

Mark Your Calendar

Texas Pepper Conference

November 7-9, 2007

Palm Aire Hotel and Suites

Weslaco, Texas

Contact: Dr. Kevin Crosby @ 956/968-5585
or Dr. Juan Anciso @ 956/968/5581

Texas Produce Convention

September 20-23, 2007

Sheraton Hotel

South Padre Island, Texas

Contact: Ray Prewitt
Ph: 956/584-1681

Precision Ag Expo

September 6, 2007

Plainview, Texas

Contact: Bob Sasser, Exec. Director TX Plant
Protection Association
P.O. Box 1897
Conroe, Texas 77305-1897

Ph: 936/539/2349

Fax: 936/539/9526

Email: tppa@consolidated.net

Website: <http://tppa.tamu.edu>

Herb Association of Texas

September 14-15, 2007

Brenham, Texas

Contact: Mariane Simmons

Ph: 512/858/1090

Website: www.texasherbs.org

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Nitrogen a Macronutrient

From the book: The Garden Doctor

Book 1 – Nitrogen, Calcium, Phosphorus, Chlorine and Potassium

by Jacob R. Mittleider

Nitrogen Defined

Nitrogen is a colorless, gaseous, odorless, inert element.

It occupies about four fifths (78 percent) of the atmosphere by volume, or 75 percent by weight, and is present in vegetable and animal tissue.

About every acre of land there is approximately 34,500 tons of nitrogen.

The supply is inexhaustible and remains constant because it is returning to the atmosphere about the same rate at which it is removed.

Chemistry of Nitrogen in Plants

Nitrogen is lost from the soil very easily. Growing plants require the nutrient in rather large amounts. The functions it performs in plants and animal life are many. In fact, essentially all life processes depend directly on nitrogen.

The more active compounds are proteins and others are enzymes, which speed up the biological processes.

In respiration, growth and reproduction, every plant cell must have an abundant supply of the nitrogen compounds.

Chlorophyll – the green pigment in leaves that enables plants to use the energy from sunlight to form sugars, starches, and fats from carbon dioxide and water – is a nitrogenous compound.

Nitrogen moves from cell to cell. It is present primarily in the tender parts of terminal bud shoots and new opening leaves.

The protein within plants is chiefly nitrogen. The element experiences many chemical changes and is constantly on the move.

Whenever the supply is inadequate, the nitrogen protein moves from the older cells to the youngest cells.

The movement of nitrogen from cell to cell when the supply is too low can be so severe that only the growing tips (called terminal buds) function properly.

The older leaves may become yellow, and whole leaves may die and drop off.

The demand for the nutrient is greatest during the early stages of plant growth.

Young plants gorge on nitrogen and hold it for use later. *But beware!* The excess gorged nitrogen cannot meet the needs of fast-growing plants longer than a few days. Therefore, there must be a continuous formation and release of available nitrogen to ensure a steady rate of growth and for producing seed and crops.

Nitrogen imparts to the leaves a deep-green color and encourages vegetative growth.

In grain crops, nitrogen increases the protein percentage and plumpness of the kernels. Also, it is important as a regulator in all plants. To a large degree it governs the use made of potassium, phosphorus and

other essential nutrients.

In vegetable crops such as lettuce and radishes, nitrogen produces tender, crisp, succulent growth, thus improving the quality.

Nitrogen Chemistry in the Soil

More than any other of the essential nutrients supplied to the soil, nitrogen determines the kind of yields produced.

Thus, along with the introduction of improved methods in agriculture, better crop varieties, and increased yields, the demand for more and more nitrogen as applications to the soil are correspondingly increasing.

All decaying processes involving organic materials require nitrogen.

During the final stages of organic decomposition, nitrogen is released back into the soil.

Nitrogen, whether atmospheric or from organic sources, has no rest in the soil. Microorganisms act on it continually, changing its composition.

The Nitrogen Cycle

Nitrogen is liberated during decomposition and returns to the atmosphere; there it can start the cycle all over again.

Also, because nitrogen has a cycle, it cannot be stored for long periods in the soil.

Native supplies of nitrogen in the soil vary considerably and are generally less than 200 pounds (90 kilograms) per acre (.4 hectare) at any one time.

In warm weather the unavailable nitrogen gas (N_2) in the soil is changed to available forms of ammonium (NH_4) and nitrate (NO_3). This change takes place in 24 to 72 hours.

Plants use nitrogen almost exclusively in the ammonium and nitrate compounds.

Adequate moisture is essential to dissolve the fertilizer granules before plants can use it.

All types of nitrogen in the soil are converted ultimately into the nitrate form.

Because nitrogen has a cycle, it is not economical to fertilize crops or land with nitrogen before the winter season.

The ammonium form of nitrogen clings (is absorbed) to the soil particles and is not lost from the soil through leaching.

If a legume crop does not have nodules on the roots, it does not increase the supply of nitrogen in the soil.

Plants cannot use atmospheric nitrogen. Nevertheless, all nitrogen originates in the atmosphere. It returns back to the atmosphere when the cycle is completed.

Lightning releases thousands of tons of nitrogen gas (N_2), which rain and snow deposit on the land.

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Nitrogen Continued

Readily available calcium is essential for proper utilization of nitrogen.

If large quantities of grain straw, bean straw, or other similar organic materials are plowed under and the field is immediately planted to a new crop, nitrogen starvation can be induced during the cool weather.

It rarely happens that cultivated land contains sufficient reserves of nitrogen to meet the requirements of a crop. There are at least two reasons for this:

1. Originally, soils did not contain large supplies of this element.
2. The element is easily lost from the soil through leaching and volatilization; much of the original supply disappeared during 50 to 100 years of cultivation.

The main source of nitrogen is from the atmosphere.

Beyond the recognizable effects of nitrogen requirements in plants, there is but little understanding about the chemical nature of this element in the soil.

It is recognized, however, that all but a small part of the nitrogen supply in the soil is in the organic form, such as vegetable, animal, and microorganism origins.

Some soil-inhabiting organisms that decompose various nitrogen compounds use a portion of the nitrogen to form new cells. These cells have very short life cycles, and when they die their carcasses become a new source of organic matter.

Nitrogen is allowed no rest in the soil. The chemical changes are many and continuous – the cycle never stops.

The supply of nitrogen in the soil regulates the ability of plants to make proteins. This function emphasizes the importance of the element.

Only two of the essential plant nutrients, nitrogen and carbon, have cycles.

Cycles Explained

It simply means that their performance begins in the atmosphere and they return back to the atmosphere when the cycle is completed.

Rainwater and snow deposit nitrogen as a gas (N_2) on the earth.

Forms of Nitrogen that Plants can Utilize

In the gaseous (N_2) form, nitrogen is not available for plant use.

Short-lived organisms, however, feed and multiply rapidly on the gaseous nitrogen. After they have digested the gaseous nitrogen, they die and leave the element changed into ammonium (NH_4) or nitrate (NO_3) ions. Both of these forms are food for growing plants.

Various soil-inhabiting organisms never stop

acting on the nitrogen in the soil. And when the changed nitrogen is a type of compound that plants can use, it is food for growing plants or it is vaporized back into the atmosphere to start the cycle all over again.

But before the gaseous nitrogen (free nitrogen) of the air can be utilized by higher plants, it must first be combined with other elements to form compounds. The process involved is called nitrogen fixation. The steps involved to produce compound combinations are quite involved because nitrogen is an inert (inactive) element and resists combining with other elements.

However, lightning combines nitrogen with oxygen in the air and forms nitrogen oxides. Rain and snow wash these oxides out of the air onto the land.

During this process, hydrogen is combined with the oxides, and they reach the land as nitrous acid (HNO_3) and nitric acid (HNO_2).

Since all forms of nitrogen that enter the soil eventually become nitrates (NO_3), which is the preferred form for plants, the various nitrogen compounds add to the total supply available to plants. But their contributions are limited, because the quantity of nitrogen involved in these forms is very small – usually less than 2 pounds per acre per year.

In addition to the nitrogen oxides, ammonia and organic nitrogen are other forms that are washed out of the air to the land in the annual rains. Their contributions to the nitrogen supply is about 5 pounds per acre per year. Even so, nitrogen from the atmosphere fails to meet crop needs, and today, in order to help meet the increasing need for nitrogen fertilizers, huge industrial installations produce large quantities of “fixed” nitrogen as compounds of ammonia and calcium cyanamide.

Another valuable source of nitrogen for crops is the rhizobia bacteria. These bacteria can live in any soils that plant life can exist in. They have the ability, in connection with leguminous plants, to fix free nitrogen from the air in forms that plants can use.

Rhizobia bacteria penetrate the root hairs of plants in the soil and live in nitrogen nodules they produce around the roots.

The bacteria work in cooperation with the plant, and their food – which is nitrogen gas – they take from the atmosphere. They live off the fixed nitrogen they produce, and also help supply the host plant with the nutrient.

The supply of nitrogen that the rhizobia bacteria can contribute in one season is influenced by several factors, such as the legume crop, the strain of bacteria, the moisture level, the weather, the drainage, and other factors.

An average amount of fixed nitrogen is usually 50 to 100 pounds per acre per year.

Precision Ag Expo
September 6th, 2007
Plainview, TX

- **Program:** Would you like to learn how Precision Ag may increase profits and/or reduce risk? Want to talk with the experts as well as leading farmers using Precision Ag? Want to see Precision Ag Equipment in the field? If so, check out the following Precision Ag Expo program and send in your registration form today!
 - **Why consider Precision Ag?** Basic overview of Precision Ag and the benefits it could offer West Texas farmers.– Olan Moore, High Plains Consulting, Springlake, TX
 - **Guidance Systems:** What can it do for my farming operation? What are the benefits? How to maximize the system? How to choose a system? How much does a system cost? (Opportunity to view various guidance systems during the afternoon demonstrations).- Jarred Karnei, AMS Regional Specialist, John Deere
 - **Using Monitors to Improve Efficiency:** Using monitors for planting seed, fertilizer, herbicides, etc. Can they improve the efficiency of your farming operation? - Trent Murphree, Precision Ag Specialist, Raven Industries
 - **Irrigation Management, Including Irrigation Scheduling System and Variable Rate Irrigation (Drip & Center Pivot) -** Based on soil temperature and soil moisture as well as plant stress. – James R. Mahan Ph.D., Plant Physiologist, USDA/ARS Plant Stress and Water Conservation Laboratory, Lubbock, TX
 - **Methods of Measuring Soil & Crop Variability's:** Discussion on using Soil Conductivity Equipment, Aerial Imaging and Sprayer Mounted Remote-Sensing. Benefits and use of each to maximize crop inputs and improve profits. – Dr. Subbarao Yarlagadda, National Agronomist, Helena Chemical Co., Collierville, TN
 - **Data Collection & Management:** (consultants, agribusiness, farmers) How is the data collected? Who manages the data? Who makes recommendation using the data? How do we measure the economics of the systems? – Dr. David Waits, President & CEO, SST Development Group, Inc., Stillwater, OK
 - **Putting it all together** – Can Precision Ag work on West Texas farms to increase profits and reduce risk? – Eddie Griffs, Lubbock area farmer & Radio Farm Broadcaster
 - **What does Precision Ag do for me on my farm?** (3 farmers discuss how to get started in Precision Ag and some of their experiences with Precision Ag)
 - **Field Demonstrations & Visit Displays** – Michael Dolle, Hale County Extension Agent, Field Committee Chairman
 - Guidance Systems Demonstrations
 - Soil Electricity Conductivity Demonstrations
 - Strip-Till Demonstrations
 - Variable Rate Technology & Aerial Imaging
 - **CEU's:** The Precision Ag Expo has been approved for 7 CCA CEU's and for 5 TDA CEU's
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Focus on Quality, Availability if You Want to Sell to Restaurants

The Grower / October 2006

Although Kentuckians' tastes vary when eating out, the restaurant chefs who serve them say their clients have one thing in common – a hankering for locally grown fruits and vegetables.

In a 2006 survey conducted by the University of Kentucky in Lexington, 90 percent of chefs who responded say their clients want fresh produce on the menu. Fifty-four percent say they advertise locally grown produce.

“They know their clients, and they know their

clients value that kind of thing,” says Tim Woods, university associate professor of agricultural economics. “These chefs, particularly with the white-tablecloth, fine-dining types of establishments, really place a premium on super-high-quality, fresh products.”

The survey focused on crops identified by the university's New Crop Opportunities Center as those that can be grown in Kentucky.

Out of a list of 14 vegetables, 16 herbs and 12

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Focus on Quality Continued

fruits, the chefs were asked to pick those they would be “interested” or “very interested” in purchasing locally.

Tomatoes – particularly heirloom varieties – were in high demand, with 87 percent of respondents indicating interest in buying them locally.

Bell peppers also appear to be much sought after, with 84 percent of respondents showing interest, as do a variety of greens, with 79 percent interested.

The most popular fruit crops were blackberries, grapes, apples and blueberries.

The survey also asked the chefs to rank the business functions on which local growers need to focus. Uniform quality and consistent availability in season emerged as the two most important.

“A lot of our farmers have either sold in farmers market programs or maybe wholesale through a cooperative, but this selling into the food service channel is new to them,” Woods says. “We’re trying to help farmers get familiar with what’s involved.”

BMPs for Organic Production

by

Tim Hartz

HorTechnology 16(3)

BMPs for organic production

Organic vegetable production is often thought of as being more environmentally benign than conventional production, and in terms of water quality organic production does have advantages. The input of readily available N tends to be lower in organic systems, and cover crop production is a standard practice. However, significant nutrient loss may still occur with organic production. One potential problem is excessive soil P enrichment. Application of manure or manure compost to augment soil N supply is a common practice; application rates of 4-6 tons/acre are typical; depending on the material, each application may contain 200 lb/acre P or more. Repeated application can increase soil P to environmentally hazardous levels. To minimize P loss, organic growers should refrain from applying significant quantities of P, regardless of source, on fields with STP above the crop response threshold. In such fields a low-P organic material such as feather meal could be used to augment soil N supply.

Efficient irrigation is also important in organic production. Although soil NO₃-N concentration is generally lower than in conventional culture, in the weeks following legume cover crop incorporation significant quantities of NO₃-N can build up. Inefficient irrigation during the establishment and early growth of the succeeding vegetable crop can result in significant NO₃-N leaching loss. Not only is this a potential water quality hazard, it may also lead to N deficiency later in crop development.

Are BMPs enough?

While appropriate application of these BMPs will minimize nutrient loss from vegetable fields, these practices alone may be insufficient to meet water quality standards.

Check for updates on our web site:

<http://aggie-horticulture.tamu.edu>