

## PHOSPHORUS IN GREENHOUSE SOILS

Gary F. Griffin  
Extension Agronomist

Phosphorus has been called the "key to life" because of its role in most life processes. In plants, phosphorus has many functions including: (1) cell division, (2) flowering and fruiting, (3) crop maturation, (4) root development, and (5) starch formation.

When plants are unable to obtain enough phosphorus, one or more of these functions slows down or ceases altogether. Phosphorus deficiency symptoms then develop. For example, decreased cell division results in stunting of plants. When sugar in the plant is not converted to starch due to a lack of phosphorus, anthocyanins are formed. These appear as purple spots or streaks in leaves and stems. Another deficiency symptom is abnormally dark-green coloration in plants.

In soils, phosphorus exists in both organic and inorganic forms. Mineral soils, especially acid ones, are notorious for their ability to fix or tie up phosphorus in forms not readily available to plants. The chief culprits in this fixation are calcium, iron, and aluminum ions, hydrous oxides of iron and aluminum, and silicate clays. There is little if any clay in most greenhouse growth media. Therefore phosphorus fixation is not the problem that it is in most field soils. Clay not only can furnish large amounts of aluminum and iron but is also capable of fixing added phosphorus. Fixation by calcium may be a problem, but only if soil pH values exceed 7.0.

In general, the greater the amount of mineral soil in a greenhouse soil mix, the greater will be the fixation of added phosphorus. Therefore, soil

mixes containing a mineral soil will contain less soluble phosphorus than artificial mixes such as peat-lites which have been similarly fertilized.

One advantage of phosphorus fixation by soils is that little if any phosphorus is lost by leaching. In general, leaching is not a problem in most greenhouse soil mixes.

The most commonly used phosphorus fertilizer is 20 percent superphosphate (0-20-0). This material is preferred over triple superphosphate (0-40-0 or 0-46-0) because it supplies sulfur as well as calcium and phosphorus. Ammonium and potassium phosphates can also be used. Various slow release fertilizers should be used at rates recommended by the manufacturer.

In general, 5 pounds of 0-20-0 per cubic yard of soil mix will provide an adequate level of phosphorus for the entire growing season. If 0-40-0 is used at 2 1/2 pounds per cubic yard, incorporate an equal amount of gypsum.

Although superphosphate can be added to soil mixes at relatively high rates without developing excess soluble salts, very high soil phosphorus levels should be avoided. The reason is that certain micronutrient deficiencies, particularly zinc and copper, may be induced.

If a phosphorus problem (or a micronutrient problem) in a soil mix is suspected, have the mix tested. The procedure used at The University of Connecticut soil testing laboratory measures only the most readily available phosphorus. The results show accurately whether a deficiency or excessively high level of phosphorus exists in the soil.