

## Background soils information

In order to interpret the soils present on the property, the following terminology and descriptions are used to describe soils:

### a. Soil horizons

Soil horizons are the different layers in a soil profile that are commonly differentiated from the adjacent one by differences in colour, texture, structure or consistence. A soil is usually characterized by describing and defining the properties of its horizons.

The depth of the topsoil is important when undertaking cultivation. A shallow topsoil under cultivation can often be inverted with the subsoil if cultivated too deep.

### b. Soil texture

All soils contain a mix of sand, silt and clay particles – this mix is called soil texture. It will vary for different soil types, for example, a 'loam' contains equal proportions of sand, silt and clay, whereas a 'silty clay loam' contains roughly 60% silt, 30% clay and the rest sand.

There is not much you can do to change the ratio of these fine particles, but it is important to have an understanding of what the textures of the various soils on your property are and what it means. Texture affects drainage, structure, nutrient holding capability, and how much pressure a soil will handle from cultivation or grazing with heavy cattle at different moisture levels, or even the ability to hang on longer under a drought. Texture should even influence your fertiliser policy.

Texture even influences land use. If you have a clay textured soil, for example, and you want to run an intensive bull system, you need a plan for wet periods, or you should sell the farm and buy one more suited.

### c. Soil structure

Soil structure is the building blocks of the soil. Its how sand, silt and clay particles are packed together and how much pore space is available between them. Soil structure is important for root growth and drainage.

Activities that destroy soil structure include pugging, compaction, and over-cropping. These activities reduce pore space, inhibit drainage, decrease worm numbers and activity, and affect the ability of plant roots to grow and seek out moisture, nutrients and oxygen. Destroying soil structure can drastically reduce pasture production and crop yields rapidly. We were at a property in the Manawatu recently where just one pugging event reduced pasture production by 50% for over three months. And this was from just one night of leaving the steers on a wet clay loam.

### d. Soil colour

The colour of a soil can give some hints to the drainage characteristics and what plants or crops could be grown.

In general, the darker the colour, the greater the amount of organic matter. This is the reason why the top soil is generally darker than lower horizons. Grayish-blue coloured soil, with scattered rusty, orange spots (mottles) suggest that the soil is water-logged for most of the year. While a browner soil, with the same mottles indicates water-logging occurs over only short periods. Free draining soils will have no mottles.

Sharp colour changes indicate a change in soil properties, such as a clay pan, affecting drainage ability and maybe root growth. The depth of the change will influence the types of crops that can be grown.

### **e. Soil consistency**

Soil consistency describes how soil will behave under different moisture levels. It is influenced by texture, the type of clay minerals present, the amount of organic matter, and the soil moisture content.

Soil behaves differently depending on how wet it is. From too dry, where large clods remain intact during cultivation; to moist soils that form a good seed-bed (like crumbly breadcrumbs when crushed in hand), to wetter soils that compress and stick together when cultivated; through to soil that is liquid and oozing water.

For safe cultivation, or even grazing with heavy cattle, it is important that soils are not too wet. This can easily be determined by rolling a sample of soil into a worm 2-3 mm in diameter on the palm of your hand. If the thread forms without breaking, the soil is too wet and would be damaged under cultivation or grazing with heavy cattle.

### **f. Parent material or rock type**

This is the material the soil is formed from.

### **g. Degree of topsoil development**

The degree of topsoil development relates the size and number of individual peds that are present when a soil is broken up. The more peds that are present and the larger their size, the greater the degree of topsoil development. The greater the topsoil development the more resilient the topsoil is to physical stresses.

### **h. Drainage status:**

The drainage status of the soil is determined by soil colours and the presence of mottles in the soil profile. The more grayish the subsoil or the more abundance of mottles the poorer the drainage. As a general rule of thumb the following table indicates the drainage status of a soil

Details	Description
There are grayish mottles in the topsoil	very poorly drained
There are significant gray mottles right up to the base of the topsoil or many orange mottles within 20 cm	poorly drained
There significant gray mottles below 40 cm	imperfectly drained
gray mottles are present below 60 cm	moderately well drained
gray mottling occurs below 80 cm or no mottles within 1 metre	well drained