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quantity of reserves present and the concentration of the waste products belong to the former class of stimuli. The chemical nature, the food value of the substance and the mass offered are of the latter class.

Generally speaking, the better food is taken before the poorer, it being kept in mind that the individual peculiarities of the plant determine what constitutes a substance a good or a poor food. The extreme diversity as regards the chemical nature of substances used to supply the carbon demand is cited.

In order to speak more precisely concerning the values of materials used as food, Pfeffer introduces the "economic coefficient" of a substance for any plant in question. The "economic coefficient" of any substance for a given fungus is the amount of the dried fungus mass produced from the consumption of 100 parts of the food material.

The coefficients of dextrose and glycerine for the two kinds of fungi most used are as follows:

	<i>Dextrose.</i>	<i>Glycerine.</i>
<i>Aspergillus niger</i> . . . . .	43	20
<i>Penicillium glaucum</i> . . . . .	33	15.

RODNEY H. TRUE.

### On the prevailing ombrophilous character of the foliage of tropical plants.<sup>1</sup>

A review of Wiesner's preliminary studies upon this subject in Europe was given in this journal in March, 1895. The present paper contains the results of his observations in Buitenzorg. It was proved, according to his previous experiments, that a distinction can be made between "ombrophobic" and "ombrophilous" foliage, and it was to be expected that this last form, the ombrophilous, would be the prevailing one in the moist tropical climate of Java.

The observations of Professor Wiesner show now, that the majority of the native and cultivated plants in Buitenzorg have ombrophilous leaves, but he observed, also, that ombrophobic leaves are not excluded. There are several plants of decidedly xerophilous character which tolerate the damp climate in this place. This is further illustrated by the fact that there is in the Buitenzorg garden a large group of Cactææ and cactus-like Euphorbiacææ, which thrive well in a place

<sup>1</sup>WIESNER, JULIUS: Pflanzenphysiol. Mittheilungen aus Buitenzorg. III: Ueber den vorherrschend ombrophilen Charakter des Laubes der Tropengewächse. Sitzungsber. d. K. Akad. d. Wiss. math.-naturwiss. Classe **103**: 169-191. 1894.

which is exposed to the full effect of the sunlight. Among these are gigantic specimens of *Cereus pruinosus* and *cinerascens*, which have attained a height of six meters, a fact that seems to prove that such plants also may be able to tolerate a damp atmosphere. The author calls attention to the fact that the depression of transpiration in Buitenzorg is not so great as formerly stated by certain botanists. Indeed, it is not unusual to see that several plants show the effects of the exposure to the sun by the wilting of their leaves. The strong imbibition of the cell membranes of the leaves allows a considerable transpiration to take place even in an atmosphere which is almost saturated with moisture. It is, therefore, not correct to suppose that the plants in the damp climate of Java are only able to transpire in a very small degree. There are in Java several plants which really need considerable evaporation but seem to thrive well in the moist atmosphere. This is due to the fact that such plants have gradually changed their character and very often, also, their habit. This is, for instance, the case with the cultivated rose, which has ombrophobic foliage, and which only produces very few leaves and small flowers in the garden at Buitenzorg. But the skill of the cultivator has nevertheless succeeded in producing a few specimens with large and odorous flowers. This is interesting, since, according to Teijsman,<sup>2</sup> there is not a single native species of *Rosa* in Java. Several varieties of these cultivated roses have changed their ordinary habit by keeping their young leaves hanging for quite a long time and by being deep red from anthocyan, before they attain the green color. Some other varieties, which were unusually leafy, showed that the ombrophobic character of the normal leaf had been modified in these. The tea-roses thrive well as a rule, but there are a few varieties of these which have, so far, entirely failed to develop.

The author discusses a number of other plants, the foliage of which is ombrophobic, and which shed their leaves after a continuous rainfall. Such plants are *Oxalis Plumieri*, *O. corniculata*, species of *Cassia*, *Acacia*, etc. It seems, altogether, to be characteristic of such plants, that they drop their leaves much earlier than those with ombrophilous foliage. But it has also been shown in all plants that the om-

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<sup>2</sup> Teijsman: Catalogus plantarum quæ in horto bot. Bogor. coluntur. 250. Batavia 1866.

brophilous character becomes lost by age and that it is not acquired until at a certain stage of the development of the leaf.

A peculiar case is mentioned to show how *Mimosa pudica* is able to protect itself against the rain. The leaflets are ombrophobic but escape the effects of the rain by the closing of the entire leaf. The leaflets themselves are, however, quite easily wetted when separated from each other, and the sensitiveness of this plant seems to be an adaptation for withstanding an excessive rain.

In regard to the ombrophilous foliage, the author confirms the observations of Stahl.<sup>3</sup> These leaves show a distinct relation to exist between their shape and their easily wetted surface viz.: the presence of hairs, a furrow-like deepening above the veins, the dripping-point, etc. It is, also, interesting to note the importance of the hanging of young leaves, which is commonly observed in Java. This seems to be explained by the fact, that such leaves are ombrophobic when young, but become ombrophilous at a later stage, and then begin to raise themselves in a more or less horizontal position.—THEO. HOLM.

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<sup>3</sup>STAHL, E.: Regenfall und Blattgestalt. *Ann. du Jardin du Buitenzorg*—11: 98.