

# Nutrition and salinity management in cotton

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Excess salt ions in the soil or from irrigation water can cause salinity and limit cotton production. Management of crop nutrition needs to consider these factors to maximise crop yield and profits and to ensure sustainability.

Salinity is currently a problem on only a limited number of cotton farms in Australia, but is a threat to many. It can be caused by irrigating with saline water. Or rising or perched water tables can bring dissolved salt to the soil surface. The excess salts that cause salinity are mainly sodium chloride (NaCl) or calcium sulphate (Ca<sub>2</sub>SO<sub>4</sub>). Salinity causes damage to the soil structure — including dispersion, erosion and waterlogging.

Salinity has two main impacts on cotton plant nutrition. The first is the osmotic effect — remember high school chemistry? This happens when the salt concentration in the soil solution exceeds the salt concentration inside plant roots. This causes water to move out of the roots. In extreme cases plants can be left severely dehydrated.

The second impact of salinity on plant nutrition is a specific ion effect which has two outcomes. Saline soil can cause toxic accumulation of ions — sodium and chloride — inside plant cells, which hinder vital physiological processes. Also these ions have an antagonistic effect on the uptake of other essential nutrients. Table 1 shows some of the specific ion effects that can occur in saline soil.

Because of these effects, it is vital that Zn, K, P and N nutrition are monitored as they may be limiting plant growth in a saline soil.

Fertilisers must be chosen carefully. For potassium, a common form of K fertiliser is KCl (muriate of potash) but this is unsuitable in saline soil. But fertilisers rich in K can be an efficient way of combating sodium-induced stress in cotton plants. Also nitrate can eliminate effects of high chloride concentrations in soil and water.

Irrigation management will also impact on nutrition of saline soil. Frequent light watering, using sub surface drip or sprinklers, can help leach excess salts without allowing excess deep drainage to contribute to water table problems. Knowing what this leaching fraction is will help growers manage irrigation and nutrition while improving salinity problems.

An important thing to remember about cotton is

**TABLE 1: Specific ion effect**

Ions accumulating in plant cells	Ions inhibited from entering plant
Na <sup>+</sup>	Zn <sup>2+</sup>
Ca <sup>2+</sup>	K <sup>+</sup>
SO <sub>4</sub> <sup>2-</sup>	PO <sub>4</sub> <sup>3-</sup>
Cl <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>



Although salinity is only a problem on a few cotton farms at the moment, it is a threat to many.

it can tolerate higher salinity levels than some other crops. It may be the best cropping option if pro-active management is dealing with the problem at the same time.

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