HYDROGEN-ION CONCENTRATION OF CERTAIN PLANT JUICES.

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A considerable number of tests were made in order to ascertain the hydrogen-ion concentration of the cell-sap of certain plants especially that of the fruiting parts. This was in part for comparison of fruits of different stages of maturity. The juices were obtained by grinding the parts in a small mill so as to crush the cells and thus release the sap. The pulp thus obtained was then squeezed out by means of slight pressure. These processes were completed in as short a time as possible. Gustafson[1] has also made a study of the hydrogen-ion concentration in certain plants and obtained results similar to those of Haas. In the first experiments the plant juices were filtered. Two layers of filter paper were used for this purpose which freed the solution of the suspended material but did not give a clear filtrate. The unfiltered sap from the young corn stalks first used was green, but after filtration it was brown. It was found that taking into account the deviation in the $\frac{n}{100}$ HCl the E.M.F. readings of the filtered and unfiltered solutions showed no difference and hence the hydrogen-ion concentration was not affected. In the first experiments with corn the stems were used and in all the tests with corn the variety known as "Stowell's Evergreen" was selected.

After the gas chain was arranged, the hydrogen was allowed to pass through from the compressor and the resistance box balanced against the standard cell. The connection of the hydrogen electrodes was effected by a 'salt bridge' which in this case was composed of concentrated KCl. This has a tendency to reduce 'diffusion potentials' to a minimum, while the cotton plugs employed act against siphoning of the solutions in either direction. When the E.M.F. of the potentiometer is balanced, the research material can then be quickly tested and the Ph calculated.

The sap of the stalk of the corn was taken from near the top[2] and 10 cc. of the sap for this experiment, as well as the others to be mentioned, was used. This sap was substituted at the hydrogen entrance end of the 'gas chain.'

The valuation of this corn sap was Ph 5.21. This was not changed, as above indicated, by the filtration process. The various readings were checked a number of times both before and after the experiments in order to ascertain that constancy had been obtained.

[1] Gustafson, F. G. Hydrogen-ion Concentration Gradient in Plants. Amer. Jour. Bot., 1924, Vol. 11, pp. 1-6.

[2] Gustafson, F. G. *l. c.*

"Proc. Ind. Acad. Sci., vol. 34, 1924 (1925)."

The green fruit of the 'Ponderosa' variety of *Lycopersicum esculentum* in which the chlorophyll had settled and the supernatant sap decanted showed a valuation of Ph 4.74. Settling of the suspended contents generally occurred in a few minutes. While the time element was always considered, the few minutes intervening between the collection and the settling of the heavier contents did not influence the results of these experiments. This was shown by a comparison of the research material which was allowed to settle a short time, with the same material which was centrifuged.

The juice of the ripe fruit of the 'Ponderosa' variety gave a valuation of Ph 5.49. Separation in this experiment, as in all subsequent ones, was occasioned as above indicated and always with the same results.

The Ph valuation of the various parts of certain other plants may now be summarized as follows:

The ripe fruit of *Pyrus malus* of the 'Yellow Transparent' variety showed Ph 3.05.

The ripe fruit of *Citrus sinensis*, sweet variety, gave Ph 3.07.

The ripe fruit of *Citrus grandis*, Duncan variety, gave Ph 5.13.

The ripe fruit of *Rheum phaponticum*, Victoria variety, gave Ph 4.43.

The ripe fruit of *Prunus persica*, Crawford variety, gave Ph 4.45.

The ripe fruit of *Cucumis sativus*, Long Green variety, gave Ph 5.64.

The green fruit of *Vitis vinifera*, Concord variety, gave Ph 5.50.

The ripe fruit of *Vitis vinifera*, Concord variety, gave Ph 3.99.

The sap from ear of corn "in the milk", Stowell's Evergreen variety, gave Ph 8.35.

The ripe root of *Daucus carota*, Danvers Half Long variety, gave Ph 3.95.

The ripe tuber of *Solanum tuberosum*, Cobbler variety, gave Ph 7.19.

The ripe tuber of *Ipomoea batatas*, Yellow Jersey variety, gave Ph 7.12.

The ripe bulbs of *Allium cepa*, Red Globe variety, gave Ph 6.82.