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Plant Pathology

Rothamsted Research

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SOIL MICROBIOLOGY

The protozoan fauna of a variety of soils is being examined by Mr. Cutler and his staff. There seems to be no clear connection between the soil geology and the character of its protozoal population except in peaty moorland soils and blown sand ; sand dunes in two different localities had similar protozoan fauna with an unusually high number of species.

The bacterial population of the heavy Rothamsted soil has been compared with that in the light soil at Woburn, and in each case both unmanured and dunged plots have been studied. The two soils differ markedly in the type of nitrogen fixing organisms ; Azotobacter is absent at Woburn but dominant at Rothamsted. Certain strains isolated from Rothamsted soil will reduce nitrate to gaseous nitrogen even under fairly good aerobic conditions. The stages of the reduction are now under examination. In conjunction with the Fermentation Department, the work on purification of milk effluents has been continued for the Department of Scientific and Industrial Research. Large numbers of bacterial strains have been isolated from the purification plants treating the milk waste, and comparisons between this flora and that of the soil have shown that the two have very different physiological properties. This was contrary to expectation, for it has been generally assumed that the organisms in the purification plant are for the most part derived from the soil.

PLANT PATHOLOGY

Virus diseases.—Dr. Henderson Smith and his colleagues have made an important advance in our knowledge of plant viruses. Mr. Bawden has been able to obtain liquid crystalline proteins from plants previously inoculated with tobacco mosaic virus. He has repeated this with three different strains of the virus, and the crystalline protein from each reproduces its characteristic disease when inoculated to susceptible plants even at a dilution of 10^{-10} . The chemical and physical properties of these proteins are being examined in conjunction with Mr. Pirie and Mr. Bernal of Cambridge. They are associated with a nucleic acid of the ribose type ; and X-ray and other physical measurements indicate that they are rod-like particles of triangular cross-section. No such proteins have been isolated from healthy plants.

Fungus diseases.—Mr. Samuel's work on the club-root of crucifers showed that more information was needed on the early stages of infection. He has devised a method for determining the amount of infection of the root hairs within a week of planting the seed. Some evidence has also been obtained to show that the first stages of infection are sometimes followed by a second infection, and further work on the life history of the organism is necessary to explain this. Dr. Garrett is studying the effect of various soil conditions, such as moisture, temperature, and organic matter content, on the survival period of Take-all disease of wheat. The purpose is to find what period of fallow is necessary after a diseased crop to eradicate the fungus from different soil types.