International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

Comparative Account of Seedling Morphology of *Luffa* Species

Santosh Jadhav[1], Niranjana Chavan[2]

[1]Department of Botany,Shivaji University, Kolhapur, Maharashtra, India

[2]Department of Botany, Shivaji University, Kolhapur, Maharashtra, India

Abstract: ***The study of morphology of plant species is restricted to mature specimens only. The seedling morphology takes considerable place in taxonomic research. It gives primary source of taxonomic and genetic characters. Seedlings show distinct identification characters. In this study seedling morphology of three major species of Luffa is studied. The marked characters can be used for distinction of wild Luffa acutangula var. amara from cultivated L. acutangula and L. cylindrica.***

Keywords: seedling morphology, taxonomy, *Luffa acutangula* var. *amara, Luffa cylindrical*

1. Introduction

The family Cucurbitaceae comprises members that are cultivated throughout the world as a source of food, fiber and indigenous medicines [1].The family consists of about 118 genera and about 825 species confined to large tropics and sub tropics. In India there are nearly 34 genera and 108 species of cucurbits of which 38 species are endemic [2].

There are about 90 genera and 700 species mainly employed as food [3]. Taxonomically, the family is better understood today with various approaches being undertaken for deducing species interrelationships. Cucurbits are well documented for their food value and medicinal potential.

Luffa is one of the most known genera of family cucurbitaceae. *Luffa* is cosmopolitan genus out of 9 species 7 species occur in India. In day to day life *Luffa* generally refers to two species *Luffa acutangula* and *Luffa cylindrica*. The tender fruits of these two species are used as vegetables. Fully ripened fruits are very fibrous source of scrubbing sponge which is used in kitchens and bathrooms.

Luffa acutangula var. *amara* is also known as Wild Luffa or Bitter Luffa. All parts of plant are bitter. Fruits can be used as antidiabetic [4] and all parts of plants have antimicrobial potential.[5].seedling morphology help to understand juvenile developments and differences among their growth patterns. The seedling stage is the busiest phase in plants life time.

Generally seedling morphology is least considered by botanist. In fossil botany ,it has been ignored possibly due to failure of delicate parts of seedlings to be preserved. Even phylogeny seedling stage is not appreciated. Moreover the seedling of many taxa, particularly herbs are small to escape attention in their native habitats. Seedlings are strikingly different from adult stage that even with good field knowledge of plants, it is difficult to correlate the seedling plant with an adult shoot of the same species.

Seed and seedling morphology studies have provided characters with taxonomic relevance [6],[7]. Some studies have demonstrated that seedling morphology is helpful for species-level identifications [8].Anatomical and morphological characters are useful for distinguishing among species at the seed stage [9],[10]. The same is valid for seedlings, for various taxonomic levels, down to the level of subfamily [11], genera [12] or species [13],[14].

2. Literature Survey

Scanty information is available on seedling morphology of *Luffa* species. Brief information is in fascicles of cucurbits and flora about taxonomic features [15]. Seedling morphology is least considered in taxonomic study. Seedling study of *Luffa acutangula* var. *amara* in comparison with other *Luffa* species is not evaluated so far.

3. Problem Definition

The attempt is made to study seedling morphology of *Luffa cylindrica*, *Luffa acutangula* and *Luffa acutangula* var. *amara* by using standard protocols.

4. Materials and Methods

Seeds of *Luffa cylindrica* and *Luffa acutangula* are collected locally. The seeds of *Luffa acutangula* var. *amara* are collected during field study of plant at Aachara, district Sindhuduraga of Maharashtra.

Under laboratory conditions, scarified seeds placed in Petri dishes with a base of Whatman paper wetted with distilled water. After germination, Seedling development was recorded until the first and second leaf expanded and the lateral branches of the main axis began to grow (after approximately 10 days).

The morphology of seedling is recorded by following method of Vogel (1980).

The seedlings are described in the form of germination type, root, hypocotyls, cotyledons, internodes, first two leaves and subsequent leaves. The plants are then transferred to the field for further study.

Licensed Under Creative Commons Attribution CC BY

5. Results

The observed morphology of three species are as follows:

1. ***Luffa cylindrica*** *:*
The seedling is phanerocotylar, epigeal
Root : Tap root, elongating, off-white, slender profusely branched, rootlets are longer than tap root.
Hypocotyl : strongly elongating (12-13 cm) whitish green, terrate with rough surface(glabrous).
Cotyledonary leaves: two, thick, oblong elliptic, dull green above , light green below, palmetely nerved.
First internode : elongated (4-5 cm),parrot green, terrate, slightly pubscent rough, the axillary buds seem to be active as they develop even at two leaves stage.
First Foliage Leaf- first foliage leaf is simple, alternate, petiolate, petiole long, slightly angular, pubscent rough, grooved, above parrot green , exstipulate blade hastate dull green, coriaceous , rough, palmetely nerved, nerves conseipous below, base hastate, apex blunt, margin obscurely sinuous.
Subsequent leaves : same as that of first foliage leaf, expect size and grooves i.e. notches are deeper at this stage,seedling shows development of tendrils.

2. ***Luffa acutangula*** :
The seedling is phanerocotylar epigeal,
Root: Tap root elongating, ,off-white, much branched, slender, adventitious root like structure is seen, these roots are longer than tap root.
Hypocotyl :strongly elongated (16-17 cm), whitish green, terrate white smooth surface.
Cotyledonary leaves : two ,thick , oblong, fleshy elliptic, dull green and above light green. Palmetely nerved below.
First internode : slightly elongating,(1.5-2 cm),parrot green, angular slightly pubscent rough, sometimes first internode is slowly elongating or minute, axillary buds are not much active as compared to *Luffa cylindrica.*
First foliage leaf: simple , alternate petiolate, petiole long, parrot green, slightly pubscent, rough grooved above, exstipulate, blade hastate, pubscent coriaceous, base hastate, apex acute, margin conspicuously sinous, leaf is not showing much deep notches,
Subsequent leaves : same as that of first foliage leaves except size.

3. Luffa acutangula **var**. ***amara*****:**
The sedling is phanerocotylar epigeal.
Root: tap root system is present, it is elongating, less branched , slender, creamy white in colour,
Hypocotyl: elongating, parrot green to whitish green in colour, terrate (cylindrical), slightly angular, glabrous (no hairs).
Cotyledonary leaves: two, thick fleshy elliptic, dull green in colour, palmetely nerved.
First internode : slowly elongating, terrate, parrot green in colour, slightly pubscent.
First Foliage Leaf: first foliage leaf is simple, alternate, exstipulate, petiolate, petiole long, rounded below, and grooved above, petiole is slightly pubscent. Blade hastate, dull green, pubscent, smooth, palmetely nerved, nerves conseipous below, base hastate,, apex acute, margin obscurely sinous.
Subsequent leaves: same as that of first leaf except size.

6. Acknowledgments

The authors wish to thank the Head, Department of Botany, Shivaji University, Kolhapur, for providing necessary laboratories facilities

References

[1] Nayar N. M. and More T. A. (1998) cucurbits, Oxford and IBH publishing, Delhi.
[2] Jeffrey C (1990) Systematics of the Cucurbitaceae: An overview,p-328,In:D.M.Bates,R.W.Robinson and C Jeffery(eds).Biology and Utilization of the Cucurbitaceae. Cornell Univ. Press, Ithaca.
[3] Rahman M.M., Amin M., Jahan H.S. and Ahmad R.(2004).*Invitro* regeneration of plantlets of *Curcuma longa* Linn. A valuable spice plant in Bangladesh. *Asian Journal of Plant sciences*, 3(3):306-309.
[4] Jadhav S.J., Chavan N.S. and Jarag R. J., 2013. .Antidiabetic activity of fruits of Luffa acutangula var.amara in streptozotacine induced diabetic rats.International Journal of Medicinal Plants.Photon 105,123-127.
[5] Jadhav S.J., Chavan N.S.,2013., Evaluation of Antimicrobial activity of *Luffa acutangula* var. *amara.* International Journal of Advance Research. 1(10):323-326.
[6] Gunn Gunn, Ch. 1981. Seeds of Leguminosae. Pp. 913-925. In: Polhill. M. and Raven P. (Eds.) **Advances in Legume Systematics**. Vol. II. Kew, Royal Botanic Gardens.
[7] Gurgel, E.S.C.; Santos, J.U.M.; Lucas, F.C.A.; Bastos, M.N.C. 2012. Morfologia de plântulas de Leguminosae e o potencial sistemático. Rodriguésia, 63: 65-73.
[8] Lungu, S.; Culham, A. 1996. Seed and seedling morphology of Entada, a study of Zambian species. In: van der Maesen, L.J.G.; van der Burgt, X.M.; van Medenbach de Rooy, J.M. (Ed.).
[9] Corner, E. 1976. **The seeds of Dicotyledons**. Vol. I. Cambridge, Cambridge University Press.
[10] Alsina, M. 1988. Estudio morfológico y anatómico de las semillas del género *Ornithopus* L. (Fabaceae). **Acta Botánica Malacitana 13:**171-178.
[11] Silva, I.V. & Scatena, V.L. 2011. Morfologia de sementes e de estádios iniciais de plântulas de espécies de Bromeliaceae da Amazônia. Seed morphology and early seedling stages in Bromeliaceae from the Amazon.**Rodriguésia 62**(2):263-272.
[12] Rodrigues, R.S., Tozzi, A.M.G.A. 2008. Systematic relevance of seedling morphology in *Acosmium*, *Guianodendron*, and *Leptolobium* (Leguminosae, Papilionoideae). **Brittonia 60**(3):287-296.
[13] Dottori, N.; Bruno, Gloria & Cosa, M.T. 2000. Anatomía comparada de las plántulas de *Solanum elaeagnifolium* y*Solanum juvenale* (Solanaceae). **Boletín de la Sociedad Argentina de Botánica 35**(1-2):115-23.
[14] Mendiondo, G., Amela García, M. T. 2005. Exomorfología de plántulas de *Passiflora* spp.

Licensed Under Creative Commons Attribution CC BY

(Passifloraceae).**Boletín de la Sociedad Argentina de Botánica 40**(Supl.):71.
[15] Fascicles Of Flora Of India II (Cucurbitaceae)

l.Luffa cylindrica



2.Luffa acutangula



3.Luffa acutangula Var. amara



Author Profile



Jadhav S. J., Research student. presently working on Bioprospecting of *Luffa acutangula* var. *amara* in Shivaji University, Kolhapur, (MS) India. Completed M.Sc. (Botany), B.Ed. working as teacher in Shri Ram Jr. College, Kolhapur, (MS), India. Presented over 8 National papers and published over 6 international papers on different aspects of *Luffa acutangula* var. *amara*.



Dr. (Prof.) Chavan N.S., Professor in Botany, Research guide, Shivaji University, Kolhapur (MS) India. Having P.G. teaching experience of 26 years, guided over 20 Ph.D. students, published 40 international, over 50 national papers and 18 conference proceedings.Carried out over 15 different projects regarding conservation and management of wet land resources, conservations of wild cucurbits and mangroves. Life member of TEAK nature club, IWSA, Marathi Vigyan Parishad, Nature & Pollution Board, Nature, Environment & Pollution Technology. Executive body member of Mangrove Society of India:

Licensed Under Creative Commons Attribution CC BY