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Report for 1923-1924 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



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Crops and Plant Growth

Rothamsted Research

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SCIENTIFIC PAPERS

Published 1923 and 1924.

CROPS AND PLANT GROWTH: STATISTICAL METHODS AND RESULTS.

(Botanical, Chemical and Statistical Departments.)

(a) CROPS AND PLANT GROWTH.

- I. WINIFRED E. BRENCHLEY. "*The Effect of Iodine on Soils and Plants.*" *Annals of Applied Biology*, 1924, Vol. XI., pp. 86-111.

Attempts to find an economic use for iodine in agriculture either for partial sterilisation or as a direct means of increasing growth led in the main to negative conclusions. There was no definite evidence of partial sterilisation, nor of any reduction in loss from "damping off" of tomato seedlings as a result of treating the soil with iodine dissolved in sodium iodide solution.

Strong doses of iodine inhibited or badly checked germination of mustard. Some of the plants made a striking recovery and ultimately surpassed the untreated controls in green and dry weight. If some time elapses between treatment and sowing the mustard is unaffected, showing neither the initial toxic effect nor the later recovery and stimulation.

Barley is more easily injured than mustard by iodine.

- II. AMAR NATH PURI. "*Effect of Methyl and Ethyl Alcohol on the Growth of Barley Plants.*" *Annals of Botany*, 1924. Vol. XXXVIII., pp. 745-752.

Experiments were carried out in water culture to determine the effect of various alcohols on barley when applied to the roots. Ethyl alcohol proved to be more toxic than methyl alcohol, the difference in the toxicity being not merely one of degree, but of kind. Ethyl alcohol favours the growth of ear shoots and the suppression of vegetative leaves, while methyl alcohol favours the growth of leaves and not that of the ear shoots. In the later stages of growth plants are able to withstand the toxic action of ethyl alcohol much better than earlier in life.

- III. W. E. BRENCHLEY AND H. G. THORNTON. "*The Relation between the Development, Structure and Functioning of the Nodules on 'Vicia faba' as influenced by the Presence or Absence of Boron in the Nutrient Medium.*" *Proceedings of the Royal Society. B.* 1925.

The work deals with the growth and functioning of nodules on *Vicia faba*, comparing those grown in culture media from which boron has been excluded with those supplied with boron.

In the absence of boron the vascular supply of the nodule is defective. The strands are entirely absent, or weakly developed, running only a short distance into the nodule. The nodules having no vascular strands remain minute and are usually buried

in the cortical tissues, and the bacteria do not swell out to form the so-called "bacteroids." In plants grown without boron, the number of nodules that attain macroscopic size is much reduced. When weakly developed strands enter the nodule, the amount of tissue containing bacteroids is closely correlated with the extent of the strands.

In the plants bearing these abnormal nodules the quantity of nitrogen fixed per nodule is small, being, in one experiment, less than one-tenth of that fixed in normal plants. The defective vascular supply is thus accompanied, on the one hand, by a reduced development of "bacteroid" forms and, on the other hand, by reduced nitrogen fixation.

In the absence or weak development of vascular strands in the nodule, the bacteria tend to become parasitic, attacking the protoplasm of the host cell. This attack is chiefly directed towards the more densely protoplasmic cells of the nodule. It is suggested that this change in the relations between the micro-organism and its host is connected with the loss or reduced supply of the carbohydrate energy material normally brought into the nodule by the vascular strands, the bacteria thus being reduced to making use of the protoplasm of the host as a source of energy.

IV. E. J. RUSSELL. *Journal of the Institute of Brewing*.
A full account of the work discussed on p. 17 of this report.

V. H. LLOYD HIND. "*Report on the Analyses of the Barleys of 1922 and of the Malts made from them.*"
Journal of the Institute of Brewing, 1924. Vol. XXX., pp. 969-986.

This report gives the results of the analyses of the barleys grown under the auspices of the Institute of Brewing Barley Research Scheme in 1922, together with those of the malts made from them.

The first season's determinations were necessarily of an exploratory character, quality being a very elusive property which has not yet been reduced to exact chemical terms. The relationships between the total nitrogen and the other quantities generally estimated in malt analyses have been studied. The usual physical valuation of barley, good as it often is in the hands of experts, is shown to fail in certain conditions, some of the low valued barleys giving quite useful malts. The influence of regional conditions, soil, season, etc., on the composition of the barley and malts is shown to be greater than that of the different manurial treatments at each centre.

(b) STATISTICAL METHODS AND RESULTS.

AGREEMENT OF THEORY AND OBSERVATION.

VI. R. A. FISHER. "*Statistical Tests of Agreement between Observation and Hypothesis.*" *Economica*, 1923. Vol. III., No. 8, pp. 139-147.

In all quantitative work, both in biology and in agriculture, tests of agreement between observation and hypothesis assume