CCA ADVANTAGE

The Voice of the Certified Crop Adviser Program
American Society of Agronomy
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CERTIFIED CROP ADVISER

ICCA Board Meets in Washington, DC

By Luther Smith

The Certified Crop Adviser Board and Advisory Council met in Washington, DC, in mid-March. They discussed, among other things, program trends, a new standards document for continuing education and standard operating procedures for the exams, and heard from USDA on TSP and EPA on CAFOs. They reviewed the 2003-2005 Strategic Plan that was approved at the last meeting, emphasizing that all CCA Boards should be using this as their guiding document.

There are 14,869 CCAs throughout the U.S. and Canada. The program has experienced phenomenal growth over the past 10 years. More recently, the growth has leveled off. The number of exams each year has reached more of a maintenance level with renewals remaining strong and averaging 94 percent annually. Overall, the CCA Program is strong and financially sound with great volunteer participation and leadership. The program would not be what it is today without the commitment of those who donate their time and talent. Please contact me, *lsmith@agronomy.org* or 608/273-8090, ext. 337, if you are interested in getting involved in the CCA Program.

Melissa Hammond, USDA-NRCS TSP Coordinator, giving the Board an update on TSP

CONTINUING EDUCATION

The continuing education committee developed a new standards document for continuing education. This document will be used by all CCA Boards when approving CEUs.

Prior to this, the Boards were using the Exam performance objectives (POs). The problem with this approach was that the POs guide the minimum competency exam, base level knowledge to become a CCA. They did not provide for advanced knowledge.

The new document is broader in scope, including professional development, and will allow for advanced knowledge and training. It will be refined throughout 2003 via end user input, with full implementation by January 2004.

EXAM STANDARDS

The exam and procedures committee has developed a new standard operating procedures document for exam development and maintenance. This document will help ensure continuity and consistency in CCA exam quality across all CCA Boards. This will be implemented immediately.

TECHNICAL SERVICE PROVIDERS (TSPS)

USDA-NRCS continues to implement and refine the TSP process. As of this writing, the payment delivery method and cost share pricing structure had not yet been released, but they continue to work on the process.

Your next steps to TSP:

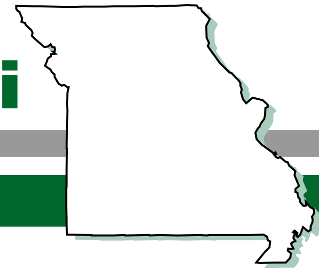
1. Establish a user ID and password by going to your local FSA or NRCS service center. It should only take a couple of days for you to receive their confirmation.

2. Go to *www.nrcs.usda.gov* and complete the certification agreement found at Tech Reg. "Tech Reg" is now on the left-hand menu, or if you first click on electronic government, it is at the bottom of the left-hand menu.

3. If there are any problems with the site, you should contact Tech Reg by clicking on "contact us" at the top of every page, or you can contact me — *lsmith@agronomy.org*.

An electronic version of CCA Advantage, including the test, is available at: *www.cropdecisions.com*

State Focus: Missouri



Missouri CCA Program's Focus: Quality

By Gordon Carlson

Andy Kendig, CCA

When asked how the Missouri Certified Crop Advisers (CCA) interest crop consultants in becoming CCAs, Andy Kendig, former board chair of the Missouri program and an ex officio officer to the board, replies, "By maintaining a quality program."

He continues, "A Missouri CCA is a highly trained, up-to-date expert in crop production systems in Missouri. Being a CCA is something that a CCA can be proud of and growers recognize as a benchmark for knowledge."

That, of course, dovetails nicely with the way the program is administered. Each CCA has to pass two exams – international and local – and submit credentials detailing education crop advising experience, plus two references.

A Founding Father

Missouri, Kendig says, is one of the "founding fathers" of the national CCA Program and long has maintained a commitment to a quality program.

"We are probably one of the more conservative states in the CCA Program," says Kendig. "However, we are constantly evaluating our program to address the needs of our CCAs while still maintaining high quality."

The Missouri exam tests knowledge of agriculture that is specific to Missouri crops and conditions, says Kendig.

However, to become a CCA, consider what an applicant must do: have up to four years of crop advising experience, depending on the individual's educational background; document his or her education and crop advising experience with transcripts and supporting references; pass the comprehensive international exam and the local exam which evaluates knowledge of soil fertility, integrated pest management, crop production and soil and water management; and sign and agree to uphold the CCA code of ethics.

CCAs in Missouri receive what Kendig terms "quality continuing education" from many sources: the University of Missouri, MU extension programs and programs offered by private industry.

Certification also is "a valuable benefit to demonstrate that a person has an outstanding working knowledge of the core agronomic information that is needed for the new Natural Resources Conservation Service (USDA's NRCS) conservation programs and plans," he adds.

Missouri CCAs represent private retailers, ag chemical and seed companies, cooperatives and independent crop consultants.

To maintain certification, a CCA must earn 40 hours of continuing education every two years. The program nationally has averaged a 94 percent renewal rate.

Latest Technology

"The continuing education aspects keep CCAs up to date on the latest technology as well as forging a strong feedback system to agricultural research programs to address the needs of growers," explains Kendig. "Farmers receive current agronomic information from Missouri CCAs that will help them make best practice decisions in their farming operations."

This emphasis on quality is understandable – and necessary – to provide CCAs a proficient understanding of crop production science, food safety, technology, economics and the environment.

Crop advisers use their knowledge in these disciplines and their local and state crop experience to provide crop and soil recommendations to their clients.

The number of CCAs internationally is 14,523 of which 403 are located in Missouri.

Kendig is an extension weed specialist with the Commercial Agriculture Program, MU Delta Center, Portageville, MO.

There are 11 Missouri CCA board members: Greg Luce, Pioneer Hi-Bred, Mexico, MO, is chairman and represents the seed industry; Paul Tracy, MFA, Columbia, MO, is a cooperative representative on the board; Paul Bailey, Missouri Department of Agriculture, Jefferson City, MO, is an ag representative; Mike Burkeybile, IMC-Global, Macon, MO, represents the fertilizer industry; Gary Colliver, Agrifinance, Liberty, MO, is an at-large member; Fred Fishel, University of Missouri, Columbia, MO; Victoria Kugler, DNR, Jefferson City, MO; Bob Miller, Missouri Department of Agriculture, Jefferson City, represents conservation; Bill Parker, Monsanto, Boonville, MO, represents the ag chemical industry; Odie Swanegan, Natural Resources Conservation Service, Columbia, represents the federal government: and Jack Young, Pioneer Hi-Bred, Monroe City, MO, represents retail. Erin Luebbering is program administrator.

Gordon Carlson is Doane Agricultural Service Co.'s Washington, DC-based correspondent.


Steve Dlugosz, CCA

Ethics – Doing the Right Thing

By Steve Dlugosz, CCA

All of us signed a Code of Ethics when we became Certified Crop Advisers (CCA). Our Code of Ethics contains five specific articles, which relate to different segments of our profession. Most of these articles are relatively clear-cut and can be easily applied to obvious lapses in ethical behavior. Cheating a client, stealing from an employer and intentionally making a recommendation that harms persons or property are obvious examples of unethical behavior.

Situations that might seem less offensive but are still considered a breach of ethics would include falsifying CEU sign-in sheets, making off-label pesticide recommendations or promoting agronomic programs which provide little or no benefit to the grower. I've heard from individuals who are frustrated that a few CCAs are doing things like this and are still in the program.

Unfortunately, the CCA Program was never intended to clean up all the improprieties that exist in the business of crop production. However, it's also important to understand that Article V of the Code of Ethics states, "A Registrant having positive knowledge of deviation from this Code by another Registrant shall bring such deviation to the attention of the Board."

Most of us are probably hesitant to pursue such action but do recognize that a well-defined and structured inquiry begins with a letter of concern to the local Board.

Real Life Examples

What about the more mundane or common situations that arise each day? Could some of these be considered unethical or a breach in the code of ethics?

> ***Unfortunately, the CCA program was never intended to clean up all the improprieties that exist in the business of crop production.***

See if any of the following situations (and accompanying justifications) sound familiar:

• Providing a misleading in-field diagnosis to protect your company or product.
"This could cost us a lot."

• Embellishing plot data to improve your product's performance.
"That's how everybody does it."

• Misrepresenting the facts to help a customer qualify for a manufacturer's respray program.
"They're a big company — they can afford it."

• Fudging expense reports.
"The company owes me."

• Discussing confidential information with other clients and co-workers.
"Everybody already knows about that situation."

• Giving products or services away against company policy.
"They'll never know."

• Tweaking sales figures to meet goals.
"But I'm so close."

• Treating clients and co-workers with a lack of respect.
"That guy deserves it — he's an idiot."

• Leaving a conference early.
"That speaker is really boring and I already signed the sheet."

Do the Right Thing

Are all of these situations a breach in ethics? Probably not. Are some of these examples of unprofessional behavior? Yes.

The point here is the difference between unprofessional and unethical behavior is not always clear. It's not unusual for different people to work under different value systems. So what do you do?

At the risk of sounding like a preacher or your mother, I offer this suggestion: Simply do what's right. That's what ethics is all about.

None of us can control how others think or act. All we can do is be concerned about our own behavior, and hopefully be a good example to others of what it means to be a professional Certified Crop Adviser.

Steve Dlugosz, CCA, is an agronomist for Ag One and Harvest Land Co-ops in eastern Indiana and western Ohio.

Corn Production as Affected by Tillage System and Starter Fertilizer

Earn one CEU!
All CCAs may earn up to 20 Continuing Education Units (CEUs) per two-year cycle as board-approved self-study articles which will include CCA Advantage articles. The CCA CEU logo (above) marks all pre-approved material, with the CEU value indicated by the number in the middle. To receive one CEU in crop management, read this article, fill out the attached exam and mail the tear-out form, along with $10, to the American Society of Agronomy. Note: Exams have been included only in copies mailed to registered CCAs. If you did not receive an exam but would like one, contact the CCA program at (608) 273-8085.

*By Jeffrey A. Vetsch and Gyles W. Randall**

Adoption of conservation tillage practices is commonplace on the well-drained loess soils of the northern Corn Belt. However, recent cropping system shifts have renewed concerns about soil erosion and the use of conservation tillage in this region. Soybean hectarage in southeastern Minnesota has increased 150 percent, and the percent of crop hectarage in a corn–soybean rotation increased from 55 percent in 1975 to 72 percent in 1999. A shift to row crop–intensive agriculture from crop rotations that included small grains and alfalfa requires farmers to change tillage practices to maintain compliance with USDA farm program conservation. Because many farmers associate no-till (NT) in the northern Corn Belt with cool and wet soils, delayed planting, slow or uneven emergence and potentially reduced corn yields, modified NT systems are gaining interest in this region. Research evaluating modified NT systems, commonly referred to as zone tillage (ZT) or strip tillage (ST), is sparse on these silt loam soils.

Several researchers have shown the benefits of starter fertilizer on early growth of corn. Varied yield responses to use and placement of starter fertilizer warrant continued evaluation in ZT and other modified NT systems.

Cone index (CI), a measurement reflecting soil density and perhaps compaction, as affected by ZT and ST, has not been widely documented. More data on soils in the northern Corn Belt are needed to determine if reductions in CI with modified NT systems (ZT and ST) will affect corn yields.

The primary objective of this research was to determine the effects of four tillage systems — NT, ZT, fall ST and conventional till (CT) — with and without starter fertilizer on corn production in monoculture corn and corn following soybeans. A secondary objective was to determine the effect of these four tillage systems on in-row CI for these two crop rotations.

Materials and Methods

The 0.5-ha experimental site was located near Rochester, MN, on a Port Byron silt loam soil. Continuous corn and corn–soybean rotations were established in 1996 using conventional tillage. The area had been cropped to corn for two years prior. Soil samples taken to a 15-cm depth in 1996 and 1998 averaged 24 (very high) and 130 (high) mg kg^{-1} soil test P and K, respectively, for continuous corn and 27 (very high) and 142 (high) mg kg^{-1} soil test P and K, respectively, for corn following soybeans.

Eight treatments, four tillage systems for corn with and without starter fertilizer, were arranged in a split-plot design with four replicates. Tillage systems, established in 1996, were the main plots. Each main plot was 4.6 m wide by 20 m long. In continuous corn, rows were planted parallel to and 38 cm away from the previous year's rows. Corn stalks were not chopped in the NT, ZT and ST treatments.

The ZT treatment, commonly called Rawson tillage, consisted of fall deep tillage (subsoiling) to a depth of 38 cm on 76-cm centers, except in 1996, when wet soil conditions did not allow. At planting, the ZT treatment received one pass with a coulter cart. The corn was planted directly over the subsoiled zone.

The ST treatment, commonly called fall strip till, was applied each fall except for 1996, when it was applied on April 17, 1997. Overwinter settling reduced the berm height to about 4 cm at planting time. Corn was planted directly into the ST zone.

The CT treatment corresponded to the CT practice for loess soils of this region. In continuous corn, corn stalks were chopped, fall chisel plowed to a depth of 20 cm with twisted shovels, and field cultivated before planting. In corn following soybeans, the CT treatment was only field-cultivated before planting. For soybeans following corn, the CT treatment was stalk-chopped, fall chisel-plowed and field-cultivated before planting. All tillage treatments were planted to soybeans in 19-cm rows.

Each main plot of six rows was split, with three rows receiving starter fertilizer at 168 kg ha^{-1} of a 9–10–24 and the other three rows receiving no starter fertilizer. Starter fertilizer was applied only for corn in the corn–soybean rotation. Starter fertilizer was applied 5 cm to the side and 5 cm below the seed with a planter coulter on all tillage treatments except ST. In ST, starter fertilizer was applied in a 15-cm deep band each year at the time of ST. In addition to deep band–placed fertilizer in ST, starter fertilizer was also applied at the same rate in the same plots in a 5- by 5-cm band at planting in 1999 and 2000 for corn following soybeans only.

Corn was planted at 79,000 plants ha^{-1} on May 13, 1997, April 30, 1998, May 4, 1999 and May 2, 2000. A corn rootworm insecticide was used in continuous corn. Weeds were controlled with a combination of pre- and post-emerge herbicide applications. Row cultivation of corn was not performed. Nitrogen as urea plus NBPT was broadcast-applied after planting at 175 and 130 kg ha^{-1} for continuous corn and corn following soybean, respectively.

Results and Discussion

Monthly average and growing season air temperatures were usually within 1∞C of normal, except in May 1997 and May and September 1998. Monthly precipitation varied greatly, from 204 percent greater than normal in June 2000 to 64 percent below normal in September 1998. Growing season precipitation was greater than normal for three of four years. Growing season temperature averages and precipitation totals were favorable for excellent crop growth in all four years.

Surface residue coverage was significantly different among tillage systems for all three sampling times in both cropping systems and did not change from fall to early spring. In continuous corn, NT, ZT and ST systems maintained high levels of crop residues for all sampling times. Generally, residue coverage was greatest for NT, intermediate for ZT and ST, and significantly less for CT (chisel system). In corn following soybeans, fall and early-spring coverage was greatest for NT and CT, intermediate for ST and least for ZT. After planting, residue coverage was about 20 percent less than before planting in NT, ZT, and ST but was 70 percent less in CT. These data suggest adequate surface residue coverage to minimize erosion in the NT, ZT and ST systems but marginal levels with one full-width, shallow-tillage operation before planting in corn following soybeans.

Significant differences in soil moisture existed among tillage systems at several depth–timing combinations for continuous corn in 1999. Generally, ZT and ST had slightly greater soil moisture content than NT or CT, especially at the 10- to 20- and 20- to 30-cm depths. Sampling times after significant rainfall events were chosen to minimize differences in soil moisture; however, moistures on June 15 were less than in April or May. Significant differences in soil moisture for corn following soybeans were not as frequent as for continuous corn, and trends among tillage systems were not consistent or clear. Variation in soil water content can influence or mask differences in CI, but the small differences in water content were assumed to be insignificant when evaluating the CI data among tillage treatments.

CI in the row with all tillage systems for continuous corn ranged from 0.2 to 1.2 MPa. Significant differences in CI were found among tillage treatments to a depth of 30 cm for all three sampling times. In April, before planting, CI was reduced by ST and CT to an 11-cm depth and to a 30-cm depth by ZT compared with NT. In May, at corn emergence, CT, ST and ZT reduced CI at 2- to 7-, 2- to 11-, and 7- to 43-cm increments, respectively, compared with NT. In June, some soil reconsolidation had occurred at shallow depths, but trends at depths between 5 and 30 cm were similar to previous samplings for ST and ZT. Generally, CT, ST and ZT produced a very loose and friable root zone that was ideal for root and crop growth to a depth of 10, 15 and 30 cm, respectively. However, CI did not exceed 1.2 MPa even in NT, and corn root growth is usually not restricted at CI values <1.5 MPa.

CI ranged from 0.2 to 1.1 Mpa when corn followed soybeans. Significant differences in CI were found among tillage treatments for all three sampling times, almost all depths in April, and to the 25- and 30-cm depths in May and June, respectively. In April, before preplant tillage, ST and ZT reduced CI to the 16- and 30-cm depths, respectively, compared with CT and NT. In May and June, ST reduced CI in the 7- to 16-cm depth compared with CT and NT. Compared with CT and NT, CI was reduced with ZT in the 7- to 24-cm depth in May and in the 11- to 30-cm depth in June. By June, only minimal reconsolidation of soil had occurred at all depths in ST and ZT. Strip till and ZT produced very loose and friable root zones ideal for root and crop growth to a depth of 20 and 30 cm, respectively.

ZT and ST significantly reduced CI on this silt loam soil. However, CI in NT was <1.3 MPa, and no compaction problem existed, which is typical of soils in this region. Thus it's unlikely that reductions in CI from ZT in this study would affect corn root growth or grain yield.

Continuous Corn Production

The number of days to achieve 50 percent emergence was affected by the treatment main effects of year and tillage system. Emergence was most rapid in 2000 and slower in 1999 and 1997. Emergence data were not taken in 1998. Although the chisel plow system (CT) significantly hastened corn emergence compared with ZT and ST, the difference (<1 day) was insignificant from a practical standpoint. Emergence in NT was 2.7 days slower than in CT. Interactions between tillage system and year were not significant.

Plant height of corn about 35 days after emergence was significantly affected by all treatment main effects. Cool, wet conditions in June 2000 reduced plant height compared with other years. Plant height increased as tillage intensity increased in order of CT > ZT > ST > NT. Height responded similarly to tillage system as emergence did and inversely to residue cover. Starter fertilizer increased plant height when averaged across years and tillage systems. The significant three-way interaction is explained by varied

continued on page 6

plant-height response to starter fertilizer among tillage systems and years. In 1999 large plant-height responses to starter fertilizer were obtained with CT, ZT and NT compared with other years. Strip till showed the smallest height response to starter fertilizer except in 1997, when CT showed no response. Small height responses in ST, where fertilizer was placed in a band 10 cm below the seed each year, suggest this placement is not as effective as a single 5- by 5-cm placement with the other tillage systems. No-till and ZT responded similarly to starter fertilizer, except in 2000, when ZT did not respond. No apparent explanation for some of these variable responses exists at this time.

Grain moisture at harvest was significantly affected by year and tillage system. Time of harvest varied considerably from year to year and was the reason for moisture differences among years. The CT and ZT systems had drier grain at harvest compared with ST or NT. Differences in grain moisture due to tillage averaged across the four years were <10 g kg^{-1}, or 1 percent. Contrary to findings in other studies, starter fertilizer did not affect grain moisture.

Corn grain yields varied among years and were influenced significantly by tillage system and starter fertilizer. Yield response to starter fertilizer averaged 0.5 Mg ha^{-1} and was not different among tillage systems or years. Compared with NT, yields were increased by 0.4 Mg ha^{-1} with ZT and ST and by 0.7 Mg ha^{-1} with CT. Continuous corn yields were affected significantly by tillage system in 1997, 1999 and 2000 but not in 1998. In 1999 and 2000, grain yields were greatest with CT and were about 0.4, 0.6 and 1.1 Mg ha^{-1} less with ST, ZT and NT, respectively. In comparison, yields in 1997 were greatest with ZT, about 0.4 Mg ha^{-1} less with NT and CT, and 0.8 Mg ha^{-1} less with ST. Strip tillage was not performed until April 1997 instead of the previous fall, which could explain the poor performance of ST in 1997.

These data show significant reductions in continuous corn yield with NT in the last two years of the study and about a 7 percent reduction compared with CT when averaged across all four years. However, competitive yields can be produced while still providing excellent residue coverage with the modified NT systems, i.e. ZT and ST.

Corn Production Following Soybeans

The number of days to achieve 50 percent emergence and grain moisture at harvest were significantly affected by year but not by the treatment main effects of tillage system or starter fertilizer. Early growth of corn was affected by all treatment main effects. The ZT, NT and ST systems produced plants that were 1, 2 and 4 cm shorter, respectively, than CT. Averaged across years and tillage systems, starter fertilizer increased plant height by 6 cm. A significant year ¥ starter fertilizer interaction for plant height resulted from a large response with starter fertilizer in 1999 compared with other years.

Corn grain yields following soybeans varied among years and were significantly affected by starter fertilizer but not by tillage system. Averaged across four years, starter fertilizer increased grain yield by 0.5 Mg ha^{-1}. Statistically significant yield differences occurred in 1998 but not in 1997, 1999 or 2000. In 1998 grain yields were greatest with ZT and were 0.5, 0.7 and 1.1 Mg ha^{-1} less with CT, NT and ST, respectively. Although no other years produced significant differences, some interesting trends did occur. Strip-till yields averaged 0.5 Mg ha^{-1} less than yields in NT, ZT and CT in 1997 and 1998 when starter fertilizer was placed 10 cm below the seed but were 0.3 Mg ha^{-1} greater in 1999 and 2000 when starter fertilizer was also placed in a 5- by 5-cm band. Yield response to starter fertilizer in ST averaged 0.2 Mg ha^{-1} less than in NT, ZT, and CT in 1997 and 1998 but was 0.5 Mg ha^{-1} greater in 1999 and 2000.

These data raise questions that have been debated in the literature: (1) Why do yield responses to starter fertilizer occur on high- and very high-testing soils, and what is the relationship between early growth and yield? (2) Is deep placement of fertilizer below the seed, such as with ST, as effective as conventional 5-by 5-cm starter placement? (3) Are yield responses to starter fertilizer in reduced-tillage systems associated primarily with N, P or K?

The data in our study may not provide conclusive answers to these questions, but they do show the complexity of tillage-related starter fertilizer issues facing corn producers. Inconsistent early growth responses to starter fertilizer accompanied by sizable and consistent yield increases were perplexing. Generally, the literature shows consistent early growth responses to starter fertilizer on high-testing sites but inconsistent yield responses. Our research supports other findings showing deep placement of starter fertilizer appears to be inferior to a 5- by 5-cm placement. We found a substantially greater yield response to starter fertilizer in the ST system when starter fertilizer was placed 5 by 5 cm from the seed plus 10 cm below the seed compared with when it was placed only below the seed. However, we cannot attribute the increased yield response on this high-testing soil solely to the 5- by 5-cm placement because of double placement (deep band plus 5 by 5 cm) and a double rate of starter fertilizer. It is unlikely that a single nutrient was consistently responsible for the yield responses we found.

Conclusions

The modified NT systems used in this study produced yields equal to or slightly less than conventional tillage in both crop rotations while maintaining significantly greater residue coverage. These data suggest starter fertilizer should be considered to optimize corn production across all tillage systems in these northern Corn Belt silt loam soils testing <30 mg kg^{-1} Bray P1 and <150 mg kg^{-1} exchangeable K. For continuous corn, these modified NT systems would be recommended on well-drained, highly erosive loess soils as alternatives to NT and CT for enhanced yield and improved erosion control, respectively. For corn after soybeans, NT and these modified NT systems would be recommended as an alternative to one-pass field cultivation.

Editor's note: *Content was adapted from the paper "Corn Production as Affected by Tillage System and Starter Fertilizer on Corn," which was published in Agronomy Journal, 2002 94, and is courtesy of the authors Jeffrey A. Vetsch and Gyles W. Randall.*

CCA 1 CEU

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This exam is worth 1 CEU in **crop management**. An exam score of 70% or higher will earn CEU credit. The International CCA program has approved self-study CEUs for 20 of the 40 CEUs required in the two-year cycle.

DIRECTIONS
1. Read the self-study article on pages 4-6 carefully.
2. Answer the questions by clearly marking an "X" in the box next to the best answer for each question.
3. Complete the self-study exam registration form on the back of this page.
4. Clip out this self-study examination page, fold and place in envelope.
5. Enclose a check for $10.00 made payable to the American Society of Agronomy, for processing fees. Payment in U.S. funds only.
6. **Mail your self-study exam and fee to:** ASA c/o CCA Self-Study Exam, 677 S. Segoe Road, Madison, WI 53711. *Please allow 60 days for processing.*
7. An electronic version of this test is also available at *www.cropdecisions.com*. Go to the Certified Crop Advisers section (left hand column) and access the "CCA Advantage" link.

Corn Production as Affected by Tillage System and Starter Fertilizer
April Self-Study Examination

DETACH HERE

1. Modified no-till systems are gaining interest in the northern Corn Belt because:
[ ] a. there are numerous studies out on zone tillage for the region.
[ ] b. there are numerous studies out on strip tillage for the region.
[ ] c. there is an association with delayed planting and no-till.
[ ] d. of the high corn yields using no-till.

2. Cone Index is a measurement of:
[ ] a. soil density.
[ ] b. soil reflectance.
[ ] c. soil structure.
[ ] d. soil moisture.

3. In continuous corn, residue coverage after planting was greatest for:
[ ] a. CT>ST>ZT>NT.
[ ] b. ST>ZT>NT>CT.
[ ] c. ZT>ST>NT>CT.
[ ] d. NT>ST>ZT>CT.

4. In corn following soybeans, fall and early spring coverage was greatest for:
[ ] a. NT>CT>ST>ZT.
[ ] b. NT>ZT>ST>CT.
[ ] c. CT>NT>ZT>ST.
[ ] d. CT>ZT>ST>NT.

5. Differences in soil moisture existed among tillage systems for continuous corn; generally:
[ ] a. NT and CT had slightly greater soil moisture content than ZT and ST.
[ ] b. NT and ZT had slightly greater soil moisture content than CT and ST.
[ ] c. ZT and ST had slightly greater soil moisture content than NT and CT.
[ ] d. CT and ST had slightly greater soil moisture content than NT and ZT.

6. Significant differences in soil moisture for corn following soybeans:
[ ] a. were not as frequent as for continuous corn.
[ ] b. were observed with NT and CT having greater soil moisture content than ZT and ST.
[ ] c. were observed with ST and ZT having greater soil moisture content than CT and NT.
[ ] d. were observed with NT and ZT having greater soil moisture content than CT and ST.

7. Compared to ZT and ST:
[ ] a. CT in continuous corn production delayed corn emergence by 2.7 days.
[ ] b. CT in continuous corn production did not hasten corn emergence from a practical standpoint.
[ ] c. CT in continuous corn production hastened corn emergence by 2.7 days.
[ ] d. CT in continuous corn production hastened corn emergence by 5 days.

8. Plant height increased as tillage intensity for continuous corn increased in order of:
[ ] a. NT>ST>ZT>CT.
[ ] b. ST>ZT>NT>CT.
[ ] c. ZT>NT>CT>ST.
[ ] d. CT>ZT>ST>NT.

9. Corn grain yields following soybeans varied among years and were significantly affected by:
[ ] a. starter fertilizer but not by tillage system.
[ ] b. tillage system but not by starter fertilizer.
[ ] c. soil moisture but not by starter fertilzer.
[ ] d. starter fertilizer but not by soil density.

10. For continuous corn, these modified NT systems:
[ ] a. are not recommended for northern Corn Belt soils.
[ ] b. would be recommended on well-drained, erosive soils as alternatives to NT and CT for erosion control and enhanced yield.
[ ] c. would be recommended on well-drained, erosive soils as alternatives to NT and CT. However, yield is significantly reduced.
[ ] d. do not need starter fertilizer to optimize corn production.

Over

CCA ADVANTAGE Newsletter

ASA C/O CCA SELF-STUDY EXAM
677 S SEGOE ROAD
MADISON WI 53711

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Continuing Education Self-Study Test

Crop Management Self-Study Test (continued)

CCA 1 CEU

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SELF-STUDY EXAM REGISTRATION FORM

Name: ______________________________

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Credit Card #: ______________ Type of Card: Visa ❏ Mastercard ❏ Discovery ❏ Am Express ❏

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A $2 processing fee will be added to all credit card charges, or enclose $10 check payable to American Society of Agronomy.

X ______________________________

Signature of Registrant as it appears on Code of Ethics

I certify that I alone completed this self-study course and recognize that an ethics violation may revoke my CCA status.

This exam issued April 2003 expires April 2005.

SELF-STUDY EXAM EVALUATION FORM

Rating Scale: 1=Poor 5=Excellent

Information presented will be useful in my daily crop advising activities: 1 2 3 4 5

Information was organized and logical: 1 2 3 4 5

Graphics/tables were appropriate and enhanced my learning: 1 2 3 4 5

I was stimulated to think how to use and apply the information presented: 1 2 3 4 5

This article addressed the stated competency area and performance objective(s): 1 2 3 4 5

Briefly explain any “1” ratings: ______________________________

Topics you would like to see addressed in future self-study materials: ______________________________