ROTHAMSTED RESEARCH

Report for 1933

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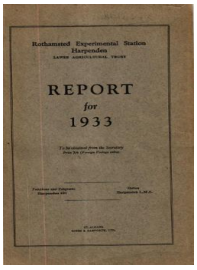

Microbiology

Rothamsted Research

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MICROBIOLOGY

(Departments of Fermentation and General Microbiology)

Biological Activities

XXXIX. J. G. Shrikhande. "*The Production of Mucus during the Decomposition of Plant Materials. I. The Effect of Environmental Conditions.*" Biochemical Journal, 1933, Vol. XXVII, pp. 1551-1562.

The conditions under which stickiness is produced in decomposing materials and manures has been investigated by means of a specially devised physical test. In the presence of a mixed natural flora, high values for stickiness are given with either sodium nitrate or mould tissue as the source of nitrogen. The final reaction of the manure profoundly influences the degree of stickiness if at all appreciable. A pH of 9.5 to 10.0, whether obtained by fermentation or subsequent adjustment, seems to give the maximum stickiness. Na or K ions are more effective in the manifestation of stickiness than Ca or Mg.

XL. J. G. Shrikhande. "*The Production of Mucus during the Decomposition of Plant Materials. II. The Effect of Changes in the Flora.*" Biochemical Journal, 1933, Vol. XXVII, pp. 1563-1574.

A number of soil fungi and two cellulose decomposing bacteria in pure culture and in different associations have been tested as to their effect on the production of stickiness. Either fungi or bacteria while working independently do not produce stickiness. Fungal decomposition followed by *Spirochaeta cytophaga* produced a markedly sticky manure, even if the period of action of the fungus was very brief. Simultaneous inoculation produced little stickiness.

XLI. J. D. Newton. "*A Study of the Composition and Utilisation of Alberta Peats.*" The Annals of Applied Biology, 1934, Vol. XXI, pp. 251-266.

The three elements commonly applied in the form of mineral fertilisers in farm practice did not produce rapid decomposition of filter paper cellulose in incubated cultures, whereas the addition of all " essential " elements produced rapid decomposition.

Fungi appeared to be more important than bacteria in the decomposition of the filter paper cellulose, and the numbers of ammonifying bacteria in cellulose fermentation cultures increased with each additional " essential " element or group of " essential " elements.

Different horizons or layers of the Alberta peats studied differ greatly in colour or stage of decomposition and in reaction or pH value, the surface samples of peat usually containing less ash than the deeper samples.

The nitrogen content of the different samples varies rather widely, and the subsurface layer usually contains about twice as much nitrogen as the surface layer.

The total phosphorus content of the different samples does not vary as much as the nitrogen content, and the calcium oxide percentages and the pH values indicate that the Carnwood and Spruce

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Grove peats require liming and that the Winterburn and Stonyplain peats do not require liming for satisfactory crop production.

The cellulose content of the peats varies from none to about 47 per cent. of ash-free cellulose, and the lignin from about 20 to 49 per cent. A decrease in cellulose content is usually accompanied by an increase in lignin. Cellulose, lignin, and ash together nearly always make up about two-thirds or more of the weight of the peat. Nitrogeneous organic matter would account for about 3 to 16 per cent., and petroleum-ether-soluble material for only 1 per cent. or less of the total peat.

Growth of oat seedlings and bacterial plate counts indicated that the fertility of Carnwood surface peat was not greatly increased or affected by the addition (about three to four months earlier) of ordinary applications of fertiliser salts.

At the end of an incubation period of 50 days appreciable losses of cellulose had occurred in the Carnwood peat cultures to which an abundant supply of fertiliser salts had been added; and bacterial numbers were increased by the addition of fertiliser salts. In the case of the Winterburn peat the losses of cellulose, if any, were within the experimental error of the determination.

After nineteen days' incubation at a relatively high temperature (55°C.), all of the cultures of Spruce Grove peat showed loss of cellulose, the largest loss occurring in the culture to which lime was given, in addition to an abundant supply of the other nutrient salts.

THE PLANT IN DISEASE: CONTROL OF DISEASE

(Departments of Entomology, Plant Pathology and Statistics)

(*a*) Insects and their Control

XLII. H. F. Barnes. "*Studies of Fluctuations in Insect Populations. II. The Infestation of Meadow Foxtail Grass* (Alopecurus pratensis) *by the Gall Midge* Dasyneura alopecuri (*Reuter*) (*Cecidomyidae*)." Journal of Animal Ecology, 1933, Vol. II, pp. 98-108.

It is shown that the relative times of emergence of the host insect and its parasites are important in regulating the subsequent numbers of the host insect. Early emergence of the parasites, together with late emergence of the host insect, may result in a greatly increased population of the injurious insect, in other words an epidemic outbreak.

XLIII. H. F. Barnes. "*Gall Midges* (*Cecidomyidae*) *as Enemies of Mites.*" Bulletin of Entomological Research, 1933, Vol. XXIV, pp. 215-18.

This paper concerns those gall midges whose larvae are predaceous on mites throughout the world. This is the third paper dealing with zoophagous gall midges. Previous papers dealt with those forms attacking Aphids (1929) and Psyllids, Tingids, Aleurodids and Coccids (1930).

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