ANATOMICAL STUDIES ON THE SEEDS OF ALTERNANTHERA SESSILIS LINN.

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Received on: 10/04/14 Revised on: 05/05/14 Accepted on: 20/05/14

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DOI: 10.7897/2277-4343.05368

ABSTRACT
Alternanthera sessilis Linn belongs to the family Amaranthaceae. It is an annual or a perennial prostate herb with several spreading branches bearing short petioles, simple leaves and small white flowers. The branches are raised from the root and are up to 50 cm long. The seed is used in Siddha system of medicine. So far no Anatomical characters have been reported on the seeds of Alternanthera sessilis Linn. The aim of this study was to evaluate the Macroscopic and microscopic characters of the fresh seed samples of Alternanthera sessilis Linn. The seed samples were mounted on FAA solution. Sections were taken in rotary microtome, stained with toluidine blue characters, histochecmical tests were observed. The seed is 400 µm long and 250 µm wide, Seed coat (Testa) is 10µm thick and hard. Both outer and inner seed coats are sclerotic with prominent appendages on the outer surface of the seed coat. Endosperm is large, thin walled and polyedral. Anatomical characters reported on the seeds of Alternanthera sessilis Linn can be used as a diagnostic tool for the botanical identity and authentication of the correct plant material.

Keywords: Alternanthera sessilis Linn, Anatomical, Macroscopic, Microscopic, Seed, Siddha.

INTRODUCTION
Alternanthera sessilis Linn belongs to the family Amaranthaceae. It is an annual or a perennial prostate herb with several spreading branches bearing short petioles, simple leaves and small white flowers1. The branches are raised from the root and reaches up to 50 cm long2. Vernacular names are Ponnokanni keerai (Siddha/Tamil), Matsyaakshi (Ayurvedic), Machhechhi (Unani) and Gudari Saag (Folk)3. Common name is sessile joy weed, used as traditional medicine in India, China, Sri Lanka and Taiwan4. Siddha mentioned Alternanthera sessilis as a Kaya Kalpa drug5. Shoot with other ingredients is used to restore virility6. Alternanthera is enriched with Vitamins, flavonoids, glycosides, saponin and other secondary metabolites7. Seed oil contains a moderate source of Ricinoleic, Myristic, Palmitic, Stearic, Oleic and Linoleic acids8. The seed of Alternanthera sessilis is used in Siddha system of medicine as one of the ingredient in the herbal medicine formulation Chandrakanthi choornam indicated in Nocturnal emission, Oligospermia, Urinary disease, Vaginal disease, Venereal disease and All biliousness9. According to World Health Organization the macroscopic and microscopic determination of the plant is the first step towards establishing its identity and purity10. Proper identification and authentication based on established scientific criteria are of utmost importance11. No anatomical characters are reported on the seed of Alternanthera sessilis Linn and hence the present study was done to evaluate the macroscopic and microscopic characters of the fresh seed samples.

MATERIALS AND METHODS
Plant Material
For the proposed study fresh seed samples were collected from the Herbal garden, National Institute of Siddha, Chennai, India. It was identified, authenticated and a voucher specimen (NIS/MB/59/2012) was deposited in the Department of Medicinal Botany, National Institute of Siddha, Chennai, India. Anatomical analysis was done in Plant Anatomy Research Centre, Chennai, India.

Anatomical analysis of the Seed
Macroscopic and microscopic analysis
The seeds were fixed in FAA (Formalin – 5 ml + acetic acid – 5 ml + 70 % Ethyl alcohol – 90 ml). After 24 h of fixing, the specimens were dehydrated with a graded series of tertiary- Butyl alcohol12. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60 °C) until TBA solution attained super saturation. The specimens were cast into paraffin blocks.

Sectioning
The paraffin embedded specimens were sectioned with the help of Rotary Microtome. The thickness of the sections was 10-12 µm. De waxing of the sections was by customary procedure13. The sections were stained with toluidine blue since it is a polychromatic stain14. The staining results were remarkably good and some cytochemical reactions were also obtained. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc. Wherever necessary, sections were also stained with safranin and Fast-green and IKI (for Starch)

Photomicrographs
Microscopic descriptions of tissues are supplemented with micrographs, wherever necessary. Photographs of different magnifications were taken with Nikon lab photo 2 microscopic Unit. For normal observations bright field was used. For the study of crystals, starch grains and lignified cells, polarized light was employed. Since these
structures have birefringent property, under polarized light they appear bright against a dark background. Magnifications of the figures are indicated by the scale-bars. Descriptive terms of the anatomical features are as given in the standard anatomy books15.

RESULTS AND DISCUSSION

Macroscopical characters of seed

The seeds are dark brown (Figure 3) with no odour, elliptical in shape with a broad blunt end and short conical opposite end (Figure 4). The seed is 400 μm long and 250 μm wide.

Microscopical characters of seed

The seed-coat (Testa) is thick and hard. It is 10 μm thick. It is uniformly thick all around the seed. The outer surface is uneven with irregular ridges. On the outer surface of the seed coat there are two or three prominent appendages or wings (Figure 8). The wings are 80 μm long and 30 μm thick. The wings are multicellular and thick walled. They are conical in shape. The seed coat consists of outer sclerotic epidermis or sclerotesta and inner seed coat which are also sclerotic. There are two or three layers of fibrous cells (Figure 7, 8). The endosperm is large, thin walled and polyhedral in outline (Figure 5, 6).
CONCLUSION
Anatomical characters reported on the seeds of *Alternanthera sessilis* can be used as a diagnostic tool for the botanical identity and authentication of the correct plant material and to differentiate the drug from its allied species. The Macroscopical and microscopical characters established on the seed may be helpful in the development of standard pharmacopoeia literature for this material.

ACKNOWLEDGEMENT
Authors are thankful to Dr. D. Aravind, Assistant Professor, NIS for authentication and Dr. P. Jayaraman, Director, Plant Anatomy Research Centre, Chennai, India for technical suggestions.
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Cite this article as:

Source of support: Nil, Conflict of interest: None Declared