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MICROSCOPICAL AUTHENTICATION OF *URGINEA INDICA* KUNTH – A POISONOUS PLANT WITH HEALING POTENTIAL

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ABSTRACT

The widespread belief that herbal drugs are perfectly safe and devoid of any adverse effects is false and misleading. Herbs can cause a wide range of undesirable or adverse reactions, some of which can result in severe injuries, life-threatening conditions, and even death if used beyond a prescribed dose. *Urginea indica* Kunth is one of such plant which is used from many scenarios in the form of pills, powders, decoctions, ointments, poultice, plant juice, infusions and lotions etc. to treat various ailments like asthma, rheumatism, paralytic affections, leprosy and skin diseases. It is reported that in small doses it acts as an expectorant, cardiac, stimulant, diuretic, deobstruent and emmenagogue but in excessive doses it is a narcotic acrid poison causing nausea, strangury and bloody urine, often suppression of urine, gastro-entritis followed by convulsion and paralysis of heart and death. Due to its narrow therapeutic index, present investigation was undertaken to microscopically authenticate this plant so as to provide a set of diagnostic characters for easy identification of genuine drug sample from the local market.

KEYWORDS: *Urginea indica* Kunth narrow therapeutic index; microscopy; identification.

INTRODUCTION

Urginea indica Kunth which is commonly called Indian Squill or Sea Onion and locally known as Jungli Piyaz.[1-4] belonging to the family Liliaceae is a glabrous herb occurring in India throughout the plains and in the dry hills of the lower Himalayas upto an altitude of 1,500m. The herb prefers a mean annual temperature of 15° and an annual precipitation of 50-75 cm. It is frequently cultivated in sandy soils near the sea-shore in the Deccan peninsula for its bulbs, which are tunicated, ovoid or pear shaped, 5-10 cm long; leaves linear, acute, sub-bifarious; flowers greenish white or dirty brown or purplish, drooping or spreading in terminal racemes, borne on erect, long scapes, often emerging before the leaves.[5] From many scenarios the bulb of *Urginea indica* Kunth have been used in the form of pills, powders, decoctions, ointments, poultice, plant juice, infusions and lotions etc. to treat various ailments like asthma, rheumatism, paralytic affections, leprosy and skin diseases. It is reported that in small doses it acts as an expectorant, cardiac, stimulant, diuretic, deobstruent and emmenagogue but in excessive doses it is a narcotic acrid poison causing nausea, strangury and bloody urine, often suppression of urine, gastro-entritis followed by convulsion and paralysis of heart and death.[6,7] Due to its narrow therapeutic index, present investigation was undertaken to microscopically authenticate this plant so as to provide a set of diagnostic characters for easy identification of genuine drug sample from the local market.

MATERIAL AND METHODS

Fresh drug material (bulbs) was collected from district Jammu, Union territory of Jammu and Kashmir for morphological and anatomical studies. After proper identification and authentication the voucher specimen was preserved in the botany section of the lab (DSRU, New Delhi) for future reference. Various organoleptic and morphological characters like colour, shape, size, odour and taste etc. were studied. For anatomical studies free hand transverse section were prepared using a razor blade and stained as per standard and well established methods.[8,9] The bulbs were further dried ; powdered and sieved through 40 mesh. The powdered drug first cleared in the solution of chloral hydrate and then mounted in solution of chloral hydrate and glycerol to prevent the formation of chloral hydrate crystals during the examination of the slide. Lignification was established by the reaction with solution of phloroglucinol and hydrochloric acid. Several preparations with different mountants like iodine water, sudan III, ruthenium red, ferric chloride etc. were also made to emphasise the

presence of particularly important cells or cell contents. Care should be taken to avoid the presence of any air bubble.[10,11] Most diagnostic features and the dimensions of the cells and other particles were recorded. Photomicrography was performed by using digital microscope with computer attachment.

RESULT

Taxonomic Classification

Kingdom Plantae
Order Liliales
Family Liliaceae
Genus Urginea
Species indica

Macroscopy

Yellowish- white tunicated bulb, ovoid- spherical, 3.5-6 x 2.5-6.5 cm., outer scale dry, membranous, inner scales fleshy, translucent with faint characteristic odour and taste is disagreeable, bitter, acrid and mucilaginous.

Surface study

The surface view of the peel shows following characteristics

- Elongated rectangular epidermal cells measuring 234µ - 324µ x 54µ - 90µ.
- Epidermal cells with moderately thick walls.
- Epidermal cells with smooth outline.
- Abundant acicular crystals of calcium oxalate present in bundles and embedded in the mucilage.
- Stomata present only on the abaxial surface but very few in number.
- Anomocytic type of stomata present.
- Trichomes absent.

Fig. 1: Surface view (Adaxial surface) x10; Fig. 2: Surface view (Abaxial surface) x10; Fig. 3: Stomata on the Abaxial surface x40 ; Fig. 4 : Epidermal cells x40.

Microscopy

T.S. of the slice of the bulb shows an upper and lower epidermis covered with moderate thick cuticle and un undifferentiated zone of mesophyll in between. Epidermal cells single layered, axially elongated, quadrangular, prenchymatous. Mesophyll consists of several layers of thin walled, large, polyhedral, parenchyma cells with intercellular spaces. Mucilage cells, starch grains that are simple, oval- spherical measuring 9µ - 36µ x 9µ - 27µ and numerous bundles of acicular crystals of calcium oxalage (each crystal measures approx.. 108µ - 144µ x 4.5µ - 9µ) present in the mesophyll. Vascular bundles present at regular intervals are conjoint and collateral encircled partially or completely with mucilage containing cells.

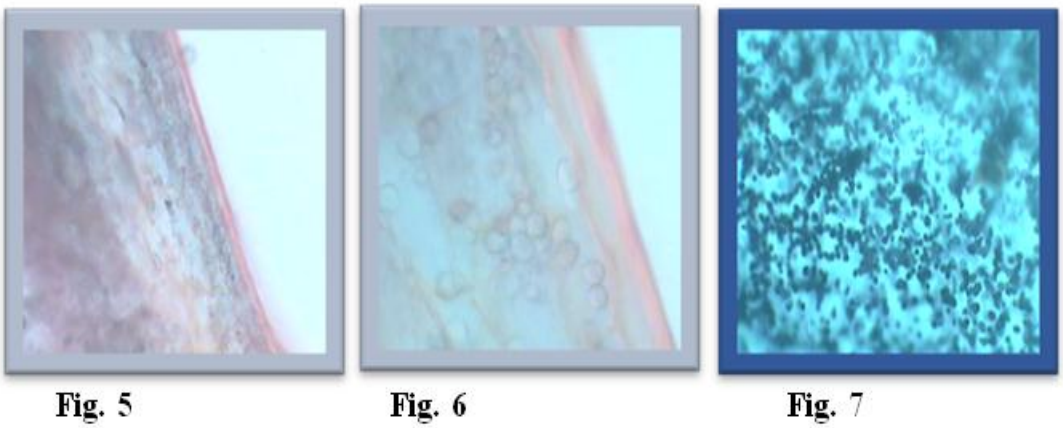

Fig. 5: T.S. inner peel x10; Fig. 6: T. S. inner peel (enlarged view) x40; Fig. 7: Mesophyll cells filled with starch grains x10.

Powder Analysis
Colour: Off white
Odour: Faint, characteristic
Taste: Disagreeable, mucilaginous, bitter and acrid.

On examination under the microscope it shows

- Abundant acicular crystals of calcium oxalate present either isolated measuring 108µ - 144µ x 4.5µ - 9µ or in bundles embedded in mucilage in the parenchyma cells.
- Abundant mucilage cells, some of which are intact and contain bundles of acicular crystals of calcium oxalate while others are broken open to show the fragments of acicular crystals.
- Irregular masses of mucilage scattered throughout the powder.
- Fragment of vessels with spiral and annular thickenings.
- Fragment of epidermal cells in surface view consisting of elongated rectangular cells measuring 234µ - 324µ x 54µ - 90µ.
- Fragment of epidermis in surface view with anomocytic type of stomata.
- Abundant parenchyma cells, thin walled, polygonal with small intercellular spaces.
- Starch grains which are simple, spherical – oval measuring 9µ - 36µ x 9µ - 27µ.

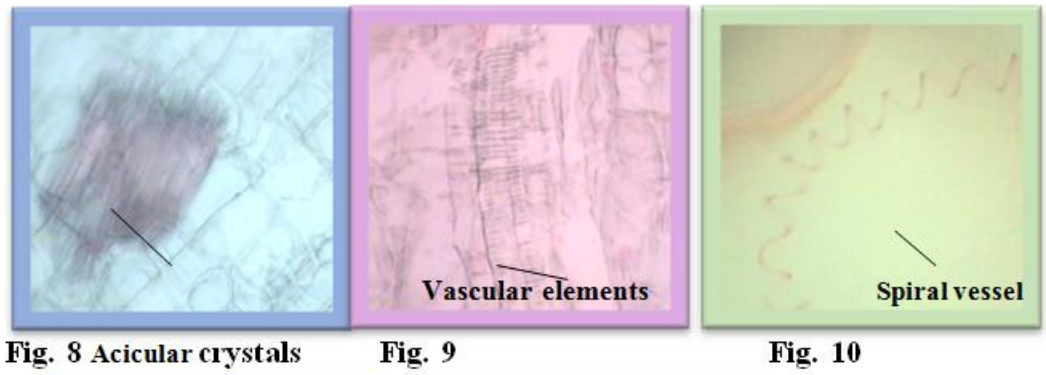

Fig. 8 Acicular crystals Fig. 9 Fig. 10

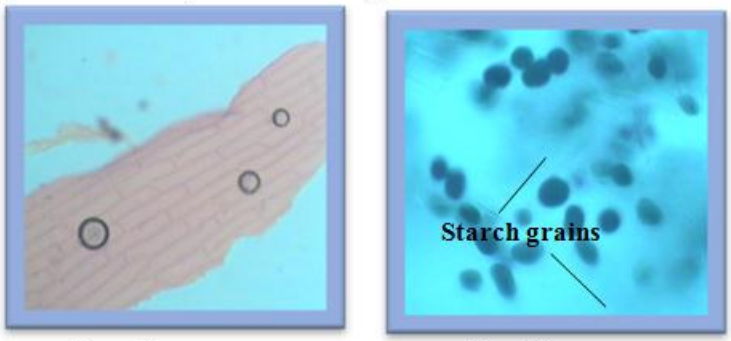

Fig. 11 Fig. 12

Fig. 8: Acicular crystals of calcium oxalate x40; Fig. 9: Vascular elements in powder x40; Fig. 10: Spiral vessel in powder x0; Fig. 11: A fragment of epidermal cell x10; Fig. 12: Starch grains in powder (enlarged view) x40.

CONCLUSION

Microscopical authentication is the initial step in ensuring the identity and quality of any herbal material and should be carried out before the preparation of any herbal formulation. It is of utmost important especially in case of *Urginea indica* Kunth which is a therapeutically potential herb that become lethal beyond a certain prescribed dose. As the oral administration of the bulbs of *Urginea indica* Kunth in any form may be a matter of serious concern, certain characters like bundles of acicular crystals of calcium oxalate, abundant mucilage cells with irregular mases of mucilage, anomocytic type of stomata, simple, spherical- oval starch grains and absence of trichomes are helpful in easy identification and authentication of the genuine drug sample from the local market.

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