Water for Profit

Managing irrigation salinity

Introduction

Salt is present in many irrigation areas throughout Queensland, particularly those that rely on groundwater supplies. Effective salinity management is crucial to ensure both environmental and economic sustainability.

What is salinity compared to sodicity?

Salinity is characterised by high electrical conductivities and low sodium ion concentrations compared to calcium and magnesium. Sodicity is characterised by low electrical conductivities and high sodium ion concentrations compared to calcium and magnesium. Situations that have both high electrical conductivities and high sodium ion concentrations are called saline-sodic.

Effect or salinity on crop performance

Salts are found naturally in soils, rainfall, irrigation water and groundwater. Salinity affects the growth of plants' leaves and roots. It lowers a plant's ability to extract water from the soil and causes poor germination and crop establishment and growth. Different salts have different effects on plant growth. Chloride toxicity can accompany salinity problems if present.

Effect of salinity on water uptake

Plants actually use salts to transfer water from outside the root into the root for use by the plant. In low salinity situations, plants move salts through the root creating a salinity concentration gradient between the root and the soil. Water moves into the root to dilute the salt concentration and is subsequently used by the plant for transpiration. When salinity levels increase, plants cannot load enough salt into the root to create the gradient and water doesn't move into the root. The plant is undergoing a stress similar to drought, even though plenty of water may be present. All crops can cope with different salt concentrations before stress becomes apparent.

Management strategies

All management strategies revolve around reducing or removing the salt from the irrigation system. Once it has been established that a salinity problem exists several management strategies can be employed.

- change the salinity concentrations in the irrigation water to reduce the salinity levels experienced in the soil. Use a less salty source if available. Mix fresh water with saltier water, either during every irrigation or by alternating he sources during the irrigation schedule. Establish a crop rotation utilising both salt sensitive and salt tolerant crops. Use the less salty water source on the less salt tolerant crop and the saltier water on the more salt tolerant crop.
- apply a leaching fraction to reduce the salinity in the soil. Applying a leaching fraction will remove salts from the root zone and reduce the salt's impact on crop growth.

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Managing irrigation salinity continued

Monitoring is required to determine whether a leaching fraction has occurred and to ensure that the leaching is not contaminating groundwater or stream flows.

- increase the efficiency of your irrigation system and reduce the volume of over-irrigation. Inefficient systems have ‘dry spots’ and ‘wet spots’. Irrigators have to over-irrigate to ensure that the ‘dry spots’ are wet enough. In the process they over-irrigate the ‘wet spots’. Applying the water evenly will reduce the volume of water and salt being put into the soil.
- reduce soil surface evaporation. Keeping the water in the soil will lower the salt concentrations. Mulching, either with organic matter or plastic mulches is effective. This is particularly effective in shallow rooted crops and during germination and establishment of crops.

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