

# Importance of nutrients for citrus trees

## Let's talk about nitrogen (N).

By Mongi Zekri and Tom Obreza

Meeting the world's escalating food needs cannot be achieved without fertilizer input. Without fertilizer, the world would produce only about half as much food, and more forested and marginal lands would have to be put into produc-

tion. Inorganic commercial fertilizer plays a critical role in the world's food security, and it is important from both yield and food quality perspectives. Intensifying production and increasing yield on limited arable land is clearly important in securing a sufficient food supply, where fertilizer plays a critical role.

Intensifying production will be

increasingly essential to meet the challenge of future food demands. However, this intensification must be done while also minimizing environmental impacts. The Nutrient Stewardship Framework (right fertilizer source, right rate, right time and right place) is therefore very important.

### NITROGEN FUNCTIONS

Nitrogen (N) is of special importance because plants need this nutrient in large amounts. Nitrogen is also easily lost from soil and fairly expensive to supply. A major factor in successful farming is the grower's ability to manage N efficiently. Nitrogen has numerous functions in plants, and essentially all life processes depend on this nutrient. Nitrogen occurs chiefly in amino acids, proteins and enzymes. The most active nitrogenous compounds occur largely in the protoplasm and nuclei of plant cells. Among them are the enzymes that speed up biochemical processes.

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An abundant supply of essential N compounds is required in each plant cell for normal cell division, growth and respiration. Even the green leaf pigment chlorophyll, which enables plants to use the energy of sunlight to form sugars from carbon dioxide and water, is a nitrogenous compound. A high concentration of N is found in young, tender plant tissues like shoot tips, buds and new leaves. This N, present mostly as protein, is constantly moving and undergoing chemical changes. As new cells form, much of the protein moves from older cells to newer ones, especially when the total N content of the plant is low. While this N movement to new tissue conserves N in the plant, the overall yield and quality can be at risk due to reduced N supply to the plant.

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Proper functioning of N in plant nutrition requires a sufficient supply of the other essential elements, particularly phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg). If one or more of these elements is in short supply, the addition of N may not produce optimum growth. Plants experiencing poor nutrition often are susceptible to disease, mature late and produce poor-quality fruit. However, if the nutrient balance and total supply are sufficient, significant growth of dark green foliage will occur. Nitrogen is the mineral element used most by citrus trees to produce leaves, flowers and fruit, although Ca and K are also used in great amounts.

Nitrogen is the key component in mineral fertilizers applied to citrus groves; N has more influence on tree growth, appearance and fruit production/quality than any other mineral element. Nitrogen affects the absorption and distribution of practically all other elements and it is particularly important to the tree during flowering and fruit set.

### NITROGEN DEFICIENCY

Trees grown where plant-available N is limited may appear nearly normal but are undersized. These stunted trees carry little fruit load and can be highly erratic in bearing habit. Affected trees bloom sparsely, flush irregularly and produce limited twig and leaf growth. Severe N starvation causes a general yellowing of the foliage. This symptom can be particularly observed on well-nourished trees that have subsequently had their N supply reduced sharply.

Effects of N on citrus fruit quality	
VARIABLE	RATING
<b>Juice Quality</b>	
Juice Content	+
Soluble Solids (SS)	+
Acid (A)	+
SS/A Ratio	-
Juice Color	+
Solids/Box	+
Solids/Acre	+
<b>External Fruit Quality</b>	
Size	-
Weight	-
Green Fruit	+
Peel Thickness	+
<b>Increase (+), Decrease (-)</b>	

## Florida Citrus Commissioners Embrace Roles on Behalf of Industry

By Marty McKenna  
Chairman, Florida Citrus Commission



I am proud to serve as your chairman of the Florida Citrus Commission (FCC) and would like to update you about key activities that have taken place on your behalf over the last six months.

This new commission was faced with many immediate issues to address. I want to personally recognize and thank all commissioners for their strong desire to understand the processes of the FCC and Florida Department of Citrus (FDOC) and their willingness to actively participate in numerous committees.

I also want to acknowledge the tremendous effort of the FDOC staff under the leadership of Debra Funkhouser, acting executive director. Everyone has pitched in to ensure business continues as usual during the transition to new leadership. The Commission and I are greatly appreciative of the staff's hard work.

The Executive Director Search Committee, comprised of myself and commissioners Jay Clark, Michael Garavaglia Jr., Michael Haycock, V.C. Hollingsworth III and Ellis Hunt Jr., have been diligently looking for the right candidate to lead the FDOC forward. We understand the importance of identifying an individual with an advanced understanding of marketing who will bring strong leadership skills and



Douglas Ackerman

diversity of thought to our industry. Following a four-month search, I am pleased to announce Douglas Ackerman as the new FDOC executive director. He brings 17 years of experience in retail, consumer packaged goods and integrated marketing communications. We are confident that he can provide leadership to enable the citrus industry to remain strong in spite of challenging economic conditions.

I believe that we are close to updating the state legislation that governs the citrus industry. The 601 Committee, under the leadership of Commissioner Hunt, has received industry-wide input and consensus. Final Chapter 601 recommendations have been submitted in legislative format for consideration by the Florida Legislature during the 2012 session. We are optimistic that our recommendations will be included in the bill drafting process beginning this month.

Personally, I am very excited about the addition of a shopper marketing program this fiscal year. With the addition of a shopper marketing director, James "Jamie" Toler, and MARS Advertising, Inc., FDOC will be able to strengthen direct relationships with supermarkets and customers. Shopper marketing programs will directly reach consumers as they are planning and making purchase decisions.

One of my goals as chairman is to evaluate the effectiveness of all FDOC campaigns. Every program includes a measurement component so that we can demonstrate progress and success. What we learn will allow us to make educated decisions about future programs.

The Commission focus is now turning to research so that we can gain an in-depth knowledge of the scope of FDOC research, including the abscission chemical research project. We will be holding the Jan. 18 meeting in Lake Alfred. I encourage you to attend and learn more about the research process along with us.

I welcome your personal input and encourage you to share comments directly with your district commissioners so that we can be responsive to your needs. Please contact me at (863) 382-1830 or mck80@earthlink.net.

*The mission of the Florida Department of Citrus is to grow the market for the Florida citrus industry to enhance the economic well-being of the Florida citrus grower, citrus industry and the state of Florida. For more information, visit [www.FDOCgrower.com](http://www.FDOCgrower.com)*



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*Nitrogen-deficient leaves*



*Magnesium-deficient leaves*

Nitrogen deficiency first appears on older leaves and then proceeds toward younger leaves. Deficiency symptoms are characterized by light yellowish-green leaves. The veins are only slightly lighter in color than the tissue in between. New leaves are small, thin, fragile and light green in color. Leaves on new flushes are greener than leaves on the old flushes. Mature green leaves slowly bleach to a mottled irregular green and yellow pattern, become entirely yellow, and then abscise. N-deficient trees are stunted with a thin canopy, and the crop is reduced as a result. The fruit peel tends to be smooth and pale in color, and the juice has lower soluble solids and acid concentrations. If N is deficient during the summer and fall when the fruit is expanding and maturing, some of the green leaves will turn yellow and may abscise. Trees that are constantly short of N are stunted with irregular and

very short twig growth. Twig dieback can occur, and crop production is greatly reduced.

The ability to distinguish between N deficiency and the deficiency of other elements is very important. Symptoms of Mg deficiency at later stages can be confused with N deficiency. Growers must always remember that yellow leaves are not necessarily an indication of N deficiency. Nitrogen deficiency can be distinguished by the general nature of the yellowing of foliage throughout the entire tree with the absence of any distinctive leaf pattern. Nitrogen deficiency in Florida is most commonly observed after flowering, but before the summer rainy season begins. In many cases, the foliage of such trees will become greener during the summer rainy season, particularly if a small crop has set. Magnesium deficiency develops in the summer, causing complete yellowing of the

leaves in the fall or early winter with no possible regreening unless Mg fertilizer is applied.

The main cause of N deficiency is a lack of available N in the soil, which can be due to a number of factors. Nitrogen leaching is caused by the combination of heavy summer rainfall or over-irrigation on a highly-porous soil. Waterlogging of the soil can cause N loss through denitrification that may lead to a temporary N deficiency that is relieved by dry weather. Weak or old trees that are N-deficient can be improved by frequently applying small doses of N fertilizer. Foliar sprays of N fertilizer sources like low-biuret urea, calcium nitrate or potassium nitrate are a very efficient and rapid way to correct N deficiency.

*Mongi Zekri is a multi-county citrus Extension agent, and Tom Obreza is a professor and interim associate dean for Extension — both with the University of Florida-IFAS.* 🍊

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