



Solving Sodium Problems

“Agronomic solutions for the golf course”

March 2003

Salt affected turfgrass sites.

Increases in Na create a host of management challenges in maintaining turf quality on a golf course.

High sodium degrades soil structure by destroying larger soil pores (macro pores) leaving smaller pores to dominate the soil. Destruction of soil pore space occurs as soil particles disperse under sodium conditions. A reduction in pore space negatively impacts water infiltration rates, percolation, drainage. These altered physical properties result in decreased carbon dioxide evolution, and lower oxygen concentrations which will impact photosynthesis and plant health.

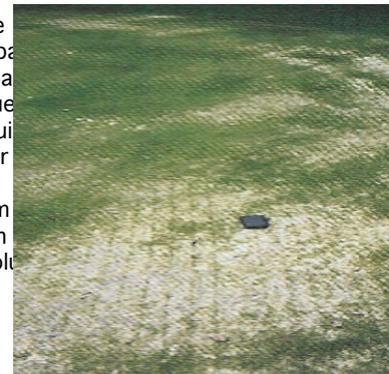
Physiological plant responses triggered as a result of excessive sodium include; increase wilting, desiccation injury, reduced turgor, decrease in hormone (cytokinin) synthesis, and an increase in plant respiration. Many of these plant physiological responses make the turfgrass more prone to diseases, stress, and wear.

Developing a monitoring strat

Water management also plays a role in management of sodium levels and water testing can reveal nutrient imbalances and deficiencies in Ca, Mg, N, Mn, S, P and reveal the sodium hazard of the irrigation water. Maintaining and maximizing nutrient levels in solution with a focus on the elements calcium and potassium in soil is critical in managing excessive sodium. Having soluble calcium available in the soil combined with proper management techniques will aid in removal of sodium from the root zone.

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Soil tests results with higher base saturation levels of Na when compared to potassium indicate a high probability of accumulation of sodium in tissue. High Na depresses K up take, requires salt affected sites to have greater quantities of potassium available. Maintaining a ratio of 2.6 : 1 ppm of K : Na will encourage potassium uptake over sodium. Adequate soluble potassium will reduce sodium accumulation in plant tissue.



Critical issues:

- Water deep and infrequent. Calculate leaching requirement for your site to flush salts from root zone. Use wetting agent to aid flushing of salts.
- Maintain soluble potassium and calcium levels in soil. Keep potassium ppm ratio higher than sodium.
- Monitor sodium hazard through frequent water and soil tests.

Lime, gypsum, and sulfur may not be enough to have an immediate impact on Na accumulation. If sodium is coming from poor quality irrigation water, Na is being continuously added. Lime (CaO) has a low solubility rate and may not supply enough soluble Ca to replace the Na. Having sufficient available calcium keeps soil surface permeable by flocculating soil colloids, thus creating pore space.

Floratine **Trical** liquid calcium adds immediate soil Ca that's soluble. **Calphlex** extends effectiveness of Ca in soil by using a unique chelating process that solubilizes Ca, and helps flush salts from root zone. **Maxiplex** humic acid aids in buffering sodium effects. **Pervade** aids in water movement in poor draining soils. **FG 20 and Turgo** add foliar potassium and silica to counter high Na tissue levels. **ProteSyn** and **Per 4 max** increases stress tolerance, building of new cells, and roots.

Use of Calphlex and TriCal in managing sodium problems

Floratine Program

Soil Applications

Tri Cal : 1 gal per acre
Maxiplex : 2 gal per acre
Calphlex : determine by formula
Pervade : 2 oz per Msf

Foliar Applications

FG20 : 2-4 oz per Msf
Per 4 Max : 2 oz per Msf
ProteSyn : 2-3 oz per Msf
Turgo : 4-6 oz per Msf

* Do not tank mix Maxiplex with Trical or Calphlex.