

Advancing Agricultural Performance™

Iowa Soybean Association
On-Farm Network™

Soybean Fungicides

**2005 Strip Trial Results
2006 Plans**



Why Fungicide Studies?

For the most part, Iowa soybean growers have not had to deal with soybean diseases. Sure, we've had occasional problems with white mold and there's been the occasional flare-up of some non-descript leaf spots.

The threat of Asian soybean rust has made soybean growers more aware of all soybean diseases. Last year, the Iowa Soybean Association commissioned a statewide survey to determine the presence and prevalence of yield-limiting soybean pathogens in the state. Conducted by Dr. Alison Robertson, an Iowa State University extension plant pathologist, the study results can be found at <http://www.plantpath.iastate.edu/soybeansurvey/>. In addition to showing which diseases are out there and which might be a problem, the survey will also serve as a benchmark by which to gauge disease prevalence in the future.

Another bit of important information is growers are beginning to try a routine fungicide application. Reasons are varied, but center around being prepared in case ASR should invade Iowa. Too, fungicide makers have talked, both in advertising and grower meetings, about results growers in other states.

In a random survey of 400 soybean growers last fall, the Iowa Soybean Association learned that about a quarter of them had used a fungicide in 2005. More than 40% of those who used one treated less than 100 acres, but 5% sprayed more than 500 acres. A few made more than one application, suggesting a need to prevent or control a specific disease. It's not known whether farmers who reported fungicide use were producing commercial or seed beans.

To Spray or Not To Spray?

Many farmers have asked this question in recent years as it relates to fungicide use in soybeans. While farmers in some areas have dealt with soybean disease issues for some time, Iowa growers have generally needed neither disease preventives nor controls.

Still, in recent years, some farmers who routinely use fungicides for seed corn production noticed soybean plant health seemed to be better in fields adjacent to their seed corn fields.

Wondering if this also increased yields, farmers cooperating with the Iowa Soybean Association On-Farm Network™ put out a few strip trials two years ago. Results were mixed, but there was enough promise that, when combined with more positive information coming from the fungicide manufacturers, more than 100 replicated On-Farm Network strip trials were completed last year.

These trials confirmed that it is possible to obtain an economic return from fungicide applications without the presence of ASR.

Conducting Your Own Trials

Before making a fungicide application, first make sure that you have the proper certification. If you are a farmer applying fungicides to your own fields you must be certified as a private

pesticide applicator. If you are custom applying fungicides you are required to have a commercial pesticide applicator certification including category 1C: Agricultural Crop Disease Control.

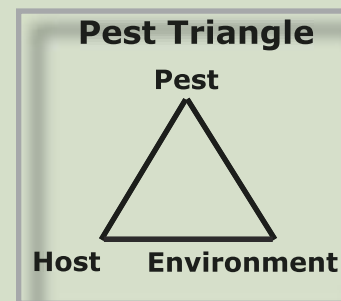
The next step is knowing which products to use. Not all fungicides can be applied for plant health purposes. Fungicides such as Headline® from BASF and Quadris® from Syngenta Crop Protection both carry Section 3 registrations for use in soybean plant health. Other fungicides are available for use on soybeans, but are currently registered as Section 18 products that may only be used as a preventative for Asian soybean rust (ASR). *To be clear, these products may not legally be used to promote general soybean plant health.* Some examples of Section 18 products include: Headline SBR™ (BASF), Quilt™ (Syngenta), Folicur® (Bayer CropScience), Stratego® (Bayer CropScience), and Laredo® (Dow AgroSciences). To use Section 18 products on soybeans for prevention of ASR, the applicator must have the Section 18 label in their possession when making applications on soybeans.

Why control soybean diseases?

Diseases in soybeans can affect plant health, and by doing so, may reduce yield. Diseases are referred to as pests in the Pest Triangle.

Some of the diseases that are targeted with soybean fungicides include: Alternaria leaf spot, Anthracnose, Brown Spot, Cercospora blight, Pod and Stem blight, and Frogeye leaf spot.

Environment during the growing season can impact the severity of foliar soybean diseases. Rain-fall, drainage, humidity, wind, and the amount of sunlight are just some of the factors that determine the environment and these conditions vary every season. Not all foliar diseases are controlled with fungicides. Refer to the product label for a complete listing of target diseases.



Routine fungicide use can boost bean yields

It's true that fungicide use can make soybeans appear healthier, delay senescence and add to yields. On-Farm Network™ participants saw that last year and in 2004. In total, they successfully completed more than 100 different replicated strip trials to look at routine fungicide use on soybeans in 2005, and on the average, they saw a yield increase.

Figure 1 shows the protocol growers used in laying out their strip trials. Figure 2 is an aerial image (from the cover) of one of the fields showing a clear visible difference between treated and untreated soybeans. Figure 3 is the grower report from Iowa Soybean Association researchers based on the trial in the photo in figure 2.

As stated, fungicides did improve yields on the average. When the costs of product and application for these trials was averaged out and a soybean price of \$6 a bushel calculated in, breakeven was determined to be about 2.8 bu. per acre. So unless the fungicide treatment showed an increase of 2.8 bu., growers would have lost money treating the entire field with fungicide.

Observations from 2005

The brief summary above doesn't really tell the entire story from the On-Farm Network

2005 fungicide trials. The results of each trial are shown in the graph on page 8. From this graph, you can see that only 15 trials did not show a yield increase. You should also note that only 22 showed enough of a yield increase to break even or show a profit.

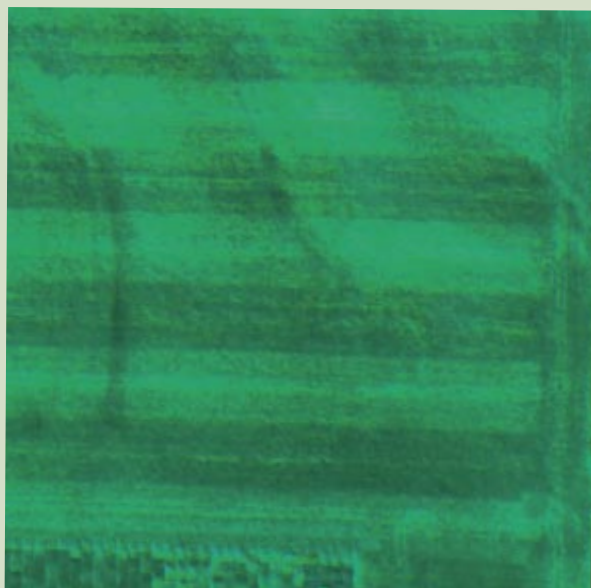
Disease control?

To date, we have not looked at disease presence or prevalence in fields, so we have no data that will show whether or not any specific chemical will prevent or control any of the diseases listed on the labels.

Figure 1

Fungicide
Check
Fungicide
Check
Fungicide
Check
Fungicide
Check
Fungicide
Check

Figure 2



Cover photo notes

In fungicide studies to date, aerial imagery hasn't always shown differences between treated and untreated strips, but in this case, the differences are easy to spot. On this field, the (presumably) healthier plants in the darker treated strips matured and dropped their leaves 1-3 days later than those in the untreated strips.

There's another point that can be made with this photo. When the On-Farm Network™ began looking at fungicides, some experts argued that strip trials would not work because of drift from the treated strips into the untreated strips. It should be obvious from the image that drift was not a huge factor.

A third point is that visual differences don't necessarily mean yield differences. In most cases where there was a visual difference, yield differences were negligible.

See additional photos and details on pages 6 and 7.



Photo: Kayla Hotvedt

Nick Liebold, New Hampton, has looked at fungicides in strip trials for two years now. He put a different twist with one set of trials in 2005 by adding an insecticide with the fungicide. The resulting yield was 11.5 bu. an acre higher in the treated strips than the untreated ones. He'll be expanding on this in strips for 2006.

Producer Comments



Photo: Christy Hemken

Dean Coleman, Humboldt, saw little difference between the treated and untreated strips in his fungicide study last year, which involved Headline applied at R1 growth stage. He intends to continue looking at fungicides in strip tests in order to gather data on their impact on yields. In addition, he has other questions he hopes to answer. "When you use fungicides to promote plant health, are you destroying beneficial fungicides, like those that help control soybean aphids?" he asks. "And, too, do these fungicides impact the soil fungi that help break down organic matter?"

Dennis Gerholdt, Cedar Falls, says he's always looking for ways to increase soybean profits, so putting out fungicide strip trials made sense to him. "It wasn't necessarily profitable on my farm, but since it was in some cases, I think it's worth looking at again," he says.



Photo: Kayla Hotvedt

"Headline® fungicide controls key diseases and enables more efficient growth and boosts plant tolerance to stress. Throughout the season, soybeans remain healthy and productive, resulting in a higher yielding, higher quality crop. In Iowa, side-by-side results in 2004-05 have shown a 4.7 bushel yield increase with Headline vs. the untreated check (*BASF results*). These results were achieved by following our ACT recommendation of Headline at 6 oz. per acre, 1-2 pints of a non-ionic surfactant per 100 gallons of water, spray volumes of 15 gpa or greater, nozzles delivering fine to medium size droplets, and soybeans at the R2-R3 growth stage."

Mark Storr
BASF Technical
Representative





Remote Sensing Sh

Strips where fungicide was applied to soybeans were visible in many of the aerial images collected in 2005. The images here are color-infrared or CIR. More specifically, the red color in the image is from the near-infrared portion of the spectrum. This portion of the spectrum measures the light used in photosynthesis, rather than measuring heat. Light reflected from the near-infrared reflects differently between vegetation and soil. It also reflects differently with varying amounts of air and water in the leaf structure. As a result, the strips look different because of a difference



Photo Key

1. Franklin County, Headline vs. no fungicide, 2.3 bu. more.
2. Black Hawk County, Quilt vs. no fungicide, 1.8 bu. more.
3. Franklin County, Headline vs. no fungicide, 3.9 bu. more.
4. Hancock County, Headline vs. no fungicide, 3.8 bu. more.





ows *Fungicide Strips*

in the rate of senescence that we attribute to the application of the fungicide. Many of the differences in the strips were not visible until the leaves started to turn or drop. The day the image is collected in relation to the stage of crop maturity plays a big role in how pronounced the strips can appear. In many cases, the differences were still visible at harvest time. Many of the combine operators reported feeling the combine work harder in the strips where fungicides were applied, but were disappointed that there wasn't more of yield difference.

- 5. Fayette County, Headline vs. no fungicide, 2.3 bu. more.
- 6. Fayette County, Headline vs. no fungicide, 1.1 bu. more.
- 7. Howard County, Headline vs. no fungicide, 4.7 bu. more.
- 8. Chickasaw County, Headline vs. no fungicide, 0.6 bu. less.



Fungicides Can Boost Bean Yields

After two years of study, it appears that routinely applied fungicides can improve soybean yields in Iowa.

In 2004, the results from 20 On-Farm Network™ replicated strip trials with Quadris fungicide showed a yield advantage of 2.1 bu. per acre. In 2005, with nearly five times that many trials, mostly with Headline fungicide, the yield advantage was about 1.5 bu. per acre. In addition to strips comparing fungicides to no fungicides, growers also used fungicides mixed with insecticides as their variable. The highest yield increase - 11.5 bu. per acre - was produced in strips treated with a fungicide and an insecticide. One of the trials compared two fungicides.

When the costs of product and application for these trials was averaged out and a soybean price of \$6 a bushel calculated in, breakeven was determined to be about 2.8 bu. per acre. No breakeven was calculated for fungicide plus insecticide. So unless the fungicide treatment showed an increase of 2.8 bu., growers would have lost money treating the entire field with fungicide. Only 22 of the trials from 2005 showed enough of a yield increase to break even or show a profit. The range in differences across all trials and all products was from -2.2 bu. to an 11.5 bu. increase.

Studies from previous years suggest a need to look more deeply into fungicide use. We need to address questions like:

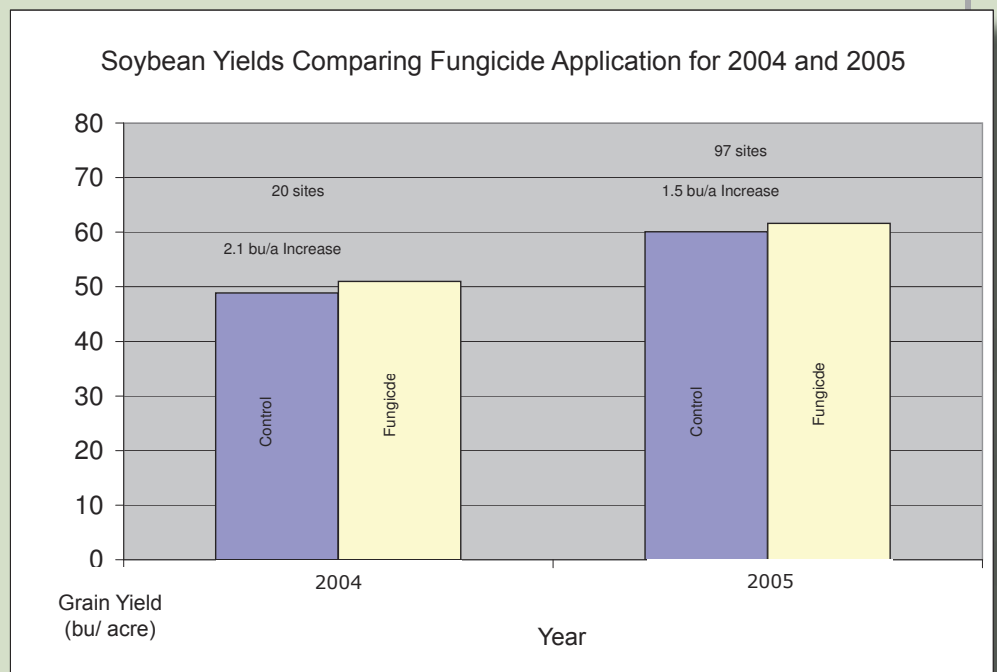
- * spatial variabilities, such as soil type and elevation.
- * management factors, including variety, tillage, and application timing and methods.
- * overall weather and climate conditions.

We may not be able to address each of these in 2006 trials, but we're anticipating more grower participation this year than in 2005.

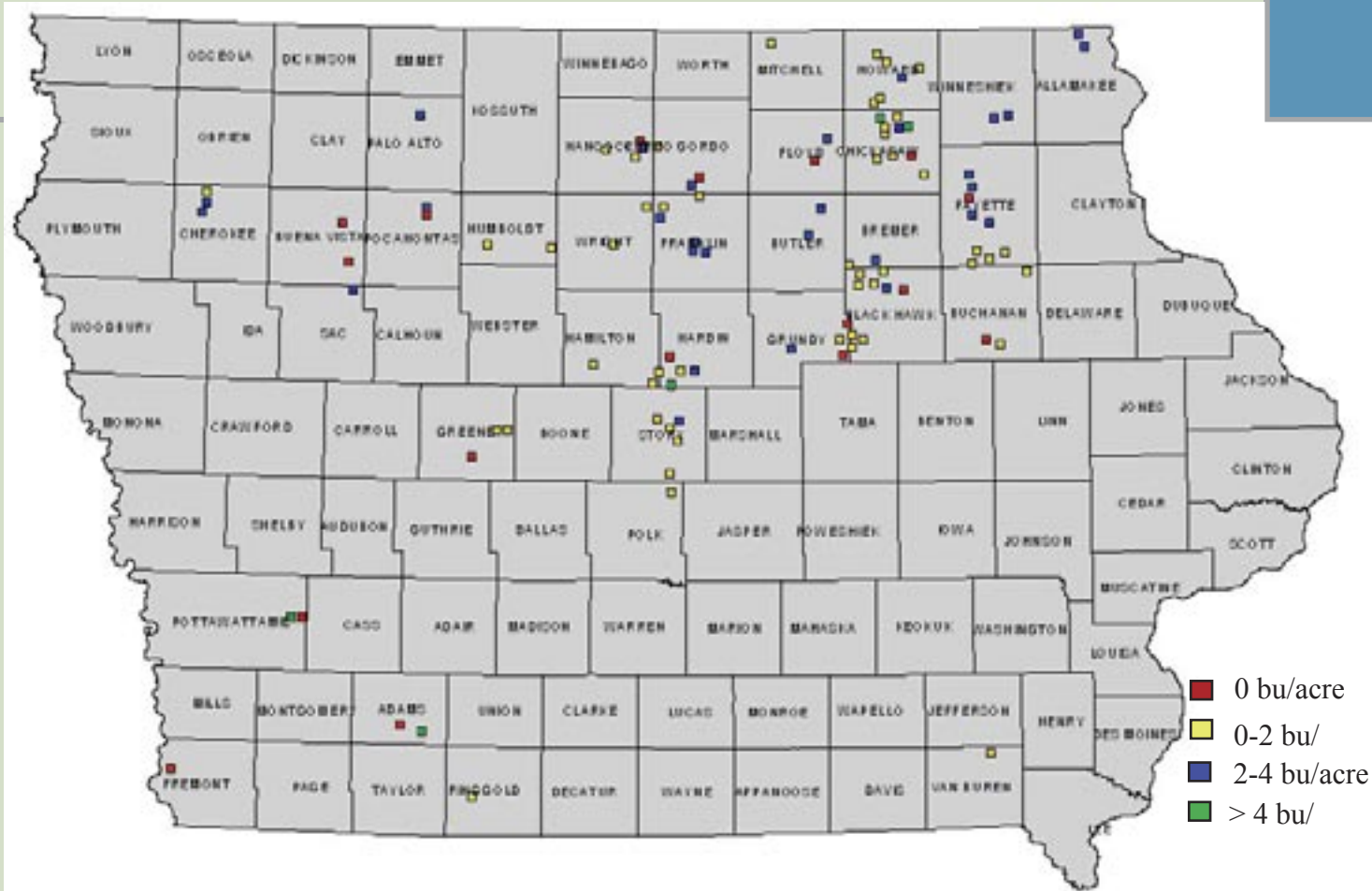
Participate in 2006

Take a close look at the map on the facing page. If you're interested in data from your area, but there are no markers near you, contact the On-Farm Network immediately to sign up. You can apply on-line at www.isafarmnet.com/agronstudies, mail the completed form on page 11 of this publication to the address on the form, or call 800-383-1423, extension 233, and sign up by phone. You'll still need to complete the information form, but the phone call will get your name on the list.

Growers with GPS and yield monitors will treat at least five alternating pairs with and without the soybean fungicide and measure the yield differences at the end of the year. The width of a strip is generally the width of the sprayer boom. Harvesting must ensure at least one combine pass within each application strip will have a "pure" yield measurement (not mixing yields from the two strips). Mixed passes are acceptable where the sprayer boom is wider than the combine platform, but the grower must be able to harvest at least one pure pass from each strip. If possible, when recording yield monitor results, please separate by load the mixed and non-mixed passes.



2005 trial locations



Grower Requirements for Fungicide Strip Trials

1. Complete and submit replicated strip trial information forms to the Iowa Soybean Association On-Farm Network.
2. Collect yield data with a combine equipped with GPS and a yield monitor.
3. Be able to apply alternating strips of fungicide and no-fungicide (check) with a minimum of five replications per field, and accurately record where each strip is located within the field.
4. Be willing to apply strips wide enough to harvest a full platform width of soybeans from each strip.
5. Manage all other factors within the field exactly the same – same planting date, same variety, etc.
6. Allow ISA to use submitted and collected data for research, educational and informational purposes.
7. Submit yield data within 30 days of harvest, and no later than December 1, 2006.

ISA agrees to:

1. Return a report analyzing the treatment differences.
2. Attempt to collect aerial images from each field and provide them to the grower at no cost.
3. Keep the data in a confidential manner that can't be linked back to the individual producer by other parties.

Priorities for 2006

Fungicide Trials

- Additional fungicide vs. no fungicide strips in soybeans. These will compare untreated strips to strips of either Quadris or Headline applied at R3. (See photos, descriptions below for soybean growth stage information.)
- Fungicides applied at R1 vs. the same fungicide applied at R3.
- Headline vs. Quadris, applied at R3.
- Combined fungicides and insecticides (applied at R3) vs. no treatment.
- Corn fungicide vs. no treatment (Contact ISA On-Farm Network™ for details.)

When to apply fungicides to soybeans

Label instructions with fungicides approved for general use in soybeans (Headline and Quadris only) require application between growth stages R1 and R3.



R1 (left) begins when there is at least one blossom is open at any node on the soybean plant.

R2 (below) occurs when blossoms at every node are open (i.e., full bloom).

R3 (below) begins when the first pods begin to form.



ISA ON-FARM NETWORK™

2006 FUNGICIDE/INSECTICIDE STRIP TRIAL INFORMATION FORM

Complete this form for each replicated strip trial.

GROWER/FIELD INFORMATION			
Your Name:		Field Name:	
Tillage: <input type="checkbox"/> No Till <input type="checkbox"/> Fall Only <input type="checkbox"/> Spring Only <input type="checkbox"/> Both Fall and Spring <input type="checkbox"/> Strip Till			
Planting Date:	Hybrid/Variety:	Population:	
Row Width:	Planter Size:	Previous Crop:	
Combine Header width/# of rows: _____	Yield Monitor: <input type="checkbox"/> Agleader <input type="checkbox"/> Case AFS <input type="checkbox"/> GreenStar <input type="checkbox"/> MicroTrak <input type="checkbox"/> Other _____		
APPLICATION INFORMATION			
Applicator Name:	Date Applied:	Time:	
Application Method: <input type="checkbox"/> Ground <input type="checkbox"/> Air	Boom Width:	Spray Nozzles:	
Application starting point (corner of field): <input type="checkbox"/> NE <input type="checkbox"/> NW <input type="checkbox"/> SE <input type="checkbox"/> SW <input type="checkbox"/> Other (Describe): _____			
Wind Direction:	Wind Speed: _____	<input type="checkbox"/> Calm <input type="checkbox"/> Mild <input type="checkbox"/> Steady <input type="checkbox"/> Gusty	
Temperature:	Relative Humidity: <input type="checkbox"/> Low <input type="checkbox"/> Med. <input type="checkbox"/> High	Acres Treated:	
Crop Stage: Soybeans <input type="checkbox"/> R1 Beginning Bloom <input type="checkbox"/> R2 Full Bloom <input type="checkbox"/> R3 Beginning Pod		Corn <input type="checkbox"/> VT <input type="checkbox"/> R1 Silking <input type="checkbox"/> R2 Blister	
Do you have GPS application data for this trial? <input type="checkbox"/> Yes <input type="checkbox"/> No (If yes please send to CBorton@iasoybeans.com)			
TREATMENT INFORMATION			
Treatment A		Treatment B	
Fungicide		Fungicide	
Fungicide Rate		Fungicide Rate	
Insecticide		Insecticide	
Insecticide Rate		Insecticide Rate	
Foliar Fertilizer		Foliar Fertilizer	
Foliar Fertilizer Rate		Foliar Fertilizer	
Carrier		Carrier	
Carrier Volume (Gallons)		Carrier Volume (Gallons)	
Adjuvant		Adjuvant	
Adjuvant Rate		Adjuvant Rate	
Other (Describe)		Other (Describe)	
Was a glyphosate product applied with the treatment? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Were there any mistakes during the application of treatment A or B (If yes please explain below)? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Additional Comments:			
Do you need a GPS receiver for harvest? <input type="checkbox"/> Yes <input type="checkbox"/> No			

Send this form and any attachments to: Iowa Soybean Association, Attn: Christine Borton, 4554 NW 114th Street
 Urbandale, Iowa 50322-5410 Email: CBorton@iasoybeans.com



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 Unique ID: ST2006 _____

On-Farm Network™

Crop Scouting Program Can Provide Early Pest Warning

The Iowa Soybean Association On-Farm Network™ Crop Scouting Program was designed to help growers keep track of pests and plant growth stages in both corn and soybeans.

Every week, crop consultants scout and report on more than 200 corn and soybean fields across the state. Their reports and a summary can be found at www.isafarmnet.com/scouting.

In addition to pest and growth stage information, consultants also report on moisture, weeds and more. A field history, showing planting date and other pertinent information is also available.

For more on this and other ISA On-Farm Network programs, write or call the association at:

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On-Farm Network™
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