APPENDIX III

Analytical Methods

All estimations were carried out on the air-dried fit earth, i.e., material passing a 2 mm round hole sieve. For calcium carbonate, nitrogen and organic carbon analyses, the fine earth was further reduced to pa through a 0.5 mm sieve. All results except pH and gravel are reported on an oven-dry basis. Gravel reported as a percentage of the field sample.

The methods used are given below and except where indicated otherwise are essentially as described by Piper (1950).

Particle Size Distribution.-Silt and clay we determined either by the Robinson pipette method with a plummet balance.

Soluble Salts.-A 1:5 soil-water suspension was shaken for one hour and the electrical conductivity (E.C.) determined at 20^{o}C. This was converted to per cent total soluble salts (T.S.) through the relationship:

$$T.S. = E.C. \times 340$$

where E.C. is expressed in mho/cm. The factor 340 has been derived from gravimetric determinations of total soluble salts in soils from the surveyed area.

15 atmosphere percentage.-This is the moisture retained, as a percentage of the oven-dry soil, after 48 hours at 15 atmosphere pressure in the pressure membrane chamber.

pH.-After determination of electrical conductivity (soluble salts), the same suspension was used to determine pH by the glass electrode.

Chlorides.-These were determined by the electrometric titration method of Best.

Calcium Carbonate.-Carbon dioxide was determined by the vacuum method of Hutchinson and MacLennan and expressed as calcium carbonate.

Nitrogen.-The Kjeldahl method was used.

Organic Carbon.-The wet combustion method of Walkley and Black was used. Results have been multiplied by an empirical recovery factor of 1.25

Exchangeable Cations.-The soil was first leached with 60 per cent. ethanol to remove soluble salts. If no carbonates were present, it was then leached with N ammonium acetate adjusted to pH 7.0; if carbonates were present, it was leached with N ammonium chloride in 60 per cent ethanol adjusted with ammonia to pH 8.5 (Tucker, 1954).

In the leachate, calcium and magnesium were determined by EDTA titration and sodium and potassium using an EEL flame photometer. The individual cations have been expressed as milligram equivalents per 100 g of soil and as percentages of the total cation exchange capacity.

Exchangeable Hydrogen.-This was determined by Mehlich's barium chloride-triethanolamine method (reference point pH 8.0), using the modification of Peech et al. (1962).

Cation Exchange Capacity.-This is the sum of exchangeable calcium, magnesium, potassium, sodium and hydrogen.

APPENDIX IV

Explanation Of Soil Terms

Bleached*: Describes* a horizon which has become pale owing to leaching.

Concretions: Local concentrations of certain chemical compounds deposited in the form of hard, more of less rounded nodules of various sizes.

Consistence: This is the behaviour of the soil when manipulated. It indicates its resistance to deformation, and is a measure of the degree of cohesion of a soil or of a soil aggregate. It is affected markedly by the moisture state of the soil. The following consistence terms are used in this report: crumbly, friable, labile, plastic, tough, hard, intractable.

Gilgai: An uneven surface manifestation of puffs and depressions often referred to as crabholes.

Gypsum: Hydrated calcium sulphate.

Illuvial: Material deposited in the soil profile as the result of translocation during soil weathering processes. It is customary to refer to the A horizons as *eluvial* horizons and the B horizons as *illuvial* horizons.

Impermeable: Describes soils which are very slowly permeable to water.

Lime: Calcium carbonate either finely divided or in concretions.

Morphology: The physical constitution of the various horizons and their arrangement in the soil profile.

Munsell colour: This is the soil colour determined by matching against the Munsell colour chart and expressed in its notation of hue, value and chroma. The notations given in this report are for moist soils. These, in general, are about two intervals lower in value than for the soils in their dry states. The written descriptions of the surface soils refer to their dry state.

Parna: A fine textured calcareous deposit of aeolian origin. It is postulated to be derived from older soils and transported mostly as small clay aggregates.

Ped: An individual natural soil aggregate.

Soil association: As used here, a group of soil types regularly associated geographically in a defined proportional pattern.

Soil horizon: A layer of soil with similar characteristics throughout. The horizon may be distinguished by differences in one or more of the following characteristics: colour, texture, structure, consistence, organic matter content, and the presence of visual products of weathering such as calcium carbonate, gypsum and iron oxide concretions.

Soil profile: This is the vertical section of a soil exposing the sequence of horizons from the surface to an arbitrary depth, in this case, to at least 4 feet. The horizons in the soils described are:

A_1 The surface layer in which organic matter has accumulated and partly leached of clay and soluble material. It represents the zone of maximum biological activity and roughly corresponds to the layer affected by tillage.

A_2 A lighter coloured, subsurface layer, poor in organic matter. This is the zone of maximum leaching.

B_2 A subsoil layer representing the zone of accumulation of some materials, chiefly clay, from the A horizon.

B_L A zone of concentration of much calcium carbonate.

C A layer representing unchanged material from which the above horizons have formed.

Soil phase: *A* modification of a soil type in which one feature is accentuated without altering the main profile form.

Soil series: *A* group of soils having horizons similar in distinguishing characteristics and arrangement in the soil profile, except for the texture of the surface soil, and formed from the same parent material. The series name is taken from the locality where it was first described.

Soil type: *A* group of soils with the same general profile characteristics, including the texture of the surface soil. The unit of soil mapping used over most of this survey.

Structure: Describes the way in which the primary soil particles are arranged into soil aggregates (peds). The descriptive terms used here are: angular blocky, subangular blocky, prismatic, coherent, massive. The size or grade of the aggregates may be fine, medium or coarse while the structure may be weakly, moderately or strongly developed.

Subplastic: This describes a soil which increases in plasticity with continued manipulation in the moist state and, in consequence, increases in field texture.
Texture: This is the grading of the soil material in, respect of the size of the primary particles.

Variant: *A* minor modification of a soil type which is usually indicated by a suitable inscription on the soil map.

APPENDIX V

Soil Survey Methods

In making this soil survey, the soil surveyors listed at the front of this report walked over the land and bored holes at intervals varying from 4 to 20 chains apart, depending on the complexity of the soil pattern. The soil profile at each spot was exposed with a 4 inch Jarrett soil auger, usually to a depth of 4 feet, but sometimes to 7 feet, and the soil classified into its soil type. To do this the soil surveyor examined the various horizons in the soil profile and noted their texture, friability, colour, thickness, and the presence of lime, iron concretions and gypsum.

The soil type at each point examined was marked on an aerial photograph (scale 1 inch to 5, 10 or 20 chains) and a boundary drawn to show where one soil type changed to another. Surface features such as change of slope, depressions and rises, which often show on aerial photos were helpful in determining where the change occurred. But it should be appreciated that a soil boundary line shown on a soil map represents a zone of transition. This zone may be narrow which means that the soil change covers only a few feet or yards, or it may be gradual with the transitional zone extending over one or more chains.

Preliminary soil maps at scales of 1 inch to 10 chains in the horticultural areas and 20 chains elsewhere were constructed by transferring the soil boundaries from the aerial photographs onto suitable base plans. These are the relevant standard mapping areas of the Military Map series with the parishes and allotments shown.

It has been necessary to reduce the size of the soil maps for publication, consequently, the scales of the maps in this bulletin have been reduced to 1 inch to 20 chains in the case of the horticultural settlements and 1 inch to 40 chains elsewhere.

The smallest area that can be shown on the soil map at the scale used is about 1½ acres, i.e., 4 chains across. This means that any area shown as a single soil type may have small areas of one or more soil types with it, *but not to a greater extent than about one sixth of the occurrence.* Where the other soil type (or types) covers more than one sixth, but not more than one third, its presence has been denoted by an *inscription* on the map. Should the second soil type exceed one third, the occurrence has been mapped as a *complex* of both soil types and is shown by diagonal hatchuring.

Where soil types are intermingled, it is not always practicable to make separations, even though the individual soil types occupy areas greater than 1½ acres. Consequently, in some of the complexes mapped, the areas of the component soil types are much greater than this. *Also,* some complexes are comprised of three soil types.

A *soil association* may be regarded as a complex of soil types on a broad scale of mapping. The Soil Association Map shows the soils of the area grouped on this basis, but in this case the map was compiled from the detailed soil maps after they were completed, and not by mapping the soils as associations in the field.