

Spotlight on Agriculture

Ministry of Agriculture, Water and Rural Development • Directorate of Agricultural Research and Training • Private Bag 13184 • Windhoek

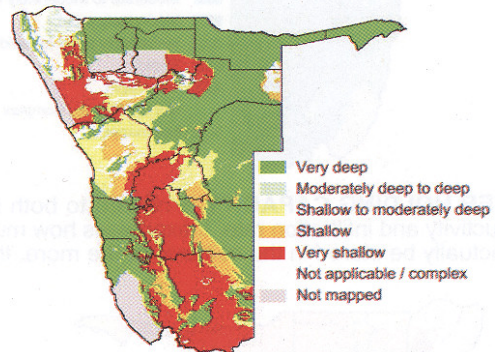
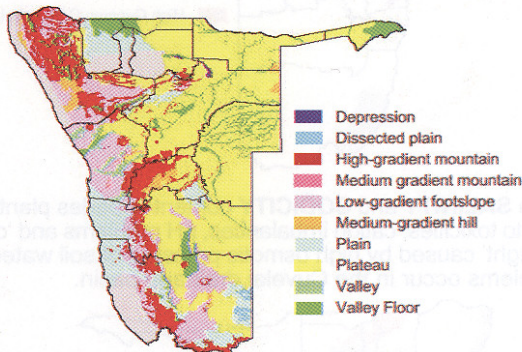
No 65 March 2003

Characteristics of Namibian soils in a nutshell

Some of the interesting characteristics of DOMINANT soils, as mapped on the 1:1 million scale Soil Map of Namibia (2000), are displayed and their importance to crop production briefly explained. A DOMINANT soil occupies the largest area of a mapping unit. The remainder is occupied by ASSOCIATED soils (covering 10 - 25 % of the area) and / or INCLUDED soils (covering 0 - 10% of the area). It must be noted that pockets of these associated and / or included soils, with characteristics completely different from those of the dominant soil, will occur in most mapping units. An unfavourable characteristic of the dominant soil does not, therefore, necessarily disqualify a mapping unit completely from use for crop production.

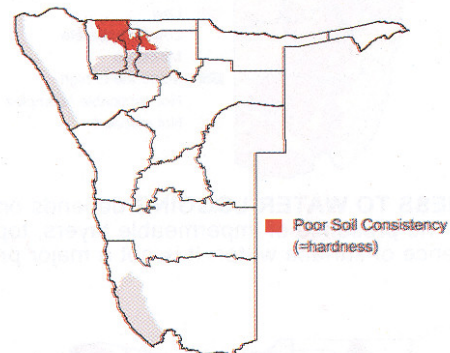
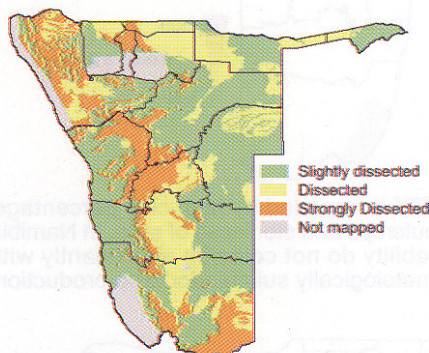
LANDFORM and soil properties are intimately linked. In Namibia, the areas with high enough rainfall coincides with favourable landforms for dry-land cropping: almost flat to gently undulating plains, plateaux and valley floors with low local relief. These favourable characteristics promote uniformity of soils, ease of cultivation and lower the risk of water erosion.

ROOTING DEPTH is very important for crops, as this defines the soil volume available to roots to find moisture and nutrients. The deeper the soils, the more water and nutrients can be tapped by the plant. Many parts of Namibia have shallow soils: unfavourable for crop production, but natural vegetation had adapted to the situation.



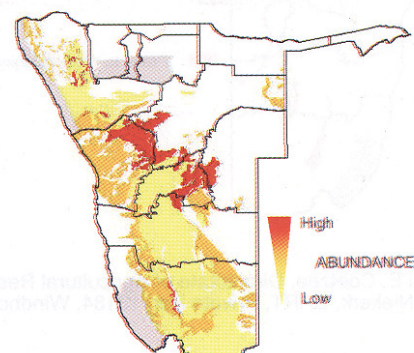
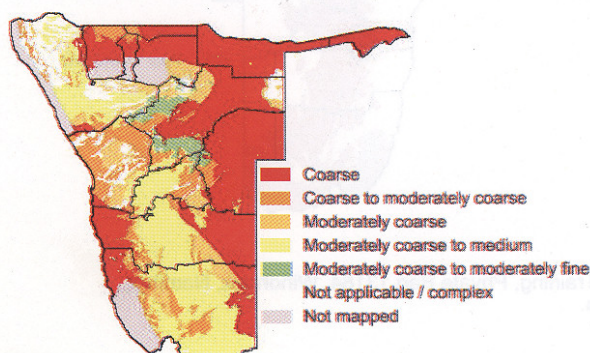
DEGREE OF DISSECTION indicates how extensively land is incised by (natural) gullies, streams and rivers, i.e. how 'broken' the landscape is. An escarpment is more incised or dissected than a sandy plain.

CONSISTENCY is a measure of the hardness of soil. Hard soils, shown here in red, limit root penetration and thus impede plant growth. Poor ploughing practices can worsen the situation by forming a so-called 'plough-sole'.

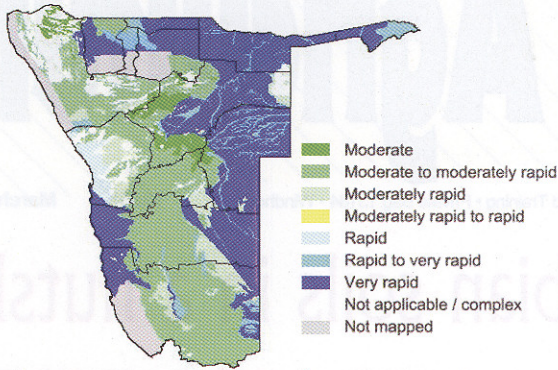


TEXTURE has a great effect on many soil qualities, such as water- and nutrient storage capacity. Very coarse (sandy) and very fine (clayey) soils are both undesirable. Those of medium texture are best for crop production.

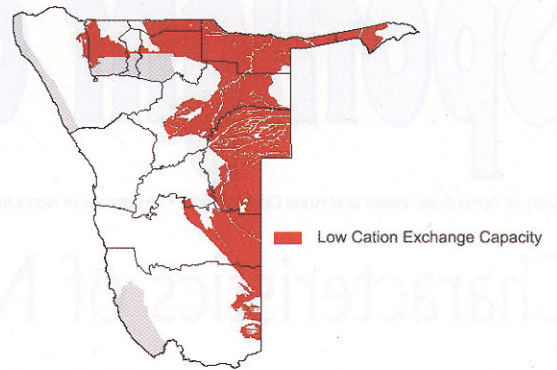
The presence of **ROCK FRAGMENTS** decreases the volume of soil available for nutrient and water storage and thus impedes plant growth. Large areas of western-, central- and southern Namibia are affected by this problem.



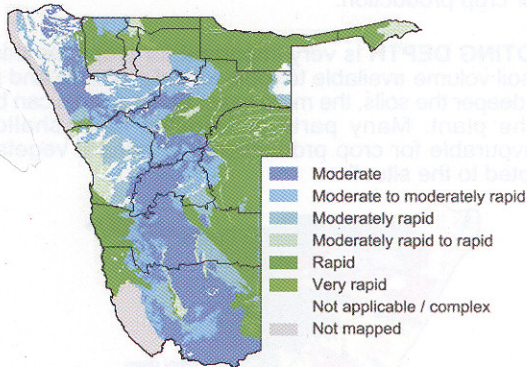
HYDRAULIC CONDUCTIVITY is a measure of internal drainage. It is determined by soil texture, soil structure and the presence of impermeable layers. Moderate hydraulic conductivity is most desirable.



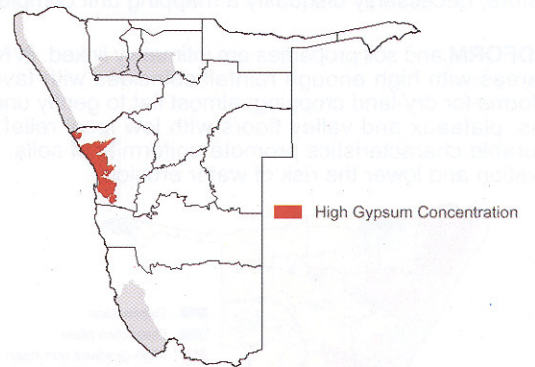
The **CATION EXCHANGE CAPACITY (CEC)** is an indicator of nutrient storage capacity of soils. It depends on texture, type of clay minerals present and organic matter content. High CEC is most desirable.



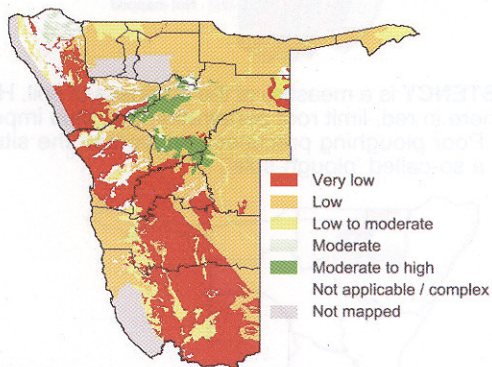
INFILTRATION RATE is a function of topography, texture, organic matter content, surface stoniness and surface sealing by crusts. A low infiltration rate promotes higher run-off, with less water available to roots and higher erosion rates.



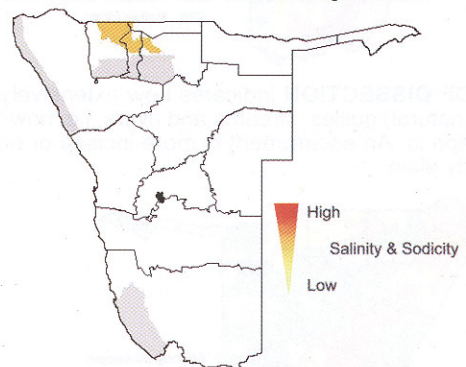
High **GYPSUM** content is undesirable as it impedes plant growth. In Namibia the desert soils contain high gypsum concentrations. High gypsum is not an economically significant problem of crop production in Namibia.



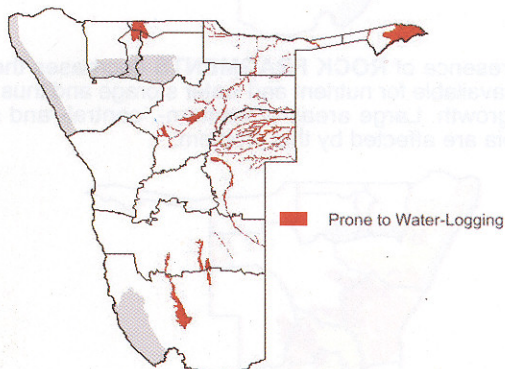
WATER HOLDING CAPACITY is related to both hydraulic conductivity and infiltration rate. It expresses how much water can actually be stored in the soil profile: the more, the better.



High **SALINITY** and **SODICITY** content impedes plant growth, due to toxicities, cation imbalances, pH problems and 'chemical drought' caused by high osmotic pressure of soil water. These problems occur in the Cuvelai drainage basin.



PRONENESS TO WATER-LOGGING depends on texture, structure, the presence of impermeable layers, topography and presence of surface water. It is not a major problem in Namibia.



WORKABILITY is impeded by high clay percentage, steep slopes, rock outcrops and stoniness of soils. In Namibia, areas of poor workability do not coincide significantly with areas which are climatologically suitable for crop production.

