

## EFFECTS OF pH ON AVAILABILITY OF PLANT NUTRIENTS IN GREENHOUSE SOILS

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The following comments will help to explain the figure on page 11.

The availability of many nutrients is affected by the pH of the soil. The effects are sometimes not as pronounced in greenhouse soils as in field soils.

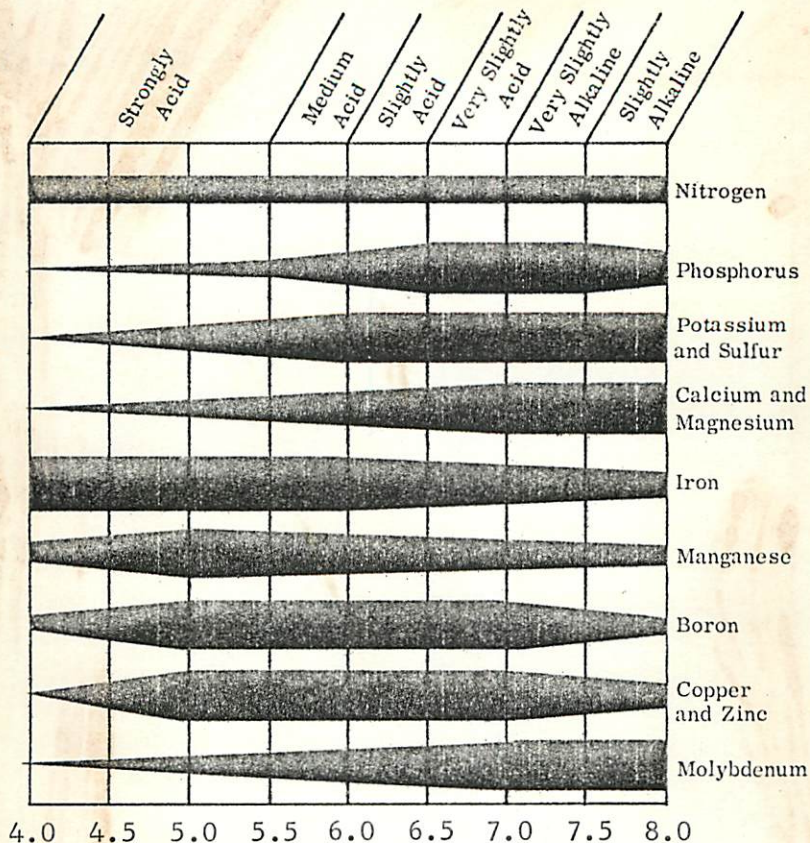
NITRATE NITROGEN is affected little by pH when applied frequently.

AMMONIUM NITROGEN may be more toxic in acid or alkaline soils than in nearly neutral soils. In acid soils the nitrifying bacteria are inhibited and cannot convert ammonium to the less toxic nitrate form. In alkaline soils ammonia gas which is toxic to plants may be liberated. This may also occur at a lower pH when hydrated lime is applied.

PHOSPHORUS is immobilized as ferric aluminum phosphates in acid soils. Incorporation of 0-20-0 at 5-7 lbs/cu. yd. will generally overcome this problem and supply adequate phosphorus for six months to a year.

POTASSIUM is more readily leached from acid soils but is otherwise affected little by pH changes.

SULFUR, applied generously as calcium sulfate in 0-20-0, is rarely limiting in greenhouse soils and is not seriously affected by pH.



CALCIUM and MAGNESIUM are adequately supplied in dolomitic limestone for plants grown at higher pH's in Connecticut soils. For crops that are grown in acid soils where these elements are readily leached, calcium sulfate (gypsum) and magnesium sulfate (Epsom salts) should be applied.

IRON is more soluble in acid soils. Some plants such as gardenias and azaleas cannot obtain sufficient iron at a higher pH although applications of chelated iron will temporarily provide available iron to the plant. Since iron reacts with phosphorus to form a

rather insoluble precipitate, continuous fertilization with high phosphorus fertilizers may induce iron deficiency.

MANGANESE, like iron, is more available in acid soils. Except for highly organic or synthetic growing media where it should be incorporated, deficiencies seldom occur. Steaming soil renders manganese more soluble and toxicities may occur.

BORON is quite available at any pH below neutral. Consequently, it may become limiting in soils that are used for many years. Token applications made once or twice a year are suggested on carnations, snapdragons and some other crops unless manure is used.

COPPER is normally supplied from copper pipes in water systems and, as is ZINC, in pesticides. These metals are available at any pH below neutral and are seldom deficient. With the decrease in copper pipe usage, copper applications may become necessary. Some details on rates of application may be found in the Connecticut Cooperative Extension Service bulletin 72-21, Greenhouse Crop Nutrition.

MOLYBDENUM is unusual in that availability declines with acidity. It may be necessary to add trace amounts to crops grown in acid soils.