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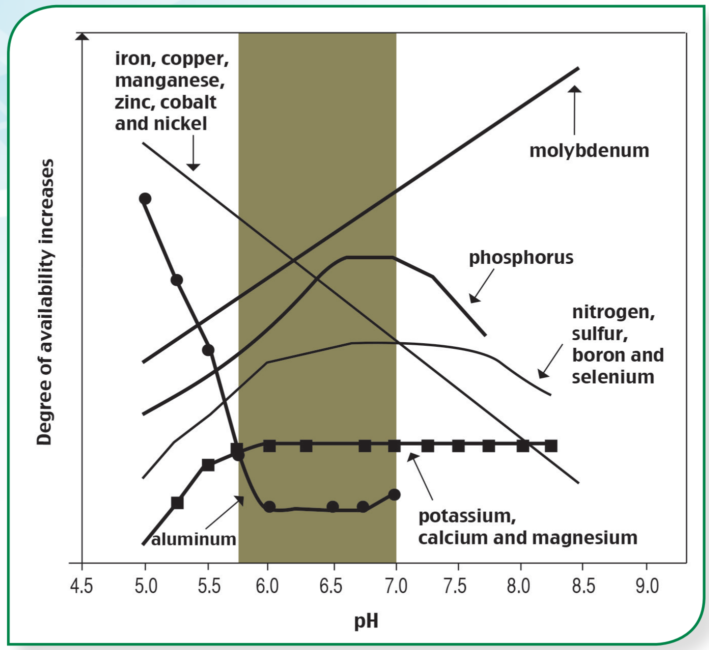
FAVORABLE SOIL pH: DOES IT REALLY INCREASE NUTRIENT USE EFFICIENCY?

More than ever agriculture needs to follow principles of sustainability that ensure build up and maintenance of long-term soil productivity. The benefits of high soil productivity include efficient use of crop inputs, environmental protection, social benefits to stakeholders, and greater farmer profits.



Typical effect of soil pH on plant nutrient availability. Actual effects may vary with other soil chemical and mineralogical properties.

Many soils around the world have a natural tendency to become acidic with time. Many factors, natural and managed, contribute to this increase in soil acidity. Soil acidity is especially widespread in tropical regions due to climates that cause intense weathering of soils. It is estimated that about 30% of soils in the world are acidic, but these regions still represent some of our most important food-producing centers.

On soils where acidity limits crop yields, soil acidity amelioration constitutes an important best management practice to achieve sustainability. Soil acidity can slow crop development and reduce yield. Contributing factors to acidity damage include its negative impacts on soil physical and biological properties, high toxicities of elements like aluminum, iron, and manganese, and reduced effectiveness of certain herbicides and availability of plant nutrients.

The efficient use of nutrients is part of sustainable agriculture around the world. There are many practices that should be taken into account to assure high nutrient use efficiency (NUE). The 4R Nutrient Stewardship approach of using the right source, rate, time, and place summarizes the site-specific principles for using nutrients correctly. It should be emphasized that each combination of 4R practices interact with many factors in the field, including soil pH, to optimize the use of nutrients.

Research has proven that each crop develops better in a specific range of soil pH and that range should also optimize nutrient availability. The chemical availability of several nutrients is improved by liming acid soils. For example, insoluble forms of phosphorus and sulfur are changed to more plant-available forms by correcting the soil pH. In general, the availability of most nutrients is greatest in the soil pH range of 5.8 to 7.0. In some cases, nutrient absorption can be doubled simply by correcting the soil pH.

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Around the world there are numerous agronomic experiments showing the paybacks of correcting soil pH in the form of better crop development, NUE, and final yield. Yield increases of up to 500% have been reported in different regions.

The most common practice to correct soil pH is liming. This practice neutralizes excess soil acidity and improves the growing environment of root systems, leading to more absorption of nutrients.

Research on the correction of soil pH is region specific so one should look for local recommendations to guide farm practice.

In the end, the ultimate benefits of correcting soil pH to the grower are higher and more profitable crop yields. A broader benefit goes to the surrounding environment due to the increased resource efficiency of producing more crops on less land.

A.Tasistro and L.Prochnow/IPNI

Examples of phosphorus deficiency in corn (left) and magnesium deficiency in soybean (right) which are two common issues on acidic soils.

Centre for Rhizobium Studies, Murdoch University.

Poor nodulation and lower biomass production in sub clover due to aluminum toxicity/soil acidity.

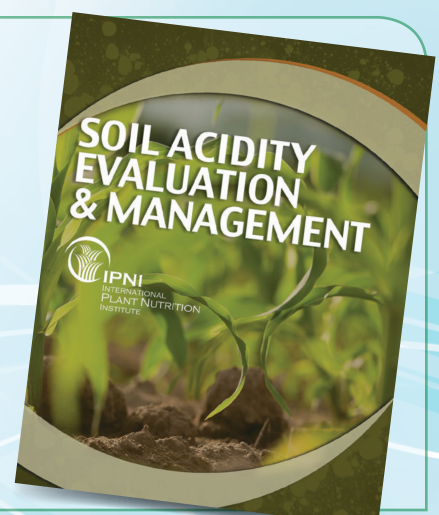
Soil Acidity Evaluation & Management

IPNI has developed a Booklet with accompanying PowerPoint slide set that is designed to provide a concise review of key concepts related to soil acidity, its evaluation and control through various management practices.

Booklet (30 pages, 8.5 x 11 in., wire bound)
Cost: US $12.00

PowerPoint Slide Set (30 slides with speaker's notes)
Cost: US $10.00

Order online at **http://store.ipni.net**



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