

# an ORGANIC opportunity?

Consumer demand for organic products rose in the 1990s by 20 percent or more annually. The Organic Trade Association reports the U.S. organic market is projected to reach a value of \$30.7 billion by 2007.

North America has nearly 3.7 million acres under organic cultivation, a relatively small percent of the more than 59 million acres worldwide. The Rodale Institute has set a goal of 100,000 certified organic U.S. farmers, representing 5 percent of the 2 million American farmers, by 2013.

Price premiums for organic products have contributed to growth in certified organic farmland and, ultimately, market expansion. Organic products are now available in nearly 20,000 natural food stores, and 73 percent of conventional grocery stores have added them to their shelves.

“Currently market prices for organic commodities are averaging two to three times that of conventionally grown commodities,” said Dale Johnson, chapter administrator of the Organic Crop Improvement Association in Northeast Wisconsin.

The transition from a conventional farming system to an organic system involves increased managerial costs, the use of specialized equipment, and risks of shifting to a new way of farming (USDA 2005). Organic seed and nutrients might be more expensive, and rotations are generally longer for pest and disease suppression.

“Still, once an organic producer gets the system down, he can actually incur fewer out-of-pocket expenses for nutrients and crop protection chemicals,” Johnson said. “A producer switching from conventional to organic should expect to spend



a lot more time caring for his crops. The largest grower we certify has 1,100 acres certified organic, and he tells me that even with the increased labor, he would never go back to conventional farming.”

This need for fewer nutrients and chemicals coupled with the steady growth of the organic food industry has caused many ag retailers and crop consultants to ask how it will affect business. John Stelling, branch manager of Western Farm Service Center in Hollister, Calif., said he got into organics when his conventional customers got into it.

“We provide the same services to our organic customers as our conventional customers. They seem to apply less nitrogen to their soil, but monitoring soil fertility is even more important to them because if fertility drops and can’t support the crop, it takes an organic producer longer to bring it back up,” he said.

“Pest monitoring is also very important,” he said. “It is more difficult to manage insects, but

Don't count out working with organic farmers. Organic customers need help and advice just like conventional customers do.

A 2003 SURVEY by Whole Foods Market found that 72 percent of consumers who buy organics purchased organic produce, 30 percent bakery, 29 percent non-dairy beverages such as soy milk or juice and 23 percent purchased organic dairy products.

## INTERNET RESOURCES

### ACRES U.S.A.

[www.acresusa.com/magazines/magazine.htm](http://www.acresusa.com/magazines/magazine.htm)

### MOSES

[www.mosesorganic.org](http://www.mosesorganic.org)

### Organic Trade Association

[www.ota.com/index.html](http://www.ota.com/index.html)

### Organic Crop Improvement Association

[www.ocia.org](http://www.ocia.org)

### USDA

[www.ers.usda.gov/Briefing/Organic](http://www.ers.usda.gov/Briefing/Organic)

### Rodale Institute

[www.rodaleinstitute.org](http://www.rodaleinstitute.org)

we use soft chemistry and work with our growers to establish acceptable levels of tolerance. Our biggest challenge is weed control as there are so few herbicides available.”

Stelling is positive about the organic industry in his area. “This year it amounted to about 5 percent of our business. Next year I expect it to grow to 10 percent to 15 percent. It still isn’t a huge market, our largest organic customer has only 450 acres certified, but there is an opportunity to make a profit.”

In Maine, many organic fruit and vegetable producers sell locally to farmers markets, roadside stands and local restaurants. They are certifying much smaller acreages, some as small as five acres.

“When you factor in their expenses for meeting the organic certification requirements and labor costs, they may not have a lot of extra money to put into hiring outside advice,” said Donna Lamb, Cooperative Extension agent in Piscataquis County. Farmers like the first-hand approach to scouting their fields to stay on top of their crop needs. The growers look to Extension and their certifying agencies for agronomic and marketing advice.”

## NEED FOR CCAS

Dale Johnson thinks there is a need for Certified Crop Advisers to be more active in working with

organic producers. “Right now our producers are getting most of their advice from product manufacturers and from doing lots and lots of reading,” he said. “While this has been working for us pretty well, I think it would be better to get more advice from independent sources.”

To prepare to work with organics, Stelling advises CCAs to start online, then attend conferences and talk to manufacturers. Johnson recommends newsletters that organic producers depend on, such as *ACRES USA* and *Organic Broadcasters*.

“I was a conventional farmer for many years, and I can’t stress enough how important it is to keep an open mind when learning about organics,” Johnson said. “Much of the knowledge that is being used is very old, and there is a lot of experimentation going on. Growers can’t always use that anecdotal knowledge because sometimes they just have to get the crop in the ground, but it is important not to just blow them off when they do.”

The opportunities for CCAs to work with producers of organic products appears to be mixed and depends on the type of crops and markets in that region. Preliminary research indicates premium prices are holding up fairly well, but no one can say how long this will continue as more producers certify crop land for organic production. **AG**

# Legislative Update

## SUPPLEMENTAL CRITICAL USES OF METHYL BROMIDE

In accordance with the Clean Air Act and Montreal Protocol, EPA has completed a rule authorizing a supplemental critical-use exemption of 610,665 kilograms of methyl bromide for 2005. Critical-use exemptions are anticipated under the Montreal Protocol for circumstances where there are no technically and economically feasible alternatives. Methyl bromide allowances for the 2006 calendar year were established, and EPA is working to make these allowances available as quickly as possible. Allowance decisions for 2007 will be made at a meeting in Dakar, Senegal.

[www.epa.gov/ozone/mbr](http://www.epa.gov/ozone/mbr)

## EPA ISSUES NEW GUIDANCE ON PROTECTING, RESTORING WETLANDS

The EPA has issued a document, “National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution” that provides guidance for state, tribal, and local officials in reducing nonpoint source pollution.

The 204-page document can be downloaded from the Web or a free copy can be obtained through the National Service Center for Environmental Publications, phone at (800) 490-9198 (request Publication # EPA 841-B-05-003).

[www.epa.gov/owow/nps/wetmeasures/](http://www.epa.gov/owow/nps/wetmeasures/)

## CCA Update

### CCA NEWS BRIEF

The latest issue of the email newsletter *CCA News Brief* is available on the CCA Web site at [www.certifiedcropadviser.org](http://www.certifiedcropadviser.org). If you did not receive this monthly e-mail, contact your certification rep at (608) 273-8085 or update your email address by going to the CCA Web site and click on "Update your Address" in the green sidebar.

### NEW CEU OPPORTUNITY DEBUTS IN JANUARY

The American Society of Agronomy's monthly newsletter, *CSA News*, has been redesigned to a news magazine format, beginning with the January issue. Each issue will carry a self-study article worth one CEU, similar to the CCA Advantage.

For the January issue only, the *CSA News* will be made available online to all CCAs and an email notice with a link will be sent to you in early January. CCAs who do not have Internet

access can call (608) 273-8085 for a print version of the magazine.

The *CSA News* is the members-only news magazine of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America.

### UPCOMING CEU SCHEDULE

For education programs in your area, search the CEU Calendar at the CCA Web site: [www.agronomy.org/cca/edu.html](http://www.agronomy.org/cca/edu.html)

### INDIANAPOLIS—2006, SO EASY TO DO SO MUCH!

The American Society of Agronomy will hold its annual meeting in Indianapolis Nov. 12-16, 2006. Plans are being made to offer an expanded CEU program to CCAs. This will be an opportunity for you to learn about the latest agronomic research by scientists from the U.S., India, China, France, Brazil, South Africa, Australia and more. Plan to attend.

### 2006 GREAT PLAINS SOIL FERTILITY CONFERENCE

- March 7-8, 2006, Denver, Colorado
- 6.5 Nutrient Management and 1.5 Crop Management CEUs
- [www.ppi-ppic.org/gpsfc](http://www.ppi-ppic.org/gpsfc)

### NRCS POSTS ENERGY ESTIMATOR FOR TILLAGE

NRCS has posted the first of a series of tools designed to aid producers in making energy-efficient conservation practice decisions. It concentrates on diesel fuel used in the production of selected crops across common tillage systems. Other NRCS tools being built at the present time include one for estimating and comparing energy consumption across different nutrient management systems and another for irrigation systems. These tools are intended to give you an idea of the magnitude of energy savings that producers could incur under different management systems.

<http://ecat.sc.gov.usda.gov>

### ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

Updates on EQIP and links to the 2006 online application materials can be found at <http://www.nrcs.usda.gov/programs/eqip>.



BY KARL GLASENER, Director of Science Policy ASA-CCSA-SSSA (202) 408-5382 [karglasener@cs.com](mailto:karglasener@cs.com)

## CCA ADVANTAGE

Continuing Education  
Self-Study Course

BY P. D. SCHROEDER,\*  
D. E. RADCLIFFE, AND M. L. CABRERA

# studying the effects of ph RAIN RU

Over the past decade, control of nonpoint-source pollution has come to the forefront in efforts to improve water quality. The principal components of agricultural nonpoint-source pollution are sediment, bacteria, N, and P. Of these, P is the element most commonly associated with accelerated eutrophication in freshwater systems because these systems are usually P limited.

Georgia is one of the top broiler chicken-producing regions of the United States with 1.29 billion broilers raised in 2002 (National Agricultural Statistics Service, 2002). Besides broiler production, agriculture in central and northern Georgia is generally limited to beef cattle and hay production. Thus, broiler, cattle and hay production are often integrated, and broiler litter (manure and bedding) serves as an organic fertilizer on pastures and hayfields. Traditionally, broiler litter is applied to meet forage N needs, but surface application greatly increases the risk of P loss in surface runoff because of low (2:1) N to P ratio. Forms of P in runoff include dissolved inorganic and organic P forms and particulate P associated with mineral or organic particles transported in runoff. Because erosion rates from hayfields and pastures are low, the dissolved fraction is usually the dominant form of P in runoff from hayfields and pastures.

A strong relationship exists between the rate of manure application and the concentration of total phosphorus (TP), dissolved reactive phosphorus (DRP), and particulate P in runoff where P concentrations in runoff typically increase with an increase in manure

application rate. The majority of the published research shows that most of the P is lost in the first runoff event from fields where manure has been surface-applied. Several researchers have shown that after an initial spike, P concentration in runoff declines with time or number of rainfall events, often remaining greater than background concentration for an extended period. In a multiple-year study, Pierson et al. (2001) reported increased P concentration in runoff from natural rainfall for up to 18 months after an application of poultry litter to a small watershed in Georgia. In contrast, some small plot studies have shown P concentrations in runoff were similar to background concentrations after two artificial rainfall events.

Because most of the P lost from manure applications is lost in the first runoff event, several researchers investigated the effect of time between manure application and a runoff-producing rainfall on P loss. Several small plot or lab studies have shown a decrease in P concentration with an increase in time to a runoff-producing rainfall event with liquid poultry manure or incorporation of poultry litter into the soil. However, when dry poultry litter is surface-applied to pastures and hayfields, a surface layer of thatch is likely to prevent direct contact between the litter and the soil, reducing the possibility that P in the manure will be adsorbed immediately by the soil.

The objectives of this research were twofold. The first was to determine the effects of application rate and initial runoff timing on the long-term loss of P from poultry litter surface-applied to pastures and hayfields. The second

was to develop equations that may be used to predict P loss from surface-applied poultry litter and evaluate the effectiveness of these equations with runoff data from a reference site.

## MATERIALS AND METHODS

### EXPERIMENTAL DESIGN

To determine the effect of manure application rate and initial runoff timing on P loss, we used three poultry litter application rates and three runoff scenarios. Poultry litter application rates were 2, 7, and 13 Mg ha<sup>-1</sup> (1800, 6200, and 11,600 lb/A, typical application rates in northern Georgia). Rainfall scenarios included: (i) sufficient rainfall to produce 30 minutes of runoff immediately after litter application (R1); (ii) no rainfall for 30 days after manure application, then sufficient rainfall to produce 30 minutes of runoff (R2); and (iii) small rainfall events every 7 days (5 min at 75 mm h<sup>-1</sup> [3 in/h]) for 30 days and then sufficient rainfall to produce 30 minutes of runoff (R3). Simulated rainfall was applied to each plot at a rate of 75 mm h<sup>-1</sup> with a standard rainfall simulator and experimental protocol. These scenarios were chosen based on the contradictory nature of previous research related to timing to first runoff event. The third runoff scenario is unlike any previously reported and we believe it to be the most realistic. Based on 30 years of weather data from the Athens, Ga., area, the probability that 25 mm (1 in) of rain will fall on any single day is approximately 7 percent and the probability of receiving 50 mm (2 in) of rain on any given day is less than 4 percent. However, the probability that 6 mm (0.25 in) of

# Phosphorus surface NOFF



## Rainfall timing and poultry litter application rate effects on phosphorus loss in surface runoff

rain will fall on a given day is about 18 percent. Based on these probabilities, it seemed more realistic to expect that after manure application some small rainfall events will occur before an event large enough to produce runoff.

The three litter rates and rainfall scenarios were applied to 1- × 2-m (3.3 ft x 6.6 ft) plots in a 3 × 3 randomized complete block design with three replications. In addition, three control plots were included (one for each block) to allow for correction of P loss not associated with litter application. Therefore, the experiment consisted of 30 plots (3×3×3+3 = 30). Following the implementation of the initial rainfall scenarios, all plots received sufficient rainfall to produce 30 minutes of runoff on a biweekly basis for 5 months from May through October 2001. Due to several days of unseasonably warm weather in January 2002, we had the opportunity to conduct additional rainfall simulations on the 13 Mg ha<sup>-1</sup> plots and control plots.

The experimental site was a hayfield with a fairly uniform 8 percent slope at the University of Georgia Plant Sciences Farm near Athens, Ga. The soil in the study area is a Cecil sandy loam (fine, kaolinitic, thermic Typic Kanhapludults) with average pH of 5.7 and Mehlich III-extractable P of 22 mg kg<sup>-1</sup> (22 ppm) in the A horizon.

From March 3 to May 1, 2001, 30 1- × 2-m plots were installed at the site in

three blocks of 10 plots. The litter used in this study was collected from a broiler farm in northern Georgia and applied by hand.

### SAMPLE ANALYSIS

Soil samples were collected from the surface 10 cm (4 in) of each plot following the final runoff event. Samples were air-dried and ground to pass a 2-mm sieve. Soil pH was determined in a 1:2 soil to water mixture using a glass electrode. Water-soluble and Mehlich III-extractable P in soil was determined. Total P in unfiltered runoff samples was determined colorimetrically following micro-Kjeldahl digestion (Baker and Thompson, 1992). Immediately after collection, 125 mL (4 oz) of each runoff sample was filtered (0.45-µm pore diameter) to remove particulate matter and stored at -20°C until analyzed. The DRP concentration of filtered runoff water samples was also determined colorimetrically.

Total P content of the poultry litter was determined colorimetrically following micro-Kjeldahl digestion. Water-soluble phosphorus (WSP) in poultry litter was determined colorimetrically after shaking 20 g (1 oz) of manure in 4 L (1 gal) of deionized water for 4 hours. Total P, water-soluble P, pH, and moisture content of the poultry litter were 23.98 g kg<sup>-1</sup> (0.024 ppm), 6.2 g kg<sup>-1</sup> (0.006 ppm), 8.46, and 54.2 percent, respectively. The pH of

the litter was determined in a 1:5 litter to water mixture using a glass electrode. Litter moisture content was determined after oven-drying at 65°C for 48 hours.

### STATISTICAL ANALYSIS

Total and soluble P mass losses from each plot were calculated for each runoff event using P concentration and runoff volume. Overall total P loss and cumulative P losses by runoff event were calculated. Average TP and DRP losses from control plots were subtracted from treatment plot P loss so that only P loss associated with litter application would be analyzed. Statistical analyses were performed using the Statistical Analysis System (SAS Institute, 1994). Analysis of variance (ANOVA) techniques were used to determine treatment effects and to check for interaction across all 10 runoff events. The least significant difference method was used to separate treatment means. Nonlinear regression was used to develop predictive equations relating P loss in runoff from surface-applied poultry litter to P application rate, runoff depth, cumulative rainfall, days since manure application, antecedent soil water content, and temperature. Regression analysis was also employed to determine if STP levels were related to P application rate, runoff depth, cumulative rainfall, or pH.

To evaluate modeling performance, the following measures were used: correlation coefficient (*r*), a measure of

the linear correlation between observed and simulated results; root mean square error (RMSE), an estimate of the inherent error in the simulation; and the relative RMSE (RRMSE = RMSE/observed mean  $\times$  100), a measure of error in relation to the mean. In addition, we also regressed observed against simulated results and analyzed the intercepts and slopes to determine if they were different from 0 and 1, respectively.

## RESULTS AND DISCUSSION

### RAINFALL AND LITTER TREATMENT EFFECTS

Analysis of variance for TP and DRP in runoff across all runoff events revealed significant interaction between treatments and runoff events. However, for individual runoff events treatment effects were significant ( $p < 0.01$ ), and there was no interaction between litter rate and rainfall scenario. Therefore, each biweekly runoff event was analyzed as an independent experiment to assess treatment effects.

Cumulative TP and DRP loss were greatest from the treatment (R1) with artificial rainfall producing runoff almost immediately after litter application. The other treatments (R2 and R3) did not produce significantly different cumulative TP or DRP losses ( $p = 0.05$ ). The fact that the most realistic initial rainfall treatment (R3) produced less cumulative TP and DRP loss (4.08 and 3.38 kg ha<sup>-1</sup>, respectively [3.6 and 3.0 lb/A]) than R1 (7.40 and 5.62 kg ha<sup>-1</sup>, respectively [6.6 and 5.0 lb/A]) suggests that under “real world” conditions (R3) P losses from surface-applied manure may be considerably less than the “worst case” scenario (R1). The effect of rainfall timing was most pronounced in the first runoff event where the R1 treatment showed both the greatest TP and DRP loss (4.41 and 3.22 kg ha<sup>-1</sup>, respectively [3.9 and 2.9 lb/A]) and the highest percentage P loss (59.6 and 57.3 percent, respectively). The R3 treatment

produced the smallest TP and DRP loss as well as the smallest percent TP and DRP losses in the first event. Over the remainder of the events there was little difference in P loss or percentage P loss among the rainfall treatments.

The fact that cumulative P loss was not different between the treatments with and without small, non-runoff producing rainfall events (R2 and R3) suggests that the initial application of small amounts of rain may have had two contrasting effects. First, the small rainfalls probably leached some soluble P from the manure lying on the surface and transported it into the soil where it was adsorbed by reactive soil surfaces. Conversely, the wet and dry periods between the small rainfall events may have stimulated mineralization of organic P, thereby negating some of the adsorption effects. Thus, no differences were observed between the treatments.

The results of this experiment both affirm and contradict previous research on P loss following poultry litter application. It is quite clear from our research that a 30-day delay between litter application and runoff significantly reduced both the initial TP and DRP loss and the overall mass of P lost when compared with runoff immediately following manure application.

## CONCLUSIONS

When runoff-producing rainfall was applied immediately following litter application, significantly greater TP and DRP losses ( $p < 0.05$ ) were measured for the first runoff event. It appears that rainfall timing (i.e., time to first runoff event) and litter application rate have a dramatic effect on P loss in runoff. Additionally, after 10 runoff events P losses in runoff were still significant and resulted in P concentrations exceeding 1 mg L<sup>-1</sup> (1 ppm), the value that has been proposed as the maximum desirable P concentration in agricultural runoff. Total mass of P lost from all 10 runoff

events represented 6 to 11 percent of the P applied, indicating that a significant pool of litter P remained after 10 events. Most of this P pool may be organic P that remains on the soil surface rather than inorganic P adsorbed to the soil since only modest increases were seen in STP levels. Additionally, an equation relating litter P application rate to changes in Mehlich-III STP explained about 60 percent of the variability in Mehlich-III STP.

Nonlinear regression equations that may be useful in predicting P losses in runoff from surface-applied poultry litter were developed. These equations were able to explain 68 percent to 91 percent of the variability seen in P losses. Because the levels of P loss seemed to rebound after several months as reflected in the runoff from the January 2002 rainfall simulations, future research in this area should be directed at determining the effect of the interval between runoff events on P loss. The results indicate that the equations developed in this study were reasonably effective in predicting DRP loss from poultry litter that was surface-applied to the pastures and hayfields at the reference site and may be of use elsewhere under similar conditions. The largest source of variation between observed and simulated DRP concentration was associated with instances where observed DRP concentration increased in the absence of additional P application. These counterintuitive increases in DRP concentration may be explained by a combination of processes including variable source area and microbial turnover. The results of this study also indicate that in the presence of surface-applied manure the use of equations that relate P in runoff to STP may not be appropriate.

*Contact Information: Dr. Philip Schroeder, Assistant Professor Agriculture, Cameron University, Lawton, OK.*

*E-mail: pschroeder@cameron.edu;*

*Phone: (580) 581-2881.*



# Rainfall timing and poultry litter application rate effects on phosphorus loss in surface runoff

## January Self-Study Examination

1. **Principal components of agricultural non-point pollution include all of the following EXCEPT**
- a. sediments.
  - b. bacteria.
  - c. phosphorus.
  - d. potassium.
2. **Most poultry litter in Georgia is spread on**
- a. peanut and cotton fields.
  - b. hay and pasture fields.
  - c. corn and wheat fields.
  - d. open woodland.
3. **Compared to other animal manure, poultry manure is relatively high in**
- a. nitrogen.
  - b. phosphorus.
  - c. potassium.
  - d. soluble salts.
4. **A purpose of this research was to**
- a. assess different soil types for their ability to assimilate phosphorus.
  - b. develop equations that could be used to predict phosphorus loss.
  - c. test different manure sources for their environmental impact.
  - d. determine the impact that eroding soil has on phosphorus transport.
5. **The highest poultry litter rate used in this study was**
- a. 2 Mg ha<sup>-1</sup>
  - b. 13 Mg ha<sup>-1</sup>
  - c. 6.6 kg ha<sup>-1</sup>
  - d. 23.98 g kg<sup>-1</sup>
6. **A characteristic of this study is that it included**
- a. three different simulated rainfall scenarios.
  - b. four rates of poultry litter.
  - c. two north Georgia locations.
  - d. four different field slopes.
7. **The statistical method used to differentiate treatment effects in this study was**
- a. nearest neighbor dependence.
  - b. linear regression.
  - c. chi square.
  - d. least squares difference.
8. **Characteristics of sample analysis included**
- a. using field moist samples.
  - b. Kjeldahl distillation to determine N content.
  - c. colorimetric determination of P.
  - d. collecting soil samples at incremental depths.
9. **A reason why cumulative P loss was not different between treatments with and without small, non-runoff producing rainfall events could be the**
- a. opposing effects of leaching and mineralization.
  - b. heavy residue cover on the research plots.
  - c. very low soil test P values of the plots.
  - d. lack of field slope which negated runoff effects.
10. **Highest amounts of P loss occurred when the runoff rainfall event was**
- a. just prior to manure application.
  - b. immediately after manure application.
  - c. 7 days after application.
  - d. 1 month after application.

DETACH HERE

**GET A CEU!**

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.

American Society of Agronomy, for processing fees. Payment in U.S. funds only.

**DIRECTIONS**

- 1. Read the self-study article on pages 18-20 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

- 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](http://www.AgProfessional.com). Go to the Certified Crop Advisers section (lefthand 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 January 2006 expires January 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