CCA ADVANTAGE

A DRY SUMMER brings a range of pest problems to the Midwest

■ By Colleen Scherer, managing editor

A variety of pests are keeping scouters on alert this year after a mixed bag planting season. Here are some of the highlighted pests by state.

Indiana is having problems this year from slugs in both corn and soybean fields. "Many areas of fields are so severely damaged that replanting is necessary," say John Obermeyer, Christian Krupke and Larry Bledsoe with Purdue University. "On corn, slugs feed on the surface tissue of leaves resulting in narrow, irregular, linear tracks or scars of various lengths. Soybean damage is not as predominant on the foliage, but rather on the hypocotyl and cotyledons."

Indiana is also seeing a few Japanese beetles emerging in extreme southern counties at the end of June. By mid-July, most of the state will see this pest.

Corn rootworm injury is becoming noticeable in Illinois. Scouters are reporting larvae and observing root-feeding injuries.

"With predicted high temperatures and a continued lack of rainfall in some areas, the incidents of rootworm injury will increase," says Kevin Steffey, University of Illinois.

Soybean aphids have begun to emerge in Illinois as well. The first report came in on June 8. Infestation rates have varied between 8 percent and 20 percent, Steffey says. Predicted high temperatures are expected to keep populations down, however, conditions could change.

The recent stretch of dry weather across Illinois and parts of Iowa has led to some dry environment insect problems. Grape colaspis and false chinch bugs are showing up in both states.

"When I receive reports of both grape colaspis injury (especially in soybean) and false chinch bugs, I am always reminded of 1988," Steffey says. "Not that I am predicting a drought, but both of these insects caused significant problems early in the season in 1988, to be overshadowed later by two-spotted spider mites. We have not received a large number of reports of these two insects causing problems, but the reports are worth mentioning nonetheless."

The symptoms of grape colaspis damage include stunted plants, purple stems, "burned" leaf edges, classic symptoms of phosphorus and potassium deficiencies. Although uncommon, grape colaspis can appear on soybeans as well as corn.

"Grape colaspis injury to soybean was relatively widespread in 1988 when soybean seedlings were struggling to grow in dry soils," Steffey continues. "Hundreds of fields were affected, with as much as 95 percent stand reduction in a few fields. However, it's important to note that most of the affected soybean fields were soybean planted after PIK (payment-in-kind) acres on which legumes (e.g., clover, alfalfa) had been grown."

Corn blotch leafminers are reported to be causing injury to whorl stage corn in Nebraska's York County. They have been reported causing injury to corn the last couple of years in many fields in central Nebraska. Corn blotch leafminers are immature stages of a fly that tunnel inside corn leaves, leaving hollowed out whitish tunnels where they have fed. High populations may kill several of the lower leaves of whorl stage corn.

Photo courtesy of Spencer, Illinois Natural History Survey

Rootworm larvae feeding on corn plant in Champaign County. The size reference is a dollar coin.

As long as the weather remains hot and dry across most of the Midwest, Asian soybean rust is not expected to be a problem for most soybean growers. That could all change if several factors happen, but the likelihood that it will be a problem is small this year. AG

Texas CCA

The Texas Certified Crop Adviser Board has been searching for ways to help promote the Certified Crop Adviser Program (CCA) in Texas. The board understands the rigorous testing and continuing education requirements for CCA certification. We want to communicate the importance of CCA member knowledge and experience to agriculture commodity producers in Texas.

The Texas Certified Crop Adviser Program (TCCA) has been working with its members to find out what they believe will help the program in Texas. A survey was sent out to all current Texas Certified Crop Advisers and slightly more than 15 percent replied with comments. The majority of those completing the survey work for an agriculture company that sells agriculture chemicals, fertilizer or seed. Twenty-two percent of those answering the survey were independent crop advisers.

Sixty-one percent felt listing their name and information on the Web site would be a benefit. Half felt having a link from the TCCA Web site to their Web page would be a benefit. Sixty-eight percent felt having a TCCA newsletter on the Web site and using e-mail notification when important information was placed on the Web site, would be beneficial. Some of the more popular items that the members mentioned that would help were notification of insect outbreaks, approval of a Section 18 or 24c, continuing education opportunities, and which chemicals work best on insect outbreaks. These are only a few of the more popular items suggested. Fifty-five percent of the members felt there are adequate continuing education courses available to receive their required continuing education credits. Many of those who felt there were not adequate courses available commented they had problems acquiring credits in nutrient management and water and soil management.

When asked what would make the CCA better in Texas and how can we get more crop advisers involved in the program, we received a lot of comments. The two most mentioned comments, by far, were "Make the program mean something to producers," and "Promote the program to farmers." The members felt most producers did not even know what the CCA is, much less the requirements they must meet to become a member of the CCA. There were also many comments that company representatives should be certified if they are giving recommendations as part of their employment.

At the last TCCA Board Meeting, the board members discussed the comments received in the survey and came up with several items to research. Ideas that were discussed to help promote the program included placing ads in some of the major publications producers receive, setting up a TCCA display at major conferences the producers attend, and seeking links from commodity association Web pages. It was also discussed that TCCA needs to promote the use of its Web site to get information out to members and producers. An e-mail notification system of important postings on the Web site was also discussed. The board also recommended that a letter be sent to continuing education course sponsors to get their courses approved in a timely manner so the courses could be posted on the Web site. The board felt if these ideas are implemented, program improvement would be achieved.

The TCCA Board has also been talking with two of the major agriculture universities in Texas to do a pilot project allowing students the opportunity to take the CCA exam after taking certain prerequisite courses. The exam would be built into their course curriculum as part of their degree plan. This would give students a great opportunity to have CCA certification prior to their job search after graduation. CCA members are valuable assets in a strong agricultural state like Texas, and the importance of these assets needs to be cultivated. AG

Getting involved with conservation districts

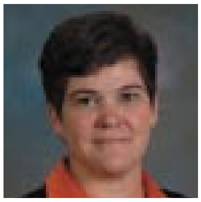
Your nation's conservation districts are a great way for you to get involved in your local community's natural resource decisions and opportunities. Although you may not want to actually run for election to your local conservation district board, you can get involved by becoming an associate member.

More than 3,000 conservation districts across the country work with more than 2.5 million cooperating landowners and operators to help them manage and protect land and water resources on nearly 98 percent of the private lands in the United States. Many of these landowners also depend on Certified Crop Advisers for professional advice and input.

The relationship between conservation districts and CCAs is critical and is growing as landowners face increasing environmental pressures and land-use decisions. You can make this partnership even stronger by being an active associate member of your local district.

Each local conservation district has its own rules and requirements for associate members but most strongly encourages community involvement and relies on volunteers to strengthen their activities and effectiveness. Check out the NACD Web site www.nacdnet.org for more information regarding conservation districts and their work both nationally and locally.

Get involved in the decisions that shape the natural resources in your community—be an associate member of your local district. AG



BY KRYSTA HARDEN, CEO,
National Association of Conservation Districts

Ag Lenders and CCAs

BY LUTHER SMITH, Executive Director, American Society of Agronomy

Do you know the local ag lenders in your area? If not, you might want to start to build a working relationship with them. Ag lenders and CCAs have the same client and customer base, so it might be an important part of your business plan.

The ICCA Program is working to build relationships with other organizations that have similar interests or goals. Ag lenders are one of those groups. The purpose of these relationships is to add more value and opportunities to being a CCA and at the same time add value to the other organizations by working with CCAs. This only works if it is a win/win for all parties involved.

CCAs and ag lenders share the same client base to some degree. An ag lender wants to minimize risk exposure and evaluate the financial viability of the farm business. A CCA helps to minimize the risk exposure by helping the farmer implement agronomic best management practices for that specific farm location.

Gary Sipiorski, chairman of the Agrural Committee for the Independent Community Bankers of America (ICBA) and President of the Citizens State Bank of Loyal, Loyal, Wis., says, "As a CPA or veterinarian adds value to the farmer in the eye of the lender, we also believe the CCA adds value when it comes to the cropping enterprise and agronomy practices. It is always considered to be an advantage if the grower is working with a CCA. They add value and are more comfortable with the producer when making a decision."

So does this mean you get a lower interest rate for your farmer clients? Not necessarily, but it might make the difference between getting the loan or not. You add value to the overall farm business by what you do in providing crop advice and inputs.

As a CCA, you are committed to working with your grower customers in adopting the best management practices that are both economically and environmentally sound. A CCA is considered a business partner to the grower because both have a lot to gain or lose based on the recommendations that are made. A study by the Kansas Farm Management Association on farm profitability and good management identified eight primary traits that contribute to farm profitability: yield, price, government payment, technology, cost, planting intensity, rent and size. CCAs influence five of them: yield, cost, technology, planting intensity and size. Ag lenders are very interested in these same traits.

Getting to know and developing a positive working relationship with ag lenders and other service providers helps your clients' overall business. Take time to get to know the ag lenders in your trade area. They will appreciate it and so will your clients. AG

CCA CERTIFIED CROP ADVISER
ADVANTAGE

Continuing Education
Self-Study Course

SEDIMENT AND TRANSPORT IN IRR

BY D. L. BJORNEBERG, D. T. WESTERMANN, J. K. AASE, A. J. CLEMMENS, AND T. S. STRELKOFF

Phosphorus is an essential nutrient for crop growth. Runoff from agricultural land is the main source of nutrients that impair stream water quality in the United States.

Forty-four percent of the irrigated land in the United States is surface irrigated and 51 percent (4.75 million hectares, or 11.7 million acres) of that is irrigated with furrows. Although farmers try to control runoff from rain or sprinkler irrigation, runoff is often necessary to achieve acceptable uniformity during furrow irrigation and in many cases, it is impractical to contain runoff on sloping fields (i.e., >1 percent).

The mechanics of erosion can be divided into three components: detachment, transport and deposition. Water flowing in irrigation furrows detaches and transports sediment. Deposition occurs when flowing water can no longer transport the sediment. Some particles may be deposited within a few meters, while others are transported off the field with runoff water. Most sediment detachment occurs on the inflow end of furrow irrigated fields with uniform slope because flow rate is the greatest and sediment load is the least when water enters a field.

Flowing water also transports P, either dissolved in water or sorbed to or part of sediment. Sediment-bound P is directly related to soil erosion. Typically, more than 90 percent of the P transported from furrow-irrigated row crop fields is associated with detached sediment. Runoff from fields of grass, hay or pasture contains minimal sediment so soluble P is a greater percentage of the total P loss. Phosphorus may also desorb as runoff water interacts with a thin layer of surface soil in the furrow. Soluble P concentration in runoff typically increases as the extractable P in surface soil increases. Suspended sediment may also be a sink for soluble P.

Irrigation furrows provide a unique opportunity to measure P transport changes with time and distance in a field without the interference of rain drops and sheet flow because P and sediment are detached and transported by only flowing water. We measured sediment and P transport during furrow irrigation to better understand the interactions between sediment detachment and deposition, and P sorption and desorption. Our objective was to identify factors affecting P transport during furrow irrigation.

MATERIALS AND METHODS

We measured sediment and P transport during six irrigations conducted over five years using the same general procedures. All irrigations were performed on freshly tilled, fallow fields, 110 to 180 m (361 to 590 ft) long with 0.007 to 0.012 m m^{-1} (0.7 to 1.2 percent) slopes, with Portneuf silt loam at the Northwest Irrigation and Soils Research Laboratory, near Kimberly, Idaho. Any surface residue remaining from the previous crop was tilled into the soil several months before any irrigation. Two to nine furrows were monitored during each irrigation. Each monitored furrow was wheel compacted when furrows were formed.

FURROW FLOW SAMPLING AND ANALYSIS

The irrigation water source was the Snake River. Furrow inflow rate was controlled by spigot valves on gated pipe for all irrigations except Irrigation 2, which used siphon tubes from a concrete-lined ditch. Inflow rates were typical or slightly greater than normal for production fields to ensure that water advanced across the field in a reasonable time (1 to 3 h) without causing unrealistically high erosion rates. Inflow rates were measured by flumes or by the time required to fill a known volume. Inflow rates were set the same for each furrow during an irrigation except during Irrigation 4, which had three different inflow rates to give a greater range of sediment and P transport.

Furrows were monitored at four equally spaced locations in each furrow. Water samples were collected from flume outflow to determine transported sediment and P concentrations.

SOIL SAMPLING AND ANALYSIS

Surface soil (0–30 mm, or the upper 1 inch) samples from 10 to 12 points along the furrow bottom on each quarter segment were composited immediately before each irrigation (<1 h). Soil P should be relatively uniform in this surface layer because the field was tilled and furrows formed 1 or 2 d before irrigation, and P fertilizer had not been recently applied. The soil samples were analyzed for both bicarbonate-extractable P and calcium chloride–extractable P (0.01 M $CaCl_2$) as an indication of water-soluble P. Soil samples were also collected from the furrow bottom after Irrigations 5 and 6, approximately 10 to 15 m (33 to 49 ft) from the inflow point and 10 to 15 m upstream from each flume location. Samples were collected from the surface seal layer (0–5 mm) and immediately below the surface seal (about 5–20 mm).

TYPICAL FURROW FLOW, SEDIMENT, AND PHOSPHORUS TRENDS

Flow rate increased rapidly with time after water advanced past a monitoring station and then remained relatively constant. Flow also decreased between each monitoring station as water infiltrated. The dissolved reactive phosphorus (DRP) concentration at each station decreased rapidly with time until reaching a quasi-steady state concentration, a trend noted in

PHOSPHORUS
IGATION FURROWS

PHOTO COURTESY OF NRCS

previous runoff studies. The quasi-steady state concentrations were greater than the inflow DRP concentrations, which was typical for all irrigations.

Only 31 of the 805 furrow flow samples had DRP concentrations less than the inflow DRP concentration, indicating that DRP was not removed from flow in these furrows. At any given time during the irrigation, DRP concentration generally increased with distance down the furrow. However, the DRP concentration 1 min after water advanced past a flume (first sample) was similar among the four stations.

Sediment concentrations can be quite variable with time and distance during irrigation.

WATER FLOW AND SEDIMENT TRANSPORT IN FURROWS

Although all irrigations were conducted on the same soil with similar surface conditions (fallow, recently tilled, no surface residue), soil and P losses were quite variable. Infiltration was much greater during Irrigation 1 than for all other irrigations, possibly because this field was moldboard plowed in the spring after being planted to grass for 8 years before this study. The high infiltration rate caused a slow advance rate, little runoff and small sediment and P losses. Erosion was minimal during Irrigation 1, with 36 percent of the samples having sediment concentrations below the lower detection limit for the Imhoff cone (<100 mg L^{-1}, or 100 ppm). Irrigation 5 had the greatest soil loss even though runoff volume was less than Irrigations 2, 3, and 4.

The decreases in flow rate and flow volume with distance were approximately linear for all irrigations, which indicate uniform infiltration down the furrows. Flow-weighted sediment concentration always increased from inflow to Station 1 because inflow water contained little sediment and the furrow flow was most erosive on the upper end of the field where flow rate was greatest. As water continued to flow down the furrow, sediment concentration increased, decreased, or remained unchanged depending on flow rate, soil erodibility, and possibly other undefined characteristics. Sediment load decreased between stations when sediment concentration was constant or decreased, because flow rate always decreased with distance. Sediment was deposited between Stations 3 and 4 for all irrigations but Irrigation 5. Suspended sediment usually deposits on the lower end of a field as furrow flow rate decreases when water infiltrates.

TOTAL PHOSPHORUS IN FURROW FLOW

Changes in flow-weighted total P concentration with distance down a furrow during an irrigation were almost parallel to changes in sediment concentration, because total P was directly related to sediment concentration ($r^2 = 0.75$). Thus, total P load increased as sediment was detached and decreased as sediment was deposited. This emphasizes the importance of controlling erosion to control total P loss. Furthermore, total P can be reduced in furrow irrigation runoff by removing sediment with settling ponds or similar practices.

Total P concentration was directly related to sediment concentration because the majority of the total P was associated with particulates, which is typical for clean-tilled irrigation furrows. Nearly 80 percent of the water samples collected during the six irrigations had greater than 95 percent particulate P; 92 percent of the samples had greater than 90 percent particulate P. More than 95 percent of the total P was particulate P when sediment concentration was >2500 mg L^{-1}.

The linear relationship between total P and sediment concentrations did not change noticeably with time during irrigation or distance down the furrow. Sediment, total P, and DRP mass losses increased linearly with the three inflow rates used for Irrigation 4 because runoff volume increased with inflow rate. Sediment and total P concentrations also increased with inflow rate during Irrigation 4, but DRP concentrations were similar for all three inflow rates. There was not an overall trend between inflow rate and sediment and total P losses among irrigations. Irrigation 3, for example, had the highest inflow rate but Irrigation 5 and the high inflow rate on Irrigation 4 had greater sediment and total P losses. Field- and irrigation-specific characteristics are import factors affecting erosion and total P transport.

DISSOLVED REACTIVE PHOSPHORUS IN FURROW FLOW

The DRP concentrations were greatest in the first samples collected from each station, when the advance front was about 1 to 5 m (3 to 16 ft) past the flumes. Since the infiltration rate is highest at the advancing water front, most water with the greatest DRP concentration infiltrates into the soil until the advance front reaches the end of the furrow.

Flow-weighted DRP concentration typically increased with distance down a furrow, indicating that P continued to desorb as water flowed down the furrow even if sediment and total P concentrations decreased. Although DRP concentration increased with distance, DRP load often decreased on the fourth and sometimes on the third segment of the furrow because the mass of soluble P that infiltrated with irrigation water or re-sorbed to suspended sediment or furrow soil exceeded the mass of P desorbed. Most of the DRP load was supplied by inflow, with the exception of Irrigations 2 and 3, despite the fact that DRP concentration increased as water flowed down the field.

As discussed in the previous section, DRP concentration was a small proportion of the total P, except for a few samples during Irrigation 6 when sediment concentration was low (<2000 mg L^{-1}) and during Irrigation 1, which had much lower sediment concentrations than the other five irrigations.

SOIL PHOSPHORUS VERSUS DISSOLVED REACTIVE PHOSPHORUS RELATIONSHIPS

Correlations between extractable soil P and furrow flow DRP were not significant after the first sample at Station 1, with correlation coefficients varying from -0.02 to -0.30. These correlations indicate that soil P does affect DRP in furrow flow, but furrow flow hydraulics and interactions with transported sediment likely confound these relationships.

The poor correlation between soil P concentration and DRP concentration in furrow flow tends to contradict previous studies where soil P correlated with runoff DRP concentration.

The limited range of soil P concentrations among irrigations and field segments within each irrigation likely contributed to the lack of significant correlations between DRP concentration and furrow soil P concentration. The ratio of maximum to minimum soil P ranged from 1.6 to 2.9 for the six irrigations in this study, with the largest ratios occurring in Irrigations 4 (2.8) and 6 (2.9), which had significant correlations.

SUSPENDED SEDIMENT AND SOIL PHOSPHORUS VERSUS DISSOLVED REACTIVE PHOSPHORUS RELATIONSHIPS

The DRP concentration in furrow flow correlated better with sediment concentration than furrow soil-extractable P (0.01 *M* $CaCl_2$) concentration, especially on the first quarter segment of the field, at Station 1. Sediment concentration predicted 18 percent to 55 percent of the variability in DRP concentration at Station 1. Correlation coefficients between sediment and DRP concentrations ranged from 0.41 to 0.69 ($P < 0.03$) for all sampling times at Stations 1 and 2.

Correlations were more erratic at Stations 3 and 4. The DRP concentrations down the furrow, especially at Stations 3 and 4, were affected by concentrations transported from upper furrow segments as well as sediment dynamics on these furrow segments.

In theory, any detached sediment is a source or sink for DRP. In general, DRP concentration tended to increase as sediment concentration increased as shown by the correlation between DRP and sediment concentration. However, increasing sediment concentration later in an irrigation often had little or no impact on DRP concentrations in furrows. A change in sediment concentration without affecting DRP concentration suggests that the time when sediment is first detached affects DRP concentrations in furrow irrigation flows.

FURROW SOIL-EXTRACTABLE PHOSPHORUS CHANGES

The furrow surface seal soil samples (0–5 mm) had 5 percent to 40 percent lower extractable P (0.01 *M* $CaCl_2$) concentrations than the soil before irrigation. Although sampling depths were different, the soil was thoroughly mixed to at least 80 mm by tillage before irrigation. Surface seals form as aggregates disintegrate and as fine sediment deposits on the furrow wetted perimeter when sediment laden water infiltrates. Phosphorus probably desorbed from this soil as the aggregates broke apart during the initial wetting, as the sediment was transported with furrow flow before deposition, and as water infiltrated through the seal during irrigation. Phosphorus desorbed from the surface seal layer during infiltration may not contribute to DRP transport, but move downward with the infiltrating water. If soil in the surface seal layer is detached again and transported in furrow flow, less P would likely desorb from this sediment than when it was initially detached.

The amount, duration and timing of transported sediment are critical components affecting DRP concentration in furrow flow, as well as the mass of DRP being transported. Initial extractable soil P concentration also affects the DRP concentration but is masked by furrow flow hydraulics, suspended sediment loads, and nonequilibrium conditions.

CONCLUSIONS

Sediment and P transport in shallow ephemeral channels like irrigation furrows involve many interacting processes. Total P concentration was strongly correlated with sediment concentration on these tilled fallow fields with typically more than 90 percent of the total P associated with particulates. Thus, soil erosion must be controlled to reduce total P loss. The DRP concentration in furrow flow was also affected by sediment concentration along with the time that the water was in contact with soil and suspended sediment, furrow soil P concentration, and furrow hydraulic conditions. Results from this field study indicate that suspended sediment concentration has a greater influence on DRP concentration in-furrow flow for whole fields than furrow soil P concentration. Sediment detachment, transport, and deposition in furrows must be understood to accurately predict both soluble and particulate P transport. AG

Sediment and phosphorus transport in irrigation furrows

July Self-Study Examination

1. Irrigation water runoff in furrow irrigated fields is often necessary to

[ ] a. achieve uniformity of water coverage.
[ ] b. push water across fields with undulating topography.
[ ] c. lessen residue redistribution.
[ ] d. minimize the effects of salinity in irrigation water.

2. The percentage of P transported off-site due to detached sediment in furrow irrigated row crop fields is typically

[ ] a. 60%.
[ ] b. 70%.
[ ] c. 80%.
[ ] d. 90%.

3. An objective of this research was to

[ ] a. quantify how various forms of P fertilizer react in irrigation water.
[ ] b. determine how furrow irrigation influences ground water quality.
[ ] c. identify factors affecting P transport during furrow irrigation.
[ ] d. assess the effect of crop residue on nutrient transport.

4. A characteristic of this research was that the experiment was conducted on

[ ] a. irrigated as well as rainfed fields.
[ ] b. fields with slopes exceeding 5% where erosion had been a problem.
[ ] c. clay loam soils.
[ ] d. freshly-tilled, fallow fields.

5. A finding in this study related to dissolved reactive phosphorus (DRP) concentrations was that they

[ ] a. were highest in irrigation water inflow.
[ ] b. generally increased with distance down the furrow.
[ ] c. tended to be removed as water flowed across the field.
[ ] d. precipitated out of the water as irrigation flow decreased.

6. A reason why flow-weighted sediment concentration always increased between inflow and Station 1 is

[ ] a. water inflow was rich in sediment.
[ ] b. more erosion occurred in the upper end of the field where flow rate was greatest.
[ ] c. sediment concentration increased as flow decreased.
[ ] d. sediment deposition was greatest at the upper end of the field.

7. Total P concentration was directly related to sediment concentration because

[ ] a. most of the total P was associated with particulates.
[ ] b. phosphorus in water is quickly absorbed into solids.
[ ] c. recent fertilizer applications were surface-applied.
[ ] d. soil organic matter separates from sediments during irrigation.

8. A lack of correlation between dissolved reactive phosphorus and soil phosphorus is likely due to

[ ] a. a limited range of soil P concentrations among field segments.
[ ] b. antagonism of phosphorus in high pH environments.
[ ] c. the lack of precision of current soil testing methods.
[ ] d. the clay soil of the field acting as a nutrient buffer.

9. A reason why the furrow surface seal samples had less extractable P concentration than the soil before irrigation is due to

[ ] a. water-soluble compounds concentrating in the surface seal.
[ ] b. phosphorus desorbing from the soil as the aggregates broke apart.
[ ] c. high levels of carbon occupying exchange sites following irrigation.
[ ] d. soil testing methods that detect less phosphorus in the highly alkaline surface seal.

10. Strategies for reducing phosphorus loss from fields when Total P concentration is strongly correlated with sediment concentration might include all of the following EXCEPT

[ ] a. controlling soil erosion.
[ ] b. using settling ponds for irrigation water runoff.
[ ] c. more carefully controlling water flow to minimize runoff.
[ ] d. using gypsum on fields to encourage soil aggregation.

DETACH HERE

GET A CEU!

This exam is worth 1 CEU in **Nutrient 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 40-42 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.AgProfessional.com*. Go to the Certified Crop Advisers section (left-hand column) and access the "CCA Advantage" link.

SELF-STUDY EXAM REGISTRATION FORM

Name: ______________________________

Address: ______________________________

City: ________________ State/Province: ____________ Zip: ____________

CCA Certification #: ______________________________

Credit Card #: ________________Type of Card: Visa ❑ Mastercard ❑ Discovery ❑ Am Express ❑

Expiration Date ________________Name on Card: ________________

Enclose a $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 July 2006 expires July 2009.

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: ______________________________

DETACH HERE