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DISTRIBUTION AND DIVERSITY OF VARIOUS TYPES OF TRICHOMES IN CERTAIN SPECIES OF *LEUCAS* R.Br.

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ABSTRACT:

The taxonomic value of trichome and its systematic and phylogenetic relationships are well known. The present study is an attempt to document the different types of trichome and their distribution in certain species of *Leucas* R.Br. Fresh plant specimens were collected from different locations of Kerala, and micro-preparations of trichomes from leaves as well as stem peelings were observed. The surface of all species of *Leucas* studied was entirely covered by trichome. All the trichomes are uniseriate in nature while the number of cells may vary to uni, bi, or multicellular. All trichomes possess pointed apex. *L.aspera* possess two types of trichomes; non-glandular, uniseriate, 1-3 celled in abundance and glandular, 2-5 celled stalk with rounded tip in scanty. Remarkable variation exists with respect to the length of the trichome in different species of *Leucas*. The smallest trichome was observed in *Leucas linifolia*. The present study indicated that there exist diversity in both distribution and morphology of trichomes in species of *Leucas*.

KEY WORD: *Trichome, Leucas, Lamiaceae, Kerala.*

INTRODUCTION:

Trichomes are the hair like outgrowth of the plants epidermis which is often found on the stems, leaves and reproductive organs of numerous plant species. They possess variety of characteristics and serve different functions. Trichome varies considerably with respect to its morphology, location, function and types even in same plants or within species. The taxonomic value of trichome and its systematic and phylogenetic relationships are well known with respect to Lamiaceae while the distinctive trichome characteristics in Lamiaceae especially in *Leucas* are scattered and scanty (Girish, *et al.*, 2010). They reported abundant glandular and few non-glandular trichomes in lamina and sessile glandular trichomes with broad base and 3 to 4 celled head in the stem of *Leucas cephalotes*. The present study is an attempt to document the different types of trichome and their distribution in certain species of *Leucas* R.Br.

MATERIALS AND METHODS:

Fresh plant specimens were collected from different locations of Kerala (Table.1). Micro-preparations of trichomes from leaves as well as stem peelings were observed on Olympus trinocular research microscope (Biolux-CXT-II). Micro photographs of trichome were taken in Leica dm 500. Basic terminology used in trichome classification and description is that suggested by Harris and Harris (2001). All voucher specimens of the plant species are deposited at the Herbarium of P.G Department of Botany, Devamatha College, Kuravilangad.

Table 1: Description and collection sites of *Leucas*

PLANT SPECIES	LOCATION	DISTRICT	HABIT
<i>Leucas martinicensis</i> , R. Br.	Attapady	Palakkad	Erect herb
<i>Leucas linifolia</i> , Spreng.	Pookkottu lake	Wayanad	Erect herb
<i>Leucas zeylanica</i> , R. Br.	Vandanam	Alappuzha	Herb
<i>Leucas aspera</i> , Spreng.	Asramam	Kollam	Herb
<i>Leucas chinensis</i> , R. Br.	Marayur	Idukki	Scandent herb
<i>Leucas angularis</i> , Benth.	Munnar-Top station	Idukki	Prostrate herb
<i>Leucas vestita</i> , Benth.	Mannavanchola	Idukki	Herb
<i>Leucas ciliata</i> , Benth.	Mannavanchola	Idukki	Scandent herb
<i>Leucas hirta</i> , Spr.	Ponmudy	Trivandrum	Prostrate herb

RESULTS AND DISCUSSION:

The surface of all species of *Leucas* studied was entirely covered by trichome. Categorized list of species studied along with the type of trichome presented in Table 2, 3 and 4. Except in *Leucas zeylanica*, R. Br. all other species possess non-glandular trichome while in *Lucas zeylanica*, R. Br. glandular trichomes were observed. All the trichomes are uniseriate in nature while the number of cells may vary. It may be uni, bi, or multicellular in nature. All trichomes possess pointed apex. The presence of abundant glandular and few non-glandular trichomes in the leaves of *Leucas cephalotes* was described by Girish *et al.*, (2010). They reported that simple uniseriate 2-3 celled trichomes with pointed apex are plenty on lower surface of the leaves. The glandular trichomes are stalked with 2-4 cells or sessile with a unicell head. In the present study is in agreement with trichome morphology described by Girish *et al.*, (2010). Singh (2001) reported *L.aspera* possess two types of trichomes; non-glandular, uniseriate, 1-3 celled in abundance and non-glandular, 2-5 celled stalk with rounded tip in scanty. In the present study irrespective of the species variation all *Leucas* possess non-glandular trichome. The non-glandular trichome is protective in function by covering the layer of epidermis in response to environmental changes. These non-glandular trichomes are considered to shield the stoma and oil glands from intensive heat during the dry and hot season as they had shown high distribution and surrounded the stomata (Fahn

1986). Remarkable variation exists with respect to the length of the trichome in different species of *Leucas*. The smallest trichome was observed in *Leucas linifolia*, Spreng. (157.75µm) while the largest was observed in *Leucas vestita*, Benth. (796.33µm). Previous studies have indicated that phytohormones interfere with trichome size (Maes *et al.*, 2008). The variation in size of trichome may attribute to the amount of solar radiations a plant recorded (Brewer and Smith 1997). The present study is a documentation of trichome types in the stem and leaf of nine species of *Leucas*. The study indicated that there exist diversity in both distribution and morphology of trichomes in species of *Leucas*.

Table 2: Distribution of various types of trichomes in the stem of *Leucas* species

TAXA	TRICHOME TYPE						TOTAL NUMBER OF TYPES
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	
<i>Leucas martinicensis</i> , R. Br		*		**	***		3
<i>Leucas linifolia</i> , Spreng.		**		***			2
<i>Leucas zeylanica</i> , R. Br.				**	***	*	3
<i>Leucas aspera</i> Spreng.		**	**	***	**		4
<i>Leucas chinensis</i> , R. Br.			**		***		2
<i>Leucas angularis</i> , Benth.	**			**	***		3
<i>Leucas vestita</i> , Benth.			***		**		2
<i>Leucas ciliata</i> , Benth.		*		**	***		3
<i>Leucas hirta</i> , Spr.				***			1

Table 3: Distribution of various types of trichomes in the leaf of *Leucas* species

TAXA	TRICHOME TYPE						TOTAL NUMBER OF TYPES
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	
<i>Leucas martinicensis</i> , R. Br				***	**		2
<i>Leucas linifolia</i> , Spreng.	*	**	**	**			4
<i>Leucas zeylanica</i> , R. Br.		*		**	**	*	4
<i>Leucas aspera</i> , Spreng.	**	**	***	**			4
<i>Leucas chinensis</i> , R. Br.		*	**	**			3
<i>Leucas angularis</i> , Benth.	*			**	***		3
<i>Leucas vestita</i> , Benth.			***		**		2
<i>Leucas ciliata</i> , Benth.		*		**	***		3
<i>Leucas hirta</i> , Spr.		**		***			2

*Low; **Medium; ***High

T₁ Non-glandular unicellular short trichome; T₂ Non-glandular unicellular long trichome

T₃ Non-glandular bicellular short trichome; T₄ Non-glandular bicellular long trichome

T₅ Non-glandular multicellular trichome; T₆ Glandular unicelled trichome

Table 4: Diversity of trichome in *Leucas* species

Description	Distribution
Non-glandular, uniseriate, unicellular, short trichome	Few on the stem of <i>L. angularis</i> and also well distributed on both abaxial and adaxial leaf surfaces of <i>L. linifolia</i> , <i>L. aspera</i> , and <i>L. angularis</i>
Non-glandular, uniseriate, unicellular, long trichome	Few observed on the stem of <i>L. martinicensis</i> , <i>L. linifolia</i> , <i>L. aspera</i> and <i>L. ciliata</i> . Present few on both abaxial and adaxial leaf surfaces of <i>L. linifolia</i> , <i>L. zeylanica</i> , <i>L. aspera</i> , <i>L. chinensis</i> , <i>L. ciliata</i> and <i>L. hirta</i>
Non-glandular, uniseriate, bicellular, short trichome	Distributed few on the stem of <i>L. aspera</i> , <i>L. chinensis</i> , and well distributed at <i>L. vestita</i> . And also on the abaxial and adaxial leaf surfaces of <i>L. linifolia</i> , <i>L. aspera</i> , <i>L. chinensis</i> and <i>L. vestita</i>
Non-glandular, uniseriate, bicellular, long trichome	Well distributed on the stem of <i>L. martinicensis</i> , <i>L. linifolia</i> , <i>L. zeylanica</i> , <i>L. aspera</i> , <i>L. angularis</i> , <i>L. ciliata</i> and <i>L. hirta</i> . Also well distributed on both abaxial and adaxial leaf surfaces of <i>L. martinicensis</i> , <i>L. linifolia</i> , <i>L. zeylanica</i> , <i>L. aspera</i> , <i>L. chinensis</i> , <i>L. angularis</i> , <i>L. ciliata</i> and <i>L. hirta</i> .
Non-glandular, multicellular trichome	Well distributed on the stem of <i>L. martinicensis</i> , <i>L. zeylanica</i> , <i>L. aspera</i> , <i>L. chinensis</i> , <i>L. angularis</i> , <i>L. vestita</i> and <i>L. ciliata</i> . Also well distributed on both abaxial and adaxial leaf surfaces of <i>L. martinicensis</i> , <i>L. zeylanica</i> , <i>L. angularis</i> , <i>L. vestita</i> , and <i>L. ciliata</i>
Glandular unicelled trichome	Exclusively observed in <i>L. zeylanica</i>

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