



INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES  
(Int. J. of Pharm. Life Sci.)

**Morpho-anatomical studies in *Urginea indica*, Kunth  
Hyacinthacea - A wonderful wild herb**

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**Abstract**

Present paper reports anatomical investigation of *Urginea indica*, a wild and less known plant and important medicinal herb. In this investigation there is an effort to investigate most available varieties which were identified by scientists in past and as many accessions available in India with their geographical locations. Plant samples were collected from dry hilly areas and rocky places of India. *Urginea indica* is found throughout the plains and in the dry hills of the lower Himalayas. Infectious diseases, Pains and Inflammation, Common ailments, Systemic disorders, Organ-specific disorders are treated in Ayurveda and Unani by *Urginea indica*. Plant anatomy, the study of the internal structure of plants, has been a source of fascination and a field of scientific inquiry since the time of the earliest microscopists. Transverse sections of plant parts viz., stem, leaf, anther, stigma, ovary, seed, bulb scale, bulb peel and root were investigated. In macerated material of bulbs there are showing xylem tracheids/ vessels that are showing short and wider in diameter elements that indicate advanced among monocots. Roots show distinct radial polyarch condition with casperian thickenings in endodermis. In leaves, stomata are hypostomatic and anomocytic type. Flowers are trimerous, bisexual. Dithecous anthers in t.s show clear four pollen chambers. Pollen shape was ellipsoid and its surface was reticulate. Gynoecium is with globose or trifid stigma, short style and trilobed ovary. Ovary is superior and having axile placentation, ovules are anatropous. These anatomical features will help to provide information of taxonomic significance.

Key- Words: Anatomy, Pollen, Stomata, Tracheids, vessels, *Urginea indica*

**Introduction**

*Urginea indica* Kunth., belonging to the family Hyacinthaceae, is a perennial glabrous herb commonly known as "Indian squill" and locally in Pakistan as "Junglipiyaz", where it grows in Salt Range, Kotli Near Mirpur and Mt.Tilla (Baquar, 1989). In the indigenous traditional system of medicine, *U. indica* is reputed for a number of therapeutic benefits, for which bulb or rhizome are the most commonly employed plant parts. It is chiefly used in chronic bronchitis and asthma. The other actions attributed to *U. indica* are anthelmintic, cardio-tonic in heart insufficiency, deobstruent, digestive, expectorant, stomachic, diuretic, emmenagogue and purgative, in addition to its use in calculous and paralytic affections, rheumatism, leprosy, skin diseases, internal pain and scabies (Baquar, 1989; Kirtikar and Basu, 1988; Prajapati et al., 2003). Bulbs crushed or sliced are also applied under the sole of feet to prevent burning sensation (Kapoor, 1990; smanghani et al., 1997) and are externally used for removing corns and warts (Kapoor, 1990; Prajapati et al., 2003).

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Among phytochemical constituents, the glycosides, scillaridin-A and scillaridin-B have been reported to be present in fresh squill (Prajapati et al., 2003). Other constituents found in squill include flavonoids, carbohydrates, antifungal glycoproteins, steroids, alkaloids, tannins, coumarins and saponins (Abbas et al., 2012; Kameshwari et al., 2012). Pharmacological evaluations have revealed the presence of antibacterial, antifungal (Shenoy et al., 2006), laxative and spasmodic (Abbas et al., 2012), antioxidant, antiangiogenic and pro-apoptotic activities in *U. indica* (Deepak and alimath, 2006). Despite of its extensive medicinal application in airways hyperactivity disorders and also in cardiac disorders, *U. indica* has not been studied widely to evaluate these medicinal uses. This study was aimed to provide pharmacological basis for the medicinal use of *U. indica* in bronchospastic disorders like asthma and as cardiac stimulant.

**Material and Methods**

To study and differentiate different varieties, we collected the plant from various locations and tried to analyse the morphology and anatomy.

The varieties of *Urginea indica* selected are as given below:

Table 1:

Accession	Altitude ( in meters)	Temparature ( degree celcius)
KERALA	150	32- 36
GUBBI	780	27- 33
BELLARY	485	34- 44
KASHMIR	5.753	8 – 32
SEETHAMPUN	170	28 -40
TRICHY	78	40
UDUPI	39	18-40
KADAPA ( Andra)	138	37-42
GOPALASWAMY BETTA	1450	21
YEDIYUR	780	31
KANAKAPURA	638	32-36
TIRUCHENDUR( T.N)	3	36
BETTAHALLI	682	20-28
TUTICORIN(T.N)	4	36

#### Accessions of *Urginea indica*

Before my morphological analysis, I collected the information of *Urginea indica*'s various taxonomic varieties that existed at different locations of India of for their studies.

1. Andra pradesh: Chittore, Nellore, Prakasam, Vishakhapatnam, Kadapa, Ananthpur
2. Chittor – 2 – Punyagiri village collected in 1918 by Hooker. – *U. coramandaliana*
3. Chittor - Honalykonda district - *U. wrightiana*
4. Nellore – Chinthaldeni collected in 1930 – *U. indica*
5. Prakasam – 2 spp
6. Vishakapatnam – *U. coramandaliana* - Place : Ragupalium
7. Ananthpur – *U. coramandaliana* S. K. University
8. Madhya pradesh Kosangabad, - 3 spp *U. indica* (Bori rf locality)
9. Karnataka North and South canara – *U. coramandaliana*
10. Koimbattore – Changalpattu, Tirichanapalli - Ramanathapuram
11. North Karnataka – Gokak- *Urginea congesta*, Collected place: Bhairikolla, Falls road, Gokak,-

*Urginea indica* specimens were collected from **Yedeyuru** hill tops near Bangalore. Grown in green house of Bangalore University, Botany department. The samples of roots leaves bulbs and inflorescence were put in 70 % alcohol for anatomical studies. Anatomical studies were carried out on 10 samples. In these samples, twenty preparations were made of each type of sections. The crosssections were stained with saffrinine and methylene blue.

All sections were covered by glycerin gelatin and made into permanent slides as described by Vardar (1987). Preparats were observed through an Olympus BX-50 microscope and photographed.

#### Morphology

Habit : Herbs. 'Normal' plants. Perennial; with a basal aggregation of leaves; bulbaceous, Mesophytic. Roots: Fibrous, yellowish, thick .

Height of the plant: 11.2cms – 15cms

Root length: 3 cms

Circumferance of the bulb: 12 cms

Number of flowers per inflorescence: 4-6

Length of the pedicel: 0.5cms

Fruit length: 1.3cms

Fruit circumfarance : 0.9cms



**Bulbs:**

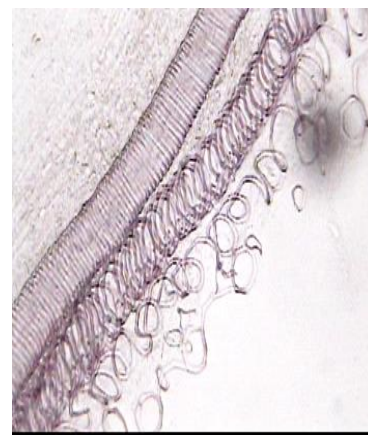
*Urginea indica* Kunth. commonly called as Indian Squill is a perennial geophyte with fibrous roots of six to ten inches of length, proceeding from the base of the bulb is a scapigerous herb. The rounded conical, pear shaped bulbs with white transparent outer scales are about the size of an big onion, consisting of fleshy coats which are thin and papery red or orange brown in colour enclosing each other completely.

**Maceration of Bulbs:**

Put the material, which should be in very small pieces, into a test-tube; pour on just enough nitric acid to cover it, and then add a few crystals of potassium chlorate. Heat gently until bubbles are evolved, and let the reagent act until the material becomes white. Four or five minutes should be sufficient. Pour the contents of the tube into a dish of water. After the material is thoroughly washed in water, it may be teased with needles and mounted, or it may be put into a bottle of

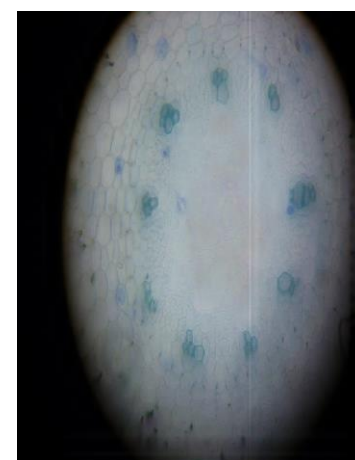
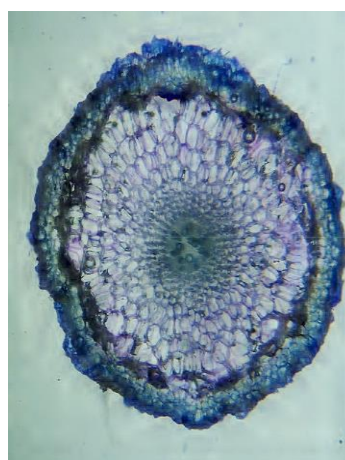
water and shaken until many of the cells become dissociated

. After a thorough washing in water, the material may be stained. The large tracheids of ferns, dissociated in this way and stained in safranin.



Epidermal cells slightly angular . Suberized cells are found outside epidermis forming the bark. Three layer of hypodermis or exodermis. Inner to this around 8 rows of large circular parenchyma cells of the cortex with glandular secretions. The endodermis is a single layer with very thin-walled cells with casperian thickenings. The pericycle is two layered. Stele is comparative to others is smaller.

Stele is primitive with protostele characters. . Xylem arms vary in number in different populations from 5-15 and radial. There is variation in number and arrangement of proto and metaxylem, exarch. Root xylem with vessels; vessel end-walls scalariform, or scalariform and simple. Pith is parenchymatous with storage cells.



**Leaf****Morphology:**

Mesophytic. Leaves alternate; spiral; sessile; sheathing. Leaf sheaths with free margins. Leaves simple. Lamina entire; linear, or lanceolate, or ovate (rarely); parallel-veined; without cross-venules. Lamina margins entire.

**Leaf anatomy**

The leaves are equifacial. The upper and lower epidermis are uniseriate and covered by a cuticle. Beneath upper and lower epidermis, 1-layered palisade parenchyma is present. The spongy parenchyma between the two palisades is 8-11-layered. consists of nearly orbicular cells, some of them contain raphide type crystals. Vascular bundles are arranged in a single row in spongy parenchyma. The vascular bundle in the midrib region is not conspicuously larger than the others. Therefore, the midrib do not constitute a projecting part.

**Leaf surface micromorphology**

The leaves are amphistomatic with anomocytic type of stomata. The stomata lie at the same level as the epidermal cells. Namely, they are of mesomorphic type. Stomata present; aperiogenous (no subsidiary cells), amphistomatic. The mesophyll containing

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**How to cite this article**

Hemlata S.K. and Kameshwari M.N.S. (2015). Morpho-anatomical studies in *Urginea indica*, Kunth Hyacinthaceae - A wonderful wild herb. *Int. J. Pharm. Life Sci.*, 6(4):4389-4392.

Source of Support: Nil; Conflict of Interest: None declared

Received: 28.02.15; Revised: 21.03.15; Accepted: 30.03.15