



Pharmacognostical Studies of Roots of *Symphytum officinale*

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ABSTRACT

The present study provides a detailed summary of pharmacognostical characters of roots to give clear standards for identification of the drug. The findings of macroscopic studies unveiled that the color of pieces of roots were internally buff to light brown and dark brown to blackish brown externally with longitudinal wrinkles. Transverse section of root showed dark brown cork next to the cork is a phelloderm consisting of layer of tangentially elongated parenchyma cells; endodermis; small groups of vessels and starch grains are found singly or in groups. Powder microscopy revealed the presence of fragments of parenchyma, few vessels with bordered pits or reticulate walls; calcium oxalate crystals and rounded and oval starch grains. The roots of *Symphytum officinale* showed the characteristic physicochemical values like Total ash (11.1%), acid insoluble ash (0.74%), water soluble ash (0.83%), alcohol extractive value (18.3%), water soluble extractive value (22.3%) and loss on drying (13.5%). Various pharmacognostic characters observed in the above study helps in standardization, identification and establishments of quality parameters of plant.

Keywords: Pharmacognostical, Physicochemical values, Standardization, *Symphytum officinale*.

INTRODUCTION

Symphytum officinale is a perennial flowering plant of the genus *Symphytum* in the family Boraginaceae. Along with several species of *Symphytum*, it is commonly known as Comfrey. To differentiate it from other comfrees, this species may be known as common comfrey, ¹Quacker comfrey, ¹ and cultivated comfrey.¹ It is native to Europe and it is known elsewhere, including North America, as an introduced species and sometimes a weed. Comfrey has been used in folk medicine as a poultice for treating burns and wounds. The root of the comfrey is used in case of pulmonary complaints. The leaves of the comfrey have been used for the treatment of rheumatism and gout.² The present work has been designed to delineate the pharmacognostic profile of roots of *Symphytum officinale*.

MATERIALS AND METHODS

Collection and preparation

The roots of *Symphytum officinale* were purchased from Natural Botanicals Ghaziabad in July 2013 and were authenticated by the Dr.Sunitagarg, chief scientist of CSIR- NISCAIR, New Delhi with Ref.No.NISCAIR/RHMD/consult/2013/2287/67. A voucher specimen (SO-1) was deposited in the departmental herbarium of G.H.G Khalsa College of Pharmacy, Gurusar Sadhar, Ludhiana, and Punjab. The roots were dried in shade and coarsely powdered. Small amount of rhizomes were finely powdered for microscopic studies.

Pharmacognostical study

The pharmacognostical study has been done by performing morphological and microscopic analysis of leaves as per WHO guidelines.

Morphological features

Morphological features of the root such as color, odour, size, shape, taste, fracture and texture were studied.

Microscopic analysis

Transverse section of root and powder characteristics were identified with routine reagents such as chloral hydrate, glycerine, safranin solution, fast green, phloroglucinol, hydrochloric acid, lactophenol and iodine solution etc to study the lignified cells, fibre, xylem vessels, starch grains, calcium oxalate crystal etc. Permanent slide of TS of root was prepared to observe the presence and arrangement of cellular structures as per the procedure of Johansen³ and the representative figures were taken with the help microscopic image camera.

Physico-Chemical Parameters

The ash values including total ash, acid insoluble ash and water soluble ash and moisture content using loss on drying method were determined as per the Indian Pharmacopoeia⁴. Extractive values with various solvents like alcohol and water were performed as per standard procedure⁵.

Quantitative Studies

Foreign organic matter, length and width of xylem vessels, calcium oxalate crystals and diameter of starch grains etc were noted as per standard procedures^{6,7}.



RESULTS AND DISCUSSION

Macroscopy

The colours of pieces of roots were internally buff to light brown and dark brown to blackish brown externally with longitudinal wrinkles. Odour was disagreeable with bitter taste. Shape was cylindrical to irregular with variable size. Fracture was hard (as shown in Plate -1).



Plate 1 : Photograph of roots of *Symphytum officinale*

Microscopy

After preparation of slide using chloral hydrate and glycerine and examine under microscope the transverse section of root show dark brown cork next to the cork is a phelloderm consisting of layer of tangentially elongated parenchyma cells; endodermis; small groups of vessels are found from which small radial strands of vessels interrupted by parenchyma, project towards the centre of root; starch grains are found singly or in groups. Powder microscopy reveals the presence of fragments of parenchyma, few vessels with bordered pits or reticulate walls; calcium oxalate crystals and rounded and oval starch grains as shown in fig 1- 8.

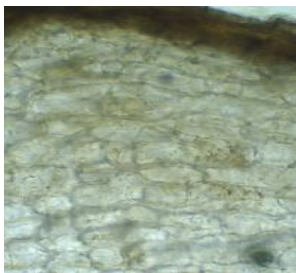


Fig-1



Fig-2

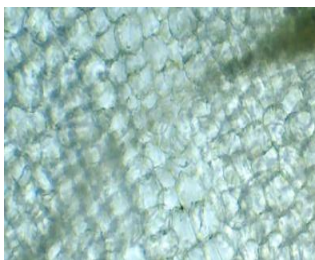


Fig-3

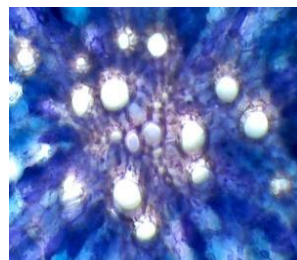


Fig-4



Fig- 5



Fig-6



Fig-7

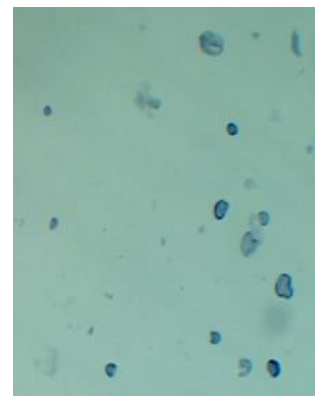


Fig-8

Fig- 1 - Showing cork and phelloderm consisting of layer of tangentially elongated parenchyma cells; fig-2& 3 – Endodermis and xylem vessels; fig-4- showing staining of xylem and phloem using safranin and fast green; fig-5 - showing calcium oxalate crystals; fig-6 -vessels with bordered pits or reticulate walls; fig-7 lignified xylem vessels; fig-8 - rounded and oval starch grains stained blue with lactophenol and iodine solution.

Physicochemical constants

The results of the physico-chemical analysis of the roots of *Symphytum officinale* are tabulated in table 1. The value for loss on drying at 105°C of roots was 13.5%. Lower percentage loss on drying will be better because fungal contamination will be less due to lesser moisture. The roots have tolerable moisture content. The total ash is particularly important in the evaluation of purity of drugs, i.e., the presence or absence of foreign matter such as metallic salts or silica where as acid insoluble ash value indicates the presence of higher bicarbonates as per Indian Pharmacopoeia⁴. It also gives an indication whether the crude drug is exhausted or not. Water soluble extractive value is higher than alcohol soluble extractive value which is indicative of that the drug or roots are more soluble in water than in alcohol.

Table 1: Results of Physicochemical analysis of the roots of *Symphytum officinale*

Physicochemical constant	Percent (w/w)
Loss on drying	13.5%
Swelling index	50%
Foreign matter	0.2%
Total ash value	11.1%
Acid insoluble ash	0.74%
Water soluble ash	0.83%
Alcohol extractive value	18.3%
Water soluble extractive value	22.3%

Quantitative Studies

Microscopic techniques have pivotal roles in authentication, identification and establishments of quality parameters of plant. In quantitative microscopy mean diameter of starch grain and average length and width of xylem vessels and calcium oxalate crystals were determined and the data are represented in Table 2.

Table 2: Results of quantitative microscopy

Parameter	Mean Length	Mean Width	Mean Diameter
Xylem vessels	289.4µm	28.36µm	
Calcium oxalate crystals	15.5µm	9.2µm	
Starch grains			100µ

CONCLUSION

The detailed systematic pharmacognostical evaluation of plant and plant material provides means of standardization of an herb that can be used as drug or as raw material. Morphological characteristics can be

utilized for quick identification of the drug and are particularly useful in the case of powdered materials. On the basis of these studies identification and authentication of herbal drugs has become more appropriate which is also helpful for making monograph of plants. The present work has been designed to delineate the pharmacognostic profile of roots of *Symphytum officinale* which provides the detailed summary of pharmacognostical characters of rhizomes to give clear standards for the identification of drug.

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