



Agro Services International Inc.

Fertilizing Crops in Florida Soils

Although the principles of balanced nutrition are the same no matter where a crop is grown, the soils of Florida present some unique problems that must be managed differently from soils in other areas.

Soil Analysis

The first step in any plant nutrition program is soil analysis. It is absolutely necessary to determine the level of soil acidity and the supply of all nutrients before deciding which fertilizers to apply. It is also necessary to ensure that the laboratory uses suitable methods. Many laboratories use methods that work on a limited range of soils, but give misleading information on other soils.

Balanced Nutrition.

It is very important to ensure that your crop has a balanced supply of all nutrients. It is often believed that some crops, such as grasses, do not require all of the essential nutrients; only pH and the macronutrients are considered important. This approach is incorrect and ultimately results in poor growth and quality.

Soil Acidity.

The soil of Florida are poorly buffered, meaning that the pH can change rapidly. Even a small excess of lime can increase soil pH to the point that it creates nutrient deficiencies. It is therefore necessary to monitor soil pH regularly and apply lime carefully. The soil pH analysis does not indicate the amount of lime needed, this must be determined by the exchangeable acidity analysis.

Limestone must be finely ground to work properly, granular limestone is not very effective. Limestone does not move into the soil and should not be left on the surface, but must be mixed into the soil for best results. In cases where this is not possible, such as in established pastures or orchards, it is surface applied but this reduces its effectiveness.

High pH

Alkaline soils can be acidified using elemental sulfur or fertilizing with sulfate of ammonia. In many cases, it is easier to correct the nutrient problems that high pH causes than to acidify the soil.

Nutrient leaching.

The soils of Florida are generally sandy with low cation exchange capacity (CEC) values. This means that the soil does not have the ability to hold on to many of the nutrients, allowing them to be easily leached out.

All nutrients do not leach out of the rooting zone at the same rate. Our studies have shown that on these soils, six inches of water can leach 80 % of applied nitrogen, 100 % of applied potassium, 100 % of sulfate-sulfur and 79 % of applied boron.

Calcium (48% loss), magnesium (32%) and manganese (40 %) are leached to a lesser extent, while leaching losses from copper (1.1%), iron (3.5%) Zinc (4.2 %) and phosphorus (5.9 %) are very low.

Fertilizer Application

These differences in leaching rates must be considered when fertilizing. Nutrients that are rapidly leached (nitrogen, potassium, sulfur and boron) must be applied in small, regular doses especially under rainy conditions. Where possible, materials that release these nutrients slowly should be used. Examples of these include calcium borate (boron), sulpomag (potassium, magnesium, sulfur) and various slow release nitrogen fertilizers.

Copper, iron, zinc and phosphorus can be applied in a single dose at the beginning of the crop since they are not easily leached. Their low leaching rates creates another problem. If these nutrients are surface applied, they may not move into the rooting zone quickly enough for a fast growing crop to use them. It is therefore better to place or incorporate these nutrients in the soil during land preparation.

You must consider the soil acidity level before deciding how to manage calcium and magnesium deficiencies. If the soil is acidic, calcitic limestone will usually provide sufficient calcium but not magnesium. Dolomitic limestone can be used to correct acidity as well as provide calcium and magnesium.

Calcium deficiency usually occurs in loam and clay soils only when they are acidic. In Florida, it is common to find sandy soils that are not acidic but are deficient in calcium. On these soils, limestone should not be used to supply calcium or magnesium as this can increase soil pH to the point that other nutrients become unavailable.

Calcium can be supplied as calcium sulfate; calcium nitrate also provides available calcium but is expensive. Soluble magnesium sources such as kieserite, magnesium sulfate and sulpomag are preferred on non-acidic soils. Granular magnesium oxide releases nutrients very slowly on non-acidic soils and is not recommended if a quick supply of magnesium is required.

On acidic soils, the micronutrients (Fe, Mn, Zn, Cu,) can be soil applied. Fertilizers based on oxides release the nutrients slowly and may not be effective if an immediate supply is required on a nutrient deficient soil. Materials based on metal sulfates are faster acting. There is also a range of micronutrients based on oxysulfates containing both the sulfates and the oxides, providing a combination of fast acting and slow release nutrients.

On soils with pH values above 7.0, the micronutrient sulfates and oxides are not recommended as the nutrients are rapidly fixed. Specially prepared chelated fertilizers can be used, but they are usually expensive. Under these conditions, foliar application of chelated products is usually very effective, but regular applications are needed especially during stages of rapid growth.

Soluble salts

Soluble salts are readily leached out of Florida's sandy soils under our high rainfall conditions. High salt levels therefore do not usually occur in the field, but can occur in covered greenhouses or areas near the coast where irrigation water is contaminated with high-salt water.

Fertigation

Fertigation allows small amounts of soluble grade fertilizers to be applied regularly through the irrigation system, increasing nutrient utilization by crops. The mobile nutrients nitrogen, potassium, sulfur and boron benefit most from this method.

The less mobile nutrients can also be applied by fertigation, but there is little advantage to doing so. Because soluble calcium, magnesium and phosphorus fertilizers are expensive, it is usually more cost effective to apply these nutrients as granular fertilizers.

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