

# Keys to optimal corn yields

*Increasing corn yields needs not just more nitrogen application but proper nutrient balance.*

It takes more than high nitrogen uptake for corn to realize its maximum yield potential. Nitrogen, potassium and phosphorus uptake need to be in the proper ratio.

This was one of the main findings of a comprehensive review of corn research in the U.S. and worldwide over the past 100 years by cropping systems specialists Ignacio Ciampitti of Kansas State University and Tony Vyn of Purdue University.

"The highest corn yields, if there are no other limiting factors, are when nitrogen and potassium uptake is in a 1-to-1 ratio and nitrogen and phosphorus uptake is in a 5-to-1 ratio," Ciampitti explained. "Having the right nutrient balance within the plants is more important to increasing yields than just applying extra nitrogen."

Those nutrient uptake ratios are measured in above-ground portions of the corn plant soon after physiological maturity is reached, he added. The ratios will be different at other stages of growth.

## Meat advisory committee named

AGRICULTURE Secretary Tom Vilsack announced the appointment of members to the National Advisory Committee on Meat & Poultry Inspection (NACMPI) for the 2014-16 term.

Established in 1971, the 17-member advisory committee meets on food safety concerns and advises the secretary of agriculture on matters affecting federal and state inspection program activities. It also contributes to the U.S. Department of Agriculture's regulatory policy development.

"The diverse perspectives on food safety that the advisory members bring are invaluable to our success in ensuring the safety of the foods we eat," Vilsack said. "I am firmly committed to aggressively decreasing the incidence of foodborne illnesses, and these outstanding individuals will be instrumental in our work to protect the American people's food supply."

The new NACMPI members are: Dr. Michael Crupain of Consumer Product Safety & Sustainability, George Wilson of Wilson & Associates LLC, Dr. Tanya Roberts of the Center for Foodborne Illness Research & Prevention, Kurt Brandt of United Food & Commercial Workers International Union, Dr. Dustin Oedekoven of the

Corn takes up a higher percentage of its potassium earlier in its life than nitrogen. By the flowering stage of development, corn has absorbed about 80-90% of its total seasonal potassium amount, but only 50-60% of its total seasonal nitrogen uptake, Ciampitti said.

As a result, as the season progresses, the nitrogen:potassium ratio in the plant gradually gets larger. At maturity, high-yielding corn has a ratio of about 1:1.

Similarly, the nitrogen:phosphorus ratio within the plant changes as the season progresses, but in the opposite direction. Phosphorus accumulation is greatest later in the season, the review noted.

"Corn plants eventually accumulate most of their phosphorus in the kernels, and the proportionately later phosphorus uptake means that the nitrogen:phosphorus ratio declines as the season progresses," Vyn said. "Changes in this ratio are related more to plant phosphorus changes than to changes in plant nitrogen."

Although the yield level of corn is not strictly related to the nitrogen:phosphorus balance, in high-yield-potential corn systems, the best ratio in corn plants at physiological maturity is near 5:1, Ciampitti said.

Optimal nutrient ratios were found to be comparable between the U.S. and the rest

of the world as well as across the decades of corn hybrid improvement, the research review showed. In general, high-yielding corn systems require better nutrient balance and more nutrients, Ciampitti and Vyn said.

If fertilizer application adjustments are needed for corn production in the subsequent growing season to reach optimal nitrogen:potassium and nitrogen:phosphorus ratios based on a plant analysis done shortly after physiological maturity in the current season, Ciampitti explained that these adjustments should be based on: (1) soil test data, (2) a consideration of potential soil nutrient supply from organic sources in the soil and (3) expected yield and crop nutrient removal rates.

As important as nutrient balance is, the specialists found other factors that are also important to achieving corn's maximum yield potential. "Yield improvement, both in the U.S. and worldwide, can't be attributed solely to changes in nutrient application. It also reflects the combined effects of other production practices, such as water management, seeding rates, timeliness of field operations, insect and disease control, weed control and more," Ciampitti said.

Focusing solely on nutrient applications as the means of increasing corn yields will not always help producers close the gap between potential and actual yields, he said. There needs to be an integrated approach to corn yield improvement, including genetics and management.

"For example, we found one of the main factors contributing to continued corn yield gains in the U.S. was related to genetic improvements such as reduction in barrenness, more erect leaf angles, better flowering/silking synchrony, (leaves staying green longer), better tolerance to pests and drought and better tolerance to crowding," Ciampitti added.

Another main factor is management, such as better fertilizer application methods and timing, pest control, earlier planting dates, reduced tillage systems and water management, he added.

An integrated approach to improving corn yields is the most effective, he said, and key nutrient ratios should be monitored and managed for proper balance and optimal yields. ■



**YIELDS:** If there are no other limiting factors, the highest corn yields result when nitrogen and potassium uptake are in a 1-to-1 ratio and nitrogen and phosphorus uptake are in a 5-to-1 ratio.

of the world as well as across the decades of corn hybrid improvement, the research review showed. In general, high-yielding corn systems require better nutrient balance and more nutrients, Ciampitti and Vyn said.

As important as nutrient balance is, the specialists found other factors that are also important to achieving corn's maximum yield potential. "Yield improvement, both in the U.S. and worldwide, can't be attributed solely to changes in nutrient application. It also reflects the combined effects of other production practices, such as water management, seeding rates, timeliness of field operations, insect and disease control, weed control and more," Ciampitti said.

Focusing solely on nutrient applications as the means of increasing corn yields will not always help producers close the gap between potential and actual yields, he said. There needs to be an integrated approach to corn yield improvement, including genetics and management.

## Starbucks crafts updated animal welfare standards

By CHERYL DAY

STARBUCKS has asked its farmers and suppliers to phase out gestation crates for sows and cages for chickens in its updated animal welfare standards for dairy, egg and meat production.

Well-known for handcrafted beverages, Starbucks serves more than just coffee and tea in its 21,000 stores in 66 countries. Along with a bakery case full of pastries, cookies and other bakery items, the food chain has also added sandwiches to its menu board.

In 2009, the company established a North American buying preference to purchase dairy, egg and meat products from suppliers that adhere to Starbucks' animal husbandry and processing standards.

According to Starbucks, the focus of its animal welfare standards includes:

- Supporting responsible use of antibiotics to support animal health;
- Eliminating the use of artificial growth hormones and, for poultry, fast growing practices;
- Addressing concerns related to dehorning, tail docking and castration both with and without anesthesia, and
- Phasing out gestation crates for pigs and cages for chickens.

More specifically, Starbucks stated in its "Animal Welfare-Friendly Practices" document: "Our priority is to ensure we offer food made with ingredients such as cage-free eggs, gestation crate-free pork and poultry processed through more humane systems."

Furthermore, the company indicated that it consulted with key stakeholders and non-governmental organizations, in addition to engaging industry participants, before developing its animal welfare standards.

With the new California egg production regulations set to go in effect Jan. 1, 2015, animal rights activist group The Humane Society of the United States applauded the Starbucks announcement.

Starbucks has not announced an official timeline or specific details for its farmers and suppliers to adhere to the updated standards.

However, the company did explain that it has been increasing its year-over-year purchases of cage-free eggs since 2008. ■