

Vegetable ~~Matters of~~ Facts

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Salinity

Irrigating Vegetable Crops with Water High in Soluble Salts

Irrigation water that contains high levels of total soluble salts (salinity) can affect the growth and yield of vegetables.

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

It is important to:

- Maintain adequate soil moisture at all times.
- Schedule irrigations to match crop water requirements.
- Allow a leaching fraction above demand to reduce salt build up.
- Regularly monitor salinity levels.
- Use good irrigation practices.

What is Salinity?

This refers to the presence of soluble salts in soil or water. Salt is naturally present in soils, surface water and groundwater 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.

Salinity is usually measured as the electrical conductivity (EC) of water or soil solution. EC is a good indicator of total dissolved salts (TDS). Most Australian laboratories use a 1-part soil: 5-part water suspension method to determine soil EC_{1:5}. 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.
- Saline water applied through sprinkler irrigation, depending on the concentration of salts, can also damage the leaves by burning the leaf edge.
- 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.



Measuring Your EC Levels

Knowing your EC levels will help in vegetable production and monitoring of inputs. Portable electrical conductivity (EC) meter (pictured left) is an inexpensive tool to measure EC.

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

Adding fertiliser to irrigation water increases EC because fertilisers are salts. Therefore it is very important to check the EC of the fertigation solution.

Some EC meters record pH, EC, TDS and temperature.

Irrigation management of salty water

Salts are most damaging to plants when the soil is dry.

1. For this reason, any means of maintaining or replenishing soil moisture content will help to avoid salt damage to plants.

2. Infrequent but heavy watering is recommended for saline soils rather than frequent, light watering. This is because heavy watering will help dissolve salts and leach them down and out of the plant root zone. This excess water used for leaching is called the "leaching requirement".

3. Incorporation of low salt containing organic matter such as peat or 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.

Fertilisation and nutrient management using recycled water

Recycled water contains varying levels of plant nutrients, some in significant amounts. A comprehensive nutrient plan will consider soil fertility, crop requirements and removal, nutrient content of recycled water, crop rotation and potential losses through volatilisation, leaching or run-off.

Irrigation Practices

- Use infrequent heavy irrigations.
- Irrigate at night or early morning to avoid evaporation loss and concentration of salts on leaves.
- Trickle irrigation is better than overhead spray irrigation.
- Try not to irrigate in windy weather to get an even distribution.
- Do not irrigate as a fine mist.
- Do not water under hot windy conditions.
- Schedule irrigations based on crop needs using evaporation figures, tensiometers or other irrigation scheduling equipment.

Disease Management

- Long periods of leaf wetness can also lead to increased pressure for some diseases such as septoria on lettuce.
- This should also be taken into account when timing irrigations in conjunction with weather conditions.
- Warm nights during summer are unlikely to have little impact on disease.
- But if plants are likely to remain wet for an extended period the best time to irrigate may be from 4.00 am.

Soil salt tolerance of vegetable crops

Artichoke	Moderately Tolerant
Broccoli	Moderately Sensitive
Cabbage	Moderately Sensitive
Carrot	Sensitive
Cauliflower	Moderately Sensitive
Celery	Moderately Sensitive
Lettuce	Moderately Sensitive
Onion	Moderately Sensitive
Potato	Moderately Sensitive
Radish	Moderately Sensitive
Spinach	Moderately Sensitive
Pumpkins	Moderately Sensitive
Tomato	Moderately Sensitive

For salt thresholds and yield reduction see the Vegetable Matter of Facts Number 38, Salinity Unit Converter

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 can change sharply in a short space of time, so test water salinity regularly.
- Note that irrigation water coming from different sources (channel/river water, recycled water, catchment/dam water and groundwater) will vary in salinity levels.

For more information on soil/water salinity please

See the Vegetable Matters of Fact Number
38
Salinity Unit Converter
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<http://www.dpi.vic.gov.au/vegcheque>

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