

sent in high concentrations, it will displace other important nutrients (such as calcium and magnesium), causing them to be leached out more rapidly and thereby inducing nutrient deficiencies in the plant.

Toxicities

Problems associated with saline water sometimes result from toxic effects of chloride or, occasionally, sodium. Chloride or sodium toxicities may develop gradually over a long period of exposure. With some species, sprinkler irrigation may induce toxicity problems because of foliar absorption of chloride or sodium.

Chloride toxicity symptoms include leaf burn starting at the tip of older leaves and progressing back along the edges with increasing severity. Sodium toxicity is characterized by burning on the outer edges of older leaves which progresses inward between the veins as severity increases. Many ornamentals exhibit leaf burn when chloride or sodium levels exceed 0.5 percent of the leaf dry weight. Periodic leaf analysis can detect chloride or sodium accumulation.

Sodium Hazard of Saline Irrigation Water

Use of saline irrigation water may also result in nutritional or soil permeability problems induced by sodium. An excess of sodium in the medium will dislodge nutrients such as calcium and magnesium from the medium and thereby induce deficiencies of these nutrients. In field soils, excess sodium can result in reduced permeability of the soil to water. The U.S. Salinity Laboratory (1954) has developed a formula called the Sodium Absorption Ratio (SAR) to determine the potential hazard due to sodium:

$$\text{SAR} = \text{Na} \div \sqrt[3]{(\text{Ca} + \text{Mg}) \div 2}$$

where Na, Ca, and Mg are expressed in milliequivalents per liter (meq/l). Sodium, calcium, and magnesium values that are expressed in parts per million (ppm) or milligrams per liter (mg/l) can be converted to meq/l by the following formula:

$$\text{meq/l} = \frac{\text{mg/l (or ppm)}}{\text{eq. wt.}}$$

where "eq. wt." is the equivalent weight of the element. Equivalent weights of sodium, calcium, and magnesium are 23, 20, and 12, respectively.

Irrigation water with an SAR value less than 3 is ideal for nursery use, while water with SAR values between 3 and 9 are acceptable for use in