



# Modern Ag Product

## Sup-O-Phos

By Norman Wilson Ph.D.

Modern Ag Products Sup-O-Phos is an organically complexed or chelated white phosphoric acid with an analysis of 0-50-0. The organic phosphate bonding of Sup-O-Phos provides a highly stable form of phosphate for foliar feeding or soil application. The organically complexed phosphate is readily absorbed by plant roots and leaves and can be safely applied directly or through sprinkler irrigation systems. When Modern Ag Products Sup-O-Phos is used for soil application, organic complexing provides protection from chemical reactions with calcium or aluminum which can produce water insoluble and unavailable phosphorus forms.

The importance of a readily available phosphorus source for crop nutrition cannot be over emphasized. The optimal phosphorus requirement for most crop plants is in the range of 0.3% to 0.6% of the plant dry weight as determined by tissue analysis. The most important consideration in phosphorus nutrition is the ratio of phosphorus to nitrogen in growing crops. For optimum crop response, phosphorus should be maintained at or near 10% of the nitrogen level. If a leaf sample contains 4% nitrogen, then the phosphorus level should be about 0.4% of dry weight. Availability of adequate phosphorus is absolutely essential for crop development and yield. Phosphorus is necessary for cell division (growth), energy transfer within plants, and regulation of key enzyme reactions in photosynthesis and respiration.

Crops have a peak demand for phosphorus early in the growing season when high metabolic activity occurs. Annual crops have an especially high phosphorus requirement from germination through rapid growth as the root system and leaf canopy are developing. Perennial crops, including trees, vines, hay, and pasture also need high levels of phosphorus as they break dormancy, rebuild root systems and grow leaf canopies.

Unfortunately, the availability of phosphorus from natural sources may be rather low early in the growing season. Cold and often water saturated or very dry soils will have reduced microbial activity and a slow decomposition rate of organic residue. Biological activity is extremely important because organic phosphorus compounds may account for 50% or more of total soil phosphorus and as much as 90% of the available phosphorus taken up by the crop. Root development will also be slowed in cold and wet (or dry) soils and phosphorus nutrition is directly related to root mass. Phosphorus is practically immobile in the soil solution and crop roots must grow and expand in order to access soil phosphorus. Under early stress conditions, a foliar application of phosphorus will often stimulate root growth, and act as a catalyst for increased phosphorus uptake. Modern Ag Phosphate and a balanced foliar formulation like VitaMax are excellent sources of phosphorus for foliar feeding.

An additional challenge in phosphorus nutrition is created by the chemical reactivity of the phosphate ion in the soil. Phosphate has a strong

affinity for calcium and aluminum and will react with these elements in the soil to produce water insoluble and unavailable forms. Soil pH becomes an important factor because a high level of aluminum is present in low pH soils and a high level of calcium is present in high soils. Phosphorus available is greatest at a pH of about 6.5.

The characteristics of phosphorus just reviewed suggest that the real "phosphorus nutrition problem" is one of availability and uptake not necessarily quantity in the soil. This is the reason that soil tests for phosphorus can be misleading and, when used alone, are of limited value in making fertilizer recommendations. Phosphorus fertilizer recommendations should be based on a complete examination of the soil including such characteristics as organic matter content, pH, calcium and magnesium content, biological activity, water relationships, and a history of past crop performance (tissue analysis) if available. The application of Modern Ag Products Sup-O-Phos alone or used to complex liquid bulk formulations such as 10-34-0 can increase the efficiency of Phosphorus fertilization by 30% or more. When possible, phosphorus fertilizer should be placed in or near the crop root zone and application should be made as close to peak crop demands as practical.