



A NEW ARTIFICIAL GENERIC KEY FOR LAMIACEAE

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Article Received on 17/01/2015

Article Revised on 06/02/2015

Article Accepted on 28/02/2015

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ABSTRACT

A study on seedling morphology of family Lamiaceae was carried out to prepare the seedling flora and to document juvenile characteristics. In the present study 13 genera were covered to document juvenile characteristics. In all the taxa seedling is of macaranga type. An artificial dichotomous key of genera has been prepared on the basis of

germination type and seedling morphology.

KEYWORDS: Seedling Morphology, Key, Macaranga Type, Lamiaceae.

INTRODUCTION

Lamiaceae include 252 genera and 6800 species. Many species of this family are economically important either for their essential oils or for use as spices. Phylogenetic relationships within Lamiales support a broad circumscription of this family, including many genera traditionally placed in Verbenaceae. Most systematists have restricted Lamiaceae to those species with more or less gynobasic styles, a circumscription resulting in a polyphyletic assemblage because gynobasic style has evolved more than twice.^[1]

Many morphological characters of seedlings are found suitable to distinguish the investigated genera and species at their juvenile stage. Seedling morphology should be taken into consideration in a comprehensive way to distinguish the genera and species and in solving taxonomic and phylogenetic implications. So to make the Verbenaceae and Lamiaceae more natural and monophyletic, juvenile data may be helpful for their better circumscription and delimitations. Seedling morphology have been utilized in the preparation of seedling flora by different workers.^[2-4] In all the taxa paracotyledons are thin, long, green, persistent and leaf like. These become free and spread in the air and have a photosynthetic function. This suggests that development type of seeding is macaranga type. In the present study 12 genera

of Lamiaceae and one species of Verbenaceae (*Lantana camara*) have been covered to document juvenile characteristics.

MATERIAL AND METHODS

The mature and ripen seeds of different species of Lamiaceae were collected from natural habitat in Saharanpur forest division, (U.P.) India and dried in the sun for one week. Morphological observations have been made with the help of hand-lens, dissecting and compound microscope. For correct identification, seedlings were collected from natural habitat and were compared and identified with the help of seedling raised from identified seeds. For the morphological observations of seedling, seeds were sown in the garden soil at a depth of 0.5 cm. Protruded seedlings were studied up to the 5th true leaf stage. In the present study morphological features of the seedlings have been described according to the terminology given in several elaborated works.^[1, 2, 5] Besides, deeds on seedling morphology of several other authors have been followed in this study.^[6-9] Day and date of appearance of leaves upto 5th true leaf stage were also recorded. Observations have been made on six seedlings of each species.

OBSERVATIONS AND KEY TO GENERA

- 1a. Paracotyledons obcordate to oblong with obtuse apex.....Group A.
1b. Paracotyledons cordate to ovate with acute apex.....Group B.

Group A

Paracotyledons obcordate to oblong with obtuse apex

- 1a. Paracotyledons 2, isocotylar, opposite, exstipulate, leafy, petiolate, persist upto fifth true leaf stage, petiole 0.2 cm, blade 0.4×0.4 cm, oblong, reticulate venation with 9 (1+8) strands.....*Ajuga*
- 1b. Paracotyledons 2, isocotylar, opposite, exstipulate, leafy, petiolate, persist upto third to fourth or sometimes fifth true leaf stage, petiole 0.2 to 0.4 cm, blade vary
- 2a. Paracotyledons petiole 0.2 cm, blade 0.6×0.4 cm, first true leaf elliptical, 3.1×2.1 cm, margin serrate, hairy.....*Leonotis*
- 2b. Paracotyledons petiole 0.3 cm, blade 0.5×0.4 cm, first true leaf oblanceolate, 4.2×1.2 cm, margin serrate, hairy.....*Leucas*

Group B

Paracotyledons cordate to ovate with acute apex

1a. Paracotyledons and (or) first leaf and (or) higher leaves present

2a. Paracotyledons 2, isocotylar, opposite, exstipulate, leafy, petiolate, persist upto third to fourth or sometime fifth true leaf stage, petiole 0.9 cm, blade 0.4×0.1 cm elliptical, fleshy, reddish- green, hypocotyl straight or slightly curved..... **Ocimum**

2a. Paracotyledons 2, isocotylar, opposite, exstipulate, leafy, petiolate, persist upto third to fourth or sometime fifth true leaf stage, petiole upto 0.5 cm, blade upto 0.7×0.5 cm hypocotyl straight or slightly curved or curved, smooth sometimes hairy

3a. Paracotyledons petiole 0.2 cm, blade cordate 0.4×0.4 cm, epicotyl length at first true leaf stage 0.7 cm, hypocotyl smooth.....**Anisomeles**

3b. Paracotyledons petiole 0.2 cm to 0.5 cm, blade cordate to obcordate or oblong-ovate, epicotyl length at first true leaf stage vary, hypocotyl smooth or hairy

4a. Epicotyl 0.4 cm at first true leaf stage, paracotyledons petiole green, 0.4 cm, blade 0.4×0.4 cm, hypocotyl whitish- green, smooth or sometimes hairy.....**Nepeta**

4b. Epicotyl upto 0.5 cm at first true leaf stage, paracotyledons petiole green, length otherwise, blade vary, hypocotyl vary, first true leaf lanceolate or linear- lanceolate or ovate or oblong- elliptic

5a. First true leaf ovate, petiole 0.8 cm, blade 3.4×0.9 cm, epicotyl 0.5 cm collet white- opaque.....**Roylea**

5b. First true leaf vary, petiole upto 0.5 cm, blade upto 4.0×2.0 cm, collet otherwise

6a. Paracotyledons persist upto second true leaf stage, hypocotyl green- purple, slightly curved, collet white- opaque, first true leaf ovate- oblong, petiole 0.4 cm, blade 4.0×2.0 cm.....**Eremostachys**

6b. Paracotyledons persist upto first or sometimes second true leaf stage, hypocotyl curved or slightly curved, greenish- purple, collet otherwise

7a. Hypocotyl curved, epicotyl green, hairy, 0.1 cm at first true leaf stage, root length 1.5 cm at paracotyledons stage, venation hexagonal cyclic reticula.....**Salvia**

7b. Hypocotyl slightly curved, green-purple, epicotyl white-purple, smooth, epicotyl length otherwise, venation hexagonal non cyclic reticulate, root length vary

8a. Epicotyl white- purple, 0.4 cm at first true leaf stage, hypocotyl 0.9 cm at paracotyledons stage, root length 3.2 at paracotyledons stage.....**Perilla**

8b. Epicotyl white- purple, 2.0 cm to 2.2 cm at first true leaf stage, hypocotyl 3.5 cm to 3.7 cm at paracotyledon stage, root length 6.2 cm to 6.4 cm at paracotyledon stage

9a. Petiole of true leaf hairy, epicotyl length at third true leaf stage 3.4 cm, root length 6.2 cm at paracotyledon stage.....*Scutellaria*

9b. Petiole of true leaf smooth, epicotyl length at third true leaf stage 2.7 cm, root length 6.4 cm at paracotyledon stage.....*Coleus*

1b. Paracotyledons and (or) first true leaf and (or) higher leaves present or absent; germination hard; primary roots non- fibrous, branched, secondary many, root length 2.9 cm at seed leaf stage.....*Lantana*

CONCLUSION AND DISCUSSION

Many morphological characters of seedlings are found suitable to distinguish genera and species at their juvenile stage. Therefore seedling morphology should be taken into consideration in a comprehensive way to distinguish the genera and species in solving taxonomic and phylogenetic implications. So to make the Verbenaceae and Lamiaceae more natural and monophyletic, juvenile data may be helpful for their better circumscription and delimitations. Seedling morphology investigations made reveal that group A (*Ajuga*, *Leonotis*, *Leucas*) have obcordate-oblong paracotyledons with obtuse apex and group B includes *Anisomeles*, *Nepeta*, *Ocimum*, *Roylea*, *Salvia*, *Coleus*, *Eremostachys*, *Perilla*, *Scutellaria*. It is characterized by cordate or ovate with acute apex paracotyledons. Thus, these findings suggest that Lamiaceae is composed of two groups.

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