

Comparative study of stomatal index of some folk herbal plants used in birth control

SHEETAL SHAMA MINZ AND KUNUL KANDIR

ABSTRACT

The present investigation deals with the comparative study of stomatal index of some ethnomedicinal plants. Commonly the stomata are found on both surfaces of leaves. The most important function of stomata is gaseous exchange. The determination of stomatal index of ethnomedicinal plants like *Lawsonia inermis*, *Moringa olifera*, *Bauhinia purpurea* etc. are used in Birth Control.

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Key words : Stomatal index, Stomata, Epidermal cell

INTRODUCTION

Stomata is a minute epidermal opening with a central pore and two kidney shaped cells containing chloroplast known as guard cells. The stomata are commonly found in the leaf surface. In upper surface of leaves, the number of stomata is less than lower surface.

The primary and most important functions of stomata is gaseous exchange and secondary function is transpiration. The distribution of stomata on upper and lower surface of leaves shows great variation.

After counting the stomata and epidermal cells, the stomatal index is determined. Stomatal index is the percentage of total numbers of stomata with total number of epidermal cells around the stomata in a unit area of leaf, it can be calculated by the following formula.

$$\begin{aligned} \text{S.I.} &= \frac{S}{E + S} \times 100 \\ \text{S.I.} &= \text{Stomatal index} \\ S &= \text{No. of stomata per unit area} \\ E &= \text{No. of epidermal cells in the same area} \end{aligned}$$

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MATERIALS AND METHODS

Lawsonia inermis, *Moringa olifera*, *Bauhinia purpurea* leaves were collected from Dipu Toly, Ranchi, in March – April 2010. These plants were identified with the help of Botany of Bihar and Orissa Vol. I, II and III (Haines; 1921) which are maintained in the University Department of Botany, Ranchi University, Ranchi (Jain and Rao; 1978).

RESULTS AND DISCUSSION

The findings of the study have been discussed in detail as under:

Following plants were investigated :

The investigation of these plants showed that the stomatal index of *Bauhinia purpurea* was more and less in *Moringa olifera* (Table 6 and Fig 1). Different parameters were used in this study. Many research work and have been done in this field. The medicinal plants of polygonaceae family have been studied by different scientists (Hammed *et al.*, 2008). Stomatal frequency maturity and index on developing bracts of four abscisic acid mutant and wild type plants of *Arabidopsis thaliana* was also studied in different parts of country (Razem and Davis, 2002). The relationship of stomatal density and index was studied in different areas (Elwain *et al.*, 1995). The

Table 1: Stomatal index of <i>Lawsonia inermis</i> Linn. (Lower surface)			
No. of Obs.	No. of stomata per unit area	No. of epidermal cells per unit area	S.I.=S/E+S X 100
1.	80	130	
2.	78	110	
3.	76	120	
4.	82	100	
5.	84	120	
6.	75	132	
7.	74	135	S.I. = 38.65%
8.	80	140	
9.	83	138	
10.	82	135	
	Total = 794	Total = 1260	
	Avg. = 79.4	Avg. = 12.6	

Table 2 : Stomatal index of <i>Moringa oliefera</i> Linn. (Lower surface)			
No. of Obs.	No. of stomata per unit area	No. of epidermal cells per unit area	S.I.=S/E+S X 100
1.	80	350	
2.	75	380	
3.	75	360	
4.	76	365	
5.	79	370	
6.	78	375	
7.	80	380	S.I. = 17.17%
8.	74	375	
9.	75	378	
10.	78	380	
	Total = 770	Total = 3713	
	Avg. = 77	Avg. = 371.3	

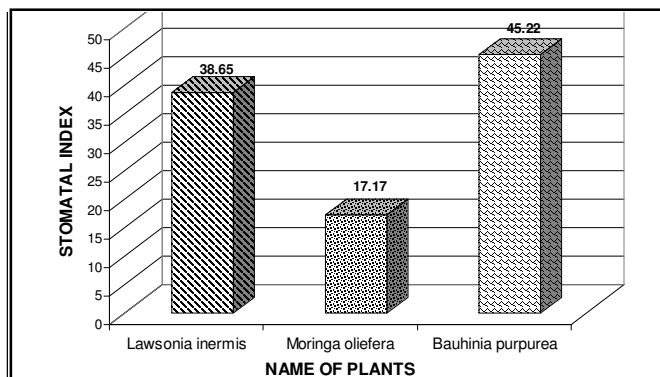
Table 3 : Stomatal index of <i>Bauhinia purpurea</i> Linn. (Lower surface)			
No. of Obs.	No. of stomata per unit area	No. of epidermal cells per unit area	S.I.=S/E+S X 100
1.		350	450
2.		355	440
3.		360	455
4.		365	460
5.		370	445
6.		372	450
7.		380	455
8.		390	460
9.		400	445
10.		390	460
	Total = 3732	Total = 4520	S.I. = 45.22%
	Avg. = 373.2	Avg. = 452	

Table 4 : Statistical analysis of plants by given data <i>Lawsonia inermis</i> Linn.									
No. of stomata	Freq.	Mean	Median	Mode	No. of Epidermal cell	Freq.	Mean	Median	Mode
74.	1				100	1			
75.	1				110	1			
76.	1				120	2			
78.	1				130	1			
80.	2	79	79	79	132	1	125.6	131	141.8
82.	2				135	2			
83.	1				138	1			
84.	1				140	1			

Table 5 : <i>Moringa oliefera</i> Linn									
No. of stomata	Freq.	Mean	Median	Mode	No. of epidermal cell	Freq.	Mean	Median	Mode
74	1				350	1			
75	3				360	1			
76	1				365	1			
78	2	77	77	75	370	1	368.28	370	373.44
79	1				375	2			
80	2				378	1			
					380	2			

Table 6 : *Bauhinia purpurea* Linn

No. of stomata	Freq.	Mean	Median	Mode	No. of epidermal cell	Freq.	Mean	Median	Mode
350	1				440	1			
355	1				445	2			
360	1				450	2			
365	1				455	2	450	450	460
370	1	371.33	370	390	460	3			
372	1								
380	1								
390	2								
400	1								

**Fig. 1 : Graphical representation of stomatal index**

types of stomata was also studied in different parts of the country (Cothem, 2008). The stomatal study of the plants are used in the classification of plants. The statistical analysis also play an important role in the field of taexonomy.

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