SALINE IRRIGATION WATER

Salinity

Irrigation water that contains high levels of total soluble salts (Sodium Chloride) can affect the growth and yield of all crops.

If salinity is identified as an issue on your property, you need to understand and apply a variety of good management practices that reduce the salinity impacts.

Sodicity is a soil property which is associated with irrigating with saline or brackish water, as a result of the accumulation of too much sodium leading to the structural decline of the soil.

Monitoring Notes

- Testing a soil sample is a more reliable assessment of the amount of salt actually affecting vegetable crops. Surface water tests provide a reading that is only accurate at the time of testing.
- The salinity of irrigation water can change sharply in a short space of time, so test water salinity regularly.

Note that irrigation water coming from different sources (river water, recycled water, dam water and groundwater) will vary significantly in salinity levels.

Sodium Chloride

Many of the effects of sodium and chloride are commonly found together in soil and water.

Sodium is not an essential element with most plants being natrophobic (sodium hating) and having mechanisms to exclude sodium from uptake by the roots.

Chloride is an essential plant micro-nutrient and is easily absorbed through the roots and leaves of the crop. However, high concentrations can lead to chloride toxicity and can also reduce production through imbalances with other nutrients.

Measuring Electrical Conductivity (EC) Levels

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Knowing your EC levels will help in vegetable production and monitoring of inputs.

Portable electrical conductivity (EC) meters are inexpensive tools to measure EC.

Measuring EC in water solutions is fairly simple. The meter is calibrated and then the sensor is submersed into a sample from the water supply.

Note: Adding fertiliser to irrigation water increases EC readings because fertiliser's are salts.

Most Australian laboratories use a 1-part soil: 5-part water suspension method to determine soil EC1:5. Other methods can determine the amount of TDS directly.

How does salinity affect crop production?

Soil salinity generally affects plant growth by making it more difficult for the plants to absorb water from the soil. Excessive uptake of salts by plants from the soil may also have a direct toxic effect on the plants. Sodium in irrigation water can also damage plants causing leaf burn and scorch.

Crops vary considerably in their capacity to withstand adverse effects of salinity.

Salt rings around capsicum seedlings (Bolivar water)

Irrigation management with salty water

Salts are most damaging to plants when the soil is dry. For this reason, any means of maintaining or replenishing soil moisture content will help to avoid salt damage to plants. This can be assisted by the following management techniques:

1. In glasshouse environments with mounded beds on the NAP, frequent but not heavy watering is recommended for saline soils rather than infrequent heavy watering. This is because most of the subsoil is heavy clay and heavy watering will build up an excess of water on top of the clay layer, called a "perched water table". Heavy watering will only help dissolve salts and leach them down and out of the plant root zone in sandy soil types.
2. Incorporation of low salt organic matter such as compost will also help to reduce the injurious effects of salts because the soil will be able to hold more water, and salt concentration will thereby be diluted.
3. Incorporation of low salt gypsum and lime will help to break up the heavy clay layers, improving the soil structure and therefore allowing better leaching of salt.

Water High in Soluble Salts

The effect of salty irrigation water on crop yields can be reduced by good management.

Salinity refers to the presence of soluble salts in soil or water.

Salt is naturally present in soils, and most irrigation water supply systems. The most common salt causing salinity is sodium chloride, but there may be a range of other salts such as magnesium, calcium or potassium present from other farm practices.

Saline soil conditions can also cause soil to become sodic. If sodium is present in high amounts in poor quality irrigation water, it may replace calcium attached to the clay particles. Soil then becomes sodic, causing soil structural decline and is more prone to waterlogging and hard setting when dry. Hence, there is a close relationship between salinity and sodicity.

Sodic soil problems can be improved through the application of gypsum.

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