, 0.365, 0.483, 0.602 |
| 2    | Chloroform   | n-Hexane: Ethyl acetate 4: 1     | 0.211, 0.346, 0.538, 0.692 |
| 3    | Methanol     | Methanol: Acetone: Hexane 4:1:2  | 0.192, 0.519.              |
**Fluorescence analysis:**

Powdered drug was sieved through No.120 mesh and the behavior of powdered root drug with different chemical reagents and fluorescence characters of the powdered root and the extracts were observed under UV (254 and 366 nm) and visible light. Colors produced were compared with the standard colour chart and corresponding numbers were assigned to them. These results are recorded in table 5 to 7 respectively.

**Table No. 5**

Colour analysis of root powder of Chlorophytum borivilianum with various chemical reagents.

| Reagents                  | UV Light Short (254nm) | Long (366nm) | Visible Light |
|---------------------------|------------------------|--------------|---------------|
| Powder as such            | Brownish white 50M60Y0C| White 0M0C   | Buff Colour 15C15M60Y |
| Powder + 1NNaOH           | Brown with red spot 50M70Y10K| Brown with few white spot 30Y60M0C40K| Light brown 50M70Y20K |
| Powder + Picric Acid Solution black| Brownish 30Y60M60K| Black 100K | Yellow 10M100Y |
| Powder + Acetic Acid Solution (5N) | Yellowish brown 50M70Y5K| Whitish brown 10Y40M40K| Yellow wish Buff colour 15C15M70Y |
| Powder + 1NHCI            | Brown 50M70Y40K        | Cream 10M60Y | Whitish buff 30C10M60Y |
| Powder + 1NHNO3           | Brown 05Y30M0C30K     | Cream 10M60Y | Whitish buff -brown 30C10M60Y |
| Powder + Iodine           | Black 100K            | Black 100K | Brownish black solution. 30C10M60Y |
| Powder + FeCl3            | Brown 50M70Y40K       | Black 100K brown | Yellowish solution. 50M70Y5K |
| Powder + HNO3 + NH3 Solution | Greenish              | Brown       | Whitish-brown |
| Powder + 1NNaOH           | Brown 5GY20K          | With yellow spot 50M70Y40K | 10Y40M40K |
| Powder + Methanol         | Brown 50Y70Y40K       | Brown with 20Y50M50K | Brown in methanol white spot 50M70Y40K |
| Powder + 50%HNO3          | Cream 10M60Y          | White 0M0C  | Cream 10M60Y |
|                           | Brown 50M70Y40K       | Brown 50M70Y40K | Yellowish brown 50M70Y5K |
Table No.-6

Colour analysis of different extracts of Chlorophytum borivilianum.

| Reagents          | Consistency | UV Light Short (254 nm) | UV Light Long (366 nm) | Visible Light |
|-------------------|-------------|-------------------------|------------------------|---------------|
| Petroleum ether   | Solid       | Yellowish brown 50M70Y20K | Cream 10M60Y          | Yellowish orange 30M 100Y  |
| Chloroform        | Solid       | Brown 50M70Y40K          | Yellowish Brown 50M70Y5K | Yellowish orange 50M70Y5K  |
| Alcohol           | Syrupy_consistency | Deep blue 100C 50M | Whitish blue 40C15M | Lilac colour 60Y90M10K |

Table No 7

Behavior of Chlorophytum borivilianum root powder with different chemical reagents.

| Reagents                         | Observation                                             |
|----------------------------------|---------------------------------------------------------|
| Powder as such                   | Buff colour. 15C15M60Y                                   |
| Powder + concentrated H2SO4      | Reddish brown. 50M70Y5K                                 |
| Powder + concentrated HCl        | Pale brown. 40M60Y15K                                   |
| Powder + concentrated HNO3       | Yellow. 10M100Y                                        |
| Powder + glacial acetic acid     | Brownish yellow 30M100Y                                 |
| Powder + Ammonia solution        | Brown with red spot. 15M70Y20K                          |
| Powder + water                   | Absorbs water quickly and forms dough like matter, which is sticky in nature, Colour – Yellow 10M100Y |

In Conclusion, the present study on pharmacognostical characters of Chlorophytum borivilianum may be useful to supplement information concerning its identification.

ACKNOWLEDGEMENTS

Authors would like to thank Vice Chancellor, B.I.T. Mesra, Ranchi, for providing facilities and interest exhibited in this work.

REFERENCES

1. Bhagat chetali, Jadeja G.C., Variation and correlation in root yield and biochemical traits of safed musli (*Chlorophytum borivilianum*), Journal of medicinal and aromatic plant sciences, 25, 33-36, 2003.

2. Wallis T.E., Text book of pharmacognosy, Vth Ed., C.B.S., Publishers and distributors, Delhi 1967.
3. Kokate C.K., Practical pharmacognosy, IInd Ed., Nirali Prakashan, Pune, 1989.

4. Iyangar M.A., Pharmacognosy of powdered cruds drugs, reprint IInd ED., Published by Iyangar M.A., Kasturba Medical College, Manipal, 1986

5. Pharmacopoeia of India, IInd Ed., published by Controller of Publication, Govt. of India, New Delhi, 947, 1966.

6. ChascR., Journal of American Pharm., Assoc., 38,324,1949.

7. Kokoshi C.J., Journal of American Pharm., Assoc., 47, 715, 1958.

8. RobisonA.H., MorrisonJ.L., Elements of cartography, 6th Ed., John Wiley & Sons, INC, New York, 320,1998.