High Salinity in Arid Areas

Because of physically and chemically weathering salts are continuously released to the soil. Under humid climatic conditions a desalinification caused by washing-out with gravitation water starts in the course of the terrestrial soil development. That is why the risk of a soil salinity is small.

Under arid climatic conditions the salt displacement is converted. After periodical rainfalls or artificial irrigation water, soluable salts move with the help of the capillary flow, caused by evaporation, on top of the soil surface. On the soil surface the salts are enriched. The degree of salinity depends on

- the salt content of the soil material,
- the intensity of artificial irrigation,
- the salt content of the used irrigation water,
- the salt content of possible ground water (e. g. nearness to the sea) and
- the quantity of salty fertilizers.

In arid climate artificial irrigation often causes a change between extremely desiccation and wetting of the top soil. The irrigation supplies the soil with larger quantities of dissolved nutrients. The result of this is a salt accumulation, provided that the quantity of supplied ions is higher than the quantity lead away by washing-out and plant ingestion. As the washing out in arid areas is very low, water with a low salt content can cause a considerable salinity. On uncultivated areas 300 mm irrigation water with a content of 0,03 % soluable salts only, leave about 900 kg salts per hectare annually.

The Effect of Salts on Soil Property

Salts influence the availability of water in the soil for plants. The salt concentration in the soil also influences the constitution of cations in the colloid system (clay minerals, organic colloids). A surplus of Na^+ leads to a displacement of other cations (Ca, Mg, K) of the cation exchange capacity.

The Effect of Salts on Plants

Salts have an effect on the protoplasm of the plants because of their osmotic bond of water and their specific effectiveness of ions. As salt solutions bind water, water is not available more and more. A 0,5 % NaCl-solution holds the water with a suction of 4,2 bar, a 1 % solution with 8,3 bar, and a 3 % solution with 20 bar. If the salinity in the soil is higher than 2000 - 4000 micro mhos/cm (measured in electric conductivity) the plant growth is clearly reduced.

Plants can only ingest water for their own demand, if the plants have a greater suction on the water than the diluted salts in the soil. The plant's water ingestion is even more productive, the larger the absorbing surface of the root system is.

SW-Düngesysteme GmbH
Am Exer 10 b
38302 Wolfenbüttel
Germany

Telefon: (++49 53 31) 90 31 10
Telefax: (++49 53 31) 90 31 29
e-mail: info@sw-duenger.de
Internet: www.sw-duenger.de

The plants can be damaged, if they ingest too much sodium and chloride ions solved in the soil water. A surplus of Na^+ and Cl^- has a very swelling effect on the cell structure and influences the Aity of the enzymes. The plants die if a certain content of NaCl in the protoplasm is reached. This depends on the certain salt resistancy of the plants.

In arid areas a too high salt content in the soil (osmotic bond of water) and a too high ingestion of NaCl of the plants is dangerous for the plants.

The Effect of Salts on Micro-organisms

A high salinity in the soil effects the micro-organisms reduction of enzyme Aity and of microbial Aity at the same time. Only a few adaptable and salt resistant species survive when the salinity is rising.

How *TURF* Reduces the negative Salt Effect

For grassing arid locations the following has to be considered:

1. The salinity (measured in electric conductivity) in the soil should not exceed 2000 to 4000 micro mhos/cm.

2. The pollution of sodium chloride should not be too high. The limit of concentration depend on the soil and salt amicability of the establishing plants.

Under arid conditions and salinity ***TURF*** has the following effect:

1. The soil is supplied with organic colloids in order to bond water-soluable colloid. Thus the osmotic water bond is reduced by ions. In this case ***TURF*** *activ* is used, which has an effect as a colloid in the soil.

2. The plants need an optimal nutrient supply, which is free of any additional salinity. ***TURF*** *forte* is a nutrient resource in the long term.

3. ***TURF*** *activ* and ***TURF*** *forte* in combination considerably stimulate the root growth. The roots grow and get into deeper soil layers. Thus the water storage in the soil is optimally used.

4. ***TURF*** *activ* and ***TURF*** *forte* stimulate the microbial soil life and together with the root growth the organic mass in the soil is considerably increased. The increase of organic mass in the soil improves the colloidal bond of ions and due to this, the osmotic bond of water by ions.

SW-Düngesysteme GmbH
Am Exer 10 b
38302 Wolfenbüttel
Germany

Telefon: (++49 53 31) 90 31 10
Telefax: (++49 53 31) 90 31 29
e-mail: info@sw-duenger.de
Internet: www.sw-duenger.de