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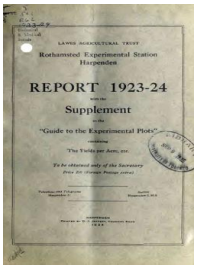
Report for 1923-1924 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



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The Soil Organisms

Rothamsted Research

Rothamsted Research (1925) *The Soil Organisms ;* Report For 1923-1924 With The Supplement To The Guide To The Experimental Plots Containing The Yields Per Acre Etc., pp 60 - 62 **- DOI: https://doi.org/10.23637/ERADOC-1-116**

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barium chloride titration) gives unsatisfactory results with solutions of calcium bicarbonate and tap waters, owing to the solubility of the precipitated calcium carbonate. If the precipitation is done in the presence of solid calcium carbonate in calcium hydroxide and calcium chloride, good results are obtained with short intervals of standing.

IV. THE SOIL ORGANISMS.

(Bacteriological, Mycological and Protozoological Departments.)

(*a*) BACTERIA.

XXXVII. H. G. THORNTON. "*On the Vibration Method of Obtaining a Suspension of the Bacteria in a Soil Sample, Developed by C. L. Whittles.*" Journal of Agricultural Science, 1923. Vol. XIII., pp. 352-353.

A criticism of the results obtained in preliminary work with this bacterial count method.

XXXVIII. H. G. THORNTON and N. N. GANGULEE. "*Seed Inoculation of Lucerne* (Medicago Sativa) *and its Relation to the Motility of the Nodule Organism in Soil.*" Nature, December, 1924.

Preliminary results of work on the passage of the nodule organism through soil and of the relation of this to seed inoculation. The addition of soluble phosphate to the milk suspension of bacteria used to inoculate seed was found, in pot experiments, to produce a large increase in nodule numbers.

XXXIX. P. H. H. GRAY and C. H. CHALMERS. "*On the Stimulating Action of Certain Organic Compounds on Cellulose Decomposition by Means of a New Aerobic Micro-organism that Attacks Both Cellulose and Agar.*" Annals of Applied Biology, 1924. Vol. XI., pp. 324-338.

A new micro-organism from soil is described that has the power of rapidly decomposing cellulose and agar. It can utilise either of these substances as the sole source of energy, and the ability to decompose these compounds is not lost after long subculturing in the laboratory. The organism has been named *Microspira agar-liquefaciens*. Pure-culture experiments showed that under conditions of adequate aeration this organism will decompose filter-paper to a greater extent when supplied with small quantities of xylose and lignin.

See also paper III.

(*b*) PROTOZOA.

XL. H. SANDON. "*Some Protozoa from the Soils and Mosses of Spitsbergen.*" Journal of the Linnean Society (Zool.), 1923. Vol XXXV., pp. 449-475.

The protozoa contained in 3 samples of mud, 8 samples of soil, and 14 samples of mosses from Spitsbergen have been investigated. An abundant fauna was found, most of which was identical with that occurring in the soils and mosses of temperate lands.

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Seven new species of flagellates are described, of which, however, five have subsequently been found in soils from non-arctic regions.

XLI. H. Sandon and D. W. Cutler. *"Some Protozoa from the Soils Collected by the 'Quest' Expedition."* Journal of the Linnean Society (Zool.), 1924. Vol. XXXVI., pp. 1-12.

Soils were examined from St. Paul's Rocks, South Georgia, Elephant Island, Tristan da Cunha, Gough Island, St. Helena, St. Vincent, and San Miguel Azores. The protozoa found in the soils of these remote lands are mostly identical with those found in almost any ordinary English soil. It appears that there is a fairly well defined and characteristic soil protozoan fauna, which is practically ubiquitous. The richest fauna were those found in soils from Tristan da Cunha and Gough Islands, which had been manured with the dung of farm animals for many years. The poorest samples were from South Georgia and St. Vincent, which were all practically sub-soils.

XLII. D. W. Cutler. *"The Action of Protozoa on Bacteria when Inoculated into Sterile Soil."* Annals of Applied Biology, 1923. Vol. X., pp. 137-141.

Three portions of sterile soil were inoculated with bacteria alone, bacteria and amœbæ, bacteria and flagellates. The bacterial numbers were counted daily. The experiment showed that the bacterial population in soil free from protozoa is able to maintain a higher level for a longer period than when protozoa are present; and that the presence of protozoa is one of the factors concerned in keeping the numbers of bacteria below the level they might otherwise attain.

XLIII. R. V. Allison. *"The Density of Unicellular Organisms."* Annals of Applied Biology, 1924. Vol. XI., pp. 153-168.

The density of certain unicellular organisms of known diameter has been measured by Stokes' formula.

The average density of algal cells studied is 1.098 and that for the cysts of Gonostomum sp. 1.057.

The density of the algal cells was found to vary greatly between the larger and smaller sizes, while for intermediate cells it is fairly constant. The total variation in average density of protozoan cysts was much less marked.

During maturation, the cysts of a certain species of Colpoda decreased to one-fourth their original volume, while their average density increased from 1.04 to 1.06.

By the application of the formula of Hehner and Richmond to the density values so obtained, a tentative value has been derived for the actual dry matter of the cells studied. On this basis the dry matter of the young cysts (4 day) of Colpoda sp. amounts to 10.6 per cent. while at the later stage (20 day) it is 15.1 per cent.

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XLIV. R. V. Allison. "*A Note on the Protozoan Fauna of the Soils of the United States.*" Soil Science, 1924. Vol. XVIII., pp. 339-352.

The examination of a series of soil samples from widely divergent points in the United States shows a considerable uniformity in the distribution of the more important of the three protozoan sub-phyla, Flagellates, Ciliates and Rhizopoda. The range of type genera was found to be quite similar to that holding for English soils.

From quantitative studies upon these same samples it is suggested that a possible explanation of the divergent conclusions of English and American investigators may be found in the difference in the extent of the protozoan fauna in the respective materials investigated. Thus the biological phenomena which follow the partial sterilization of the soil and which have been so extensively studied by both groups of investigators, though admittedly similar in nature, may have as their fundamental basis groups of organisms of quite diverse natures.

XLV., XLVI. D. W. Cutler and L. M. Crump. "*The Rate of Reproduction in Artificial Cultures of* Colpidium Colpoda. *Parts II. and III.*" Biochemical Journal. 1923-24. Vols. XVII., XVIII., pp. 878-886, 905-911.

The rate of reproduction of *Colpidium colpoda* has been tested in cultures derived from one or more animals isolated into small volumes of fluid. It is shown that in the main such cultures are comparable with mass cultures.

The allelocatalytic effect, described by Robertson, has been tested and found not to obtain with *Colpidium* when isolated into fluid whose volume varies from 0.5 to 8.5 mm. A few experiments are given in support of the contention that the rate of reproduction can be accelerated by the addition of small quantities of crushed bacteria or protozoa.

Experimental evidence is given that the number of divisions *Colpidium colpoda* undergoes in definite periods of time is intimately connected with the size of the bacterial population.

Further investigations on the relation between the size of the inoculum and the rate of reproduction demonstrates that the number of divisions steadily decreases as the number of animals inoculated increases.

(*c*) FUNGI.

XLVII. J. Henderson Smith. "*On the Early Growth Rate of the Individual Fungus Hypha.*" The New Phytologist. 1924. Vol. XXIII., pp. 65-78.

The fungal hypha elongates at the tip only. The rate of elongation is at first very slow, but steadily increases as time passes, and eventually reaches a maximum value many times greater than the initial rate, and this is maintained for a long period. Different individual hyphæ show considerable differences in the actual rate and in the manner of development, but the majority behave similarly under similar circumstances. Although it increases as the length increases, the rate of extension is not