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Report for 1933

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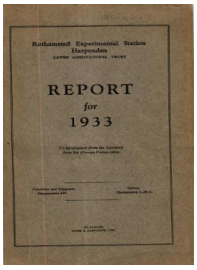

Purification of Effluents

Rothamsted Research

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sugar there is no evidence of any preference for ammonia over nitrate. The loss in presence of ammonia was about 14 per cent. with a C/N ratio of 8, but was nil, or even replaced by a slight gain, when the ratio was 84. Evidence is given that the loss of gaseous nitrogen takes place within the cell of the micro-organism and is not a simple decomposition of ammonium nitrate. There is also evidence that in presence of nitrate the loss is still greater, though no definite figures can yet be given.

Fungal tissue is fully available to micro-organisms as a source of nitrogen ; it is as easily and as completely nitrified as ammonia and it left no resistant unnitrifiable residue.

In all these decompositions brought about by micro-organisms there is also much resynthesis, the organisms building up their body tissues out of the decomposition products.

The sticky part of the humic residue left in the decomposition of farmyard manure is supposed to have considerable physical effect in the soil ; its formation has been studied in detail. It is most easily formed when the decomposition is begun by fungi and then carried further by bacteria ; the optimum pH is about 9.5 or 10. Nitrate and fungal tissue are better sources of nitrogen than ammonia, and the action proceeds better when the mineral bases are sodium or potassium than when they are calcium or magnesium.

PURIFICATION OF EFFLUENTS

D. W. Cutler and E. H. Richards, and their staffs, are applying these results with considerable success to the purification of effluents from sugar beet factories and from milk factories. In both cases organic matter has to be decomposed and in both cases micro-organisms are far the cheapest agencies for doing the work. The conditions required are a ready supply of oxygen, suitable reaction and suitable carbon/nitrogen ratio. The requirements may vary at different stages in the decomposition : thus the decomposition of complex substances like proteins and fats proceeds most rapidly when the first stages are done under anaerobic, and the later stages under aerobic conditions.

For sugar beet factory effluents appropriate conditions have been worked out, and the results are embodied in a report issued by the Department of Scientific and Industrial Research, under whose aegis all this work has been done. For milk factory effluents the problem is proving more difficult because of the presence of fat ; this is an old trouble long familiar to sewage experts, called upon to deal with the soap in domestic sewage. In view of its importance a special investigation of the decomposition of fat has been started. Conditions have been found under which both the fat and the casein can be precipitated from the effluent, leaving a liquid that can be run over biological filters without fear of clogging them.

PLANT PATHOLOGY

A new stage in the history of the Plant Pathology Department is opened with the appointment of J. Henderson Smith as Head and of G. Samuel as Mycologist in place of W. B. Brierley, and R. H. Stoughton respectively. Professor Brierley is writing his results for publication. Professor Stoughton's have been published, thus bringing to a close the work on Black Arm of cotton, the bacterial