Table 24. Guidelines for interpreting the quality of irrigation water.

Item		Minor Problems	Increasing Problems	Severe Problems
*Specific ion toxicity from **ROOT** absorption*				
Sodium	(meq/l)	<3	3 - 9	>9
Chloride	(meq/l)	<4	4 - 10	>10
	(mg/l)	<142	142 - 355	>355
Boron	(mg/l)	<0.5	0.5 - 2	2 - 10
*From **FOLIAR** (sprinkler) absorption*				
Sodium	(meq/l)	<3	>3	---
	(mg/l)	<69	>69	---
Chloride	(meq/l)	<3	>3	---
	(mg/l)	<106	>106	---
NH_4-N (for sensitive crops)	(mg/l)	<5	5 - 30	>30
NO_3-N	(mg/l)	<5	5 - 30	>30
HCO_3^-(sprinklers)	(meq/l)	<1.5	1.5 - 8.5	>8.5
	(mg/l)	<90	90 - 520	>520

antagonistic ion which displaces potassium and can limit availability of iron and manganese in soils. Boron in irrigation water is rarely a problem for turfgrasses because boron accumulates in leaf tips which are removed by regular mowing. However, other landscape plants may be more sensitive to boron levels. High concentration of chloride, sulfate, and bicarbonate ions also can cause specific ornamental plant injury under certain soil conditions. Tables 23 and 24 offer general ranges of elements and some expected results at various concentrations.

SOIL AMENDMENTS

Several soil amendments are used for soil reclamation in conjunction with leaching to remove salts from the rootzone. The soil amendments react with soil sodium to cause it to be released. These released salts must then be leached out of the soil profile. It has been reported that one acre-foot of quality water applied per acre will reduce salinity by about 50 percent whereas two acre-feet per acre passing through one foot of soil will reduce salinity by about 90 percent.

Amendments used for treatment of clay-textured sodic soils include gypsum, sulfur, sulfuric acid, lime sulfur, ferric sulfate, calcium chloride, calcium nitrate, and calcium carbonate. Table 25 lists several amendments and their equivalent amounts to pure gypsum.

Because of their expense, calcium chloride and calcium nitrate are not widely used. Sulfuric acid is dangerous to handle and can be corrosive to some types of equipment. Ferric sulfate and lime sulfur also are usually too expensive for practical applications. Ground limestone is effective on acid soils, but its usefulness drops in high pH soils, which most sodic soils are. Thus, gypsum is the material most often used for reclaiming clay-textured saline soils.

Table 25. Equivalent amounts of several soil amendments in relation to pure gypsum.

Amendment	Equivalence to pure gypsum
Gypsum ($CaSO_4 \cdot 2H_20$)	1.00
Sulfur (S)	0.19
Sulfuric acid (H_2SO_4)	0.61
Ferric sulfate [$Fe_2(SO_4)_3 \cdot 9H_2$)]	1.09
Lime sulfur (CaSx; 9% Ca + 24% S)	0.78
Calcium chloride ($CaCl_2 \cdot H_20$)	0.86
Calcium nitrate [$Ca(NO_3)_2 \cdot H_20$]	1.06

Gypsum

Gypsum is used because of its effectiveness and low price. Gypsum is a by-product of phosphorus acid mining. It is low-to-moderately soluble in water and supplies soluble calcium to replace sodium, as shown: