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Report 1921-22 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



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Control of Soil Population

Rothamsted Research

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were fairly constant so long as the conditions of temperature, water supply, etc., remained the same. Mr. Cutler's work showed that this is not the case; the protozoa and bacteria vary in numbers from day to day (p. 38), while Mr. Thornton has shown that the bacteria may vary from hour to hour. Careful experiments are being made to see if the production of plant food by the organisms varies in the same way. The changes in numbers of bacteria seem to be brought about by changes in numbers of active amœbæ, but it is not clear why the amœbæ should fluctuate as they do. It does not appear that their variations in numbers are determined primarily by variations in moisture supply or temperature; there seems to be some deep seated biological cause at work.

Besides these hour to hour and day to day variations, there seems to be a seasonal variation in numbers; bacteria, protozoa and, apparently, fungi and algæ, are uplifted in number in Spring and Autumn, but depressed during Summer and Winter. Laboratory experiments have been begun to find an explanation, but the problem is clearly very complex. The depressing effect of protozoa on bacteria in the soil was directly demonstrated by inoculating protozoa and bacteria into sterilised soil; the numbers of the latter were greatly reduced (p. 38). This experiment has often been attempted before, but without success, the experimental difficulties having proved too great. The Bacteriological Department, under Mr. H. G. Thornton, has successfully worked out methods by which the bacteria in the soil can be counted, and their changes in number followed, to a degree of refinement and accuracy that satisfies statistical tests of far greater stringency than had been previously applied (p. 37).

THE CONTROL OF THE SOIL POPULATION.

This work was seriously checked in March, 1921, by the death of Mr. W. B. Randall, who had provided funds for the maintenance of a special assistant. It is, however, being slowly continued. The disappointing results given by certain organic agents which promised well have been traced to their decomposition in the soil. This is in the main bacterial, and a special study has been made by Messrs. Thornton and Gray of the bacteria which break down phenol, cresol and naphthalene. The introduction of certain groups into the molecule retards decomposition and intensifies activity; thus nursery experiments indicate that dichlorocresol is some 25 times as potent for sterilising purposes as ordinary commercial cresol. The large scale experiments are recorded in the report of the Cheshunt Experimental Station.

The effect on the micro-organisms of treating soil with phenol is being studied in the Bacteriological and Protozoological Departments. Three groups of bacteria are found capable of decomposing this substance, belonging respectively to the Mycobacterium, Pseudomonas and Clostridium types; the Mycobacteria are interesting among soil bacteria in that they appear to have a definitely discontinuous geographical distribution; the Pseudomonas organisms are apparently of chief importance in phenol decomposition, as they greatly increase in numbers