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Report for 1957

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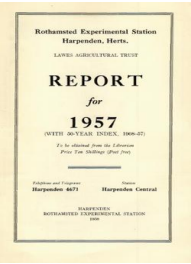
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LAWES AGRICULTURAL TRUST

REPORT
for
1957

Tropical Soils

H. Greene

H. Greene (1958) *Tropical Soils ;* Report For 1957, pp 219 - 222 **- DOI: https://doi.org/10.23637/ERADOC-1-90**

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TROPICAL SOILS

H. GREENE

This note deals with soil work in territories receiving support from Colonial Development and Welfare Funds. During 1957 Ghana and the Federation of Malaya achieved independence: it is perhaps appropriate to offer congratulations and good wishes to the soil men who now have increased responsibilities in those two territories.

Dr. R. Glentworth of the Macaulay Institute has made a preliminary report on the soils of Hong Kong: he describes a sequence of paddy soils differing in drainage of their subsoils. Under his direction further studies of the soils of Hong Kong are being made by C. J. Grant. Under recent leadership of Mr. A. C. S. Wright of the Soil Bureau of New Zealand, good progress has been made in soil survey of the Fijian Islands: N. G. Cassidy and I. W. Twyford are responsible for much of the supporting analytical work. In North Borneo T. R. Paton has surveyed the heavily forested Apas–Balung region, which includes valuable recent volcanic soils and also infertile strongly weathered soils. On the other side of North Borneo A. W. Allen has surveyed the soils, and R. H. Forster the agricultural practices of the Keningau plain, a terraced valley with soils ranging from fertile alluvium to infertile podsols. A report by C. A. H. Hodge on some soils of British Somaliland has been prepared for circulation. A revised map showing soil associations of Tanganyika is contained in the new edition of the *Atlas of Tanganyika*. It represents the views of W. E. Calton. A soil map of the copper belt of Northern Rhodesia has been published together with a report which includes field observations by A. O. Ballantyne and valuable analyses by J. B. M. Vogt. The upland soils have a very low content of magnesium and other plant nutrients. About 300 miles to the east of the copper belt there is the Ngoni " devasted area ", of which M. J. S. W. Priestly and P. Greening have made a land-utilization survey. Their interesting report published in November 1956 advocates, as others have done, changing from communal to individual ownership of land. A contrary view was persuasively presented by Sir Gerard Clauson in *Communal Land Tenure* published by F.A.O. in 1953. Some at least of the Ngoni soils are much more fertile than those of the copper belt.

In the adjacent territory of Nyasaland G. Jackson has carried out a reconnaissance of lands in an area north of Blantyre and has made land-use surveys of smaller areas adjoining the brackish Lake Chilwa and near Nkata Bay on Lake Nyasa. The Nyasaland Government has a report on soils of the Elephant Marsh which is flooded by the Shire river: analyses by C. V. Cutting show that the soils would be suitable for sugar cane if water control were established. G. Murdoch has continued soil survey in Swaziland.

Under direction of E. M. Chenery rapid progress is being made in the soil survey of Uganda. The aim is to complete a reconnaissance

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soil map of Uganda by July 1959. J. F. Harrop, C. D. Ollier and S. A. Radwanski undertake the field work, which is supported by soil-fertility studies and analysis. Soil surveyors are at work in Western and Northern Nigeria but not yet in the Eastern region. J. C. Chisnall has begun a survey of seasonally flooded inland areas of Sierra Leone. M. Brunt of the Directorate of Oversea Surveys has carried out a land-use survey including paddy fields and upland areas along the River Gambia.

D. M. Lang has completed his field work in the soil survey of Malta: according to D. A. Osmond the soils are calcareous, some resembling those of Cyprus and falling conveniently into Kubiena's system of classification. The coastal soils of British Guiana have been surveyed in part by Messrs. D. Crocker and C. H. Simonson provided by the International Co-operation Administration; under the direction of T. A. Jones of the Regional Research Centre for the West Indies a reconnaissance survey of the Rupununi Savannah has been completed and additional surveys are being undertaken elsewhere in British Guiana. J. Stark has been seconded to this team. There is now an evident need for agronomists to discover how the various soils can best be used. Good progress has been made in the soil survey of Jamaica.

In Fiji pot tests and field trials supplement the soil survey; large responses have been obtained with nitrogen, phosphorus and potassium fertilizers but not yet with minor nutrients or lime. One problem is to find crops to replace sugar cane when the Rewa mill closes down. Minor nutrients are of interest in East Africa. E. M. Chenery, adapting pot techniques originated at Long Ashton, has observed boron deficiency in tea; he finds the most common deficiencies in Uganda are nitrogen, phosphorus and sulphur. W. E. Calton and J. W. Vail have prevented die-back in wattle by spraying with boron. This was at Njombe, Tanganyika Territory. In pasture research at Kitale, Kenya, E. D. Bumpus and his colleagues have been finding that grass and legume mixtures respond strongly to the sulphur of gypsum; indications of a response to magnesium have been obtained in field trials with Kenya white clover and with lucerne. Local variation is high, however, and these observations await confirmation.

Water is the most important of the plant nutrients: H. C. Pereira of the East African Agriculture and Forestry Research Organisation is leading co-operative studies relating plant cover and stream flow in East Africa. H. L. Manning of the Empire Cotton Growing Corporation has made a study of rainfall probability in relation to Uganda agriculture. He demonstrates the importance of the seasonal pattern of rainfall. J. B. D. Robinson has obtained good growth of maize, beans and pineapple on camber beds constructed in ill-drained hollows of the coffee research station, Ruiru, Kenya. H. F. Birch of the East African Agriculture and Forestry Research Organisation has devised a respirometer which has enabled him to demonstrate fairly uniform decomposition of organic matter with formation of nitrate when soil is repeatedly wetted and dried. These laboratory tests throw light on changes in the field at the beginning of the rain season and may explain why early sowing is so important.

In the Lake Province of Tanganyika J. E. Peat and his associates

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of the Empire Cotton Growing Corporation have firmly established for cotton and millet the value and long-lasting residual effects of cattle manure and of double superphosphate. When these are applied there is also a response to top-dressed nitrogen. Tie-ridging, which retains rain-water, is notably beneficial also. Numerous field experiments in Nyasaland continue to show a general and profitable response to nitrogenous fertilizer. This is the case with various crops, including tea; young tea has benefited from the sulphur in fertilizers; tung near Zomba responded to nitrogen but failed to give an expected response to zinc. In the less-mountainous parts of Basutoland A. C. Venn continues to find a marked response of maize and wheat to small applications of phosphate, but consistent responses to nitrogen have not yet been obtained. No deficiency of minor nutrients has been observed. For rice in Zanzibar G. E. Tidbury finds the most profitable dressing is 2 cwt./acre of sulphate of ammonia plus 3 cwt./acre of single superphosphate.

H. Irving has summarized fertilizer studies (1947–51) carried out on acid sandy soils of the Eastern Region, Nigeria. With yams nitrogen and phosphorus gave fairly consistent gains: with intercrops of melon and maize there were responses to nitrogen: cassava intercrop showed some response to nitrogen and potassium. Rice on inland swamps responded well to superphosphate, as is the case in Sierra Leone also. There the field experiments of C. J. Piggott have confirmed that groundnuts at Njala require calcium and also phosphorus, potassium and magnesium. He is also using pot tests and the subtractive technique which R. A. Webb brought to the Gambia from Long Ashton. Using small Kraft bags containing soil in which wheat was sown, G. Murdoch in Swaziland demonstrated clear differences between soils and a general response to nitrogen and phosphorus. At the West African Rice Research Station at Rokupr, Sierra Leone, T. E. Tomlinson examined soils of mangrove swamps. He found that those containing fibrous residues are likely to become extremely acid after exposure to air, and should not be chosen for empoldering: rice seedings are severely damaged at pH 4 or less. Observations by M. G. R. Hart suggest that the acidity is due to bacterial oxidation of elemental sulphur. P. W. Arnold has returned to Rothamsted after one year's secondment to the West African Cocoa Research Institute. He observed that in some fertilizer experiments the trees and soils were damaged by too heavy and too localized application of fertilizer. Good results are now being obtained in revised experiments carried out by R. K. Cunningham. Field experiments with groundnuts in the Gambia have not yet shown a striking response to minor nutrients, but have confirmed a marked deficiency of the major nutrients. In Cyprus P. A. Loizides has recorded prolonged residual responses to basic slag and to farmyard manure applied to calcareous alluvial clay loam. At the Imperial College of Tropical Agriculture, Trinidad, T. A. Jones, G. Havord and G. K. Maliphant have evolved a promising technique for studying uptake of nutrients by excised cocoa roots.

In the autumn of 1957 H. Greene visited Swaziland, Southern Rhodesia, Nyasaland, Northern Rhodesia, Kenya, Tanganyika, Uganda, the Belgian Congo, Pakistan and Malta. In the Congo he

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attended discussions regarding the work of the Inter-African Soil Bureau, located in Paris, and of the Inter-African Pedological Service, located at Yangambi in the Congo. In Pakistan Greene attended meetings organized by the Food and Agriculture Council of Pakistan and by the United Nations Educational Scientific and Cultural Organisation with a view to Arid Zone research. On this occasion there was a symposium on soil erosion and its control. E. W. Russell was an invited participant in the symposium.