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Report for 1930

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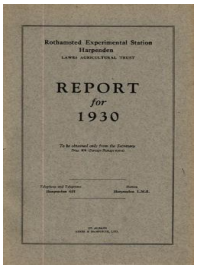

Cultivation of the Soil

Rothamsted Research

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and its Oxidation by Bacteria. The production of ammonia from peptone did not increase as the bacterial numbers increased, but beyond a certain point fell off. Introduction of a protozoan Hartmanella lowered the bacterial numbers but seemed to increase the rate of ammonia production.

During the work on sugar beet effluent a number of organisms were discovered which oxidise ammonia to nitrite ; critical examinations have already revealed 42 distinct strains of these organisms in addition to the nitrosomonas and nitrococcus previously known. Four distinct species have been isolated from the Rothamsted soil which, while agreeing physiologically with some of those from the filters, are morphologically different.

CULTIVATION OF THE SOIL

Cultivation is one of the costliest items in the arable farmer's programme ; its high cost, indeed, is sending many of them into grass farming. It is not yet reduced to a science and consequently cannot be treated by advisors with the same confidence as manuring.

The Physics Department at Rothamsted is endeavouring to work out a science of cultivation, and it is proceeding in two ways. Experiments are made in the field to try and discover by dynamometer and other tests what cultivation does to the soil, and to see what other methods have the same effect. Other studies are made in the laboratory to explain the field measurements and observations, and to work out the physical properties of the soil, especially those related to cultivation such as stickiness, friction, plasticity and permeability ; to discover also what is meant by tilth and crumb structure. The physical properties under investigation for the purpose of explaining tilth and crumb structure include the plasticity of the soil, the electrical conductivity and dielectric constants of soil suspensions, the specific gravity in the crumb and finely powdered states before and after pumping out all air. Cultivation with a rotary implement, the Simar, which makes a seed bed in one operation, has for the past five years been compared with the normal cultivation which requires two or three processes to do the same thing.

The Simar has consistently given a better seed bed, so that there has always been better germination and early growth ; more plants, and on wheat more tillers. This, however, has applied to the weeds as well as the sown crop, and the " Simared " plots have always been the more weedy. The final yields have been much the same as with the ordinary cultivation, the advantage of the early growth not having been maintained—perhaps the result of the weed growth.

The Simar appears to be admirable for inducing germination of weeds and cleaning land.

The effect of sheep folding on light land has been studied at Woburn. The compacting of light soil obtained by sheep is different from that given by implements ; it extends to a greater depth and it lasts longer ; the top three inches of the soil is mainly affected. It gives also a coarser tilth. In this year's tests it did not increase the water holding power of the soil, on the contrary the trodden part was, if anything, somewhat the drier ; but a fuller investigation is being made.