

## Stomatal Density and Growth of Custard Apple (*Annona squamosa* L.) in Arid Region

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Custard apple (*Annona squamosa* L.) is found to be naturally grown in hilly areas of Aravalli hills, Nimbaheera and Chittorgarh, exhibiting variation in growth attributes. For predicting the growth potential of various plants, a number of parameters like original tree vigour, stem and root anatomy (Beakbane & Thompson 1947), respiration rates (Miller *et al.* 1961) etc. have been studied in detail which are tedious methods. Therefore, quicker method of forecasting the vigour of a plant is desirable. Chaklader (1967) found a good correlation between the frequency of stomatal distribution and vigour of mango plant. Keeping the above points in view, an attempt was made to classify six cultivars into dif-

ferent vigour groups on the basis of variation in number of stomata and size. This may be useful in predicting the growth of different varieties in breeding programme.

The leaf samples were collected from 5 year old plants from six cultivars namely *Red sitaphal*, *Atemoya*, *Balanagar*, *Chittorgarh local*, *Island Jem* and *Washington-PI 107005* in 1989. The fifth leaf from the tip of a branch was sampled. The impression of stomata was taken by spreading a thin layer of thermocol solution in xylene (Beakbane & Majumdar 1975). The stomata were counted microscopically in 10 fields replicated 5 times. The

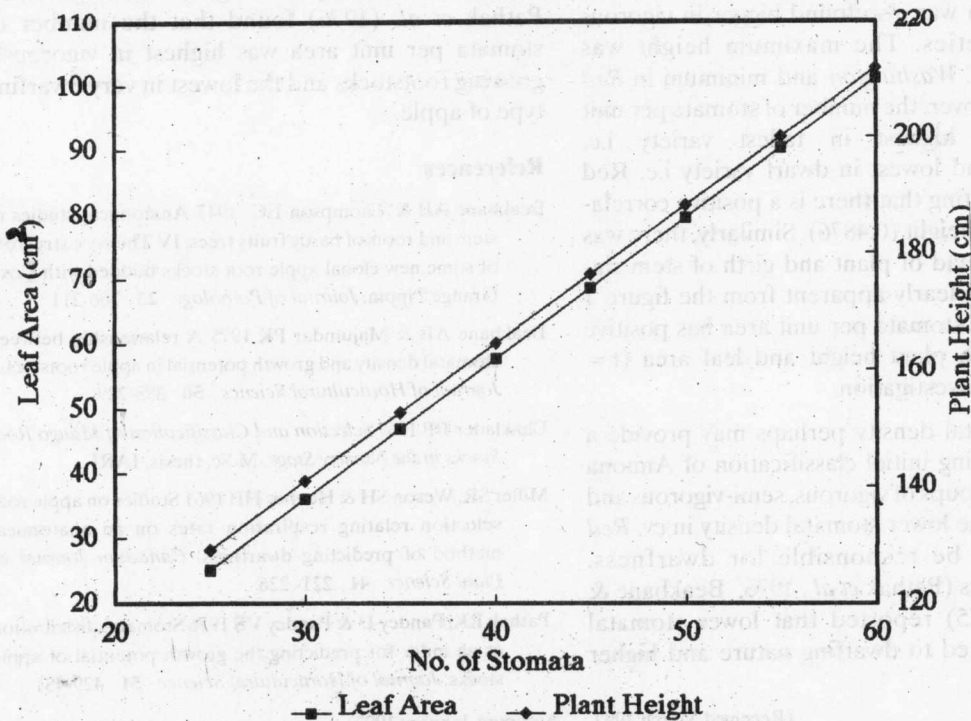


Fig 1 Correlation between number of stomata and plant height and leaf area in Annonas

**Table 1** Stomatal count, size of stomata and growth of *Annona* cultivars

Cultivar	Number of stomata cm <sup>-2</sup>	Size of stomata ( $\mu$ )		Height of plant (m)	Spread		Girth of stem (cm)	Leaf area (cm <sup>2</sup> )
		Length	Breadth		N S (m)	E W (m)		
Red sitaphal	27623	17.1	8.5	1.2	1.1	1.2	2.9	21.5
Atemoya	33121	15.7	7.1	1.5	1.4	1.4	3.2	44.7
Balanagar	43182	15.7	11.4	1.6	1.5	1.5	3.2	78.6
Chittorgarh local	32252	15.7	8.5	1.3	1.2	1.2	2.8	32.1
Island jem	38663	19.9	5.7	1.5	1.5	1.5	3.2	45.3
Washington PI 107005	45185	15.7	8.5	2.0	1.6	1.9	3.3	80.1
SE m $\pm$	2.90	—	—	0.13	0.18	0.18	0.35	0.91
CD at 5%	8.57	—	—	0.39	0.55	0.54	1.05	2.70

growth parameters viz. height, spread, girth of stem and leaf area were recorded.

The stomatal density cm<sup>-2</sup> varied from 27623 to 45185 in different cultivars of annonas (Table 1). The highest number of stomata was found in cv. *Washington* followed by *Balanagar*, *Island Jem* and other varieties which was significantly superior over *Red sitaphal* having lowest number of stomata. The density of stomata was found to be correlated with height of the plant, spread (EW) and leaf area. The size of stomata was also found bigger in vigorous growing varieties. The maximum height was recorded in cv. *Washington* and minimum in *Red sitaphal*. Moreover, the number of stomata per unit leaf area was highest in tallest variety i.e. *Washington* and lowest in dwarf variety i.e. *Red sitaphal*, indicating that there is a positive correlation with plant height (0.4876). Similarly, there was increase in spread of plant and girth of stem significantly. It is clearly apparent from the figure 1 that number of stomata per unit area has positive correlation with plant height and leaf area ( $r = 0.7965$ ) in this investigation.

The stomatal density perhaps may provide a means for making initial classification of *Annona* cultivars into groups of vigorous, semi-vigorous and dwarf types. The lower stomatal density in cv. *Red sitaphal* might be responsible for dwarfness. Various workers (Pathak *et al.* 1976, Beakbane & Majumdar 1975) reported that lower stomatal count was related to dwarfing nature and higher

stomatal count in vigorous types in apple. In the present study also, cv *Washington* is vigorous and tall followed by *Balanagar*. *Island Jem*, *Atemoya* and other varieties.

Correlation ( $r$  value) and regression equation of plant height, spread ( $r = 0.6095$ ) and leaf area indicated that these growth parameters are positively correlated with stomatal density. Chaklader (1967) also found a positive correlation between the stomatal density and vigour of mango trees. Pathak *et al.* (1976) found that the number of stomata per unit area was highest in vigorously growing rootstocks and the lowest in very dwarfing type of apple.

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