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The Soil at Rothamsted

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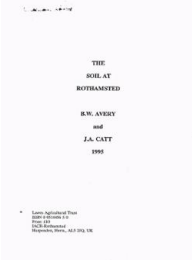

Textures and Stoniness

Rothamsted Research

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(7.5YR5/6) to yellowish red (5YR5/6-8) and show additional micromorphological features (Avery & Bullock 1969; Avery *et al.* 1972) attributed to soil development in one or more earlier interglacial stages of the Quaternary. Soils with B horizons of this kind have been grouped as paleo-argillic brown earths in England and Wales, and are typically more strongly leached and weathered than younger soils in parent materials of originally similar composition. Those on Clay-with-flints include typical paleo-argillic brown earths (Carstens and Winchester series) with uniformly coloured B horizons, and stagnogleyic paleo-argillic brown earths (Batcombe and Hornbeam series) in which the B horizons show varicoloured mottling within 60 cm depth, indicative of reduction/mobilization and redeposition of iron (gleying) under periodically water-saturated conditions.

Following construction of the Redbourn by-pass, soils of the third class are of very limited extent, occurring only in Flint Field and the adjoining Ver Spinney (Fig. 1). They have very dark coloured topsoils rich in organic matter and greyish gleyed subsurface horizons with ochreous mottles and streaks.

Texture and stoniness

As the topsoils generally contain substantial proportions of loess-derived material, they are predominantly silty in texture. Over at least 75 per cent of the area mapped, the estimated particle-size (textural) class is silty clay loam (Fig. 2b), or silt loam according to the U.S.D.A. system (Fig. 2a), with between 18 and 27 per cent clay and less than 20 per cent sand (60 μm - 2 mm). Topsoils of finer texture, mainly heavy silty clay loams with 27-35 per cent clay, occur chiefly on upper slopes susceptible to erosion, as in Barnfield (Avery *et al.* 1972) and Claycroft, and only sporadically on the plateau. Lighter soils, mainly silt loam or sandy silt loam containing less than 18 per cent clay, have been recorded only in parts of Flint, Scout, Ver and Osier fields (Fig. 1).

The topsoils nearly everywhere contain angular, or angular and rounded, flint stones in proportions which locally exceed 15 per cent by volume. Under old grass, as in Highfield (profile 13), they are concentrated in a layer some 10-20 cm below the surface as a result of earthworm activity. Of the predominant 'Clay-with-flint soils' (Batcombe, Carstens and Winchester Series), those on the nearly level plateau are generally less stony than on bordering slopes, and the subsoils contain fewer but larger flints. Average weights per acre of stones (> 6 mm) in successive 23 cm layers, quoted for the chief experimental fields by Hall (1917), exemplify these trends. Thus the surface layer of Barnfield is significantly more stony than those of Broadbalk and Hoosfield but not quite as stony as Agdell, and the topsoils of both Barnfield and Broadbalk are on average two to three times more stony than the subsoils at 46-69 cm. In the generally loamy soils at lower levels, however, the subsoils are in places much more stony than the topsoils, particularly alongside and west of the R. Ver in Flint, Osier and Scout fields (Fig. 1).

Mineralogy

The mineralogy of the fine earth < 2 mm has been studied only in Batcombe and associated soils in Broadbalk (Weir *et al.* 1969) and Barnfield (Avery *et al.* 1972). The results indicate that the Batcombe soils in both fields are developed in a relatively silty (loess-containing) superficial deposit overlying and mixed with the Clay-with-flints. The fine sand and more particularly the coarse silt fractions of the latter contain around 95

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