Soil potential
Soil potential only becomes a meaningful term if it is specified in terms of a specific crop. A soil type which is not suitable for the production of dryland maize can, for example, be ideal for pastures.

Factors determining soil potential

**Soil colour**

Red: good drainage

Yellow: less dry than red soils

Grey: waterlogged soils

Black: high humus content

Brown (usually the topsoil): presence of organic matter

Mottling in the subsoil: varying watertable.

**Soil texture**

Soil texture is the proportion of sand, silt and clay particles.

◊ Sandy soils have a rapid infiltration rate but poor water retention capacity.

◊ Clayey soils have a slow infiltration rate but a good water retention capacity. These soils are also more fertile than sandy soils because plant nutrients are retained.
Soil depth

This gives an indication of the soil volume which can be utilised by the plant and which is conducive to moisture retention.

◊ Effective soil depth is the depth where adequate moisture, nutrients and air occur.

◊ Effective soil depth can be lowered by rocky layers, a high clay content, waterlogged layers, limestone layers, acid subsoil and compacted layers.

◊ Various crops have different requirements concerning effective soil depth.

Soil structure

Structure indicates the natural cohesion of soil particles when forming larger parts.

◊ Structureless soils are loose and sandy. These soils usually comprise high-potential agricultural land.

◊ Structured soils have a high clay content in the form of blocks or prisms and a low to marginal agricultural potential.

Rainfall

Various soils react in different ways to rain.

◊ Sandy soils absorb water quickly, but dry out soon.

◊ Clayey soils take long to absorb water but retain moisture for a longer period.

◊ Shallow soils store less water and waterlogging could be a problem.

◊ Deep soils store greater quantities of water.
Position and inclination

The inclination or position in the landscape determines if the water will move in the direction of the soil or away from it. Land on summit areas will receive less runoff than lands at the lower end of an incline. Soil erosion can result if steep inclines are cultivated.

General guidelines

◊ Soil classification is recommended when determining the potential of a specific soil type.
◊ Cultivate crops which are adapted to the soil type.
◊ Crop requirements should be considered.
◊ Using soils for the wrong purpose can cause irreparable deterioration.

Soil fertility

Soil fertility refers to the capacity of the soil to provide plant nutrients to actively growing plants.

Nutrients

Plants require certain nutrients to ensure optimum growth and production.

Carbon, oxygen and hydrogen are readily available in the air and water.

Nitrogen promotes optimum growth and is needed for good colour development.

Phosphorus promotes root development.

Potassium influences quality, vigour and firmness of the plant.

Calcium promotes protein formation and cell growth (general plant vigour).
Soil acidity

◊ The pH of a soil is an indication of soil acidity.
◊ Acid soils have a pH of below 7.
◊ Most plants grow optimally at a pH (water) of 5.5 to 7.0 and a pH (KCl) of 4.5 to 6.0.
◊ If the crop’s soil acidity requirements are not known, a pH (KCl) of 4.7 to 5.0 should be the goal.
◊ If the soil pH is unfavourable the quantity of available plant nutrients is limited, resulting in ultimate yield loss.
◊ Lime is applied to increase the pH of the soil.

Fertilisation

Organic fertilisation

Organic fertilisers, such as cow dung, poultry manure and guano contain all the nutrients needed for plant growth.

Poultry manure contains the highest proportion of plant nutrients, followed by sheep and horse manure, cow dung and lastly pig manure.

Chemical fertilisation

Chemical fertilisers contain a high percentage of nitrogen, phosphorus and potassium. Injudicious use of these fertilisers can cause damage to plants as well as the soil. Soil analyses give a reliable indication of nutrient deficiencies.
Soil sampling

A soil sample indicates:

◊ The quantity of plant nutrients needed in the soil as well as the type of nutrients.
◊ Which type of fertiliser to apply.
◊ The quantity of fertiliser.
◊ Area where fertiliser has to be applied.

Soil sample

A soil sample consists of several subsamples. Subsamples are obtained from various localities in a land. A topsoil subsample contains soil from the upper 250 mm of soil at a specific locality in the land unit. All the subsamples are added and mixed to form a representative sample for analysis.

Land unit

If large areas of a land differ in colour, depth and texture, each land unit should be sampled separately. If these differences comprise only a small area these areas can be ignored during sampling.

General guidelines for taking samples

◊ Use a clean bag (not a used fertiliser, lime or salt bag or pesticide containers).
◊ A sample should consist of at least 1 kg of soil.
◊ Mark the sample clearly.
◊ Fresh soil samples should be taken after 3 years.