



## COMPARATIVE STOMATAL STUDIES IN TWO ECOTYPES OF *ALLIUM HOOKERI* THWAITES.

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**Abstract:** The two Ecotypes of *Allium hookeri* Thwaites were collected from two different agro-climatic zones of Jharkhand for comparative stomatal studies. For stomatal studies leaf is divided into three parts and peeling was done with the help of razor. Peeled material were stained in safranin and mounted in glycerin. Then stomatal index as well as stomatal length and width were calculated by using ocular micrometer. The maximum length ( $50.0 \pm 1.73 \mu$ ) was observed in apex portion of the abaxial surface of Ecotype-II and the minimum length ( $36.3 \pm 0.39 \mu$ ) was observed in the abaxial surface of the basal portion of the ecotype-I. The maximum width size ( $18.4 \pm 0.84 \mu$ ) was observed in the middle portion of the abaxial surface of ecotype -II and the minimum width was ( $12.09 \pm 0.74 \mu$ ) at the apex portion of the adaxial surface of ecotype-I. Stomatal index ( $16.07 \pm 1.16$ ) which was maximum in the adaxial surface of the Ecotype-II and minimum in the basal portion of the adaxial surface of ecotype-I ( $7.21 \pm 0.67$ ). Through this investigation it must be concluded that anomocytic type of stomata is present in both the ecotypes. However there are some differences in the stomatal index, length and width of stomata. Stomatal study is helpful in understanding the biosystematic studies.

**Index Terms-** *Allium hookeri*, Stomatal index, Anomocytic, Ecotype, Biosystematic.

### I. INTRODUCTION

*Allium hookeri* Thwaites is a wild herb belongs to amaryllidaceae family (APG IV) is a bulbous, evergreen, perennial and herbaceous plants having many medicinal properties such as it exhibits anti-inflammatory, anti-microbial, anti-obesity, anti-diabetic and anti-carcinogenic activities etc. (Lee et al, 2018). It is widely distributed in the northern hemisphere, North America, North Africa, Europe and Asia. In India it is basically found in the north eastern region especially in the state of Manipur having variation in different climatic zone. Commonly, it is known as hooker's chives and locally called as van lahsun. Stomatal characters are helpful in biosystematic studies as it play an important role in controlling

photosynthesis and transpiration which is most crucial physiological processes of the plant life. Every species has different stomata having different shape, size and distribution which affects the functional efficiency of the plants that are genetically controlled (Miller, 1938). This investigation deals with the stomatal studies of the selected ecotypes of *Allium hookeri* Thwaites.

## II. MATERIAL AND METHODS

Both the ecotypes were collected from two different agro-climatic regions of Jharkhand i.e. from Ranchi and Godda. For stomatal studies young and healthy leaves were selected. The leaves were divided into apex, middle and basal portion of both the abaxial and adaxial surface of the leaves. Mechanical peeling was done with the help of sharp razor. Peeled materials were first stained in 1% aqueous safranin solution (Nalawade & Gurav, 2017) and mounted in 5% glycerine (Awasthi et al, 1984). Stomatal index, length and width of the stomata were calculated by ocular micrometer. Calculation of Stomatal index (Salisbury, 1927) was done using following formula:

$$S.I = \frac{S}{E+S} \times 100$$

Where,

S.I = Stomatal index

S = Number of Stomata per unit area

E = Number of epidermal cells in the same unit

## III. RESULT

Data for stomatal studies are depicted in table (1) and in fig (1- 6). Stomatal index and stomatal size of the two ecotypes of *Allium hookeri* Thwaites were calculated. The measurement of abaxial and adaxial surface of leaves at the apex, middle and base were observed. The maximum length ( $50.0 \pm 1.73 \mu$ ) was observed in apex portion of the abaxial surface of Ecotype-II and the minimum length ( $36.3 \pm 0.39 \mu$ ) was observed in the abaxial surface of the basal portion of the Ecotype-I. The maximum width size ( $18.4 \pm 0.84 \mu$ ) was observed in the middle portion of the abaxial surface of ecotype-II and the minimum width was ( $12.09 \pm 0.74 \mu$ ) at the apex portion of the adaxial surface of ecotype-I. Stomatal index ( $16.07 \pm 1.16$ ) which was maximum in the adaxial surface of the Ecotype-II and minimum ( $7.21 \pm 0.67$ ) in the basal portion of the adaxial surface of ecotype-I.

## IV. DISCUSSION

Anomocytic type of stomata was reported in the above species (Stebbins & Khush, 1961). Stomatal characters are used as an important tool in distinguishing medicinal plant (Johr A, 2013). Stomatal function is important in controlling physiological process such as photosynthesis and transpiration.

Stomatal size, distribution, density, morphology and behavior are closely associated with transpiration and are helpful in selecting drought resistant genotypes (Lakra and Kumar 2017). It has been reported from various literature that no work has been done on this species till date.

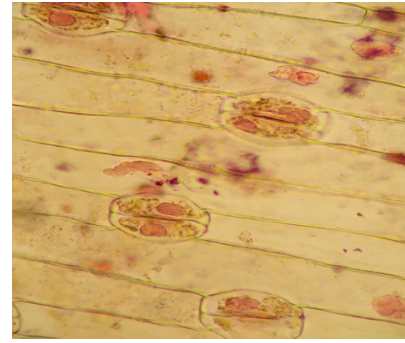


Fig : 1 Ecotype-1 Plant

Fig : 2 Ecotype -1 Stomata

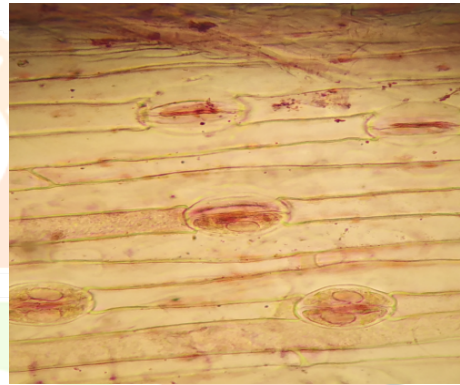


Fig : 3 Ecotype- 2 Plant

Fig : 4 Ecotype – 2 Stomata

Table 1: Stomatal index (%), Length and Width of stomata (in  $\mu$ ) in Abaxial and Adaxial surface of leaves of the two Ecotypes of *Allium hookeri* Thwaites.

Surface of Leaves	Ecotypes	Apex portion of Leaf			Middle portion of Leaf			Base portion of leaf		
		S. I.	Length ( $\mu$ )	Width ( $\mu$ )	S. I.	Length ( $\mu$ )	Width ( $\mu$ )	S. I.	Length ( $\mu$ )	Width ( $\mu$ )
Abaxial Surface	I	8.10	39.3	15.2	10.11	42.3	13.02	9.07	36.3	14.02
		±	±	±	±	±	±	±	±	±
	0.59	0.40	0.40	0.33	0.42	0.94	0.56	0.39	1.2	
	II	10.02	50	15.6	13.02	48.8	18.4	12.05	47.6	16.8
±		±	±	±	±	±	±	±	±	
Adaxial Surface	I	7.86	40.38	12.09	9.49	38.01	13.44	7.21	36.32	12.96
		±	±	±	±	±	±	±	±	±
	0.43	0.50	0.74	0.89	0.36	3.06	0.67	0.33	0.30	
	II	10.02	49.2	16.8	12.01	48.4	18	16.07	46	15.2
		±	±	±	±	±	±	±	±	±

		±	±	±	±	±	±	±	±	±
		0.81	1.97	0.76	1.16	1.75	1.02	1.16	1.42	0.76

Fig. 5 Column graph showing the stomatal index of Apex, Middle and Basal portion of Ecotype 1 &2 of *Allium hookeri* Thwaites.

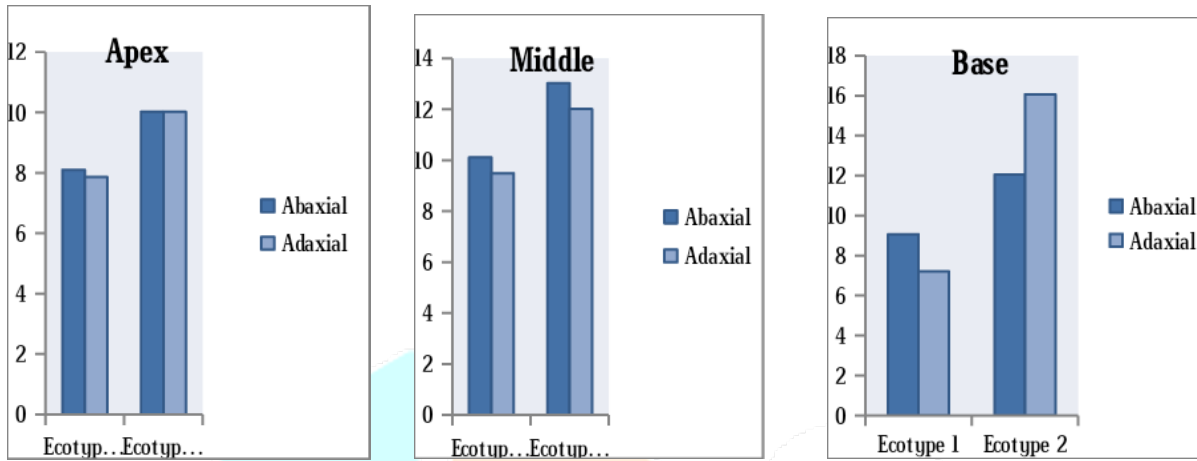
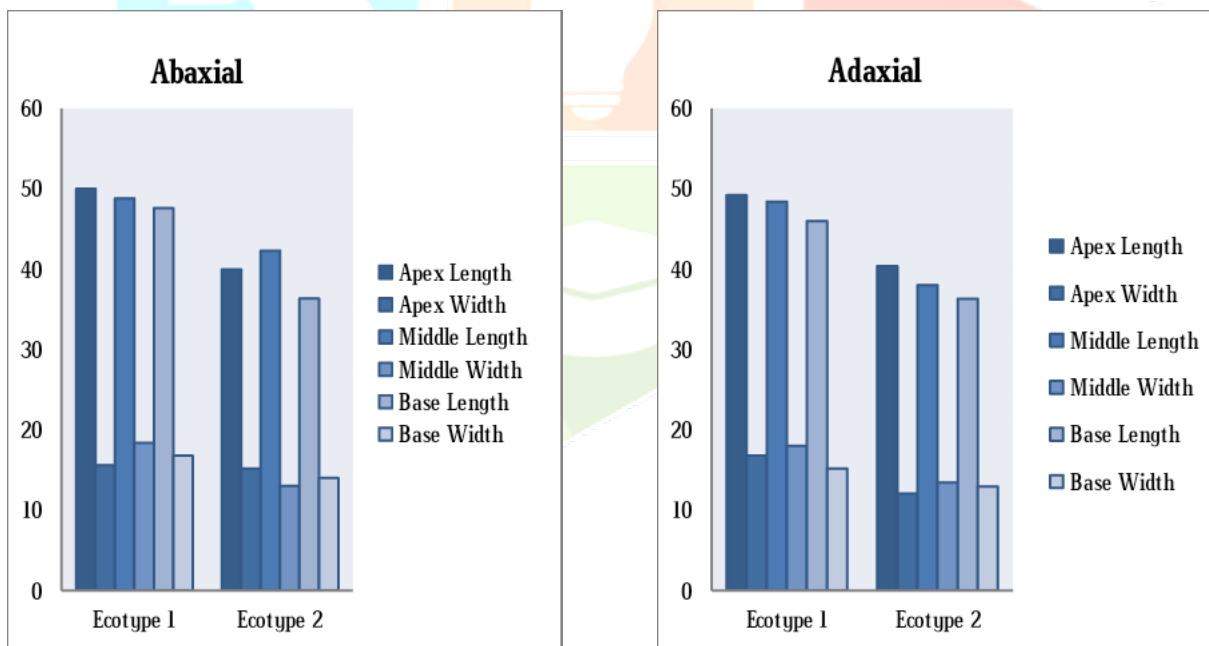


Fig. 6: Column graph showing the Stomatal length and width ( $\mu$ ) of Ecotype 1&2 of *Allium hookeri* Thwaites.



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