Research Article

www.ijrap.net

ANATOMICAL STUDIES ON THE SEEDS OF *ALTERNANTHERA SESSILIS* LINN.

B. Akila^{1*}, K. Manickavasakam²

¹Ph. D Scholar, Department of Maruthuvam, National Institute of Siddha, Chennai, Tamil Nadu, India

²Director, National Institute of Siddha, Chennai, Tamil Nadu, India

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

*Corresponding author

Dr. B. Akila, Ph. D Scholar, Department of Maruthuvam, National Institute of Siddha Chennai, Tamil Nadu, India

E-mail: drakila10@gmail.com

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, histochemical 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 polyhedral. 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 Ponnonkanni 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, saponins and other secondary metabolites⁷. Seed oil contains a moderate source of Ricinoleic, Myristic, Palmitic, Stearic, Oleic and Linoleic acids⁸. The seed of *Alternanthera sessilis* Linn is used in Siddha system of medicine as one of the ingredient in the herbal mineral 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).

Figure 1: Plant image of *Alternanthera sessilis*

Figure 2: Flower with seed

Figure 3: Seeds external feature

Figure 4: LS of seed – entire view -16 x
(En- Endosperm; Sc- Seed coat)

Figure 5: Seed coat with outer wing – 40 x
(En- Endosperm; Sc- Seed coat)

Figure 6: Cellular endosperm of the seed – 40 x
(En- Endosperm)

Figure 7: TS of seed –10 x

Figure 8: Seed coat enlarged showing sclerotic testa and outer outgrowing wing – 40 x
(ISC: Inner seed coat; OSC: outer seed coat; W: Wing)

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.

REFERENCES

1. Subhashini T *et al.* Anti- Inflammatory Activity of Leaf Extracts of *Alternanthera sessilis*. Hygeia J D Med 2010; 2(1): 54-56.
2. Yadav *et al.* *In vitro* antioxidant and free radical scavenging activity of *Alternanthera sessilis*. International Journal of Pharma Sciences and Research 2011; 2(6): 1502-1506.
3. Khare CP. Indian Medicinal Plants- an illustrated dictionary. Berlin/Heidelberg: Springer-Verlag; 2007. p. 39.
4. Surendra Kumar M *et al.* Screening of aqueous and ethanolic extracts of aerial parts of *Alternanthera sessilis* Linn. R. Br. ex.DC (Amaranthaceae) For Antidiabetic Activity. Journal of Pharmacy Research 2011; 4(5): 1528-1530.
5. Rajiv Gupta *et al.*, Nootropic potential of *Alternanthera sessilis* and *Clerodendrum infortunatum* leaves on mice. Asian Pacific Journal of Tropical Disease 2012; 2(1): 465-470. [http://dx.doi.org/10.1016/S2222-1808\(12\)60204-7](http://dx.doi.org/10.1016/S2222-1808(12)60204-7)
6. Asolkar LV, Kakkar KK, Chakre OJ. Second supplement to Glossary of Indian Medicinal Plants with Active principles. Part-I (A-K). New Delhi: 1st ed. National Institute of Science Communicate and Information Resources (CSIR); 1992.
7. Hundiware Jogendra C *et al.* A current update on phytopharmacology of the genus *Alternanthera*. Journal of Pharmacy Research 2012; 5(4): 1924-1929.
8. Hosamani Kallappa M, Ganjihal Savita S, Chavadi Dheeraj V. *Alternanthera triandra* seed oil: A moderate source of ricinoleic acid and its possible industrial utilization. Industrial Crops and Products 2004; 19(2): 133-136. <http://dx.doi.org/10.1016/j.indcrop.2003.07.009>
9. Vaidhiya Vithuvanmani Kanusamy Pillai. Sigicha Rathna Deepam ennum vaidhiya nool. Part-II. Chennai: B. Rathinayakar and Sons; 2007. p. 168.
10. Bigoniya P *et al.* Pharmacognostical and physico-chemical standardization of *Syzygium cumini* and *Azadirachta indica* seed. Asian Pacific Journal of Tropical Biomedicine 2012; 290-295.
11. Mariappan *et al.* Pharmacognostical studies on *Morinda tinctoria*. Int J Pharm Pharm Sci 2012; 4(2): 636-638.
12. Sass JE. Elements of botanical Microtechnique. New York: 1st ed. Mc Graw Hill Book Co; 1940. p. 222.
13. Johansen DA. Plant Microtechnique. New York: 1st ed. Mc Graw Hill Book Co; 1940. p. 523.
14. O'Brien TP, Feder N, Mc Cull ME. Polychromatic staining of plant cell walls by toluidine blue-O. Protoplasma 1964; 59: 364-373. <http://dx.doi.org/10.1007/BF01248568>
15. Easu K. Anatomy of seed Plants. New York: John Wiley and sons; 1979. p. 550.

Cite this article as:

B. Akila, K. Manickavasakam. Anatomical studies on the seeds of *Alternanthera sessilis* Linn. Int. J. Res. Ayurveda Pharm. 2014;5(3):330-333 <http://dx.doi.org/10.7897/2277-4343.05368>

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