Association 2

Soils Associated with Silurian and Devonian Sediments

Geology

This vast and diverse unit incorporates all of the Lower to Middle Devonian and Middle to Upper Silurian sediments which form the majority of the study area (60%). The sediments are between 430 to 390 m.y. old and are predominantly of marine origin with minor non-marine materials associated with the Cathedral Range, Knobby Spur area, south-west of Taggerty.

Around the granitic intrusions the sediments form metamorphic aureoles of various extent. One such area extends from around the Mount Tanglefoot/Mount Mitchell Plateau north in a 10 km wide band across to Mount Cunningham south of Molesworth. These sediments were altered in response to the granitic intrusion with formed Black Range Ring Dyke.

Also in conjunction with this association are the main streams which disect the country and form the Recent Quaternary colluvial and alluvial wash material of the drainage courses and valley flats.

Lithology

Undifferentiated sediments which include sandstones, siltstones, thin bedded claystones, greywacke-conglomerates, isolated limestone lenses an calcareous siltstones. Sideslopes and foothills incorporate varying amounts of scree and fan deposits of poorly sorted sand, gravel and silt. Small drainage courses and minor alluvial flats show a complex of gravel and silt materials. The metamorphic aureoles contain altered Devonian sandstones, siltstones and mudstones and consist of hornfels, spotted sediments, schistose and gneissic volcanics. Included are minor areas of limestone and medium grained granodiorites which have formed some areas of scree and fan deposits. The edges of the metamorphosed area are ill defined and the extent of metamorphism is quite variable.

Soils

The profiles include uniform fine textured clays and gradational soils, which incorporate large percentages of broken rock and gravel in their subsoil. They are typified by a bleached, dry hard, relatively erosion resistant A_2 horizon.

Soil depth is dependent on topographic position with the bare crests and upper slopes of the hilly and mountainous terrain exhibiting very shallow profiles (<20 cm) and rock outcrop and the more protected lower slopes giving rise to deeper profiles (to 150+cm).

Surfaces are generally smooth with a leaf litter layer restricted to forested land. Good grass cover on agricultural areas occurs on the lower slopes and more gently sloping terrain. Stone and rock outcrops are restricted to the small conical crests and on steep slopes. Where sheet erosion and/or overgrazing has taken place, the exposed A_2 horizon may give rise to a hard-set, sparsely vegetated surface.

The A_1 horizons are typically shallow, dark brown to very greyish brown clay loam. On lower slopes, textures included light clays with varying amounts of silt. Structure is massive to weak with fine varying amounts of silt. Structure is massive to weak with fine subangular blocky, rough-faced peds. In many cases hydrophobic properties were evident. The transition to the distinct A_2 horizon is usually clear and always occurs within 25 cm of the surface. In a number of cases, particularly on the edge of gullies and road cuttings, the A_1 horizon is missing due to erosion and the A_2 horizon provides a distinctive, relatively impervious (dry) hard mantle to the subsoil layers.

The A_2 horizon is a bleached continuous, massive and moderately cemented pan. Soils are generally light yellowish brown to a brown silty-light clay which slakes slowly in field tests. Some lower situations exhibit minor gravels and angular, fractured stone from transported material. Small, 2-3 m, distinct, orange mottling was seen on lower slope and level components which gives a uniform, speckled appearance. The A2 horizons are generally 30-40 cm thick and abruptly grade into the subsoil clays.

Subsoils are particularly variable due to the range of sedimentary origins and climatic factors. Generally they are 40-50 cm deep, diffusely grading into a well fractured and broken sandstone/mudstone base. Small tongues of ‘B’ horizon may extend for two metres or more into the

fractured material. On other occasions the A_2/C horizon boundary can be diffuse. Gravel contents throughout the upper part of the 'B' horizon may reach 70-80%. On colluvial slopes a 30-40 cm thick banding of small and large well sorted gravel may occur.

Subsoils are usually yellowish brown, strong brown to brownish yellow, weak to moderately structured clay with subangular-blocky often impervious smooth faced peds. Some higher rainfall areas tent to exhibit rough-faced ped which show good hydraulic percolation. Some areas exhibit a dry hard, 'self-mulching' breakup of the soil mass into a fine angular blocky mass with smooth ped fabric. Structural units generally show a strong slaking tendency with many cuttings exhibiting some slumping and sapping of the B horizon. On hand augered sites the shearing effect tends to mask structure identification. On upper drainage areas some sites were apedal at depth. On the mountainous, high rainfall forested areas in the south-east (around Jamieson) soils become much redder with yellowish red to red material common. In drier situations a red to reddish brown mottling effect occurs which becomes more pronounced in deeper profiles where red mottling may also be noted.

Textures are always in the clay grades with medium-heavy clays common. Due to parent material variability, it is unusual for materials to include a range of silt and fine sand. In many profiles grit occurs.

Some profiles within the foot slope and lower slope elements have lime concretions clearly visible in exposed cuttings, and elsewhere on lower slopes, although carbonate was not seen, soil alkalinity indicated its presence.

The soils are prone to erosion and degradation particularly when exposed. Fractured parent material is often unstable in roadside batters. A typical feature is the protrusion of the resistant A_2 hardpan following erosion of the surface A_1 and slumping of the subsoil through dispersion and slaking processes. In the west on some Silurian sediments, severe tunnelling is evident on moderately sloping cleared land. Areas about Strath Creek appear to have been laid bare and denuded from overgrazing. They are particularly prone to water erosion, and also to wind damage after prolonged dry spells.

Profiles are considered nutrient deficient for most forms of agricultural use. In lower drainage depressions salting is apparent by the presence of crusting and spiny rush. Although surface infiltration may be good, particularly where shallow soils over fractured rock exist, percolation into the clayey materials appears to be slow.

Summary of Soil Features: Soils Associated with Silurian and Devonian Sediments

Classification		Texture		Structure		Permeability		Depth to Bedrock	Subsoil Slaking Tendency	Inclusions
PPF	USC	Surface	Subsoil	Surface	Subsoil	Surface	Subsoil			Gravel, Stone, Other
Variable Gn 3.3 3.6 3.7 3.8 Gn 2.4 Gn 4.8	CL	Clay-loam some light clay with silt; A_2 horizons typically a silty light clay	Medium heavy clay	Massive-weak fine subangular blocky	Apedal Weak to moderate subangular blocky	Poor to very poor due to the presence of A_2 horizon	Slow	Variable depending topographic position Crest areas shallow; side slopes moderately deep; lower slopes usually >100 cm	Moderate to rapid	Variable shallow soils incorporate large amounts of sandstone gravel. Some areas show the existence of gravel bands, although these are usually thin.