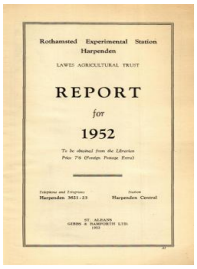
ROTHAMSTED RESEARCH

Report for 1952

Full Table of Content



Soil Work in the Colonial Territories

H. Greene

H. Greene (1953) *Soil Work in the Colonial Territories ;* Report For 1952, pp 156 - 158 **- DOI: https://doi.org/10.23637/ERADOC-1-74**

SOIL WORK IN THE COLONIAL TERRITORIES

H. GREENE

On Singapore island plans are being made to increase local production of fresh vegetables : probably a more important objective is to increase rice production in the Federation of Malaya to provide more human food and larger supplies of bran and broken rice that can be fed to pigs forming the prime mover in the ingenious system operated by the Chinese market gardener. In the Federation of Malaya, the Department of Irrigation and Drainage and the Department of Agriculture have been achieving outstanding results in spite of very severe physical difficulties and grave personal danger. Nevertheless there is perhaps a gap which should be filled as soon as terrorism is sufficiently controlled to permit expansion of agricultural research. Average rice yields in Malaya are low and detailed experimental work under adequate conditions is needed to improve them. In particular it seems necessary to establish one or more areas, totalling perhaps 2,000 acres, having greatly improved control of water. Possibly pumps mounted on barges may help to meet the need for research on rice growing, a need which has been explicitly recognized by past and present Directors of the Departments concerned.

Brief examination of some coastal soils in Malaita and Guadalcanal make it possible to confirm the recommendation of Mr. D. H. Urquhart that cocoa is a promising crop for peasant farmers in the British Solomon Islands Protectorate. Like the Argonauts of the Western Pacific described in 1922 by B. Malinowski, the Solomon Islanders are not only skilled but are artistic gardeners and it is probably a good plan to recognize their talents in this direction. Public health is an urgent problem for the Islanders suffer from malaria, hookworm, leprosy and yaws.

The Directors of Agriculture in Sarawak and North Borneo have proposed setting up in Labuan a joint laboratory for study of soil and entomological problems. This plan is likely to receive support from Colonial Development and Welfare Funds. Rice production is being increased in Sarawak by use of small pumps and in North Borneo by extension from existing rice growing areas. These sound and modest projects may well lead to more rapid expansion later. In North Borneo Mr. J. L. Greig considers that major economic interest attaches to the production of Manila hemp which is grown near Tawau in soil derived from volcanic mud flow. Professor C. W. Wardlaw was impressed by the good recovery made by the hemp under the management of Borneo Abaca Ltd., a subsidiary of the Colonial Development Corporation. Competition from weeds and occasional dry periods had injured the crop: a suspected virus disease seems of less importance. Soils suited for hemp are to be surveyed by Mr. T. R. Paton, a Colonial Research Student, who received post-graduate training in this country under Dr. A. Muir

https://doi.org/10.23637/ERADOC-1-74

and who is receiving further training in soil survey in New Zealand under Mr. N. H. Taylor.

Another Colonial Research Student, Mr. I. T. Twyford, who received post-graduate training at the Macaulay Institute, has joined the Department of Agriculture in Fiji in time to take part in laboratory studies associated with the soil reconnaissance of Fiji which has been started by the generous and valued help of the soil surveyors of New Zealand. Very satisfactory reports are received from Mr. A. C. Venn, a Colonial Research Student who received post-graduate training in field experimentation under Dr. E. M. Crowther and Dr. G. W. Cooke. Mr. Venn is now in Basutoland and has made a good start in applying these techniques there. Mr. R. F. Montgomery and Mr. A. J. Smyth, who formerly held Colonial Research Studentships, are now working under Dr. H. Vine in the Cocoa Soil Survey in Nigeria of which good reports have been received. Mr. E. M. Clegg has taken up his duties as Soil Surveyor in Northern Rhodesia. Another Colonial Research Student, Mr. T. E. Tomlinson, after completing two years post-graduate research in Oxford has spent some time under Professor L. Wiklander in Sweden and is now working under Dr. R. K. Schofield in preparation for his duties at the Rice Research Station at Rokupr in Sierra Leone. The estuarine and alluvial soils of West Africa can be reclaimed for rice but contain sulphur, part of which is readily oxidized to sulphuric acid in amounts that can prevent plant growth. There are vast areas of such soils that may be reclaimed for rice production but we have yet to learn how best to master the intricate technical problems involved in reclamation.

It is possible that weathering by sulphuric acid is of wider occurrence than has hitherto been suspected. In April 1952 Dr. Elizabeth Alexander, a geologist then resident in Singapore, showed Dr. Greene deep exposures of sedimentary material ranging from stones and gravel to sand and clay. The sediments had been raised to a nearly vertical position by emergence of a granite mass now forming the central part of Singapore island and of the Malayan peninsula. The sandy, yellow parts of the sediments showed Liesegang surfaces in close conformation, predominantly horizontal but having a wavy outline. The upper part of the exposure had red and white mottling such as is commonly found in the humid tropics in the deep subsoil at the foot of higher land (perhaps in this case at the foot of a higher mass of granite). The red and white mottling was evidently a later process than the Liesegang formation which, it is suspected, resulted from the progressive oxidation of sulphur by percolating water. A newly-formed gully in similar geological material a few miles from this site had exposed at depth a grey sandy sediment which when tested with indicator proved to be of high acidity such as occurs when sulphur or sulphide is oxidized to form sulphuric acid. It seems possible that mangroves or other plants accumulated sulphur during deposition of the sediments so that when the sediments were tilted they constituted nearly vertical sheets of porous material impregnated with organic residues ready to produce strong acid as soon as they were reached by drainage waters containing dissolved oxygen. Year after year a progressive

https://doi.org/10.23637/ERADOC-1-74

downward percolation of oxygen contained in drainage water might well produce the Liesegang surfaces. Near the most recent and deepest surface there would be a layer of acid water capable of decomposing clay and of becoming charged with iron and aluminium in solution and containing silica in a finely divided state. As this liquid drained downhill through media differing in porosity, diffusion and hydrolysis would make it possible for the sesquioxides to separate out in nearly pure forms as apparently they have done.

These exposures in Singapore have been examined by Messrs. C. G. Akhurst and G. Owen of the Rubber Research Institute of Malaya. They have confirmed the high acidity of the deep lying grey sediment. High acidity and high contents of sulphur in present-day lowland soils have been recorded in Malaya by R. G. H. Wilshaw (1940) and by J. K. Coulter (1952) and in Uganda by E. M. Chenery (1952, unpublished observation). J. A. Prescott and R. L. Pendleton (1952) mention the high acidity of marshes in Western Australia which is associated with the oxidation of ferrous sulphides such as marcasite and which may have some bearing, they consider, on the origin of laterite. Prescott and Pendleton also note indications that gallium, molybdenum, lead, vanadium and zinc may be segregated with iron in laterite. It is evident that weathering by sulphuric acid may be found to have considerable practical and scientific interest.

Dr. Elizabeth Alexander has noted rapid removal of silica in Singapore and suspects that silica dissolves and separates from solution much more rapidly than has been supposed. Satisfactory supporting evidence is still awaited and would be received with great interest because we do not yet have a clear understanding of the conditions that lead to removal of silica which is characteristic of the type of weathering that has been called lateritic.

https://doi.org/10.23637/ERADOC-1-74