Salinity – Part 2

Salinity management

In this issue of "Vitality" we will take a closer look at some of the sources of salinity and how to manage it.

Sources of salts

As mentioned in the last issue, not all salts are necessarily harmful, depending on their composition, and there may be a wide range of sources to a single salt problem. They fall into three main categories:

Existing salinity issues

Some soils have existing salinity issues or are more prone to developing salinity problems. This is often related to shallow water tables with saline groundwater, and may be exacerbated by poor irrigation and/or vegetation management. In some cases, off-site management practices have resulted in rising watertables further down the catchment. Sandy soils and "duplex" soils tend to be more prone to expressing salinity problems due to their lower buffering capacity and natural presence in areas more likely to experience saline water.

Fertiliser

Different fertilisers have different salt levels and may affect soil salinity differently. This is most easily assessed by looking at the salt index of each fertiliser. The salt index (SI) of a fertiliser tells us how salty that fertiliser is – the higher the SI, the more salt the fertiliser contains and the more potential it has to contribute to salinity issues. For example, muriate of potash (potassium chloride) has a SI of around 114, and is approximately 46% chloride, which can reduce uptake of some nutrients, has potential toxicity issues of its own, and has been linked to increased cadmium uptake. Sulphate of potash (potassium sulphate), on the other hand, has a SI of about 46, and contains approximately 17% sulphur, which is a plant nutrient. Of these two fertilisers, muriate of potash carries a much higher risk of contributing to salinity issues.

Water

Irrigation water is an often unrecognised source of salinity, particularly where salt-sensitive crops are concerned. Salts may be naturally present, such as in many groundwater systems (extracted through bores), or they may have accumulated in a river system or dam through inputs from further upstream and/or evaporation.

Managing salinity

If soil/water/plant sap monitoring is undertaken, it is likely that a potential salinity issue can be identified and managed appropriately before it becomes a problem. The longer the issue is left, the

more difficult it becomes to deal with and fewer options become available. Once symptoms are noticeable, you have already experienced an economic loss through reduced crop productivity.

Choosing low-salt-index fertilisers will reduce salt inputs into the crop and soil; often, the lower SI options contribute more than one nutrient to the crop, as well (eg potassium sulphate contributes both K and S, potassium nitrate contributes both K and N, but potassium chloride only contributes K). Changing the irrigation frequency to a more pronounced wetting and drying pattern is also often used as part of a salinity management program, as the wetting part of the cycle helps wash the salts from the profile – if the soil stays moist all the time, the salts tend to stay put and accumulate, rather than being flushed away. Where saline water is an issue, it may be possible to dilute the saline water with fresher water if another source is available, but in many cases this is not an option. Some commercial products are available to help reduce salinity levels in soil and water; however, these should be considered short-term solutions, as they do not address the long-term issues that are causing the salinity problem to exist.

Early-stages

If caught early enough, salinity may not impact on production at all, or the loss in production may be so minor that it does not have a significant impact. In these cases, careful fertiliser and irrigation management can take an existing crop through to harvest and maintain productivity in the future. There is even the possibility of reversing salinisation of land through careful management, particularly where external influences are minimal.

Moderate salinity issues

Some salinity issues are considerable enough to warrant more significant changes to agricultural practices, which, in addition to fertiliser and irrigation management, may also include switching to more salt-tolerant crops or varieties (eg from wheat to triticale).

Severe salinity problems

Once a salinity issue has become a serious problem, there are often very few productive options available, other than establishing highly salt-tolerant species in the affected area and making sure the problem does not spread through careful management of surrounding areas. If a salt-tolerant crop is to be grazed, bear in mind that the stock will need access to good-quality drinking water to offset the high salt levels in their feed, and that there is a risk of translocating the salt through their manure. Care also needs to be taken to not expose the soil, as this can not only make the salinity issue worse, but can also lead to erosion issues, which then compounds the problem.

As the saying goes, prevention is better than cure, so it is important to establish management practices that minimise your risk of being affected by salinity and monitor your crops (and soils and water) to keep track of progress.

If you suspect salt may be an issue, undertake testing to determine if this is the case and establish the extent. You should discuss the available options with your agronomist or trusted consultant, as not all management solutions are appropriate for all situations. Most state government agriculture departments can provide good advice as well.