CERTIFIED CROP ADVISER

CCA ADVANTAGE

The Voice of the Certified Crop Adviser Program
www.agronomy.org/cca

Annual Executive Director's Report

By Luther Smith
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As we close out the 12th year of the Certified Crop Adviser (CCA) Program, there are about 14,000 CCAs throughout the United States and Canada. The total number of CCAs has been pretty consistent, averaging around 14,000 give or take 5 percent over the last four years. The program is very much alive and healthy and the Board of Directors continues to explore ways to add increased value to your being a CCA.

The Board decided to add a staff position earlier this year to provide marketing and promotion support. This function was previously out-sourced, but after an evaluation of the position it was decided to add this as a staff function and split the position with the American Society of Agronomy (ASA). **Betsy Ahner** joined the ASA/CCA staff in February.

Betsy is developing new and improved marketing efforts in conjunction with the local CCA boards. These efforts will include Web-based Power Point programs, media kits, a co-op marketing program to enhance local board programs, a newly revised crop adviser of the year award, articles with major farm press and presence at major trade shows with farm broadcasters and agricultural publishers, to name a few.

OUR TARGETS

One of the primary target audiences remains the CCA's customer. The grower is ultimately the beneficiary of the success of the CCA Program and needs to be kept aware of how important it is to growers and the CCAs. Many of the marketing items will be produced with that in mind and to be used as tools for CCAs to promote themselves. A CCA telling the CCA story to a customer or policy maker has the best impact.

Creating awareness among and educating legislators and regulators about CCA abilities has always been part of the program. This fall the Board decided to expand that effort by hiring some consulting help in Washington, DC. These efforts will center on preparing for the next farm bill debate as well as enhancing the Technical Service Provider (TSP) Program.

It seems early to be talking about the next farm bill, but many agricultural and conservation groups are already beginning talks and preparing plans. I recently attended a conference by AgriPulse Communications on "Charting the Future of Conservation Policy: An Insider's Perspective." We discussed how conservation-oriented the 2002 Farm Bill was or is and how that is impacting and shaping production agriculture.

It was also interesting to see that the majority of the groups at this meeting were not ag-focused but environmental- or conservation-focused. That is an important aspect as we work with such groups to implement the current farm bill and to start building the next one. These same groups are also interested in educational efforts.

OUR FOCAL POINT

Continuing education has always been a focal point of the CCA Program. The Board continues to explore ways to build value through education. One opportunity will be pilot tested this winter and that is to have the option to add a specialty-area certification in addition to a CCA certification.

It would be similar to a nurse becoming an operating room nurse. That person is still a nurse but has focused continuing training and education into one aspect of the profession.

This could also be the same for CCAs. CCAs who focus their services in pest management, for example, could add a "pest management" specialty certification and direct their continuing education in that area. Not everyone will want to do this and it will not be required, but it would allow an option for those who so desire to specialize to do so.

The continuing education committee will be working on the details and will work with USDA-NRCS on one of the specialty areas as a pilot test. USDA-NRCS is very interested in determining if this specialty area concept could be developed to enhance the TSP Program. The Board is very committed to seeing this add more value to being a CCA. If it does not, it will not be implemented.

ADDING VALUE

Maintaining and adding value to your CCA certification is very much in the forefront of your Board's actions. Whether in policy, continuing education or promotions, everything we plan to do needs to answer the value question.

Your certification brings advanced professionalism; job enhancement, advancement, placement opportunities; recognition with legislators and regulators; a formalized continuing education process; and it has established crop advising as a profession. You represent a standard of excellence in production agriculture through your CCA certification.

Not everyone (60 to 65 percent do) who starts the certification process achieves it, so be proud of what you have earned and let people know about it. If you don't place value on your CCA certification, don't expect anyone else to.

Wishing you the best in 2005.

USDA Revises the Not-to-Exceed Pay Rates for Tech Service Providers (TSPs)

By Luther Smith, CAE, Executive Director, CCA program

The USDA-Natural Resource and Conservation Service (NRCS) recently revised the not-to-exceed (NTE) Rates for Technical Assistance (TA). These rates are used as guidelines to establish cost-share payment rates for work performed by a Technical Service Provider (TSP).

The rates were first released about a year ago. "We revised the NTE rates after considering public comments received from the first release in August 2003," NRCS Chief **Bruce Knight** says. "As a result, we have increased rates, built in more flexibility for their use and significantly reduced inconsistencies in payment rates among neighboring states and regions."

The first set of rates seemed to cause frustration for providers due to the large differences between states and even counties. "NRCS established NTE payment rates for categories of technical services for each state. To ensure consistency across state lines, the agency reviewed payment rates between adjacent states where similar resource conditions and agricultural operations exist, taking into account differences in state laws, cost of doing business, competition and other variables," says Knight.

NTE RATES ARE NOT THE BOTTOM LINE

There will still be differences between states and counties due to local priorities and resource concerns. The NTE Rates are not the bottom line on pricing, though.

The rates are not what TSPs have to charge for their services, but they do set the rates that a landowner will receive in cost share from USDA. The TSPs can still charge what they believe is appropriate for their services. The landowner is required to make up the difference between what the TSP charges and what the landowner receives from USDA, if there is a difference.

The best approach would be to evaluate the NTE Rates for your state and county. The NRCS Web site to do this is very user friendly. You can find the 2004 rates at *http://www.tsp-nte.nrcs.usda.gov/tspnte2/*. You can also compare these rates to the 2003 rates by going to *http://www.tsp-nte.nrcs.usda.gov/TSPNTE03Archive/*.

Remember, the NTE Rates do not dictate what TSPs can charge for their services. The rates establish what USDA will pay a landowner in a cost-share program. The TSP and the landowner should discuss this first before they agree to do the work. The benefit is that the landowner has the opportunity to seek cost-share funds from USDA for technical assistance covering some if not all of the costs.

Site Security

By Betsy Ahner, CCA Program Manager—Marketing

In the wake of terrorist activities, CCAs and their employers have been extremely active in upgrading the security around their facilities. Activities include:

- training employees in security;
- taking the Security Vulnerability Assessment (SVA) program which is sponsored by ARA, CLA and TFI;
- upgrading their facility's fencing and barricading;
- implementing tighter new employee hiring procedures;
- increasing lighting at their facilities;
- working more closely with law enforcement authorities; and
- eliminating the sale of some products.

WHAT HAS YOUR ORGANIZATION DONE?

CCA in conjunction with *AgProfessional* magazine will be conducting a poll and will release the results in the February issue of "CCA Advantage." We appreciate your participation in the poll when you receive it.

In the meantime, we would like to also report on CCAs and their organization's security activities. If you have an effective program or ideas that you would like to share for the good of the industry, please send me an e-mail at *bahner@agronomy.org*, or give me a call at 608/268-4950.

To make it even more worth your effort, all who contact me will have their names entered in a drawing for a terrific CCA shirt!

Marketing Yourself and Your Certification

By Betsy Ahner
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The International Certified Crop Adviser Board and many of the local CCA boards are placing a major emphasis on marketing. This broad term can mean many things to many people. In this case it has been defined to mean:

1) Promoting the CCA program itself to potential CCAs and regulatory agencies,
2) Promoting the program to retain current CCAs,
3) Promoting the value of supporting the program to employers who hire CCAs and
4) Promoting the value of your certification to your potential customers.

An unlimited budget would make this task much easier, but that will only happen in our dreams. The next most practical step is to prioritize the four choices listed above in their order of importance and effectiveness. The second step is to determine where the audience is, the message that needs to be conveyed and the most cost-effective way to reach them.

Rising to top priority is promoting the value of your certification to potential customers or, to state it more crassly, "helping to make the cash register ring." Obviously, since the ICCA program is not as well funded as the major political parties, it cannot buy ad space and airtime in the major markets of Canada and the U.S. What it can do is provide the tools for your local boards to promote the value of certification and provide you with the tools to promote yourself. You will be hearing more about that in the coming months as press kits, ad slicks and Power Point presentations are developed.

In North America, the 2004 cropping season is winding down and everyone in agriculture is looking forward to a little more time to take stock and make plans for 2005. If you had more business than you wanted in 2004 and made enough money to meet your needs, you can stop reading this article — you probably don't need any ideas on how to market yourself.

The major companies whose products we buy on a regular basis strive for something called top-of-mind positioning. It's like a word association test — say "ice cream" and see what brand you think of first.

How do you get your area farmers to think of your name first when they think "crop adviser"?

You can do what political candidates do and send direct mail pieces every other day, buy radio and television ads, get your employees to hang ads on doors, pay telemarketers or get Bruce Springsteen to sing at your rally.

However, since most CCAs work in rural areas and towns with populations of 10,000 or less, you can get the job done without spending millions of dollars. Visibility is the key. Paid ads help, but you can be visible in less expensive ways.

- Be active in your community in the same organizations in which your potential customers are members.
- Be available as a speaker to ag classes and organizations.
- Put your name and the CCA logo on your vehicles, business cards, ads and clothing.
- Choose sponsorships for the visibility they give you and when appropriate, **be there** to introduce yourself.

A news article is worth much more than a paid ad. Local newspapers give preference to their advertisers, and if you invite them to your annual open house or customer appreciation, you could get your photo and a story published. That's free publicity.

Don't forget to have fun. One pet store gives out a snack-size candy bar with every sale and follows through at the end of every radio ad by reminding listeners not to forget their candy bar. You could carry a box of doggie or kiddy treats in your truck when you make farm visits. Residents of one town in Wisconsin got very upset when a new owner did away with a yellow building that had a happy face on it. Corny, but it was a landmark for everyone who traveled that interstate.

Finally, remember character, integrity, honesty and good service are not out of style. The other side of working in a small town is if you mess up, word spreads — fast.

Your designation as a Certified Crop Adviser marks you as a professional. When was the last time you looked that word up in the dictionary?

CCA Logo Use Guidelines

Only crop advisers who have received a certificate from their CCA state/regional/provincial CCA Board may use the logo. The logo may be used in advertisements, business cards or stationery.

In advertisements, the logo can only be used to indicate the firm or business employs Certified Crop Advisers. It may not be used to indicate that a firm is certified or endorsed by the CCA Program or the American Society of Agronomy.

There are no restrictions on the location of the logo in the ad, stationery or business card.

The color of the logo may be changed to accommodate printing needs. For example, if using only red and black on the document, the logo could be printed in red.

Electronic files of the CCA logos can be downloaded at *www.agronomy.org/cca/general.html*.

Seeding and Nitrogen Rates Required to Optimize Winter Wheat Yields Following Grain Sorghum and Soybean

By S.A. Staggenborg, D.A. Whitney, D.J. Fjell, and J.P. Shroyer

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.

Harvested winter wheat in Kansas has declined 21% from 1990 to 2000. Despite this decline, winter wheat remains an important crop in most cropping systems throughout the state. Including winter wheat in crop rotations with summer crops improves control of problem summer annual and perennial weeds, reduces the incidence of residue-borne fungal diseases and is an excellent source of residue cover for reduced-tillage systems.

Improved economics associated with intensifying crop rotations has been a motivating factor in the adoption of no-till systems in Kansas. Adoption of no-till planting of winter wheat immediately following summer crop harvest was one of the first changes made to intensify crop rotations. Planting winter wheat immediately after summer crop harvest eliminates an 11-month fallow period, thus reducing the duration of the transitional period from summer crops to winter wheat. However, planting no-till winter wheat behind summer crops presented problems, such as later planting dates and managing heavy summer crop residue if the previous crop was corn or grain sorghum. Using soybean as the previous crop addresses the residue issue, but with the dominance of corn and grain sorghum in Kansas, management strategies are needed that address issues impeding successful wheat production following these summer crops in no-till systems.

Proper management of late-planted wheat after a summer crop is complicated by factors that are influenced by the previous crop as well as the environment that the wheat crop is subjected to as a result of delayed planting. The recommended winter wheat planting window for Manhattan, KS, is from Sept. 25 through Oct. 20. When following a summer crop, harvest often delays wheat planting through early November, suggesting that higher seeding rates are needed to maximize yields.

Wheat yields may also be influenced by factors such as soil water content, allelopathy and N availability. Previous-crop influence on N availability to the following wheat crop in a no-till system complicates N management. Increased residue levels of grain sorghum compared with soybean have the potential to decrease N availability to the subsequent wheat crop through N immobilization. The relative N contribution by soybean to the subsequent wheat crop is less clear than the effects of available N by sorghum residue.

Little data exists to guide producers in managing double-crop winter wheat planted in a no-till system in Kansas. Therefore, the objective of this study was to determine if the optimal seeding rates and N rates for wheat are different when wheat is no-till planted immediately following grain sorghum compared with soybean.

MATERIALS AND METHODS

To initiate the previous-crop residue treatments, grain sorghum and soybean were planted in a randomized complete block design on the Agronomy Farm near Manhattan, KS, in the spring of 1997, 1998 and 1999. Soil type at this location is a Reading silt loam. Recommended cultural practices for these crops were followed, but grain yields were not recorded. The winter wheat variety 2137 was no-till planted into the existing summer crop residue on Oct. 20, 1997, Oct. 30, 1998, and Oct. 25, 1999. Seeding rates of 67, 101 and 134 kg ha^{-1} were used in 1997 and an additional seeding rate of 168 kg ha^{-1} was added in 1998 and 1999. These seeding rates correspond to approximately 1.8, 2.7, 3.6 and 4.5 million seed ha^{-1} for the four seeding rates of 67, 101, 134 and 168 kg ha^{-1}, respectively, based on an average seed weight of 37.3 g 1000^{-1} seed. All plots were planted with a plot drill in 0.25-m row widths. Nitrogen rates of 0, 45, 90 and 134 kg ha^{-1} were applied as ammonium nitrate after planting in the fall each year. A split-split plot arrangement of a randomized complete block design with four replications was used with previous crops as main plots, seeding rates as sub-plots and N rates as sub-subplots. Sub-subplots were 6 m long and 1.5 m wide.

Soil test results indicated that levels for pH, P and K were within the optimal ranges for winter wheat production. Therefore, no additional soil amendments were applied during the study. No herbicide applications were required for the first two growing seasons, but 26 g a.i. ha^{-1} flucarbazone-sodium was applied March 6, 2000, for control of winter annual grasses.

To assess N uptake by the plant and to determine if final uptake levels were adequate, plant N content was determined from whole-plant samples taken at anthesis, and grain N levels were determined from grain samples taken at harvest.

Because the number of seeding rate treatments differed in 1998 from 1999 and 2000, a single-year analysis of variance was conducted for data from 1998. An F test indicated homogenous variances among 1999 and 2000 data; therefore, a combined-year analysis of variance was conducted. Single degree-of-freedom contrasts were used to test N rates and seeding rate effects.

Significant linear or quadratic responses were characterized using regression analysis. Nitrogen or seeding rates that produced maximum yield, leaf N content or grain N content for all quadratic responses were determined by solving the first derivative for zero.

RESULTS AND DISCUSSION

Growing conditions varied from year to year throughout this study. Precipitation was below normal and temperatures were near normal for the 1997–1998 growing season. Rainfall received in early June during grain fill improved yields, which averaged 3848 kg ha^{-1}. During the fall of 1998, rainfall and temperatures were above normal. Above-average rainfall was received in the spring of 1999 with near-normal temperatures. These spring conditions resulted in leaf rust infestations that reduced yields, resulting in an average yield of 1,895 kg ha^{-1}. Above-average temperatures and extremely low rainfall amounts in the fall of 1999 resulted in poor fall growth. Above-average temperatures during grain fill in late May and early June of 2000 reduced grain yields, resulting in an average yield of 2,678 kg ha^{-1}.

Grain Yields. Grain yields were influenced by seeding rate in two of three years of the study as indicated by the significant seeding rate main effect in 1998 and significant seeding rate x year interaction in 1999 and 2000. Because no seeding rate x N rate or seeding rate x previous crop interactions were found, data are presented as main effects within each year. Grain yields responded in a linear manner to increasing seeding rates in 1998, in a nonlinear manner in 1999, and did not respond to seeding rates in 2000. In 1998, grain yield increased at a rate of 5.1 kg ha^{-1} per kilogram per hectare of seed. The quadratic yield response to seeding rates in 1999 was the result of low yield at the 67 kg ha^{-1} seeding rate compared with the three higher rates. Grain yield increased at a rate of 23.1 kg ha^{-1} per kilogram per hectare as seeding rates increased from 67 to 101 kg ha^{-1} and 3.5 kg ha^{-1} per kilogram per hectare as seeding rates increased from 101 to 168 kg ha^{-1}. The optimal seeding rate in 1999 was determined to be 150 kg ha^{-1}.

Based on the two years in which wheat yield responded to seeding rates, seeding rates of ≥134 kg ha^{-1} were needed to reach maximum yields. This is approximately 35 kg ha^{-1} higher than the recommended seeding rate for continuous wheat in Kansas. Wheat yield response to increasing seeding rates was lower than expected, especially considering the late planting dates in this study. A 1993 study reported maximum wheat yields at seeding rates of approximately 90 kg ha^{-1} when planted in early September. However, when planting was delayed until late September, seeding rates from approximately 120 to 170 kg ha^{-1} were needed to maximize wheat yields. In 1998 and 1999, a seeding rate of ≥101 kg ha^{-1} was needed for maximum yield with a late-October seeding date.

Others have reported inconsistent wheat yield responses to seeding rates as well. They reported that when early-season growing conditions were unfavorable, tiller production was limited and unable to compensate at the lower plant densities. As a result, yields increased as seeding rates increased as a result of higher spikes per square meter at the higher seeding rates.

Early-season growing conditions varied throughout this study and influenced yield responses to seeding rates. October and November temperatures were near average in 1997 and above average in 1998 and 1999. Adequate early-season growing conditions occurred in the fall of 1997 and 1998, the two years when yields responded to seeding rates. October and November precipitation was above average in 1998, and despite being below average in 1997, the precipitation was received over a period from 13 days before planting through seven days after planting. Coupled with the near-normal temperatures in 1997, early-season growing conditions were adequate.

The 1999–2000 growing season began with a precipitation deficit in October. November precipitation was near normal but was received in one large storm. This coupled with above-average temperatures reduced overall growth. Under these conditions, a seeding rate response would have been expected. However, above-average temperatures and high-velocity winds during late May in 2000 hastened maturity and reduced overall yield potential. This stress and reduction in yield potential may have masked any seeding rate differences.

Wheat yield response to N fertilizer was influenced by the previous crop in this study, as indicated by the significant N x previous crop interactions. Both linear and quadratic responses were significant for each previous crop, except following soybean in 1999 when only the quadratic response was significant. In 1998 and 1999, wheat planted after grain sorghum required higher N rates to maximize yields but produced lower maximum yields than wheat planted after soybean. In 1998, maximum wheat yield after grain sorghum of 3,760 kg ha^{-1} occurred at 112 kg N ha^{-1}, whereas maximum wheat yield after soybean was 4,059 kg ha^{-1} and required 94 kg N ha^{-1}. In 1999, the maximum wheat yield of 2,043 kg ha^{-1} after grain sorghum required 94 kg N ha^{-1}, and maximum wheat yield after soybean of 2,333 kg ha^{-1} occurred at 70 kg N ha^{-1}. A 1983 study reported a similar trend with wheat following soybean requiring approximately 30 kg ha^{-1} less N to maximize yields compared with wheat following grain sorghum.

In 2000, wheat yield response to N fertilizer also varied by previous crop, with wheat yields after soybean exceeding those after grain sorghum by 675 kg ha^{-1}. However, the optimal N rates for each previous crop were inverted compared with the previous two years, with the yields maximized at 128 kg N ha^{-1} following soybean and 85 kg N ha^{-1} following grain sorghum. One possible explanation for these results may be the differences in soil-available water at wheat planting as a result of the previous crop. The 1999–2000 growing season began with a precipitation deficit that continued throughout the growing season. It is reasonable to assume that less soil water was available to the wheat crop following grain sorghum compared with soybean for several reasons. In Kansas, soybean matures (leaf drop) approximate-

ly 14 days earlier than grain sorghum. Also, grain sorghum's perennial growth habit results in it continuing to use water until the plant is terminated by subfreezing temperatures. The difference in cessation of grain growth between soybean and grain sorghum coupled with grain sorghum's perennial growth habit would reduce the amount of water available for the subsequent wheat crop following sorghum. During a dry year such as 1999–2000, these differences would likely result in lower yields and a potentially different response to N applications between the two crops. Under such conditions, the higher N rate treatments following grain sorghum may have developed a denser canopy during early spring, which resulted in greater stress in late May when above-average temperatures and high-velocity winds were experienced.

Less N was required to maximize wheat yields after soybean compared with grain sorghum in 1998 and 1999, which was expected. The expectations are that soybean contributes N to the system that is beneficial to the subsequent wheat crop and/or grain sorghum reduces N availability for the subsequent crop.

It is not likely that soybean contributes N to the subsequent wheat crop. Based on soil temperatures required to release 95% of the N immobilized in soybean residue reported by a study in 1995, organic N release by soybean residue would occur most years in mid to late May in Kansas, which is late enough to have minimal impact on the subsequent wheat crop. In fact, current recommendations in Kansas for wheat following soybean do not consider N credits from the soybean on the subsequent wheat crop.

The more plausible explanation for higher N requirements for wheat following grain sorghum compared with wheat after soybean would be associated with grain sorghum residue and N immobilization. Studies in 1983 and 1984 reported lower tissue N, lower yields and a higher fertilizer N requirement for wheat planted after grain sorghum compared with soybean. Both studies attributed these differences to the low residual N content (< 10 g kg^{-1}) of sorghum residue, which produced a sink for N immobilization and reduced the amount of N available for uptake by the wheat crop. A study in 1993 reported that wheat yields and N uptake were 39 and 36% lower, respectively, when wheat no-till planted after grain sorghum was compared with wheat yield and N uptake in a continuous wheat system. An additional 15 kg N ha^{-1} was required to maximize wheat yield following grain sorghum compared with wheat grown in the absence of grain sorghum residue. In 1998 and 1999, our differences between the two crops averaged 21 kg N ha^{-1}. They also attributed the lower N use efficiency to N immobilization by the grain sorghum residue. A 1977 study reported that grain sorghum residue could immobilize as much as 62 kg N ha^{-1}.

Leaf and Grain Nitrogen Content. Wheat leaf N concentration was affected by seeding rate in 1999 and 2000. Leaf N concentration declined as seeding rates increased ($y = 2.12–0.00543x + 0.0000154x^2$, $P < 0.05$). Nitrogen application rates consistently increased N content in leaf and grain. A quadratic response best described leaf N content at heading as a function of applied N in 1998 ($P < 0.05$) and 1999 ($P < 0.05$). In 1999, differences in leaf N content following soybean and grain sorghum increased as applied N rates increased, with leaf N content being greater following soybean. In 1998 the maximum leaf N rate of 17 g kg^{-1} occurred at 120 kg N ha^{-1}. In 1999 maximum leaf N level following soybean was 22 g kg^{-1} and occurred at 134 kg N ha^{-1}, and the optimal leaf N level following grain sorghum was 21 g kg^{-1} and also occurred at 134 kg N ha^{-1}. The rate of leaf N increased more rapidly after soybean than after sorghum. Based on the equations derived, the calculated maximum leaf N contents for wheat occurred at 140 kg after soybean and 170 kg after grain sorghum. Although these values exceed the limits of the data collected, they do illustrate the relative differences in the amount of N fertilizer needed to achieve maximum leaf N values.

In 2000, differences in wheat leaf N content following soybean and grain sorghum also increased as applied N increased, with leaf N content after grain sorghum being greater. The leaf N content response to applied N was linear, rather than quadratic as in 1998 and 1999. Studies in 1995 and 1983 reported increased leaf N content with increasing applied N rates. Both reported higher leaf N content following soybean than grain sorghum, as did our result in two of the three years of the study (1998 and 1999).

Grain N was only influenced by applied N and increased as applied N rates increased all three years. In 1998 and 2000, grain N increased in a quadratic manner as applied N increased, whereas in 1999, the response was linear. In all three years, the applied N rate required to maximize grain N was greater than the N rate required to optimize grain yields. Several studies report increased grain N as applied N increased and a study in 1998 also reported higher N rates required to optimize grain N than N rates required to maximize grain yield.

CONCLUSIONS

No-till planting winter wheat immediately after summer crops such as soybean and grain sorghum requires different management practices for each previous crop. Seeding rates of ≥134 kg ha^{-1} were required to maximize grain yields, regardless of the previous crop. This is approximately 35 kg ha^{-1} higher than the recommended seeding rate for continuous wheat. Previous crop influenced N management, with wheat following grain sorghum requiring approximately 21 kg ha^{-1} more N fertilizer to maximize yields than wheat following soybean. The higher N requirement following grain sorghum was attributed to the higher residue levels produced by grain sorghum and greater N immobilization by the residue. However, allelopathy cannot be completely dismissed. Leaf and grain N levels were affected by applied N fertilizer rates throughout the study, with tissue N levels increasing with increasing N rates. Previous crop affected leaf N content in two of the three years, but the results were inconsistent. These results suggest that when winter wheat is planted immediately after summer crop harvest, seeding rates should exceed 134 kg ha^{-1} and N rates should be increased an additional 24 kg ha^{-1} following grain sorghum compared with N rates used following soybean.

Editor's note: *Content was adapted from the paper "Seeding and Nitrogen Rates Required to Optimize Winter Wheat Yields following Grain Sorghum and Soybean," which was published in Agronomy Journal, Vol. 95, March-April 2003, and is courtesy of S.A. Staggenborg, D.A. Whitney, D.J. Fjell and J.P. Shroyer.*

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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 (lefthand column) and access the "CCA Advantage" link.

Seeding and Nitrogen Rates Required to Optimize Winter Wheat Yields Following Grain Sorghum and Soybean

December Self-Study Examination

DETACH HERE

1. Including winter wheat in crop rotations with summer crops:
[ ] a. increases the yield of summer crops.
[ ] b. encourages summer annual and perennial weeds.
[ ] c. increases the incidences of residue-borne fungal diseases.
[ ] d. is an excellent source of residue cover for reduced-tillage systems.

2. When following a summer crop, harvest often delays wheat planting through early November, suggesting:
[ ] a. the need for more efficient harvesting techniques.
[ ] b. the need for a winter wheat with a later planting window.
[ ] c. that higher seeding rates are needed to maximize yields.
[ ] d. winter wheat may not be a suitable rotation.

3. Wheat yields may be influenced by factors such as:
[ ] a. soil water content.
[ ] b. soil structure.
[ ] c. field microclimates.
[ ] d. P management.

4. Increased residue levels of grain sorghum compared with soybean have the potential to decrease N availability to the subsequent wheat crop through:
[ ] a. N immobilization.
[ ] b. mineralization.
[ ] c. leaching.
[ ] d. denitrification.

5. Soil type at the study location is Reading:
[ ] a. loam.
[ ] b. clay loam.
[ ] c. silt loam.
[ ] d. sandy loam.

6.Soil test results indicated that:
[ ] a. soil pH was out of the optimum range.
[ ] b. P fertilizer was needed.
[ ] c. soil pH, P and K were within optimum ranges.
[ ] d. K fertilizer was needed.

7. To reach maximum yields regardless of previous crops, seeding rates of:
[ ] a. 125 kg/ha (111 lb/A) were needed to reach maximum yields.
[ ] b. 134 kg/ha (119 lb/A) were needed to reach maximum yields.
[ ] c. 140 kg/ha (125 lb/A) were needed to reach maximum yields.
[ ] d. 145 kg/ha (129 lb/A) were needed to reach maximum yields.

8. To maximize yields, seeding rates of:
[ ] a. 110 – 160 kg/ha (98 – 143 lb/A) were needed.
[ ] b. 120 – 170 kg/ha (106 – 151 lb/A) were needed.
[ ] c. 130 – 180 kg/ha (116 – 160 lb/A) were needed.
[ ] d. 140 – 190 kg/ha (125 – 169 lb/A) were needed.

Over

9. In leaf and grain, nitrogen application rates:

[ ] a. consistently increased N content.
[ ] b. consistently decreased N content.
[ ] c. could not be determined.
[ ] d. were the same for grain sorghum and soybeans.

10. Wheat following grain sorghum required approximately:

[ ] a. 15 kg/ha (13 lb/A) more N fertilizer to maximize yields than wheat following soybeans.
[ ] b. 21 kg/ha (19 lb/A) more N fertilizer to maximize yields than wheat following soybeans.
[ ] c. 26 kg/ha (23 lb/A) more N fertilizer to maximize yields than wheat following soybeans.
[ ] d. 30 kg/ha (27 lb/A) more N fertilizer to maximize yields than wheat following soybeans.

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 December 2004 expires December 2007.

DETACH HERE

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: _____