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Morphological comparison of three different *Alternanthera* species found in Udupi

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Abstract
Alternanthera belongs to genus of flowering plants in the family of Amaranthaceae. There are 80-200 species under the genus *Alternanthera.* In the present study three different species of *Alternanthera* that found in Udupi district are compared for its similarities and variation in their morphological characters. The three species *A. brasiliana* (L.) Kuntze, *A. ficoidea* (L.), *A. sessilis* (L.) R.Br.ex DC shows differences in there morphological features and ecological variations. For morphological analysis the species are collected from SDM College of Ayurveda campus and different areas of Udupi. Plants were identified using the regional flora and the morphological analysis was carried out by using observation and measuring technique. The study revealed some of the similarities among the three species of *Alternanthera* and some variations from species to species.

Keywords: alternanthera, morphology, ecological variations, Udupi

Introduction
The process of standization of a crude drug for its quality, purity are done by various parameters like morphological, microscopical, physical, chemical, and biological observations [1]. The morphological classification of a crude drug is divided into organized and unorganized. The organized refers to the direct part of the plant and are divided into leaves, bark wood, root, rhizome, seed, fruit, flower, stem, hair and fibres [2]. These botanical identities of plants are mentioned in various pharmacopoeia of indigenous system of medicine. There are numerous plants for which the plant source is not yet identified scientifically [3]. The morphological characters and the taxonomic characters of plant play a vital role in the determination of a particular plant species.
The term Amaranthaceae refers to Amaranthus where plants of this family are annual or short lived perennial plants. The term *Alternanthera* refers to the stamens being alternately fertile and barren [5]. There are around 165genera and 2,040 species. Some plant species of Amaranthace family are cultivated as leafy vegetables, pseudo cereals, ornamental and few as weed in the garden. The family of Amaranthacae refers to cosmopolitan as the plants species habitat ranges from tropics to the cool temperate regions [4]. It belongs to genus of flowering plants in the family of Amaranthaceae. The plants of this genus are widespread with most species occurring in the tropical Americas and others in Asia, Africa and Australia. Number of species under *Alternanthera* ranges between 80 to 200. Some species are cultivated as ornamentals while many others are weed, these plants are often forming a dense mat over the ground. Several species are notorious weeds like *A. sessilis, A .philoxerodies, A. triandra*. The genus *Alternanthera* contains both terrestrial and aquatic species [6]. Few of the plant species of Alternanthera genus are having medicinal properties and are extensively used by the traditional practitioners and few plants are used as a vegetable. In the present study a comparison is done on the basis of morphological characters *A. ficoidea, A. sessilis, A. brasiliana,* using the regional flora [7] where plant species where is shows some variations in morphological characters that which helps us to identification of particular plant species.

Materials and Methods
The species of *Alternanthera* such as *A. ficoidea, A. sessilis, A. brasiliana* shows ecological varations. For the morphological analysis, plant was collected from SDM college of Ayurveda campus and other parts of UDUPI. Plant specimens were identified by using regional flora.

Observations and Discussion
The present study deals with analysis of morphological features of three different species of *Alternanthera*. The differences among these three species of *Alternanthera* help us in identification of the plant and also to assess its taxonomical position for the future analysis.
The selected plant species was analysed for its morphological characters like habitat, habit, roots, nature of the stem, shape of leaf, length of the leaf, shape of leaf apex, petiole, type of inflorescence, flowering season, number of seeds, number of stamens, fruit and type of cultivation. The habitat of the all three species remains same as all are considered as weed where as *A. sessilis* is common only in the moist places like near water tanks, ponds, lake. The colour stem is different in *A. brasiliana* as it is reddish, hairy and the leaf colour is also metallic wine red above and purple beneath. *A. sessilis* is considered as *Matsyakshi* in the Ayurvedic classics and mentions about its properties, its usages in various diseases.

Table 1: Morphological variations in three different Alternanthera species

Characters observed	*Alternanthera ficoidea* (L.)	*Alternanthera sessilis* (L.)R.Br.ex DC	*Alternanthera brasiliana* (L.)
Habitat	As weed in open areas	moist places and weed in gardens	Cultivated in gardens and as weed on roadsides.
Habit	Prostrate herb with extensive diffuse branches	diffuse or prostrate, glabrescent herb	Herbaceous, perennial plant
Roots	Rooting at nodes with two lines of root hairs	Appear at nodes creeping on the ground	Rooting at nodes
Nature &Colour of stem	Cylindrical, slightly ridged, branched, solid and green in colour	Weak, slender, sub quadangular, greenish in colur when fresh	Reddish, hairy
Shape of entire leaf	Elliptic to oblong	lanceolate, oblanceolate or linear-oblong	Elliptic
Length of leaf (cm)	4.5cm	5cm, sometimes upto 10cm	13cm
Breadth of leaf (cm)	2cm	1cm, sometimes upto to 2cm	6cm
Shape of leaf apex	Acute	obtuse or acute at apex	Acuminate
Shape of leaf margin	Entire	Entire	Entire
Shape of leaf base	Cuneate	cuneate	Cuneate
Colour of leaf	Green	Green	Metallic wine red above, purple beneath
Petiole	Narrowed towards a indistinct petiole	Indistinct, short or absent	Indistinct, short
Nature of inflorescence	Head 1-5 sessile, axillary, ovoid	Heads 1-3 sessile axillary	Pedunculate globose white Heads
Perianth	Lanceolate, hairy outer 3nerved from base, 4mm long	Subequal, glabrous,2mm long, 1-nerved	Ovate –lanceolate, 4mmlong, 3-nerved, hairy
Number of stamens	5	3	5
Flowering season	Throughout the year	Throughout the year.	Throughout the year
Number of seeds	One	One	One
Fruits	Utricle obcordate Cordate-orbicular	Utricles obovoid	Utricle orbicular
Cultivation	Seed and cuttings	Seed and cuttings	Seed and cuttings

Fig 1: Showing leafs of *Alternanthera sessilis*

Fig 2: *Alternanthera brasiliana*

Fig 3: *Alternanthera ficodea*

Conclusion

Certain characters among the selected *Alternanthera* species had similar characters and few varations in characters from species to species. Even through the all the three species belong to *Alternanathera*, there difference in their morphology character like the nature, colour of stem, colour of leaf of *A. brasiliana* is different to that of *A. ficodea* and *A. sessilis*. The stamens in *A. sessilis* less when compared to *A. ficodea* and *A. brasiliana*. Some of the characters like habitat, leaf shage, leaf margin are similar characters in all the species.

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