# A Note on Stomatal Studies in some Rice Varieties

Practically very few attempts have been made by research workers on the study of stomatal characters of rice varieties. Rajagopalan (1956) studied the arrangement, size and frequency of stomata on leaf lamina in two varieties of wet rice, nine varieties of dry rice, three types of wild rice, and one F4 drought resistant progeny of a cross between one of the wet rice and one of the wild rice types. The results showed that :—

i. the stomata are fewer in number on the upper epidermis than on the lower epidermis.

ii. the size of the stomata was found to increase from the first leaf to the third leaf whereas the frequency decreased.

iii. there was no significant difference in stomatal size between drought resistant, and drought susceptible varieties.

Data on size and frequency of stomata on leaf lamina, leaf sheath, and stem epidermis of seven varieties of *Oryza sativa* and five wild species of Oryza viz., *O perennis*, *O. officinalis*, *O, eichingeri*, *O coarctata*, and *O. aha* indicated that the varieties differed very little in these characters. The spacing of stomatal rows was wider apart in a drought resistant type than in other varieties. The data also indicated that the stomata are fewer on the upper epidermis than on the lower epidermis of leaf. There were fewer stomatal rows on leaf sheath than that on leaf lamina. The wild species, especially *O aha* and *O coarctata* recorded bigger sized stomata spaced wider apart (Anon., 1963).

The present auther studied the size, and frequency of stomata on leaf sheath, and leaf lamina of 11 rice varieties and the data are given in Tables I and II.

As is evident from the data, the present study showed that :—

i. in general, the lower epidermis of leaf sheath shows larger stomata with lesser frequency in comparison with the upper epidermis of leaf lamina.

ii. the larger size of stomata is found to be associated with lesser frequency and

iii. the breadth of stomata appears to be less variable than length.

These observations confirm the previous findings in *O.sativa* varieties by Rajagopalan (1956) and Anon. (1963).

Comparison of the different varieties employed in the study shows that both in the case of leaf lamina and leaf sheath the *japonica* types exhibit significantly larger sized stomata and lesser stomatal frequency than the *indicas*. The data from the lower epidermis of leaf sheath further shows that for size, shape, as well of frequency of stomata the *japonica* and the *bulu* types are very similar on a par and the three

**References**

1. Anonymous (1963) Ann. Rep. I. C. A. R. Scheme for the evolution of Drought Resistant strains of paddy in Madras State (1962-1963)

2. Bavappa, K. V. A. (1963) Morphological and Cytological studies in *Areca catechu* L. and *A. triandra* Roxb. Dissertation approved for the M. Sc. (Ag ) Degree of the University of Madras (Unpublished).

3 Hirano, E. (1931) Relative abundance of stomata in citrus and some related genera. *Bot. Gaz.* 92: 296–311.

4. Rajagopalan, K. (1956) Variability in size and frequency of stomata in leaves of rice varieties and its correlation in drought resistance. *Madras Agric. J.* 43: 429-443.

TABLE II

Stomatal size and frequency on lower epidermis of leaf sheath io some rice varieties
(Average of 20 readings)

| Variety. | Stomatal characters | | | | | |
|---|---|---|---|---|---|---|
| | Length. ($\mu$) | Breadth. ($\mu$) | Length X Breadth. (sq. $\mu$) | Length Breadth. | No. of rows per intercoastal region. | No. per unit area (32,400 (sq. $\mu$) |
| INDICA TYPES | | | | | | |
| Co. 13 | 24.85 | 15.93 | 396.39 | 1.58 | 3.00 | 5.60 |
| Ptb. 10 | 24.68 | 16.98 | 419.56 | 1.48 | 4.40 | 6.85 |
| Adt. 27. | 25.73 | 17.50 | 450.19 | 1.47 | 5.55 | 8.75 |
| CHINESE TYPES | | | | | | |
| CH. 45 | 27.13 | 15.93 | 432.43 | 1.72 | 2.85 | 2.85 |
| CH. 62 | 23.28 | 18.55 | 430.59 | 1.28 | 4.05 | 7.10 |
| CH. 63 | 26.95 | 17.50 | 471.63 | 1.55 | 5.05 | 6.95 |
| JAPONICA TYPES | | | | | | |
| Aikoku | 36.57 | 18.90 | 690.29 | 1.95 | 2.00 | 3.00 |
| Asahi | 28.00 | 18.38 | 515.11 | 1.53 | 2.00 | 4.10 |
| Norin 1 | 27.65 | 21.00 | 580.65 | 1.31 | 2.30 | 5.30 |
| TJEREH TYPE | | | | | | |
| T. 2357 | 24.85 | 17.50 | 434.88 | 1.43 | 4.85 | 6.55 |
| BULU TYPE | | | | | | |
| W. 108 | 30.98 | 19.60 | 605.76 | 1.60 | 2.15 | 3.10 |

lodging character and hence studies appear necessary to see whether there is any correlation between these Stomatal characters and non-lodgingnature.

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TABLE I

Stomatal size and frequency on upper epidermis of leaf lamina in some rice varieties

(Average of 20 readings)

| Variety | Stomatal characters | | | | | |
|---|---|---|---|---|---|---|
| | Length ($\mu$) | Breadth ($\mu$) | Length X Breadth (sq. $\mu$) | Length / Breadth | No. of rows per inter-coastal region | No. per unit area (32,400 (sq $\mu$) |
| INDICA TYPES | | | | | | |
| Co. 13 | 23.28 | 15 40 | 358.93 | 1.53 | 3.85 | 15.15 |
| Ptb. 10 | 24.15 | 16.98 | 379.14 | 1.44 | 5.90 | 19.85 |
| Adt. 3 | 22.75 | 18.90 | 430.59 | 1.21 | 5.55 | 16.75 |
| CHINESE TYPES | | | | | | |
| CH. 45 | 23.63 | 19.23 | 455.09 | 1.24 | 4.50 | 15.75 |
| CH. 62 | 24.68 | 15.93 | 392.61 | 1.57 | 4.35 | 16.40 |
| CH. 63 | 22.23 | 19.43 | 431.81 | 1.15 | 5.95 | 19.95 |
| JAPONICA TYPES | | | | | | |
| Aikoku | 27.83 | 20.65 | 574,53 | 1.35 | 4.05 | 12.25 |
| Asahi | 26.95 | 19.78 | 525.53 | 1.36 | 3.85 | 12.05 |
| Norin 1 | 25.73 | 20.83 | 536.55 | 1.24 | 4 05 | 15.10 |
| TJEREH TYPE | | | | | | |
| T. 2357 | 21.00 | 17.50 | 367.50 | 1.20 | 5.25 | 20.80 |
| BULU TYPE | | | | | | |
| W. 108 | 25.03 | 17.15 | 428.75 | 1.47 | 7.10 | 18.10 |

other groups, viz. *indica*, Chinese, and *tjereh* are together on a par or very close to each other.

A comparison of the different geographical races of *O. sativa* for Stomatal characters appears to have not been attempted so far and hence the present findings are interesting. In the light of the observations of Hirano (1931) in Citrus and Bavappa (1963) in *Areca catechu* where the varieties and ecotypes could be identified by stomatal density, a more detailed investigation of these aspects appears warranted in races of *O. sativa.*

Incidentally, it may also be noted that both the *japonica* and the *bulu* types which showed larger stomatal size and lesser stomatal frequency are noted for their non-