

"The Number and Significance of Stomata in Sun and Shade Plants"

Graduating Thesis
of

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Outline.

"Number and Significance of Stomata in Sun and Shade Plants."

Introduction:

Viola cucullata.

Plantago.

Sachica No. I.

Sachica No. II.

Polygonum convolvulus.

Oxybaphus nyctaginus.

Leptilon leuadense.

Rumex crispus.

Populus monilifera.

Gleditsia triacanthus.

Vitis riparia.

Conclusion.

"The Number and Significance of Stomata in Sun and Shade Plants"

As a basis of comparison I found the number of stomata in one square centimeter of surface. The area of our field was first found by the micrometer measurement, a centimeter being equal to one hundred part of this, or one hundred lines. In our field, as viewed through the microscope, $3.5'$ of these lines were visible. This gives $.035'$ of a centimeter as the diameter of the field. The area of our field then, equals 3.1416 times $.035'$ centimeters, or $.109956$ square centimeters. The number of fields in one square centimeter will then equal 109956 . In all experiments I used this high power, and examined only the leaves of plants. In each plant that I examined, I counted the number of stomata in five fields, and took the average of the sum of these to find how many stomata there were in one square centimeter.

In the *Viola Cucullata* which grew in the sun, there was an average of 6.8 stomata in a field, on the upper surface of the leaf. This gives 747700.8 stomata in one square centimeter of surface. On the lower surface there was an average of 10.4 stomata in a field, which gives 1143542.4 stomata to one square centimeter of surface. In the *Viola Cucullata* which grew in the shade, there was an average of 1.4 stomata on the upper surface in a field, which gives 153938.4 stomata in one square centimeter of surface. On the lower surface, there was an average of 15.4 stomata in a field which gives

1693322.4 stomata, in one square centimeter of surface.

In the *Plantago* which grew in the sun, there was an average of 16.2 stomata in a field, on the upper surface of the leaf. This gives 1781287.2 stomata, in one square centimeter of surface. On the lower surface there was an average of 23 stomata to a field, which gives 2528988 stomata in one square centimeter of surface. In the *Plantago* which grew in the shade, there was an average of 2.8 stomata in a field on the upper surface. This gives 307876.8 stomata to a square centimeter of surface. On the lower surface there was an average of 12.2 stomata to a field, which gives 1341463.2 stomata in one square centimeter of surface.

In the *Lactuca* No. 1, there was an average of 3 stomata to a field on the upper surface, which gives 32786.8 stomata in one square centimeter of surface. On the lower surface, there was an average of 12.8 stomata in a field which gives 1467436.8 stomata to one square centimeter of surface. In the *Lactuca* No. 1 which grew in the shade, there was an average of 6.2 stomata in a field on the upper surface. This gives 681727.2 stomata for one square centimeter of surface. On the lower surface, there was an average of 11 stomata in a field. This gives 1209516 stomata in one square centimeter of surface.

In the *Lactuca* No. II which grew in the sun there was an average of 4.6 stomata to a field, on the upper surface of the leaf. This gives 506797.6 stomata in one square

centimeter of surface. On the lower surface there was an average of 9.8 stomata to a field, which gives 1877566.8 stomata to one square centimeter of surface. In the *Lactuca* No. 11, which grew in the shade, on the upper surface of the leaf there was an average of 3 stomata to a field. This gives 329868 stomata in one square centimeter of surface. On the lower surface there was an average of 12.8 stomata in a field which gives 1467436.8 stomata, in one square centimeter of surface.

In the *Polygonum Convolverus* which grew in the sun, there was an average of 24 stomata in a field on the upper surface of the leaf which gives 263894.4 stomata in one square centimeter of surface. On the lower surface there was an average of 10.8 stomata in a field, which gives 1187524.8 stomata in one square centimeter of surface. In the *Polygonum Convolverus* which grew in the shade, there were no stomata on the upper surface, but on the lower surface there was an average of 6 stomata to a field. This gives 659736 stomata in one square centimeter of surface.

In the leaf of the *Oxybaphus Nyctaginnus* which grew in the sun, there was an average of 12 stomata in a field on the upper surface. On the lower surface there was an average of 14.2 stomata in a field, which gives 1561375.2 stomata for one square centimeter of surface. In the *Oxybaphus Nyctaginnus* which grew in the shade there was an average of 5.4 stomata on the upper surface of the leaf. This gives an average of 593762.4 stomata on one square centimeter of

surface. On the lower surface there was an average of 7.8 stomata in a field, which gives 857656.8 stomata in one square centimeter of surface.

In the *Leptilon Canadense* which grew in the sun, there was an average of 6.8 stomata in a field on the upper surface of the leaf. This gives 747700.8 stomata in one square centimeter of surface. On the lower surface of the leaf, there was an average of 13 stomata to a field, which gives 1429428 stomata in one square centimeter of surface. In the *Leptilon Canadense*, which grew in the shade, there was an average of 7 stomata in a field on the upper surface. This gives 769692 stomata in one square centimeter of surface. On the lower surface of the leaf there was an average of 12.8 stomata in a field, which gives 140743.8 stomata in one square centimeter of surface.

In the *Rumex Crispus* which grew in the sun, there was an average of 4.6 stomata in a field on the upper surface of the leaf. This gives 505797.6 stomata in one square centimeter of surface. On the lower surface of the leaf there was an average of 9.2 stomata in a field, which gives 1011595.2 stomata in one square centimeter of surface. In the *Rumex Crispus* which grew in the shade, there was an average of 5 stomata in a field on the upper surface of the leaf, which gives an average of 549780 stomata in one square centimeter of surface. On the lower surface, there was an average of 6 stomata to a field which gives

659736 stomata on one square centimeter of surface.

In the *Populus Monilifera* there was an average of 12.8 stomata in a field on the upper surface, which gives 1407436.8 stomata on one square centimeter of surface. On the lower surface of the leaf there was an average of 11.2 stomata in a field, which gives 1231507.2 stomata on one square centimeter of surface. This small difference in the number of stomata on the upper and lower surfaces of the leaf, is due to the fact, that the petiole twists the leaf, so that it stands almost vertical to the sun, and both sides are almost equally exposed.

On the upper surface of the leaf of the *Gleditsia triacanthos*, there were no stomata. On the lower surface there was an average of 24.6 stomata in a field, which gives 1605357.6 stomata on one square centimeter of surface.

In the *Vitis Riparia* which grew in the sun, there were no stomata on the upper surface of the leaf. On the lower surface there was an average of 15 stomata to a field which gives 1649340 stomata on one square centimeter of surface. In the *Vitis Riparia* which grew in the shade there were no stomata on the upper surface of the leaf. On the lower surface there was an average of 16 stomata in a field which gives 1759296 stomata on one square centimeter of surface.

In all the leaves examined, there were more stomata found on the lower surfaces, than on the upper

surfaces. On several there were none at all on the upper surface, and in a few the number on both surfaces were about the same. As a general rule, the number of stomata was less in those plants which grew in the shade, though sometimes there was a slight increase in the number in the upper surface, and decrease in the lower, and vice versa.