Salt (Sodium) Management Systems for Saline Soils

By: Norman Wilson, Ph.D.

I. *Biological Complexing to Dissociate and Immobilize Exchangeable Sodium:* The use of **Modern Ag Products LLC** soil products including **BioBase** and **Soilcure** enhance soil biological activity to supply complex carbons (Humates and other natural polymers) to neutralize and partially immobilize sodium in the soil solution. This method is effective in all soil types and is especially useful where sodium is being added to the soil system from "brackish" irrigation water. This treatment should not be considered a one time "fix" since sodium is not removed from the soil system but is temporarily complexed (trapped) in organic forms that are less damaging to soil structure and much less toxic to growing crops. For greatest activity, **BioBase** or **Soilcure** should be applied at least annually before a crop is planted. More frequent applications should be made where high sodium irrigation water is used.

II. *Water Flushing and Leaching:* This method of salt remediation is routinely used in some areas of the world but is not practical in many saline soils because of limited water availability and slow percolation. An attempt to use this procedure with marginal irrigation and/or low porosity soils can actually make the problem worse. This method works best with underground tile and a large volume of water. Efficiency of this procedure will be improved by regular application of **BioBase** or **Soilcure** to enhance soil flocculation, aeration, and water penetration.

III. *Chemical Dissociation and Ion Exchange:* This method requires the use of gypsum, N-Cal, N-Phuric or similar products. These products supply exchangeable calcium and/or sulfur or release exchangeable calcium from the soil system. They temporarily react chemically with sodium to form less mobile or less toxic forms. These products tend to be sodium specific and should only be used cautiously and infrequently. Misuse or frequent use of any of these products can result in highly undesirable side effects such as calcium carbonate buildup near the soil surface and depletion of soil organic matter with strong acids.

IV. *Addition of High Organic Materials*: The addition of cow manure, cotton gin trash, chicken litter, compost, crop residue, or other high organic materials can immobilize and temporarily neutralize Sodium salts provided these materials are biologically broken down to form humus. This system should also not be considered a permanent "fix". **BioBase** or **Soilcure** should be applied with these materials in order to speed biological decomposition and improve humus yield.

V. *Split Fertilizer Applications and Foliar Feeding:* Sodium acts as a dispersing agent in agricultural soils, destroying natural flocculation with resulting poor soil

structural characteristics. As a direct result of soil structural deterioration, plant root development is inhibited and a growing crop is restricted in its ability to take up essential nutrients and moisture from the soil. Sodic soils are characterized by high pH which further reduces the availability of certain major and micro nutrients. Under these conditions, split applications improve fertilizer efficiency and applying **Modern Ag Products** foliar fertilizers will compensate for reduced root uptake. Liquid fertilizer efficiency can also be improved by tank mixing **BioBase** which acts in much the same way as natural humus to complex and stabilize fertilizer nutrients. **BioBase** reduces volatilization as well as chemical and clay fixation of fertilizer nutrients. **Modern Ag Products** soil products are designed to slowly move soil pH toward neutral.

VI. *Application of Elemental Sulfur or Sulfur Fertilizers:* The use of elemental sulfur or high sulfur fertilizer materials such as Ammonium Thio-Sulfate or Ammonium Sulfate can be useful in managing salts and high soil pH. These materials form very weak sulfuric acid in the soil solution and provide a potential source of exchangeable sulfur. Any effect on soil pH or sodium salts from use of these products is temporary and small but they can be useful when used with other management systems. Addition of **BioBase** will improve effectiveness of these products.

VII. *Crop Rotation:* Growing high residue and/or salt tolerant crops such as wheat, rye, grain sorghum, corn, or alfalfa in rotation with low residue crops can produce positive results. When possible, crop rotation should be a part of any long term salt management system. All residue should be returned to the soil rather than burned, grazed, or hayed and **BioBase** or **Soilcure** should be applied to facilitate rapid and efficient conversion of the raw residue to humus.

VIII. *Avoid or Limit the Use of Chloride or Magnesium Containing Fertilizers:* This would include such products as Potassium Chloride, Calcium Chloride, or Sul-Po-Mag. Chlorine reacts with sodium to form sodium chloride, probably the most damaging form of Sodium to crops and soil. Magnesium fertilizers should only be used when needed and many arid and semi-arid soils tend to contain high levels of Magnesium. The ratio of calcium to Magnesium as a percent of the soil base saturation should be 2:1 or greater. The addition of Magnesium to arid soils is rarely justified. When crop leaf analysis indicate a need for Magnesium, a foliar application of **Modern Ag Products Magnesium** is a preferred choice.

IX. It is important to remember that specific soils, crops, weather, and management systems can influence salt management strategies. The bottom line is that there is no one absolute “quick fix” to managing saline and/or high pH soils. This is particularly true when high sodium irrigation water is used on a continuing basis. The best plan of attack will usually involve the use of two or more salt management strategies and any system should be considered long term and ongoing. The use of **BioBase** or **Soilcure** on a regular schedule will enhance soil microbial activity and maintain a healthy balance of soil micro-organisms.