k-state extension AGRONOMY e-Updates

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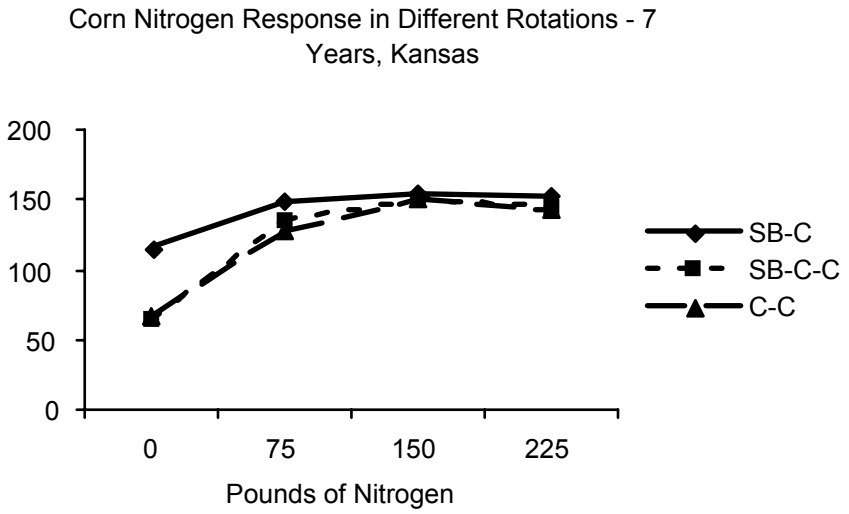
1. Continuous corn considerations

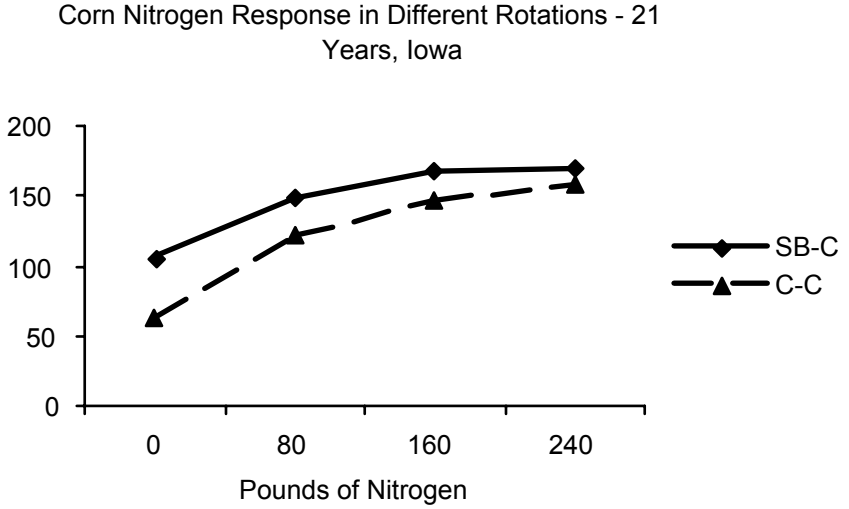
High corn prices are likely to make many producers consider planting corn on acres that were in corn last year, and typically would have been rotated to soybean or another crop. The new demand for corn from ethanol plants is one of the main factors behind today's prices. Mike Woolverton, K-State Extension Grain Economist, has issued some cautions, stating that ethanol production capacity will exceed mandated usage during 2007 (http://www.agmanager.info/marketing/outlook). Even so, corn prices currently remain strong and may encourage more corn following corn than we have seen in recent years. When planting continuous corn, producers should be aware of some production issues that may be different than for corn in typical rotations.

Hybrid selection: A good hybrid is usually a good hybrid, regardless of rotation, but be aware of the traits that may be even more important in a continuous-corn situation. Leaf diseases can be more severe, especially gray leaf spot. Hybrids differ in their resistance to gray leaf spot and other diseases. Be sure to select high-yielding hybrids that have a strong foliar disease resistance package. Root system vigor becomes more important in continuous corn because root-feeding pests begin to build up without rotation to other crops. The transgenic rootworm resistance traits can provide additional root system vigor if rootworms are a problem.

Nitrogen fertility: A number of studies over the years have demonstrated a "rotation effect" for rotated corn compared to continuous corn. Research conducted by Larry Maddux in the Kansas River Valley over a period of seven years demonstrated the yield benefit of growing corn after soybean, especially at lower nitrogen rates. Even with additional nitrogen, corn after soybean often had a slight yield advantage. Doubling the nitrogen rate from 75 to 150 pounds per acre enabled continuous corn yield to approach that for rotated corn, but it was still slightly less. Second-year corn (SB-C-C) responded similarly to continuous corn.



Similar research in Iowa showed the same type of response. In this case, yields are averaged over 21 years and a number of tillage systems, all showing the same reduction in yield for continuous corn at all rates of nitrogen fertilization.



Diseases: Seedling diseases can be more important in continuous corn, especially in situations with reduced or no tillage. The greater amount of residue present in continuous corn results in cooler soil temperatures, favoring a variety of seedling diseases. More residue also can increase the inoculum load for leaf diseases such as gray leaf spot and northern corn leaf blight. As mentioned above, some hybrids may possess greater resistance to these leaf diseases. Tillage can reduce the amount of surface residue and potentially the inoculum for fungal diseases that reside there. With tillage, keep conservation compliance in mind and maintain adequate residue to prevent undue soil and wind erosion. Foliar fungicides can provide protection from gray leaf spot and leaf rusts. Fungicides are usually required at or near tassel, making aerial application or

chemigation necessary in most cases. Stalk rot organisms survive in the soil, so rotation typically doesn't make much difference. However, more inoculum will be present in fields of continuous corn, which would be available for establishing infection if the plants are wounded or stressed. Nematodes can build up with continuous corn, especially on sandy soils.

Insects: Corn rootworm can be a greater problem in continuous corn than in corn that is rotated with other crops. Selecting a hybrid with transgenic RW resistance can help control this pest. With conventional corn, soil insecticides can be used to control rootworms. Insecticide seed treatments (e.g. Cruiser and Poncho) at the higher rates have been shown to provide some level of protection early in the season. Second-year continuous corn will not necessarily have a problem with corn rootworms; the likelihood varies across the state. In areas where there is little or no history of continuous corn, and no history of problems with corn rootworm, producers may be able to get by using an insecticide seed treatment on their second-year corn.

Tillage and Crop Residue: The rotational yield differences discussed above tend to become greater with less tillage. Try to remove residue over the row at planting. Strip tillage can be a good compromise that provides a residue-free planting zone while maintaining good residue cover between the rows.

Summary:
* Select good hybrids
* Adjust fertilizer, particularly N, rates
* Manage residue appropriately
* Be prepared for greater disease and insect pressure

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2. Topdressed nitrogen on wheat: Effect of the wet winter weather

In some cases, nitrogen was applied this winter to wheat fields covered with snow or ice, or when the soil surface was frozen. Where these soils have been saturated or even flooded this spring, there is a question about whether some of this nitrogen has been lost.

In general, applied nitrogen fertilizer can be lost from soils through:

1. Leaching. Because most soils have been frozen this winter, it's very unlikely that any nitrogen will have leached out of the root zone on medium- to fine-textured soils. There could well have been some leaching losses on sandy soils that have not been frozen, however, especially where nitrogen had been applied last fall.

2. Volatilization. Conditions have not been good for volatilization to occur until very recently. Volatilization losses are greatest where urea or UAN solution are surface-applied to damp soils when temperatures are greater than 50 degrees. Higher soil pH levels and warm, windy weather tend to make volatilization losses more likely. None of these conditions have occurred yet this winter.

3. Denitrification. It is unlikely that any topdress nitrogen applied this winter has been lost yet to denitrification. Denitrification is the process in which nitrate-N is converted by certain anaerobic soil microbes into nitrogen gas and lost to the atmosphere. This can occur to nitrate-N in the soil, or in standing water. Denitrification occurs most rapidly when soil or water temperatures are greater than 50 degrees. Applied urea would first have to move into the soil and then be converted into nitrate before it would be subject to denitrification. Applied UAN consists of about 25 percent nitrate-N, along with urea and ammonium (depending on the exact formulation). This nitrate portion, or any residual nitrate in the soil, could be subject to denitrification loss this spring if soils remain or become saturated as the weather warms up this spring.

4. Surface runoff. Fertilizer N that was topdressed onto snow or ice, or onto soils while the surface was frozen, could well have moved around in surface water. If surface water moved off the fields, then part of any fertilizer N applied this winter may have been lost. If flooding or ponding conditions occurred without field runoff, then fertilizer N applied this winter may have moved around the field, and will create uneven areas of nitrogen concentrations in the fields.

In summary, surface runoff or movement within the field is the most likely fate of fertilizer N applied since Christmas on top of snow or ice. As soils thaw, this nitrogen will move down into the soil (unless the soil is too saturated to accept any more water). If the nitrogen moves into the soil, surface movement and volatilization losses will not be a concern. Denitrification and leaching may become a concern later this spring, however, if soils remain saturated as the weather warms up.

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3. Waterlogged wheat

This has been a very wet winter in Kansas. Where soils have been partially or completely frozen, or where soils are saturated and cannot drain, water may have ponded on the soil surface. This has raised some questions about how long wheat can survive under water.

There is very little research on this subject. However, most producers have seen or heard about wheat that has drowned from being in standing water too long in terrace channels or low-lying areas during a wet fall or spring.

This will not necessarily be a good guide to what is happening this winter. Where wheat is dormant or soils are frozen (or very cold), the plants can survive for quite a while under water. Exactly how long is hard to say, but certainly more than a week.

Flooding and waterlogging are more of a concern on actively growing wheat under warm soil conditions. In this situation, wheat can be damaged after being under water in anaerobic conditions for more than a few days. Again, it is hard to be specific.

In unscientific terms, wheat is a tough plant and seems to withstand many problems under field conditions that cause significant injury under controlled research conditions. Predicting the effect of some environmental stresses (waterlogging and freezes are just two examples) can be an inexact science, at best.

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These e-Updates are a regular weekly item from K-State Extension Agronomy. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader
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