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Gardennote

Water quality in home gardens

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A reticulated home garden

Introduction

Those of us using scheme water for reticulation can usually be assured of good quality water, low in salt levels. Many gardens, however, are equipped with wells or bores that use groundwater supplies. These water sources can contain salt levels that are harmful to plant growth and the physical conditions of soil. Water quality can also affect fertility needs, system performance and longevity, and how the water can be applied. Because of this, knowledge of water quality is critical to understanding what management is necessary for a healthy garden. Home gardeners should have their bore water tested before applying it to the garden. A number of analytical laboratories will analyse water (see yellow pages). A fee for this service is charged in most circumstances. Also be aware that bore water quality changes with the seasons. This Gardennote will help in interpreting test results.

Water quality criteria

There are a number of factors in reticulated water that can be tested. For Western Australian home gardeners, it is usually enough to test total soluble salts, total solids, pH, iron content and, in arid regions, the boron content.

Salinity hazard — total soluble salt content

Total soluble salts are usually measured by the electrical conductivity of the water and are quoted as millisiemens per metre (mS/m). Multiply the conductivity (in mS/m) by 5.5 to convert approximately to milligrams per litre (mg/L) or parts per million (ppm). The suitability of water for reticulation and home gardens is influenced not only by the total soluble salts and their composition, but also by the type of soil and its drainage, the climate and the rainfall. Salts accumulating in the soil from the reticulated water often causes a salt problem.

If reticulated water is salty

Seedlings are more sensitive to salt than mature plants. In salty situations, it may help to grow seedlings using good soil in containers that break down when the plants are placed in their permanent positions. Saline water can be used more successfully on a well-drained light soil than on a poorly-drained heavy soil, and also in districts where high seasonal rainfall leaches the salts accumulated in the soil. Trickle systems can reduce the effects of salinity by maintaining a continuously moist soil around the plant roots and providing steady leaching of salt to the edge of the wetted zone. If saline water is used for sprinkler systems, it is important to reduce evaporation.

Water at night, early in the morning, or late evening when the air is more humid. Watering in the heat of the day or during high winds concentrates the salts due to the high evaporation. Do not use sprinklers that produce fine droplets and avoid intermittent (knocker type) sprinklers if possible - especially slow revolution sprinklers - that allow drying periods, and cause salt to build up on the leaves.

Generally, 635 mS/m (or 3500 mg/L) of total salts is regarded as the maximum safe level for watering of any plants. With this salt content, drainage must be excellent and each watering should apply enough water to leach accumulated salts below the roots of plants. Keep the water off the leaves to avoid burning. Where reticulation is used infrequently or only for short periods during the year, more saline water may be used. When watering with saline water, closely observe the growth and condition of plants or herbage. Saline water can cause considerable yield loss before symptoms of leaf burn become obvious.

Testing water for total soluble salts

Samples should be at least 500 mL in a clear glass or plastic bottle, previously well rinsed with the water to be sampled. Use a clean screw cap, cork or stopper to seal the bottle, and mark the bottle itself with the sender's name and address, and the date of sampling. A number of laboratories are listed in the yellow pages under 'Analysis'.

Tolerance of common plants to total salts in reticulated water

The tolerance of plants to salt water varies. In the information below, plants are arranged in approximate order to salt tolerance in each group, with the least tolerant listed first. The difference between two or three plants near one another in each row is small. These plant and water groups are only a general guide, as soil texture and drainage could be overriding factors. Plants listed as suitable for salty waters will nevertheless grow better with less salty water.

Total solids in reticulation water

High levels of total solids such as clay or silt in water can cause a number of problems - blocked nozzles and filters, excessive wear of pumps and nozzles, and adsorption of chemical molecules. This tie-up of chemicals, particularly by suspended clay particles, will reduce the effectiveness of some pesticides.

pH and alkalinity

Excessively acid or alkaline water may affect the uptake of nutrients by plants. It also may reduce the performance of some pesticides and damage the reticulation system. The acidity or basicity of reticulation water is expressed as pH (< 7.0 acidic; > 7.0 basic). The normal pH range for reticulation water is from 6.5 to 8.4.

Iron

Many underground waters contain iron. Water containing iron in solution may be clear and colourless when first drawn, but become cloudy and eventually deposit reddish-brown hydrated iron oxide after standing in contact with the air. Iron in water stains clothes, buildings and pathways brown when used in sprinklers on nearby gardens. This can be a problem with sprinkler usage on fruit trees and nursery plants. Iron deposits may block trickle systems. There is no simple method of removing iron, so garden sprinklers should be sited to prevent spraying buildings and places where the stain might be conspicuous.

Boron

In arid areas, excess boron may be a problem in the garden. If the water supply is considered suitable for the garden yet beans and citrus suffer, a check for boron is advisable.

Water group A conductivity 0–90 mS/m

Precautions for reticulation use*
1. Avoid wetting leaves on hot, dry days.
Highly salt-sensitive plants — suggested plants
Fruit: persimmon, passionfruit, strawberry, raspberry, avocado, loquat, almond, stone fruit, citrus fruit, apples, pears.
Vegetables: green beans, parsnips, celery, radish, squash, peas, onion, carrot.
Ornamentals: primula, gardenia, star jasmine, begonia, rose, azalea, camellia, ivy, magnolia, fuchsia.

Water group B conductivity 90–270 mS/m

Precautions for reticulation use*
1. Avoid wetting leaves during daytime.
2. Avoid light, frequent watering.
3. Water quickly and use continuous wetting sprinklers if wetting the leaves.
Mildly salt-sensitive plants — suggested plants
Fruit: mulberry, grape.
Vegetables: cucumber, capsicum, lettuce, sweet corn, rockmelon, potatoes, cauliflower, cabbage, watermelon, broccoli, pumpkin, tomato.
Ornamentals: hibiscus, geranium, gladiolus, bauhinia, zinnia, aster, poinsettia, lantana, *Thuja orientalis*, hop bush, *(Dodonea attenuata)* banana *(Musa* spp*)*, emu bush *(Podocarpus), Juniperus chinensis, Callistemon viminalis.*

Water group C conductivity 270–635 mS/m

Precautions for reticulation use*
1. Avoid wetting leaves of most plants where possible.
2. Adequate leaching necessary.
Slightly salt-sensitive plants — suggested plants
Fruit: olive, fig, pomegranate.
Vegetables: spinach, asparagus, kale, garden beets.
Ornamentals: stock, chrysanthemum, carnation, oleander, rosemary, bougainvillea, vinca, coprosma, *Ficus* spp., false acacia *(Robinia pseudoacacia)*, Queensland pyramid tree *(Lagunaria patersonii)*, NZ Christmas bush *(Metrosiderostomentosa)*, bangalay *(Eucalyptus botryoides)*, river red gum *(E. camaldulensis)*, Rottnest tea tree *(Melaleuca cupressiformis)*, Rottnest cypress *(Callitris robusta)*, *Acacia longifolia*, buffalo grass, kikuyu grass, portulaca, mesembryanthemum, boobialla *(Myoporum acuminatum)*, red mallee *(E. oleosa)*, swamp yate *(E. occidentalis)*, York gum *(E. loxophleba)*, swamp mallet *(E. spathulata)*, couch grass, bamboo, Kondinin blackbutt *(E. kondininensis)*, native pine *(Actinostrobus pyrimidalis)*.

Water group D conductivity 635–2365 mS/m

Precautions for reticulation use*
1. Where possible, do not wet leaves.
2. Excellent drainage and leaching essential.
Salt tolerant plants — suggested plants
Fruit: date palm.
Ornamentals: Canary palm *(Phoenix canariensis)*, salt river gum *(E. sargentii)*, saltwater couch, *Melaleuca thyoides*, salt sheoaks *(Allocasuarina cristata* and *A. glauca)*, tamarisks, saltbushes. *Under average conditions the precautions listed should allow satisfactory growth of the suggested plants. Yield of virtually all plants would be progressively reduced as saltier waters are used.

Further reading

Minimising salt damage in gardens. Department of Agriculture and Food Gardennote 3, November 2003.

When sending or delivering samples, the following information is required:

Collector's name, location (where the specimen was found), full address, telephone number and e-mail address, description of the damage and date collected.

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