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Water Requirement and Adaptation in Equisetum. by Louise Dosdall

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from organic to inorganic acids. The increase in water soluble material can be accounted for largely by that derived from the mineral matter in the manure. But the experiments were too short to show the whole effect.

Dosdall, Louise. "Water Requirement and Adaptation in *Equisetum*." *Plant World*, **22**, 1919, pp. 1-29.

The water used by *Equisetum* has been compared with that of *Bryophyllum*, *Helianthus*, *Phaseolus* and *Ranunculus sceleratus*.

Owing to the depth of the rhizomes some difficulty was found in transplanting *Equisetum*. It was found best to dig up rhizomes in autumn and plant buds in pots. Potometer experiments were not successful. The wilting coefficient was determined by the method of Briggs and Shantz. This was done both with separate plants and by growing *Equisetum* in the same pots as mesophytes. The wilting coefficient readings were always higher than for the other plants and in the same pot experiments the horsetails uniformly wilted first.

The transpiration per unit area of *Equisetum fluviatile* is also higher than that of other plants, 2 to 4 times that of *Helianthus* and *Phaseolus* and 10 times that of *Bryophyllum*, while even compared with *Ranunculus sceleratus* the loss is greater in the value of 10 : 8 or 9. *Eq. arvense* loses $\frac{1}{10}$ and *Eq. hiemale* $\frac{1}{6}$ the amount of *Eq. fluviatile*. All three species showed vigorous guttation at the nodes.

When transpiration and assimilation are compared *Equisetum fluviatile* is found to transpire 1.5 times as much as *Helianthus* and 2.3 times as much as *Phaseolus*, but *Helianthus* builds 1.8 times the amount of carbohydrates and *Phaseolus* 3 times as much. The figures refer to equal areas. The guard cells of the stomata are found to be permanently open and to show no difference in light or darkness.

The species examined showed no structural adaptation with change of habitat.

The water requirement of *Equisetum* is relatively large and *Eq. fluviatile* can be regarded as a true hydrophyte. The xeromorphism is due to ancestral features.

Waterman, W. G. "Development of Root Systems under Dune Conditions." *Bot. Gaz.*, **66**, 1919, p. 22, 17 figs. [Contrib. Hull Bot. Lab. 250.]

The area on which the investigations were made is part of the sand-dune complex of Lake Michigan. The soil is a fairly homogeneous blown sand with a considerable percentage of calcium carbonate. It shows a very unequal distribution of organic matter formed by old soil levels and buried plant remains. Part of the carbonaceous material in the soil may be due to soot from steamers which accumulates on snow and is subsequently buried. The water content varies from a 2 % average on open dunes to 7.5 % on the underlying glacial deposits: the wilting coefficients are 0.5 % and 3.3 % respectively.

In studying the development of roots, seedlings and young plants were especially examined. The conditions of germination were also studied and some experiments carried out. From the studies of living plants *in situ* and under experimental conditions the difficulty of penetration of the soil never seemed a factor in root development, and except in the case of *Salix* spp. water content is not a causal factor. On the other hand chemical substances undoubtedly alter the root development. This is especially marked in the case of *Prunus pumila*. The seeds of this plant germinate when buried in 1-2 ins. of sand. The growth of the root system is generally asymmetric and irregular. The irregularities in nature are connected with the distribution of decayed or decaying plant remains in the sand. Lateral roots are larger and more branched in the dark layers and roots may even reverse their direction of growth when coming in contact with organic matter and