AGRI-FACTS
Practical Information for Alberta's Agriculture Industry

Agdex 518-6

High Salt Content in Garden Soil

Salts are a common and natural constituent of all soils. Normally, these salts are present in low amounts in topsoil and plant growth is not affected. Accumulation of salts, through natural means or man's activities, can cause plant growth problems and result in poor growth or death of plants.

Salts can accumulate to high levels in field soils that are located in low lying and poorly drained areas. A white saltcrust on the soil surface often becomes evident when these soils dry out. Avoid purchasing topsoil from such areas for use in the garden or flower bed.

Salts can also accumulate in soil through improper care and management practices. Excessive fertilization or watering with high salt-containing waters are two of the most common ways of causing or aggravating an existing salt problem in soil. Analyze the salt content of well water before using it as an irrigation water source. It is also possible to induce a salinity problem through very heavy additions of soil amendments that have high salt content, e.g., manure, gypsum.

High salt content in soil can cause plant growth problems

Salts are a permanent constituent of soil. Once the salts have accumulated in a soil, there is no chemical treatment that will remove or counteract their adverse effects on plant growth. Special management practices become necessary in order to successfully grow plants on soils with high salt content. Some recommended practices are as follows:

Provide adequate drainage

Digging shallow ditches or trenches to remove surface runoff water will help to reduce salt content in soil and prevent further accumulation. The runoff water will carry away dissolved salts that would otherwise be deposited on the soil surface when the soil dries out. Providing subsoil drainage through installation of perforated plastic pipe or ceramic tile is considerably more difficult and costly but can also be used to prevent further salt build-up by intercepting and removing saline water.

Grow salt tolerant plants

Plants differ widely in their tolerance of high salt content in soil. The growth of some plants may be seriously reduced when grown in high salt containing soil, while more salt tolerant plants such as beets or spinach may only be slightly affected. Table 1 shows the relative salt tolerance of some commonly grown vegetables.

Salt content of soil can be measured accurately in the laboratory. Table 1 gives the salt level in soil, measured in mmhos[1], at which a 50 per cent reduction in plant growth occurs. For example, tomatoes would produce half as well in a soil having a 10 mmhos test as they would in a non-saline soil (less than 1 mmho). Similarly, cucumbers would do half as well in a soil having a test of 4 mmhos as in a non-saline soil.

The first and most common symptom of salt injury is a reduced rate of plant growth. A plant growing on saline soil is smaller than normal, may have darker leaves than normal and will wilt from drought sooner than it would in a non-saline soil. As salinity increases plant growth will cease. Leaf burn, commencing at the tip, will occur with ultimate death of the plant in highly saline soil.

Maintain adequate soil moisture

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.

[1] A mmho is a commonly used measure of salt concentration in soil. A non-saline soil normally has less than 1 mmho.

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Table 1. Relative salt tolerance of vegetables*		
High salt tolerance	**Medium salt tolerance**	**Low salt tolerance**
12 mmhos	**10 mmhos**	**4 mmhos**
beet	tomato	radish
kale	broccoli	celery
asparagus	cabbage	bean
spinach	pepper	
	cauliflower	
	lettuce	
	corn	
	potato	
	muskmelon	
	carrot	
	onion	
	pea	
	squash	
	cucumber	
10 mmhos	**4 mmhos**	**3 mmhos**

* Relative salt tolerance decreases down each column, e.g., tomato is more salt tolerant than cucumber.

Where there is good drainage and a deep water table, infrequent heavy watering is recommended for saline soils rather than frequent light waterings. Heavy watering can help dissolve salts and leach them down and out of the plant rooting zone. However, if the water table is shallow, a heavy irrigation could bring the water table up so close to the surface that capillary flow can carry water (and even more salts) from the water table to the surface.

Low salt containing organic matter such as peat, compost or grass clippings can be incorporated to help reduce the injurious effects of salts. The organic matter increases the soil's water-holding capacity so the salt concentration becomes more diluted. Do not use high salt containing manures as an organic amendment for saline soils.

A soil test provides an accurate way of determining the amount of salt in a soil. Use the soil test results and your knowledge about the relative salt-tolerance of plants to select the most suitable kind of vegetable for a particular soil. Using other management practices such as providing better drainage, timely watering and organic matter amendments will minimize salt damage and allow you to grow a wider range of garden vegetables.

U08/08