Cover Crops for Nutrient Management

Progress and Potential

Joel Gruver
School of Agriculture
Western Illinois University
Direct effects of cover crops on nutrient cycling

• Uptake of nutrients that would otherwise be lost:
  • Leaching below crop root zone
  • Losses in eroded soil or runoff
  • Losses in gaseous form e.g., denitrification

• Translocate nutrients from below crop root zone e.g., from subsoil to near surface

• Fix N (legumes)

• Release nutrients later—potentially at the time needed by the next crop
Indirect effects of cover crops on nutrient cycling

• Increase overall soil biological activity accelerating cycling of nutrients contained in soil organic matter and soil minerals

• Increase populations of specific root symbionts (e.g. mycorrhiza)

• Create biopores enhancing air and water movement and root growth and function in subsequent crops

• Build soil organic matter at soil surface and throughout soil profile
How many of you attended this conference?
> 60 articles

SURFACE WATER IMPACTS

Effect of cover crops on surface water quality
A. N. Sharpley and S. J. Smith

Effect of cereal grain winter cover crops on surface water pollutant transport from Coastal Plain corn production systems
K. W. Staver and R. B. Brinsfield

Water quality impacts of winter rye cover with selected best management practices in Pennsylvania
J. M. Hamlett and K. Brannan

Soybean tillage and cover crop effects on water runoff and soil erosion
Monroe Rasnake

> 20 related to nutrient management
GROUNDWATER IMPACTS

Effect of cover crops on groundwater quality
J. J. Meisinger, W. L. Hargrove, R. L. Mikkelsen, J. R. Williams, and V. W. Benson

Impact of annual cropping on shallow groundwater quality in the Northern Great Plains
G. J. Beke

Tillage and cover crop effects on nitrate leaching
G. V. Wilson, D. D. Tyler, J. Logan, and K. Turnage

Evapotranspiration and nitrogen accumulation in a winter rye cover crop in the northern Corn Belt
D. C. Reicosky and D. D. Warnes

Influence of fall tillage and cover crops on soil water and nitrogen use efficiency of corn grown on a Coastal Plain soil
D. W. Reeves and J. T. Touchton

Relating nitrogen uptake by cereal grain winter cover crops to changes in groundwater nitrate concentration
K. W. Staver, R. B. Brinsfield, and W. L. Magette

Use of cereal grain cover crops for reducing groundwater nitrate contamination in the Chesapeake Bay region
R. B. Brinsfield and K. W. Staver

Cultivation of cover crops to control nitrate leaching
M. Smukalski, Jutta Rogasik, and Susanne Obenauf
NITROGEN CYCLING

Role of cover crops in nitrogen cycling
John W. Doran and M. Scott Smith

Soil nitrogen movement under winter cover crops and residues
Greg D. Hoyt and Robert L. Mikkelsen

Influence of cover crops on denitrification and nitrogen mineralization
C. F. Drury, J. A. Stone, and W. I. Findlay

Effects of winter cover crops on corn yield in Parana, Brazil
Ademir Calegari

Benefits of a winter legume cover crop to corn: Rotation versus fixed-nitrogen effects
H. A. Torbert and D. W. Reeves

Rye nitrogen cycling for corn and potato production
G. K. Evanylo

Decomposition and nitrogen recycling of cover crops and crop residues
Z. C. Somda, P. B. Ford, and W. L. Hargrove

Effect of cover crops on cycling of nitrogen and phosphorus in a winter wheat-corn sequence
R. A. Samson, C. M. Foulds, and D. G. Patriquin
It concerns me that many of the questions we ask about cover crops today were asked 20 years ago, but not pursued aggressively. Was it due to a lack of funding, a lack of grower interest, or was it part of a great conspiracy of some sort?

Terry Taylor - Geff, IL
Lots more evidence that cover crops can reduce nitrate leaching

Average annual flow-weighted nitrate-N concentration of drainage water for 2002-2005

Kaspar et al. J. Environ. Qual. 36:1503-1511
ESTIMATING PLANT-AVAILABLE NITROGEN RELEASE FROM COVER CROPS

D.M. Sullivan and N.D. Andrews

HIGHLIGHTS

- Legume cover crops provide up to 100 lb PAN/acre. To maximize PAN contribution from legumes, kill the cover crop at bud stage (early May).

- Cereal cover crops immobilize up to 50 lb PAN/acre. To minimize PAN immobilization from cereals, kill the cover crop during the early stem elongation (jointing) growth stage (early April).

- Legume/cereal cover crop mixtures provide a wide range of PAN contributions, depending on legume content. When cover crop dry matter is 75 percent from cereals + 25 percent from legumes, PAN is usually near zero.

- A laboratory analysis for cover crop total N as a percentage in dry matter (DM) is a good predictor of a cover crop’s capacity to release PAN for the summer crop.
Interesting new CC research at Illinois State University

Can Cover Crops Improve the Efficiency of Fall Applied Nitrogen within Conventional Midwestern Cropping Systems?

Corey Lacey  
M.S. Candidate in Agriculture Sciences

Dr. Shalamar Armstrong  
Assistant Professor of Soil Science and Agronomy
Cover crop effects on nitrous oxide emission from a manure-treated Mollisol


Abstract
Agriculture contributes 40–60% of the total annual N₂O emissions to the atmosphere. Development of management practices to reduce these emissions would have a significant impact on greenhouse gas levels. Non-leguminous cover crops are efficient scavengers of residual soil NO₃, thereby reducing leaching losses. However, the effect of a grass cover crop on N₂O emissions from soil receiving liquid swine manure has not been evaluated. This study investigated: (i) the temporal patterns of N₂O emissions following addition of swine manure slurry in a laboratory setting under fluctuating soil moisture regimes; (ii) assessed the potential of a rye (Secale cereale L.) cover crop to decrease N₂O emissions under these conditions; and (iii) quantified field N₂O emissions in response to either spring applied urea ammonium nitrate (UAN) or different rates of fall-applied liquid swine manure, in the presence or absence of a rye/oat winter cover crop.

These results indicate that while cover crops have the potential to reduce N₂O emissions, N application rate may be the overriding factor.
A spatial model identified the critical planting dates for all locations in MA based on field studies combined with long-term weather data collected from 14 weather stations.
# Nitrogen Reduction Scenarios

<table>
<thead>
<tr>
<th>Practice/Scenario</th>
<th>Nitrate-N Reduction</th>
<th>Cost of N Reduction ($/lb)</th>
<th>Total Equal Annualized Cost (million $/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cover crops (rye) on ALL CS and CC acres</td>
<td>28</td>
<td>5.96</td>
<td>1,025</td>
</tr>
<tr>
<td>Reducing nitrogen application rate from background to the MRTN 133 lb N/ac on CB and to 190 lb N/ac on CC (in MLRAs where rates are higher than this)</td>
<td>9</td>
<td>-0.58</td>
<td>-32</td>
</tr>
<tr>
<td>Sidedress all spring applied N</td>
<td>4</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>Using a nitrification inhibitor with all fall applied fertilizer</td>
<td>1</td>
<td>-1.53</td>
<td>-6</td>
</tr>
<tr>
<td>Moving fall anhydrous fertilizer application to spring preplant</td>
<td>0.1</td>
<td>-74.36</td>
<td>-149</td>
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</tbody>
</table>

Target Load Reduction from NPS for Hypoxia Goal ~41%
## Nitrogen Reduction Scenarios

<table>
<thead>
<tr>
<th>Practice/Scenario</th>
<th>Nitrate-N Reduction % (from baseline)</th>
<th>Cost of N Reduction ($/lb)</th>
<th>Total Equal Annualized Cost (million $/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installing wetlands to treat 45% of the ag acres</td>
<td>22</td>
<td>1.38</td>
<td>191</td>
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<tr>
<td>Installing denitrification bioreactors on all tile drained acres</td>
<td>18</td>
<td>0.92</td>
<td>101</td>
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<tr>
<td>Installing Buffers on all applicable lands</td>
<td>7</td>
<td>1.91</td>
<td>88</td>
</tr>
<tr>
<td>Installing Controlled Drainage on all applicable acres</td>
<td>2</td>
<td>1.29</td>
<td>18</td>
</tr>
</tbody>
</table>

Target Load Reduction from NPS for Hypoxia Goal ~41%
Forage radish: New Multi-Purpose Cover Crop for the Mid-Atlantic

Forage radish (Raphanus sativus var. niger) is a unique fall/winter cover crop that is relatively new to the Mid-Atlantic region. It is a member of the Brassica family that also includes rapeseed, canola, mustard, cabbage, and the like. Forage radish is also known as 'Daikon' (sometimes spelled 'Dichon') radish or 'Japanese' radish and is used as a vegetable in many types of Asian cuisine. When planted by early September in the Mid-Atlantic region, forage radish exhibits a number of unique and desirable characteristics that distinguish it from other types of cover crops more commonly grown in the region.

('Daikon'). The precise classification of these and other types of radishes is not well established because they can easily cross-pollinate and therefore distinctions among subspecies are often blurred. Most of the traits and management recommendations described here for forage radish should also apply to oilseed radish.

**Forage Radish Traits:**

- Rapid germination and growth.
- Large deeply penetrating tap root.
- Winter-kills.
- Quick to decompose residues.
- High nutrient (N, P, S, Ca, B) content.
- Bio-active plant chemicals (glucosinolates).
Radishes are excellent N scavengers but what happens to this N?

Forage radish and other cover crops clean up nitrate from a sandy soil profile by mid-November. Control soil had no cover crop, only winter weeds. (Data from Dean and Weil, 2009)
Brassicas appear to be particularly adept at solubilizing P.

Biological pumping + organic acid root exudates

Third year of cover crop treatments in a corn-soybean rotation.

Nutrient cycling: Phosphorus

Soil Test P
Silt loam at Wye, fall 2003
Means for top 18 inches

**Rape**
**Rye**
**control**
**forage rad**
**oilseed rad**

Soil test P, mg/kg

50% increase
WHAT ARE COVER CROPS?

Cover crops are plants seeded into agricultural fields, either within or outside of the regular growing season, with the primary purpose of improving or maintaining ecosystem quality.

The goal of the Midwest Cover Crops Council (MCCC) is to facilitate widespread adoption of cover crops throughout the Midwest, to improve ecological, economic, and social sustainability.

WHAT DO COVER CROPS DO FOR THE ENVIRONMENT?

- Enhance biodiversity
- Increase soil infiltration, leading to less flooding, leaching, and runoff
- Create wildlife habitat
- Attract honey bees and beneficial insects

NEWS

Soybean Farmers and CCAs/Agronomists: The MCCC is conducting a survey on cover crop use in soybean systems, please take <10 minutes to help us gather information. Links to the surveys are available here.

MCCC working meeting scheduled for April 8-9, 2014 in Warsaw, IN...details to come

Northwest Indiana Cover Crop Report Winter 2014- Jasper Co. SWCD
The Use of Cover Crops to Manage Soil

T.C. Kaspar and J.W. Singer

Cover crops are used to manage soils for many different reasons and are known by many different names. Cover crops are literally “crops that cover the soil,” and one of their first uses was to reduce soil erosion during fallow periods in annual cropping systems. Cover crops are also known as “green manures,” “catch crops,” or “living mulch.” Green manure cover crops are usually legumes that fix N and are grown to provide N to the following cash crop. Catch crops are cover crops that are grown during fallow periods in cropping systems to take up nutrients, especially N, that would be lost if plants are not present. Lastly, living mulches are cover crops that are grown both during and after the cash crop growing season and are suppressed or managed to reduce their competition with the cash crop when it is growing. After the cash crop has matured and before it begins growing again, the living mulch is allowed to grow unhindered. One way to manage living mulches is to restrict them to the “fallow” spaces between crop rows. Orchards or vineyards are sometimes managed with living mulches, but it is also possible to incorporate living mulches into annual cropping systems. Thus, as can be seen from their many names and descriptions, cover crops can fulfill many soil management functions.

In terms of soil management, the basic premise for using cover crops is to reduce fallow periods and spaces in cropping systems. Natural ecosystems typically have some plants growing, covering the soil, transpiring water, taking up nutrients, fixing carbon, and supporting soil fauna for most of the time so that the ground is not frozen. Agricultural cropping systems producing grain, oilseed, and fiber crops in temperate regions typically have living plants for four to six months of the year and are fallow for the remaining six to eight months. Current planting and tilling practices often leave soil bare and exposed during fall, winter, and early spring. Some perennial cropping systems for nut or fruit crops (e.g., almonds and grapes) keep the spaces between rows fallow and tilled for extended periods. As a result of these fallow periods and fallow spaces in annual and perennial cropping systems, soil is left unprotected from erosive forces, nutrients and organic matter are lost or not replenished, runoff increases, soil fauna are stressed, and soil productivity diminishes. Thus, inserting cover crops into fallow periods or fallow spaces in cropping systems can accomplish multiple soil management goals. This discussion is not intended to be a comprehensive review and will focus on the general principles and evidence for using cover crops to manage soil erosion, runoff, soil nutrients, soil physical properties, soil water, soil organic carbon, soil chemical properties, and soil biology.
> 15,000 CCAs have received science-based info about CC

Crops & Soils

Focus Cover Crops

Feature
Cover cropping in marginal production areas, using cover crops to convert to no-till, and planting radishes as cover crops

Continuing Education
Optimizing weed suppression and plant growth with legume-oat cover crops

Industry News
NRCS CAPs: An opportunity for agriculture and IPM
Capturing Residual Soil Nitrogen with Winter Cereal Cover Crops

The enduring and widespread drought this summer has resulted in reduced crop growth, poor yields, crop failures, and anticipated increases in residual nitrate-nitrogen (RSN) in the soil profile. When no nitrogen (N) is applied to productive Midwestern soils that have subsurface or tile-drains, nitrate-N losses commonly range from 8 to 20 lbs/A with nitrate-N concentrations in the drainage of 3 to 10 mg/L or ppm. Corresponding nitrate-N losses from recommended fertilization rates are often between 25 to 50 lbs N/A and 10 to 30 ppm (Saupé and Randall, 2008). Many are asking if winter cereal cover crops (cereal rye, wheat, oats, or annual ryegrass) could help capture the RSN this fall and early winter, help prevent leaching and subsurface/tile drainage losses, and return some of that recovered N during the growing season of the crop planted next spring.

To help answer some of these cover crop N retention questions, we have referred to several important publications in preparing the information presented in this brief. These review papers and book chapters (e.g. Kaspar et al., 2008; Dabney et al., 2010) and other cover crop management resources are shown in the reference list at the end of this brief. We will only use selected highlights, because the effects of cover crops on N in cropping system productivity and on environmental impacts have been reviewed by others.

We will consider two general approaches for managing RSN after a drought. The first is to use a cover crop and the second is to monitor RSN and adjust N addition.

has been reported from southwestern Minnesota by Randall et al. (1997).

Like much of the rest of the nation in the 1988 drought, Maryland’s corn suffered, achieving only 50% of normal yields as a result of rainfall which was 48% below normal from the late-vegetative through early-grain fill period. Fortunately, an existing long-term study was underway in small watersheds in the Atlantic Coastal Plain (Brinsfield and Staver, 1991; Staver and Brinsfield, 1998), which provided data to compare the ability of a cereal rye cover crop versus no winter cover crop to capture RSN. The study used a continuous corn system receiving 140 lbs of fertilizer UAN-N/yr, with the cereal rye planted on October 1 of 1988, about two weeks before the average frost date. Soil samples were collected in 6-inch increments to a depth of five feet on November 1 and again on December 1, 1988, and analyzed for nitrate-N. Total above-ground rye samples were also collected and analyzed for total N. Figure 1 summarizes these data and shows that the soil contained 191 lbs of RSN/A in the no cover crop treatment, while the soil under the rye cover crop contained 34 lbs/A less on November 1, 1988, which is consistent with the measured rye N uptake of 39 lbs of N/A on November 1. Most of this N came from the surface six inches of soil. A month later (December 1), the soil without a cereal rye cover crop had not lost any RSN (although the nitrate-N had moved deeper in the soil profile), but the rye cover crop had taken up 75 lbs of N/A with most of that N absorbed from
HIGH-YIELD CONSERVATION

Mark Anson
Plots Cover Crop Coverage
Future Friendly Farming
Report highlights cost-effective strategies to protect wildlife habitat and save taxpayers, farmers and consumers money
10-05-2011 // Mékell Mikell

American farmers provide food, fuel and fiber for a growing nation. In the face of challenges including tight budgets, increasing threats to natural systems, climate change and extreme weather, farmers can implement strategies that assure yields and farm income while helping to address these challenges.

A new report from the National Wildlife Federation, Future Friendly Farming: Seven Agricultural Practices to Sustain People and the Environment, offers techniques that farmers and ranchers can use to increase profits, reduce greenhouse gas emissions, and protect soil, water and wildlife habitat.
Future Friendly Farming
Seven Agricultural Practices to Sustain People and the Environment

Ryan Stockwell
and
Ellav Bitan
August 2011

NATIONAL WILDLIFE FEDERATION
<table>
<thead>
<tr>
<th>Future Friendly Practice</th>
<th>Definition</th>
<th>Effect on Greenhouse Gases</th>
<th>Environmental Benefits</th>
<th>Wildlife Benefits</th>
<th>Landowner/Farmer Benefits</th>
<th>Potential Trade-Offs or Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cover Crops</td>
<td>Crops planted for the purpose of protecting and improving soil and nutrients rather than for harvest as a commodity, particularly during a period in which the land would have otherwise been barren.</td>
<td>Sequesters carbon in plants and soil. In some regions, adding a cover crop to a conservation tillage system can nearly double the rate of carbon sequestration.</td>
<td>Decreased soil erosion, improved nutrient retention, increased soil organic matter, improved water quality.</td>
<td>Increased nesting areas for species such as ducks, high quality food sources for many grassland bird and game bird species.</td>
<td>Increased profit through reduced fertilizer needs, improved soil fertility, and easier control of weeds.</td>
<td>Requires extra time and knowledge to manage; and some new techniques for growing commodity crops.</td>
</tr>
<tr>
<td>2 Conservation Tillage</td>
<td>A system in which 30% or more of the crop residue remains on soil after planting. No-till avoids tilling altogether.</td>
<td>By disturbing the soil less, soil carbon storage is increased through enhanced soil sequestration, reduced CO₂ emissions from farm equipment.</td>
<td>Reduced erosion, reduced water pollution.</td>
<td>Increased bird nest density and nest success; increased bird use and aquatic biodiversity.</td>
<td>Increased profits through reduced fuel, equipment, and labor costs.</td>
<td>Potential increase in herbicide use; increased pest threats in repetitive single commodity production.</td>
</tr>
<tr>
<td>3 Organic Agriculture</td>
<td>Uses crop rotation, compost, and biological pest control to maintain soil productivity and control pests without synthetic pesticides and fertilizers.</td>
<td>Organic agriculture averages 60% less direct energy use compared to conventional production practices; organic soils have been found to sequester more carbon than conventional.</td>
<td>Improved nutrient retention in soil, reduced soil erosion, reduced nutrient runoff.</td>
<td>Increased biodiversity; eliminating the use of pesticides helps promote beneficial insects, birds, nearby aquatic organisms.</td>
<td>Increased profit through premium prices and stronger long-term soil fertility through natural systems.</td>
<td>Requires considerable knowledge, transition period can be difficult.</td>
</tr>
</tbody>
</table>
My farm has belonged to my family since 1881. We grow corn and soybeans near Eagle Grove. I believe that every responsible farmer can and should make decisions on their farm to help reduce nitrates in Iowa’s waterways.

We have started using cereal rye as a cover crop. We also apply nitrogen in the late spring, instead of fall, which is closer to when the corn needs it. Finally, we installed a bioreactor to help further reduce nitrogen leaving the farm through subsurface tile drainage.

Initially, I wasn’t sure what real benefits to water quality these practices would bring. This spring, data showed that the nitrate concentrations in water flowing out of my tile were consistently more than 50 percent less than the water in Eagle Creek. As I continue to monitor the water coming off of my farm, I see now that there are solutions to our water pollution problem that I can implement today while still growing corn and soybeans successfully.

— Tim Smith, Eagle Grove
Welcome

ACWA (Agriculture’s Clean Water Alliance) is a group of leading ag retailers in west-central Iowa. The issue that brought ACWA together was water quality in the Raccoon River watershed. Similar concerns in the adjacent Des Moines River watershed led to our including it in our network.

The public looks to agriculture to feed a growing world population from a static land resource base. But it’s also become clear that people expect environmental performance from the business of agriculture.

ACWA is about finding the balance as we move forward.

Our primary mission as ag suppliers has historically been to help farmers improve agronomic performance by creating ACWA, we have made an agreement across the industry to internalize and implement a dual mission: blending optimal crop yield and profitability with the best environmental performance possible.

We can do this.

Farmers trust us as suppliers and consultants — we have strong relationships with them and can help inform their decision-making process.

And we know that many of the answers to our environmental challenges rest in science. The best way to start working is to collect of water quality data and find out what is really going on in the water.

The data will point to both challenges and solutions.
The data will point to both challenges and solutions. After several years of gathering and analyzing water monitoring data from our local streams, rivers and lakes, we began working with partners to implement, evaluate and demonstrate solutions.

Our water monitoring work continues, informing the selection and placement of solutions, evaluating and documenting their effectiveness, and making the case for applying public and private resources to implement water quality solutions.

It has taken a long time to recognize and understand these problems, but we do. It's also going to take us a long time to address them, but we can — and we will.
KIC 2025
Keep It for the Crop by 2025

Home Partners 4R's Research Press Release Program Watershed Maps

Illinois Agriculture's Commitment to Water Quality
GET YOUR TILING DONE NOW
while you still can
...before it's regulated*

Northern Illinois Drainage LLC
109 W 6th St, Dixon, IL 61021
815-973-6576

*Row crops, field tiles causing water quality problems, studies say

CHAMPAIGN, Ill. — In addition to causing widespread flooding, the rains drenching the Midwest this spring may exacerbate another environmental problem – phosphorus and nitrate pollution in the water supply that is causing a growing hypoxic zone in the Gulf of Mexico, presenting a danger to marine life and wildlife habitats, according to recent studies by a team of scientists from the University of Illinois and Cornell University.

The hypoxic zone, which forms every spring or summer in the Gulf, covered 7,000 square miles last summer. With high flow in the Mississippi this spring, the zone may be large again this summer.
Yield monitors have shown farmers more clearly than ever before that improved drainage improves yields.
Joel,

I have a question and I would like to know the best direction to go. I live in the Lake Erie water shed. Over the last two years I have installed 11 water control structures through a local conservation endowment. I have been asking my local Soil and Water conservation office who oversees the endowment, if they will be taking water samples to track the leaching of nutrients through my tile. They said they would not. I also asked my local extension agent, he said to check with the soil and water office. I would like to know if these structures are helping reduce runoff into Lake Erie. **Who can I send water samples into to help track the nutrients in the water?** I guess I don't really want to get a lot of expense wrapped up into it, but it frustrates me that some one is willing to pay me to install them but are not willing to track to see if it is worth there time.

Thanks
Do you know any early adopters?

\(\text{adopt} \neq \text{adapt}\)

Do you know any master adapters?

Farmers that make cover crops work tend to be master adapters!
One day, in the mid-1980s, Upton got a magnified view of his soil’s limitations. While tearing out a fence, Upton noticed plenty of moisture in the soil about three feet down. Above it sat a compacted layer of soil through which no roots were growing. Upton had a visible confirmation of why, during dry years, the shallow-rooted crops dried up even though there was plenty of water stored in the soil below.

“I began looking for a way to break up that plow pan so my crops could get to the moisture they needed”
Joel,

I would love to be in contact with them! I want this to work, but need some sort of quantification to maintain these practices in the short run to capture the long term benefits. Also I have found some info on an Illinois study (I think you were a part of?) with rape/mustards/rye covers and disease reduction in soybeans, but they seem to lack the details behinds the study ie seeding rates of the different species etc and wonder if could elaborate on those?
Hedgerow vs. field
How many of you are familiar with the 4R concept?

Great concept for improving nutrient use efficiency but *where do cover crops fit in?*
Have you ever estimated the N contribution from cover crops?
Charles Fletcher uses pasture probe to improve bottom line

Purdy, Missouri — Especially when you’re feeding the stuff, most of you closely monitor the bunker, silo, bin, mow, bag, baleage line or whatever else holds the stored feed. Probably you aren’t quite as intense in keeping track of your inventory of growing pasture. With any experience you just know what’s out there, and do fine without making things more complicated.

Charles Fletcher isn’t out to convince you that you’re wrong, but he’s sure that what he’s doing these days is right for him. Thousands of dollars in extra annual profit right.

A couple of years ago, Charles spent $475 on a New Zealand–made electronic plate meter that estimates pasture forage dry matter. His wife, Melissa, allocates three hours each week during the grazing season for taking dry matter readings on 46 paddocks at his 240-acre dairy here, one of two operated by the KBC Dairy partnership.
Putting the right amount in the right place at the right time

**WeedSeeker®**
Automatic Spot Spray System
Cut weed-control costs up to 80%!

**GreenSeeker®**
Variable Rate Application and Mapping Systems
Increase profits by optimizing your input dollars!

**GreenSeeker®**
Data Collection and Mapping Systems
A quick and easy research and consulting tool!

Trimble
GreenSeeker and WeedSeeker products are part of Trimble agriculture's flow and application control solution. To learn more about Trimble, visit: www.trimble.com/agriculture.
Hairy Vetch

3,260 lbs of DM/ac
141 lbs of N/ac

133 lbs of K/ac
52 lbs of Ca/ac
18 lbs of P/ac
18 lbs of Mg/ac
Multi-inch rain fall events are increasingly common.

Most nutrient losses occur during these events.
Impact of the 2008 floods on IA soils

20 tons per acre average soil loss across 2,284,000 ac!

Conservation structures needing repair

12,157 Grassed Waterways
8,137 Terraces
3,375 Water and Sediment Control Basins
800 Grade Stabilization Structures

KEY FINDING

Fields with combinations of two or more conservation practices (e.g., no-till + cover crops) performed much better than fields with a single practice
Are you familiar with the term *Precision Conservation*?

- “…set of spatial technologies and procedures to implement conservation management practices that integrates spatial and temporal variability across natural and agricultural systems.”
  
  – Berry et al. 2003

- “Getting the right practices, in the right places, at the right time, and at the right scale is what makes conservation effective.”

  – Cox 2005
I'm on my 3rd year. I applied once and was denied so we added a few more enhancements the next year and got in. There is a fair amount of paperwork involved but if you have a good person at the NRCS office to guide you along it isn't too bad. A good and friendly person at the NRCS office is a must!
I'm running into a little problem now as I signed up to no-till about everything and now want graze some cornstalks to eliminate volunteer corn. Can't do it. I originally agreed not to graze because at that time I did not graze my stalks. Also would like to VT some ground. Can't do it as I agreed to no-till. Times and conditions change and it would be nice to have a little flexibility but so far no luck on changing the plan. The penalty is to pay back everything you received. I'll probably sign up again but I will have to have a little more flexibility.
“Tell them why and they will figure out how”

Liberty Hyde Bailey
Real financial data for thousands of farmers across the Midwest

(* denotes retired member)

Alabama  Illinois  Iowa  Kansas  Kentucky  Michigan  Minnesota  Missouri  Nebraska  North Dakota  South Carolina  Wisconsin

Alabama
State Coordinator, John L Adrian

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Business Phone</th>
<th>E-Mail Address</th>
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<tbody>
<tr>
<td>Brown, Steve</td>
<td>175 4H Ag Science Dr. Suite D Brewton, 36426</td>
<td>251-867-7760</td>
<td><a href="mailto:sgbrown@acesag.auburn.edu">sgbrown@acesag.auburn.edu</a></td>
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<tr>
<td>Hardin, Holt</td>
<td>Po Box 906 Scottsboro, 35768</td>
<td>256-574-2143</td>
<td><a href="mailto:whardin@acesag.auburn.edu">whardin@acesag.auburn.edu</a></td>
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<tr>
<td>Lisec, Bob</td>
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</tr>
</tbody>
</table>
DO SOME FARMS CONSISTENTLY HAVE HIGHER PROFITS THAN OTHER FARMS?

Table 2. Number of Years in the High 1/3 Management Returns Group, Illinois FBFM, 1995 to 2000.

<table>
<thead>
<tr>
<th>Year in the Top One-Third</th>
<th>Percent of Farms</th>
<th>Six-Year Average Management Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>26%</td>
<td>-$54</td>
</tr>
<tr>
<td>1</td>
<td>22%</td>
<td>-$3</td>
</tr>
<tr>
<td>2</td>
<td>16%</td>
<td>$18</td>
</tr>
<tr>
<td>3</td>
<td>14%</td>
<td>$33</td>
</tr>
<tr>
<td>4</td>
<td>11%</td>
<td>$54</td>
</tr>
<tr>
<td>5</td>
<td>6%</td>
<td>$64</td>
</tr>
<tr>
<td>6</td>
<td>5%</td>
<td>$94</td>
</tr>
</tbody>
</table>