

In the vicinity of Taihape a much-weathered volcanic deposit, dark brown in colour, covers considerable areas of country to the south of the Taupo soil boundary. Observations have shown that this brown weathered deposit underlies the Taupo shower over a large extent of country. A great deal of evidence has been obtained, showing that the source of this deposit was Tongariro Mountain, and on this account the name "Tongariro" has been applied in the mapping of soils. Although the main area of Tongariro deposit responsible for soil-formation occurs south of Rangataua and Kuripapango, there is much evidence suggesting the presence of Tongariro ash as a thin coating over the Mairoa shower in the Rotorua-Arapuni and Ngaroma sector.

The volcanic deposit from Mount Ngauruhoe covers a more limited area of country around the mountain. It overlies Taupo ash, and is thought to extend in the west as far as Taumarunui.

STOCK-AILMENT ON VOLCANIC DEPOSITS.

The prosecution of the field-work has shown that the various localities which have been definitely recognized as being associated with bush sickness occur solely on three of the volcanic deposits which have been identified. These volcanic deposits are—(1) Taupo, (2) Mamaku, (3) Kaharoa.

Kopaki, Ngaroma, Lichfield, Atiamuri, and Reporoa, where bush sickness or ailments with similar symptoms to bush sickness have occurred, all come within the Taupo boundary. Mamaku, which has been known for many years to have been affected with bush sickness, is located on the Mamaku shower, which is covered by a superficial coating of the Taupo ash. Bush sickness likewise is associated with Kaharoa shower, and has been reported both at Kaharoa itself and Te Puke, and in early days from Tauranga. All of these places lie within the known limits of the Kaharoa shower. So far as observations have been made, bush sickness has not been found on the Mairoa, Tongariro, Egmont, Ngauruhoe, and Tarawera deposits.

Dopiness in sheep characterizes certain areas of the Mairoa shower west of Te Kuiti. The experiments conducted under the auspices of the Department of Scientific and Industrial Research show that this difficulty can be overcome by top-dressing pastures with lime and superphosphate. It is probable that a large extent of country between the Mokau River and Hamilton will be greatly improved by this treatment.

FIELD CHARACTERISTICS OF VOLCANIC SOILS.

The more recent volcanic deposits, owing to distinctive colour, texture, and structure, can readily be recognized in the field. Some difficulty, however, has been experienced in the identification of the older weathered deposits of Mairoa, Tongariro, and Egmont. Soils derived from these showers are somewhat similar in colour and general structure. A study of the minerals contained in the soils, combined with chemical analysis, has proved so far the only method which can be safely used in their identification.

The older deposits, particularly Mairoa and Tongariro, have a loamy texture, are brown in colour, and frequently exhibit a soapy feel when worked between the fingers. The more recent deposits of Taupo, Kaharoa, and Tongariro exhibit little weathering of the particles, which are comparatively hard and angular. These deposits give rise to grey-coloured soils, frequently of a sandy or silt texture.

Examination of the extensive deposits from the Taupo centre reveals the fact that distinct layers can readily be recognized in the volcanic ejectamenta. This is particularly marked in the vicinity of the vent from which volcanic material was ejected. A very coarse layer of large fragments occurs at the bottom of the deposit. This is succeeded by a layer of particles of much smaller size, comparable to sand-grains. A third layer of fine particles of the silt size overlies the two lower layers. As might be expected, the thickness of the different layers varies greatly in different parts of the territory covered by the deposit. The coarse layer is several feet thick in the vicinity of Lake Taupo, but is entirely absent at points on the outskirts of deposition. The intermediate layer extends beyond the limits of the coarse layer, while the top layer of silt has a very wide distribution indeed. The presence of a coarse layer underlying the topsoil at no great depth profoundly modifies the moisture conditions in the topsoil and greatly affects crop-production, unless the rainfall is particularly high.

TEXTURE OF VOLCANIC SOILS.

As might be anticipated, there occur important differences in the textural qualities of volcanic soils. The mechanical analyses which have been made show that soils derived from the Mairoa and Tongariro deposits may be classed as silt loams or sandy loams. In different localities, however, Mairoa soils exhibit important differences in degree of compaction. As far as can be judged with the limited information at our disposal at the present time, the degree of compaction appears to be connected with rainfall conditions. Under light rainfall compaction is small, and the soil and subsoil are loose and floury. In localities with high rainfall both soil and subsoil are well compacted, and offer considerable resistance to penetration with the soil-auger.

Soils derived from the Taupo and Kaharoa deposits are much coarser in texture than the Mairoa soils, and it is only on the outskirts of the areas covered by these deposits that the soils come even into the fine sandy-silt category.

Mechanical analyses of soils derived from the Taupo deposit show that there is a definite grading of particles in the topsoil. The texture of soils in the vicinity of Lake Taupo places them in the coarse-sand category. In the direction of Napier the texture becomes finer, until at Napier itself the soil must be placed in the silt-loam category. The mechanical analyses have also shown that, in addition to this horizontal grading of particles, there is a vertical grading, the top 0-3 in. invariably having a finer texture than lower spits.