

Winter 2013, No. 3

## CROP NUTRITION PROBLEMS CAN BECOME PEST PROBLEMS

We are familiar with the concept of preventative medicine, where health problems are avoided by good practices instead of curing sickness after they occur. This same concept applies to damage caused to crops by plant diseases and pests when adequate and balanced nutrition is lacking.

**Each nutrient in plants has unique and specific functions that operate in an intricate balance of physiological reactions.** A deficiency of a single nutrient will result in stress that impairs healthy plant growth. Until the symptoms of deficiency stress become visible, the hidden roles of proper nutrition in maintaining plant health are too frequently overlooked.

**New scientific studies are again confirming what farmers have known for many years about the link between plant health and nutrition.** Healthy plants can generally withstand stress and attack better than plants that are already in poor condition. For example, recent work with corn has demonstrated the link between an adequate K supply and increased leaf thickness, stronger epidermal cells, and decreased leaf concentrations of sugars and amino acids. All of these factors lower the attractiveness of plants for pests, such as spider mites.

The link between adequate K and soybean aphids has also been recently reconfirmed. Research shows that K-deficient soybeans tend to transport more N-rich amino acids in the phloem, making them a favored target of stem-sucking aphids.

The link between plant nutrition and disease control generally falls into one of these categories where proper fertilization can:

Reduce pathogen activity: Proper mineral nutrition can slow or inhibit the germination and growth of a variety of plant pathogens in soil and in plant cells.

Modify the soil environment: The selection of a N source can temporarily modify the rhizosphere pH during critical periods between germination and seedling establishment. Likewise, the addition of elemental S is a common practice to acidify the root zone of some crops for disease control.

Increase plant resistance: Healthy plant tissues are less susceptible to infection. Proper nutrition can stimulate the production of physical and chemical defenses to cope with pathogens.

Increase tolerance to disease: Adequate nutrition can help plants compensate for disease damage and to sustain a high level of natural compounds that inhibit pathogen growth within plant tissue.

Facilitate disease escape: Plants that are adequately fertilized with boron (B) and zinc (Zn) have been shown to have fewer fungal spores that break dormancy on the roots, compared to deficient plants. A healthy photosynthetic capacity also allows for a quick growth response to a pathogen invasion.

Compensate for disease damage: An adequate supply of plant nutrients is closely linked with vigorous root growth and photosynthetic activity. These healthy plants can better tolerate increased disease burdens than plants stressed by nutrient deficiency.

Nutritional and environmental stresses often trigger greater pest and disease damage to crops. While proper fertilization does not eliminate the risk of pests and diseases, it provides an important degree of protection from many yield-robbing factors.

Effective disease and pest management through proper plant nutrition improves crop quality and contributes to provide a safe, abundant, and nutritious food supply.

– RLM –

For more information, contact Dr. Robert Mikkelsen, Western North America Director, IPNI, Phone: (209) 725-0382. E-mail: [rmikkelsen@ipni.net](mailto:rmikkelsen@ipni.net).

Abbreviations: N = nitrogen; P = phosphorus; K = potassium, S = Sulfur.

Note: *Plant Nutrition TODAY* articles are available online at the IPNI website: [www.ipni.net/pnt](http://www.ipni.net/pnt)