PHARMACOGNOSTIC STUDY OF ACHCHHUCA (MORINDA CITRIFOLIA)

Dr. Pratima Shikerkar¹* and Dr. Shrikanth P.²

¹Lecturer, Department of Dravyaguna, Gomantak Ayurveda Mahavidyalaya & Research Centre, Vaje, Shiroda Goa India.
²Asso. Professor Department of P.G. Studies in Dravyaguna, S. D. M. College of Ayurveda, Udupi Karnataka India.

ABSTRACT
Pharmacognostic studies are first steps to establish the identity and maintain the quality and purity of crude drug which forms base for authentication of drug. The various parts of Achchhuka (Morinda citrifolia Linn.) are used by people in different regions for medicinal, commercial as well as part of food. Fruits are famous in the name “Noni”. In view of its wide use in India and abroad a detailed pharmacognostic studies were carried out on Achchhuka (Morinda citrifolia Linn.) for appropriate identification and authentication.

KEYWORDS: Achchhuka, Morinda citrifolia, Noni, pharmacognostic studies.

INTRODUCTION
The quality control of herbal crude drug and their bio constituents is of paramount importance in justifying their acceptibility in modern system of medicine. Owing to the medicinal properties attributed to a crude drug, it is necessary to maintain its quality and purity in commercial market. It is however observed that drugs in commerce are frequently adulterated and not comply with the standards prescribed for authentic drug.

Evaluation of a drug is necessary for confirmation of its identity and determination of its quality and purity and detection of nature of adulteration.
Initially the crude drugs were identified by comparison only with the standard description available. Due to advancement in the chemical knowledge there are number of techniques involved in standardisation of crude drugs but among them morphological and microscopic study are considered as basic steps for evaluation.

Ayurveda aims at maintenance of good health and prevention and cure of diseases. For the treatment of various diseases our ancient Acharyas have mentioned quite a large number of plants easily available in world which can be used as an effective medicine. Achchhuka (Achchhuka=Asyuka’s – means longevity).\(^{[1]}\) is one such plant in use traditionally since thousands of years. Fruit is known as Venn Nuna in Tamil culture, finds place in ancient medicinal texts of Ayurveda and Siddha.\(^{[2]}\) It is mentioned in our classical texts under phalavarga in the name of Akshiki phala.\(^{[3]}\) It is widely used in India and abroad also. Fruits are famous in the name “Noni”. Various parts of the plant are used by people in different regions for medicinal, commercial as well as a part of food. Hence, a study is desirable in regard to supplement useful data in regard to its correct identity and authenticity.

**PHARMACOGNOSTIC STUDY**

For the study of microscopic characters of Morinda citrifolia conventional pharmacognostical methods & procedures were followed.

**MATERIALS AND METHODS**

1) **Collections of samples** – authentic samples of all three parts i.e. stem bark, root bark, & leaves were collected from Udupi district, in Karnataka

2) **Place of work** – pharmacognostic study was carried out in department of pharmacognosy, COPS, Manipal.

**RESULTS AND DISCUSSION**

**Morphology**

A small glabrous tree, trunk straight, bark smooth, yellowish white, branchelets obtusely 4-angled.

**Leaves**

12.5-20 by 7.5- 10cm, broadly elliptic, acute, acuminate, or obtuse, bright green, glabrous, shining, one of the pair next the peduncle often suppressed, base acute, main nerves 8-10 pairs, prominent.
Petioles - 1.3cm long.
Stipules - Connate, short, broad, abtuse, membranous.
Flowers - White, in dense ovoid heads over 2.5cm long, peduncles solitary (rarely 2-3 together), usually leaf opposed, 2.5-5cm long.
Calyx - Limb truncate.
Corolla - Infundibulum, tube 1cm long, the mouth hairy, lobes 5, lanceolate, acute.
Stamens - 5, filaments hairy, anthers about ½ exerted.
Fruit - White when ripe, smooth & glossy about the size of a small egg, pyrenes ovoid, compressed, concave – convex, winged on the edge.

PLATE I - PLANT OF MORINDA CITRIFOLIA –

FLOWERS & FRUIT

FRUITS
CUT FRUIT
MICROSCOPICAL STUDY

Procedure

a. **Transverse section** of stem bark, root bark & leaves were carried out
   - Clearing agent – chloral hydrate
   Stains used – fluorooglucinol: Hcl (1:1), Iodine.

b. **Powder microscopy** of unripe berries
   - Clearing agent – chloral hydrate
   - Stains used – fluorooglucinol : Hcl (1:1), Iodine, Rheuthenium red

Anatomical structure of leaf (PlateII)

Leaf is dorsiventral. It is having cuticle on the upper epidermis. The lower epidermis is without cuticle. There are number of stomata’s situated on the lower epidermis. Stomata are rubiaceous but the arrangement of subsidiary cells varying somewhat in different genera and species. In Morinda the stomata are consisting of biconvex lens shaped opening with crescent shaped guard cells on either side of stoma with nucleus and chloroplasts. The guard cells regulate the opening and closing of stomatal aperture.

Below the epidermis there lies the mesophyll tissue consisting of upper compactly arranged palisade cells which are rounded or slightly elongated and lower spongy parenchyma cells which are isodiametric in structure. These two are photosynthetic as they contain chloroplast. The mesophyll cells enclose small intercellular spaces. In the mesophyll tissue are distributed reticulate veins.

In the centre of the leaf there is a mid rib which is prominent and projects more outside the lamina on the lower surface. Below the epidermal tissue in the mid rib there are collenchyma cells forming the hypodermis.

In the mid rib there is a U-shaped vascular bundle having prominent xylem and comparatively thin layer of phloem. The ground tissue is made of parenchyma cells. There are number of starch grains in the spongy as well as the palisade parenchyma Secretary elements of schizogenous nature containing resins are seen in mesophyll region mixed up with starch grains and the resins are granular, looking like starch grains. In Morinda leaf rarely raphides are found in elongated sacs floated on mucilaginous content.
Anatomy of stem bark (PlateIII)
Along with the secondary growth in the stem the bark formation takes place outside the vascular region by the formation of cork cambium which arises from the cells below the epidermis. Every year one ring of bark originates from the cork cambium which stops its activity after the growth season. In the subsequent year fresh cork cambium arises inside the previous years bark and produces bark once again. Hence we can see repeated rings of bark one inside the other. As the new rings of bark are produced annually the most outer ones gets peeled off which are replaced by the bark produced subsequently.

The bark consist of three components
1. Phellogen or cork cambium
2. Phelloderm or secondary cortex
3. Phellem or cork cells

The phellogen is the meristematic tissue which gives rise to derivatives both inside and outside. The inside derivatives differentiate into phelloderm, while the outside derivatives will differentiate into phellem. The phellem cells subsequently become dead cells and are known as cork cells and they are protective to stem. The phelloderm or secondary cortex will act as storage tissue and contain mucilage and resins.

Anatomy of root bark (PlateIII)
A root bark is produced simultaneously with the stem bark during the secondary growth in thickness. Structurally it shows the same details as that of stem. Here, the bark formation starts with the origin of cork cambium produced below the epidermis from the hypodermal region and causes bark formation. In the root the bark functions as a protective tissue to the root.

Crystals
Occasionally clusters of crystal cells are seen in the root particularly below the secondary cortex which appear as red groups of cells when stained.

Powder microscopy of Fruit (PlateIV)
The fruit of Morinda is multiple fruit formed due to fusion of calyx of all flowers with inferior ovary. The young fruits before maturity collected dried and powdered to observe the components of the fruits. Due to mechanical crushing all the details of the cell components of
the fruits are not able to be seen but some components of the fruit do show when observed under microscope.

The fruit wall being hard and fibrous, number of fibrous are seen in mass, unseparated. Rarely few fibrous got separated and are seen as long cells with blunt ends having a narrow lumen in the centre. Number of parenchyma cells are also seen from the pulp of the fruits. Resinous mass could be noticed. Occasionally shining crystals are observed. Few starch grains could be seen in fruit.
MORINDA CITRIFOLIA - ANATOMY OF STEM BARK

One layer of bark

Concentric rings of bark

Secondary cortex

Mucilage content

PLATE - III

MORINDA CITRIFOLIA - ANATOMY OF ROOT BARK

Concentric rings of bark

Mucilage content

Secondary cortex

Crystal cells

Medullary rays
CONCLUSION
The present study on pharmacognostical characters of *Morinda citrifolia* highlights useful information in regard to its correct identity and help to differentiate from closely related other species of *Morinda*.
Pharmacognostic studies reveals paracytic or parallel celled type of stomata in *Morinda citrifolia* leaf, suggestive of belonging to *Rubiaceae* family.

This study plays important role in identification and authentication of drug, the first and foremost step in any of the drug research.

REFERENCES
2. Prof. Dr. Peter P. I., Noni fruit of strange beauty and strong spirit, 60: 2 & 3.