Understanding Salt Index

WUXAL® Foliar Nutrition

Origin

Salt Index (SI) is a numerical comparison between fertilizer materials in use since 1943. Sodium nitrate ($NaNO_3$) was used as the standard since it was a commonly used, 100% water soluble source of nitrogen at the time. Its SI was set at 100 and other fertilizers are then expressed as a percent of the standard. SI measures the electrical conductivity of a 1% fertilizer solution. Solutions with a high SI have a higher conductivity, an indication of the amount of salt in the solution.

Impact of Salt Content on Plant Cells[1]

When a solution with a high salt content is separated from a solution with a low salt content by a semi-permeable membrane, such as a cell wall, water will move thru the membrane from the low concentration to the high concentration, seeking a balance. If this water movement is out of the cell, plant injury may occur. Traditionally, SI has been utilized as an indication of seedling safety for furrow applied starter fertilizers. Cells in plant seedlings have higher water content than mature plant tissue, therefore they are more vulnerable to movement of water out of the cell. While leaf cell structure is hardier than seedling cells, SI should be considered when selecting foliar fertilizers to reduce the risk of plant injury.

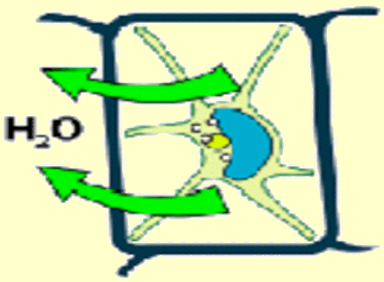
Factors influencing plant injury:

1. Excessively high fertilizer rates.
2. Low spray water volumes.
3. High ambient temperatures.
4. High relative humidity.

These conditions will increase the potential that plant injury may occur when foliar applying a fertilizer solution with a high SI.

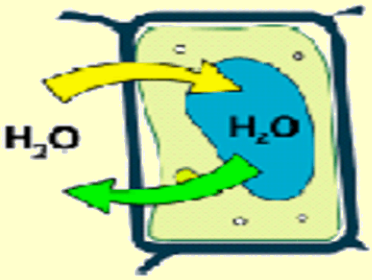
Water Movement Influenced by Salt Content[2]

High SI (hypertonic solution)



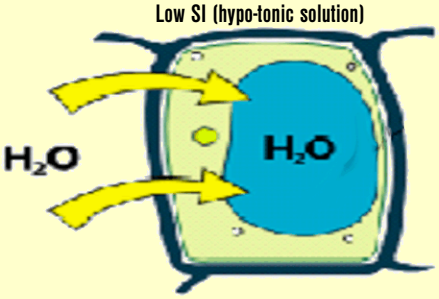
Water will exit across the cell membrane when a solution placed on it has a higher salt concentration than that within the cell. The resulting shrinkage may damage the cell.

Balanced Solution Content (Isotonic)



When in equilibrium, water will move in both directions across the cell membrane.

Low SI (hypo-tonic solution)



Water will enter across the cell membrane when a solution placed on it has a lower salt concentration than that within the cell. The resulting swelling may damage the cell.

Effect on Foliar Fertilizers[3]

Tolerance of foliar applied fertilizers varies considerably by crop. SI values do not predict the amount of a fertilizer or formulation that could produce injury on a plant leaf. It simply compares formulations regarding their concentrations of salt. It does indicate which fertilizers (those with a higher SI) will be more likely to cause plant injury. For foliar applications, spray tank dilution with water significantly reduces the SI of the fertilizer solution, allowing products with a higher SI to be safely applied without crop injury and loss of nutrient efficacy.

Salt Index

Wuxal Suspensions

Product	Analysis	Suspension SI	Use SI[4]
Calcium	10-0-0-10.7Ca	66.3	1.65
Ferro	5-0-0-5Fe	20.4	0.51
Amino Sahara	7-14-7	36.7	0.92
Manganese	5-0-0-6Mn	32.4	0.81
Zinc	5-0-0-6Zn	15.6	0.39
Combi Mn	20-0-15	51.9	1.30
Triple	15-15-15	72.5	1.81
Boron	8-10-0-7B	33.1	0.83
Microplant Mg	5-0-10-5S-1.8Mg	41.1	1.03
Microplant	5-0-10-1.7S	22.4	0.56
K25	3-0-25	66.8	1.67

Other Common Fertilizer Materials

Name	Analysis	SI
Ammonium Sulfate	21-0-0-24S	68.3
Urea	46-0-0	74.4
UAN	32-0-0	71.1
MAP	11-52-0	26.7
Potassium Chloride	0-0-62	120.1

Calculating Wuxal Use SI

Suspension SI × Dilution Rate = Use SI

Example

Spray rate = 10 gpa

Triple use rate = 0.25 gpa

72.5 × (0.25 ÷ 10) = 1.81 Use SI

PRECISION LABORATORIES

1429 S. Shields Drive
Waukegan, IL 60085
800-323-6280
www.precisionlab.com

[1]Excerpted from Fluid Journal, Vol. 9, No 2, Issue 33. Calculating Salt index. John Mortvedt.

[2]Diagram courtesy of Wikipedia.

[3]Excerpted from Influence of Foliar Nutrient Spray Concentration on Leaf Absorption and Phytotoxicity on Apple. M Thalheimer, N. Paoli.

[4]Use SI assumes 1 quart per acre of a Wuxal suspension and 10 gallons per acre spray rate with water. 2.5% v/v.