ROTHAMSTED RESEARCH

Report for 1952

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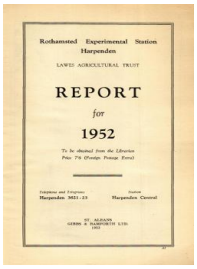

Soil Survey of England and Wales

D. A. Osmond

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SOIL SURVEY OF ENGLAND AND WALES

D. A. OSMOND

Soil surveys have been started this year of sheets 107 (Denbigh) and 280 (Wells) and work has been continued on sheets 75 (Preston), 70 (Leeds), 188 (Cambridge) and 238 (Aylesbury). In spite of changes of staff and the beginning of new surveys, excellent progress has been made so that altogether 147,000 acres have been mapped in detail on the 6 in. to 1 mile scale.

During the year Dr. G. Smith of the United States Soil Survey spent a considerable time in Great Britain and other countries of Europe, visiting the areas being surveyed with a view to correlating the higher soil classification units used in the various countries with those in use in the United States. Professor W. Kubiena, who is well-known for his work on micro-pedology, was invited by the Agricultural Research Council to visit this country for two months to give us the benefit of his wide experience both in the field and the laboratory. Resulting from an arrangement for the exchange of soil surveyors, Mr. B. W. Avery left for New Zealand in exchange with Mr. E. Cutler and will study soil survey methods in use in that country.

HERTFORDSHIRE AND BUCKINGHAMSHIRE

Sheet 238 (*Aylesbury*)

Detailed surveying has been extended in a north-westerly direction from the forest and common land around Ashridge which was surveyed last year and the soils of about 27,000 acres have been mapped; only one new series—the Berkhamsted—was set up. The soils of the area are developed on Chalk, Clay-with-Flints and Pebbly Clay and Sand. On the scarp and along the steep valley sides carved from the Upper and Middle Chalk and extending down to the Totternhoe Stone in the Lower Chalk, is the Icknield series. The soils are usually thin and generally consist of a black or dark brown crumbly loam passing via broken chalk to the solid chalk. The Lower Chalk, with a much higher clay content, gives rise to two series, the Wantage and the Burwell, both consisting of moderately deep, calcareous, grey-coloured clay or clay loam soils and differentiated by their drainage characters, the Wantage being better drained than the Burwell in which yellow and brown mottlings are apparent.

The commonest soil on the plateau is the Batcombe which has a pale brown, slightly acid, loamy surface soil of moderate depth passing to heavier red-coloured clay or clay loam of the Clay-with-Flints. Where the loamy surface soil is missing, probably owing to erosion on steep slopes, the red or orange clay is exposed at the surface and the imperfectly drained, slightly calcareous clays and clay loams of the Winchester series are found. These soils also occur on flat areas. On steep slopes erosion has frequently reduced the thickness

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of the Clay-with Flints and the solid Chalk is within easy reach of the auger; these grey-brown to brown, calcareous, flinty clay soils belong to the Wallop series.

At the foot of valley slopes covered by the above soils, colluvial material, derived from the Chalk and Clay-with-Flints, gives rise to the Coombe and Charity series which are not easily distinguished from each other. Both are variable in texture but the Charity soils contain fewer flints and are neither as calcareous nor as brown as those of the Coombe series. In the centres of the valleys there is often an organic silty loam overlying gravel that extends considerably further north-west than the present spring-heads.

The Pebbly Clay and Sand around Little Heath gives rise to the Berkhamsted soil with a freely drained, dark brownish grey, very stony, sandy loam overlying dark brown, very stony loam passing to vari-coloured loamy coarse sand over clay.

Yorkshire

Sheet 70 (*Leeds*)

No new series were defined in this area where about 11,000 acres were mapped on the Magnesian Limestone and Millstone Grit formations. Owing to the fact that a considerable time was spent in mapping restored open-cast coal sites at the scale of 25 in. to 1 mile, a smaller area than normal has been mapped. In the restored open-cast coal site survey, mainly in Derbyshire, attempts were made to classify the sites on drainage, erosion and root development characters as well as on the actual soil conditions.

In the area of primary survey aerial photographs are being used to see how much useful information can be obtained from them. The interpretation of air-photos is difficult in a country like Great Britain, where the land-use pattern is man-made and greatly obscures the detail which would be of use to the soil surveyor. However, a map made of an area from photographs bore a resemblance to the one made by previous field workers who did not use them. A map of another area made in a similar way will be checked by field work during the coming season.

Somerset

Sheet 280 (*Wells*)

This sheet borders the northern edge of the completed Glastonbury sheet and extends nearly to Weston-super-Mare and Chelwood. The area can be conveniently divided into three physical regions: (1) the low-lying moors in the south-west and a similar smaller area in the north-west; (2) the Mendip Hills which extend diagonally from south-east to north-west and (3) the " hill and valley " district north-east of the Mendip Hills. The whole area includes rocks of Silurian, Devonian, Carboniferous, Triassic and Jurassic ages as well as peri-glacial deposits on and around the Mendip Hills and a considerable extent of recent alluvial deposits including peat. So far about 14,000 acres have been mapped mainly along the southern edge of the sheet.

Almost all the series encountered have been mapped and described in earlier work but two new series—the Moon's Hill and

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the Knapp—have been recorded on andesitic lava and tuff of the Silurian age respectively. The Moon's Hill series is a thin, freely drained soil having a dark brown, light loam surface soil with a loose crumb structure overlying a lighter brown gritty loam. The andesitic rock is very soft to a considerable depth. Associated with the lava is a gritty silty clay deposit believed to be tuffaceous material. The Knapp series formed on it is a poorly drained soil having a surface soil of about 6 in. of dark grey loam to clay loam. This overlies about 3 in. of pale grey clay loam which passes to a very variegated silty clay with rounded andesitic grit.

A soil intermediate in drainage between the very poorly drained Birtsmorton series and the imperfectly drained Worcester series has been tentatively named Wellesley and may be correlated with the Spetchley series previously described in Worcester. The profile consists of about 9 in. of dark grey-brown mottled clay loam passing to red-brown Keuper Marl with mottling throughout.

Lancashire

Sheet 75 (*Preston*)

A further 25,000 acres have been mapped south of the Ribble estuary and along the eastern margin of the sheet on the foothills and moorlands around Tockholes, Darwen and Blackburn to Walton-le-Dale. In the west, between Banks and Becconsall and also north of Bretherton the former thin cover of peat has disappeared either by cutting or by cultivation, and the present profiles show a peaty heavy loam surface overlying a grey gley horizon which passes to the heavy Triassic till at about 24 in. Adequate artificial drainage has given these soils their high agricultural reputation. In many places estuarine deposits overlie peat or the till, in which old soil profiles can be seen, while in other places the till is exposed and the normal soils associated with it are found. The well-drained cultivated soils within the old embankments along the Ribble and Douglas constitute some of the best cropping land and have been mapped as a complex, the predominating soil of which has a fine sandy silt surface soil overlying silty fine sand. Traverses have also been made across the outer marsh which is now used for grazing and where there is a general tendency for the soils to contain more fine sand towards the north-west.

In the moorland, the previously established complexes have been used as mapping units as well as soil series identified earlier. One new series, tentatively named Tockholes, has been found on sandy shales and fine-grained shales and sandstones of the Coal Measures and Millstone Grit formations. The profile shows a grey-brown loam or sandy loam surface soil passing to yellow-brown sandy loam in which the proportion of sandstone and sandy shale fragments increases with depth. The more gently undulating country around Hoghton and Walton-le-Dale is covered by mixed Triassic and Carboniferous till on which the most extensive series is the Coppull.

An interesting feature of the soils found on Triassic and mixed till is the presence, at depths of from 42 in. to 60 in. of calcareous concretions and deposits on the faces of structural elements. Examination of deep cuttings in many parts of west Lancashire shows this

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to be a general feature of the soils developed on till of Triassic or partly Triassic origin.

Cambridgeshire

Sheet 188 (*Cambridge*)

During the season approximately 32,000 acres were surveyed, the greater part of which forms an irregular strip about four miles wide running east from Willingham and Long Stanton St. Michael to the river Cam where it continues eastward to near Reach and Wicken and northward to Podney, Soham Mere and Soham. The countryside is featureless and nowhere rises above 50 ft.; nevertheless it is lithologically diverse and contains soil parent materials with a wide range of textures.

The fenlands, through which the Cam flows from south to north, are the main feature of the area and peat of the Adventurers' series up to 9 ft. thick, and associated pond silts and shell marls overlying deep peat, form a band up to ½ mile wide traversed by the river whose artificial course is flanked by very recent alluvium. A complex group consisting of shallow peat, peaty loam and organic loam soils overlying weathering chalk marl. Gault clay and river loams occurs to the east of this fenland while similar soils on river loams and silts appear on the western margin.

East of the Cam are outcrops of Corallian limestone and Gault clay. The former gives rise to a shallow soil of the red and brown calcareous soil group while on the Gault and its associated drift are found the slightly gleyed Peacock and Newbarn series with smaller areas of other series. Between the two groups of soils lies the calcareous lake clay which formed the bed of the now vanished Soham Mere.

In the neighbourhood of Cottenham and Willingham the Gault and the similar Kimmeridge and Ampthill Clays give rise to soils mainly of the Peacock and Newbarn series while a brown earth of medium texture is developed on the Lower Greensand. North of Waterbeach occurs a complex of well-drained calcareous loams which, to the north and north-west merges into a complex of less well-drained loamy soils around Chittering. The river Ouse flows along the northern boundary of the area and shallow peat soils and recent alluvium are found adjacent to it. A small area of peat and gleyed sands and loams was mapped near Little Wilbraham.

Denbighshire

Sheets 107 (*Denbigh*) *and* 95 (*Rhyl*)

Detailed mapping has been started on these sheets and 38,000 acres have been surveyed in two areas, one including parts of the parishes of Llaneilian-yn-Rhos, Bettws Abergele, Llangeruiew and Wenlli, the other covering the land between Llansannan and Henllan and the moors on the southern edge of the map. Except for the coastal plain and the Vale of Clwyd the topography of the sheets is one of the high relief, much of the land in the south being over 1,000 ft. O.D. and several hills near the coast attain this height. Scarp ridges and steep sided valleys are a characteristic feature of the landscape. Most of the central district is drained by the Aled

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and Elwy and their tributaries which enter the Clwyd near Rhuddland. The Ystrad and Clywedog drain into the Clwyd from the south-east corner while the north-west is drained by the Dulas which enters the sea near Llandulas.

The greater part of the area is underlain by Silurian shales and grits, forming a monotonous series of hard non-calcareous clays and silt shales with occasional grits, whose faulting has largely determined the complex relief. A narrow belt of Carboniferous Limestone roughly divides the elevated shale country from the lower-lying ground to the north-east in the Vale of Clwyd. Basement beds of red micaceous sands and marls are associated with the limestone but are rarely sufficiently exposed to influence the soil. There are small outcrops of Coal Measures and Triassic sandstones in the Vale, but, like most of the Vale, they are also largely covered by deep drift. A large tract of marine alluvium extends from Abergele to Prestatyn; the alluvium of the Clwyd floodplain is mainly derived from Silurian shale.

In the areas mapped only a small number of series has been encountered and all, except two, have been described previously. It has been found necessary to describe phases of the Penryhn series, some of which may be given series rank later. The Aled series is a freely drained soil developed on shale alluvium whose profile consists of a brown to yellow-brown loam overlying a very stony gravel bed. The depth at which the gravel appears greatly influences the agricultural value of the soil with regard to summer drought. In all cases where this trouble occurred, the gravel was within a few inches of the surface. An as yet unnamed series developed on grey, compact shale drift and always found on the tops of smooth features also suffers from summer drought and may be temporarily waterlogged in winter owing to the impervious nature of the underlying drift. The profile usually consists of 9 in. of grey-brown light loam to loam with a sharp transition to the compact, slightly mottled, unweathered drift.

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