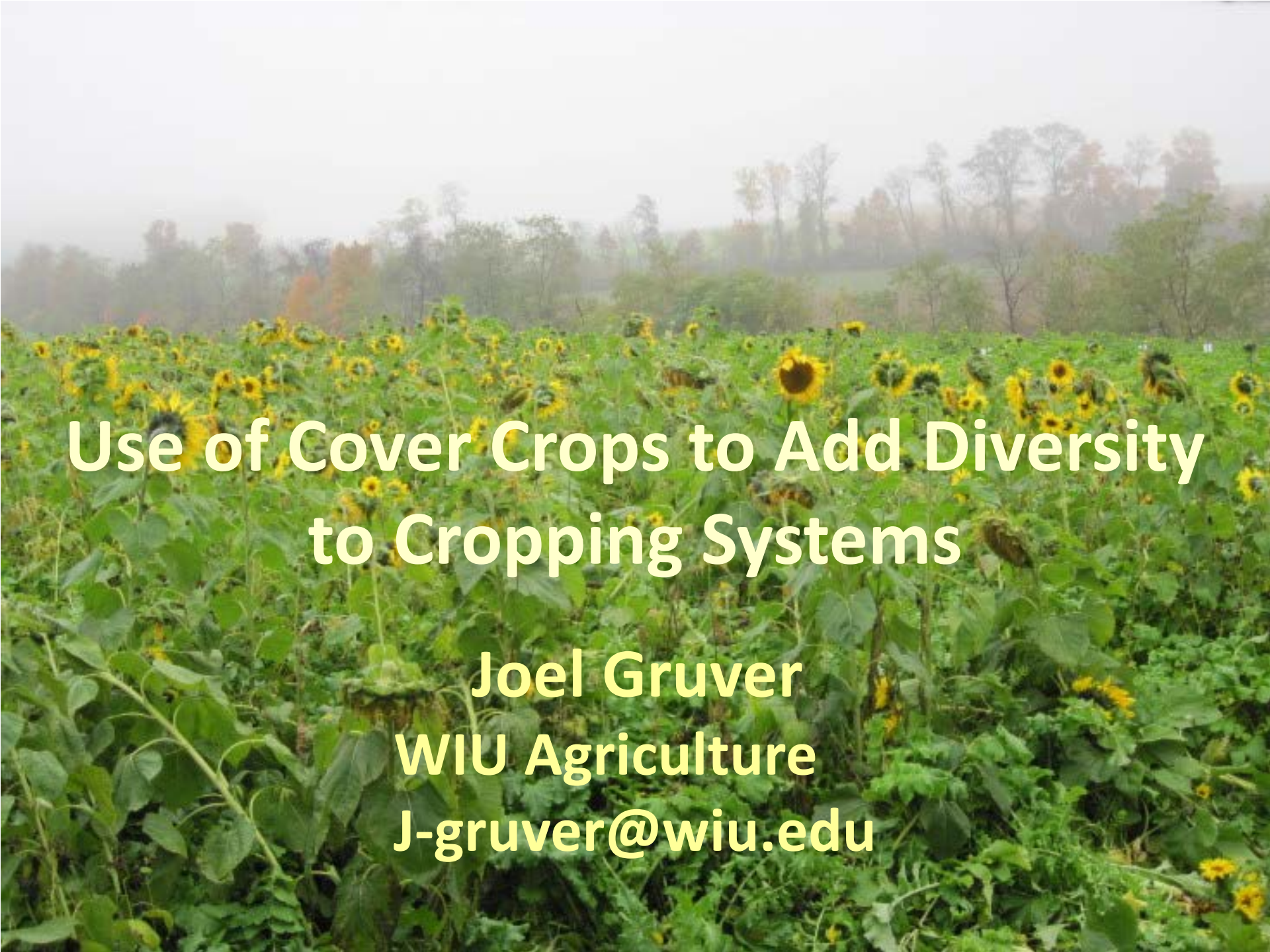

Use of Cover Crops to Add Diversity to Cropping Systems

Joel Gruver
WIU Agriculture
J-gruver@wiu.edu

First-Class Cover

Diverse cover-crop mix delivers tonnage, healthier soil.

http://hayandforage.com/hay/firstclass_cover_soil_0808/

They call it a cover-crop “cocktail” in South America. In North Dakota, it's an exotic seed “salad” that's surprising ranchers, forage growers and even cash grain producers.

In late July or early August, they fill their no-till drills with a mix of seed for six to eight crops. Then they plant it in a single pass without fertilizer through the residue of whatever crop was early harvested or perhaps winterkilled.

Trials began in scorching conditions in July 2006 with a unique series of small test plots, says Jay Fuhrer, Burleigh County NRCS district conservationist in Bismarck. Most of North Dakota was extremely dry that year.

The research crew had seven crop species to plant. One set of plots each had one of each species. The second had two, the next had three, then four, five and six. The last had all seven species in a single plot.

“The more diversity we had, the better it did,” Fuhrer recalls. “By the time we got to seven species, they just flourished. It was lush, it was tall, the leaves were flat open. The monoculture plots were pretty much dead. That's a real eye-opener.”

For North Dakota no-tiller Gabe Brown, failure isn't an option - it's a requirement. That's because Brown believes that constant change drives an ever improving system.

"We want to fail at something on this farm every year" **says the Bismarck area producer who crops ~ 1500 acres and grazes ~ 2000 acres.** ***"If I don't fail at something, I'm not trying enough things."***

What is innovation??

VS

Adoption vs. Adaptation


http://www.flickr.com/photos/uacescomm/4948570851/s
Roundup Ready
TECHNOLOGY


New class of ag technologies
that substitute for
management skill

jbgruver posted:

Here is a link to an extensive 18 year old collection of articles on cover crops - (http://www.swcs.org/documents/filelibrary/CCCWfm.pdf)

Cover crops for clean water

W. L. Hargrove, Editor

The proceedings of an international conference
West Tennessee Experiment Station
April 9-11, 1991
Jackson, Tennessee

Some great articles!

SURFACE WATER IMPACTS

GROUNDWATER IMPACTS

Tntfarms responded:

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?

jbgruver posted:

I think the main reasons are pretty straight forward:

*Shifts in farm scale and enterprises
i.e., increased farm size and geographic spread and reduced #s of grazing animals due to the simplicity and economic viability of corn/soybean and continuous corn cropping systems

*Mainstreaming of conservation tillage
i.e., soil cover with dead crop residues became an acceptable erosion control strategy for many farmers and conservationists

*Interest that was triggered by the energy crisis in the 70s and the Midwest farm crisis of the 80s was dampened by the relatively low and stable input prices in the 90s

*Farmers that survived the Farm Crisis strongly avoid practices that they perceive to involve more risk

jbgruver posted:

There are also more site specific reasons why cover crops are not more widely used.... some like competition for soil moisture may be unresolvable in drier climates without irrigation... other cover crop stumbling blocks are engineering problems, crop breeding problems or awareness/education problems that should be more solvable!

The fundamental question that Tntfarm was asking however, was not so much why aren't cover crops more widely used but rather **why haven't we made more progress in solving the solvable problems related to cover crops?**

Here are a few questions for your consideration:

How do cover crops differ from other more widely adopted "technologies" that address soil erosion, soil compaction, nutrient availability, root health… ?

How much adaptation vs. adoption is required for these other technologies?

How have significant financial incentives in the Mid Atlantic region (and any other regions where financial incentives are available) impacted cover crop adoption? How have financial incentives impacted cover crop adaptation/innovation?

What factors promote on-farm technology adaptation/innovation?

Continuous NT corn w/ hairy vetch Geff, IL - Terry Taylor

We plant a corn that is in the early part of the normal maturity range for the area. The planting date varies, but is usually first week of May. If this happens, we can expect harvest at 25% by Sept. 15. We then immediately drill the vetch at 20#/ acre with a JD 1560 drill.

Last year, we planted the corn in June and flew the vetch on in late Sept. Harvest was late Oct. We got lucky with all the rain and got a good stand. I do not anticipate that field looking like the pix by May 1 this year.

Crops

Huge news in radishes

By TIM WHITE

Key Points

- Oilseed radishes offer new cover crop potential.
- Planted radishes grow bigger than drilled ones.
- Adding Austrian winter peas provides nitrogen.

JUST when you think David Brandt has done about everything there is to do with cover crops, he comes up with something — well, something different. Maybe that's why Randall Reeder, Ohio State University agronomist, took Bob Stewart, a colleague visiting from the Dryland Institute in Canyon, Texas, to visit Brandt's farm near Carroll.

"If there is a way to break compaction or add some nitrogen, Dave is going to give it a try," says Reeder.

"I learned a lot from my visit," Stewart says. "When farmers speak, scientists should listen."

Brandt showed the researchers a variety of test plots, including his latest take on cover crops: dicom oilseed radishes.

"I'd messed around planting them with a drill, but really wasn't satisfied with what I was getting, so we put them in the planter this

BIG CROP: Dave Brandt (left) and Kevin Shaeffer hoist the huge oilseed radishes that grew following Brandt's wheat crop. Much of the radish growth is above the soil.

TINY SEED: Brandt's White planter uses special plates to plant wheat and radishes.

Using a new
plates spe
handle the
Brandt pla
inches apa
following w
result was huge radishes that are up to 30 inches long.

Brandt says leaving the radishes to rot will produce a com-

Planters can do an even better job than a drill

should be very helpful."

Brandt especially likes the trial where he planted the radishes in rows alternating with Austrian winter peas. As legumes, the peas return about 75 units of nitrogen to the soil a year. "That's about one third of

s. With the
tting about
radishes in
ut $2.25 an
ed to about
it in with
dd another
$10 per acre to his costs.

Brandt plans to be able to use GPS to place the corn right alongside the radish plants. That way it will have a moist

Midwest Cover Crops Council



Illinois | Indiana | Iowa | Michigan | Minnesota | North Dakota | Ohio | Wisconsin | Ontario

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WELCOME TO THE MIDWEST COVER CROPS COUNCIL WEBSITE

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.

WHO WE ARE?

The MCCC is a diverse group from academia, production agriculture, non-governmental organizations, commodity interests, private sector, and representatives from federal and state agencies collaborating to address soil, water, air, and agricultural quality concerns in the Great Lakes and Mississippi river basins (including Indiana, Michigan, Ohio, Manitoba, Ontario, Illinois, Wisconsin, Minnesota, Iowa, and North Dakota).

WHY COVER CROPS?

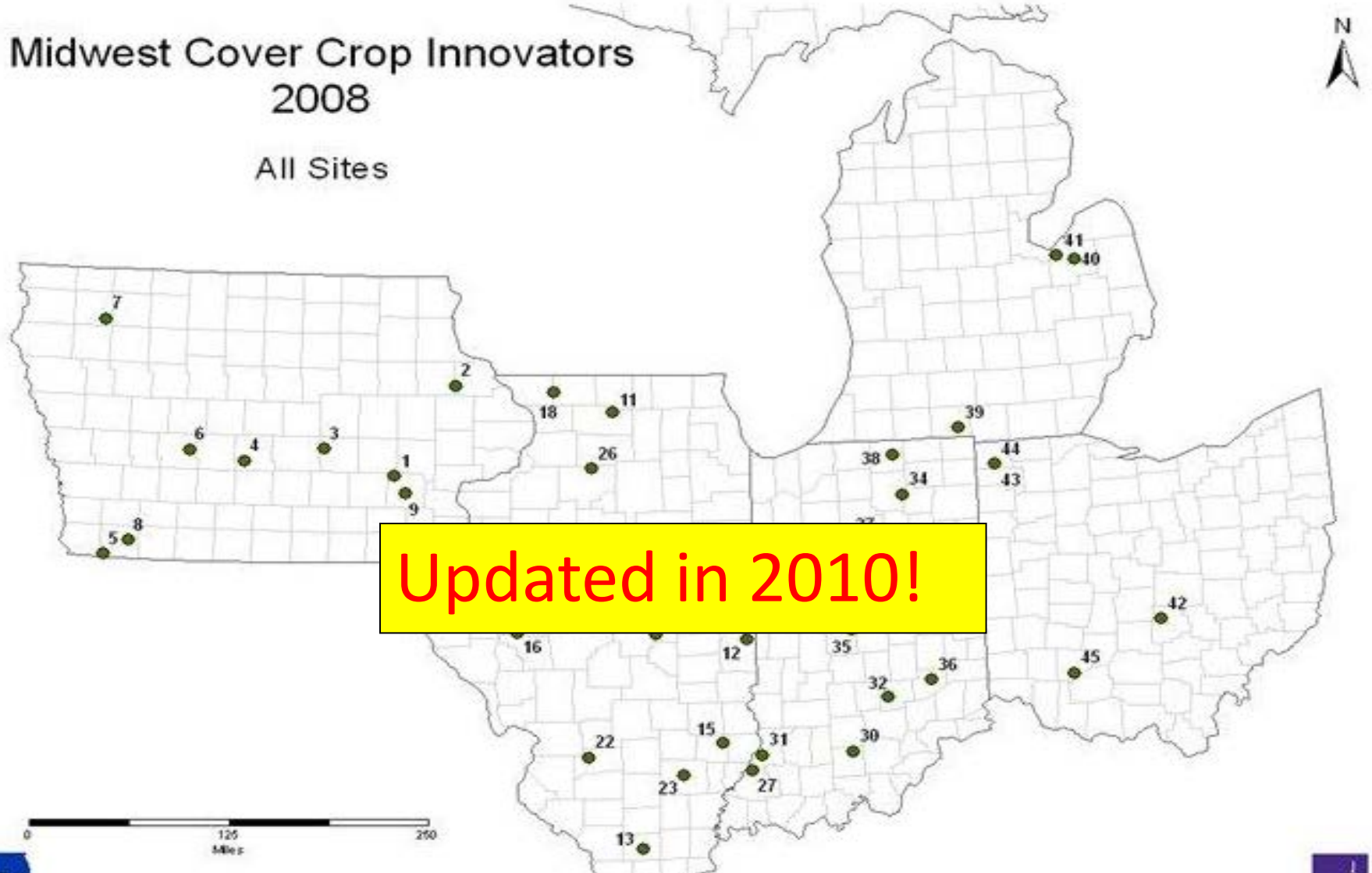
NEWS

Three new fact sheets are available from OSU Extension

- Using Cover Crops to Convert to No-Till
- Sustainable Crop Rotations with Cover Crops
- The Biology of Soil Compaction

2010 MCCC Meeting/Workshop
March 3-4
Ames, IA
Click here for the brochure

INNOVATOR PROFILES



Brad Hunt
Blandinsville, Illinois

Summary of operation

>5000 acres of no-till corn and soybeans

Cereal rye, annual ryegrass, forage radishes, and wheat as cover crops

Background

Brad H s
degree e up
of six f
stretch

Aerial seeded ~ 1000 acres of cereal rye mixed with radishes this past fall, Enrolled in CSP

Cover crop management

The cover crops that Mr. Hunt has tried include annual ryegrass, cereal rye, forage radishes, and wheat. He uses the cover crops on roughly 200 acres each year, and they are usually preceded by soybeans. His seeding rates vary depending on where they are located, but a rough average is

Have you attended a cover crop field day?

If not, make plans to attend one in 2011

www.cheneylakewatershed.org/newsletter/2008-Fall.pdf

ryegrass, radishes and ridging (pics)

View previous thread :: View next thread
Message format
Threaded Go
Forums List -> Crop Talk

jbgruver

Posted 9/29/2009 22:15 (#865190)
Subject: ryegrass, radishes and ridging (pics)

I took a bunch of photos at the WIU Organic research farm today.

The first photo shows a 10' wide strip of "Bounty" annual ryegrass that was drilled about 2 weeks ago... I also overseeded ryegrass into the adjacent soybeans so it will interesting to observe the stands after the beans come off.

The next pho eeks ago... you can't rea ishes in an adjacent fiel

The next pho

The next pho ges tomorrow. The ridges w e-till.

The last pho de to try some microwave bags this year.
1200 microwave bags will be getting filled this week with the 2008 crop and ~ 4000 more bags will get filled later in the fall with the 2009 crop.

If you can't make it to a field day, learn about cover crop innovation through participating in on-line forums (or attending a webinar :->)

****

The weather is looking pretty wild for our Twilight tour on Thursday (10/1) but we'll be out there rain or shine.
here is a link to the press release which includes directions:
http://www.wiu.edu/newsrelease.sphp?release_id=7557

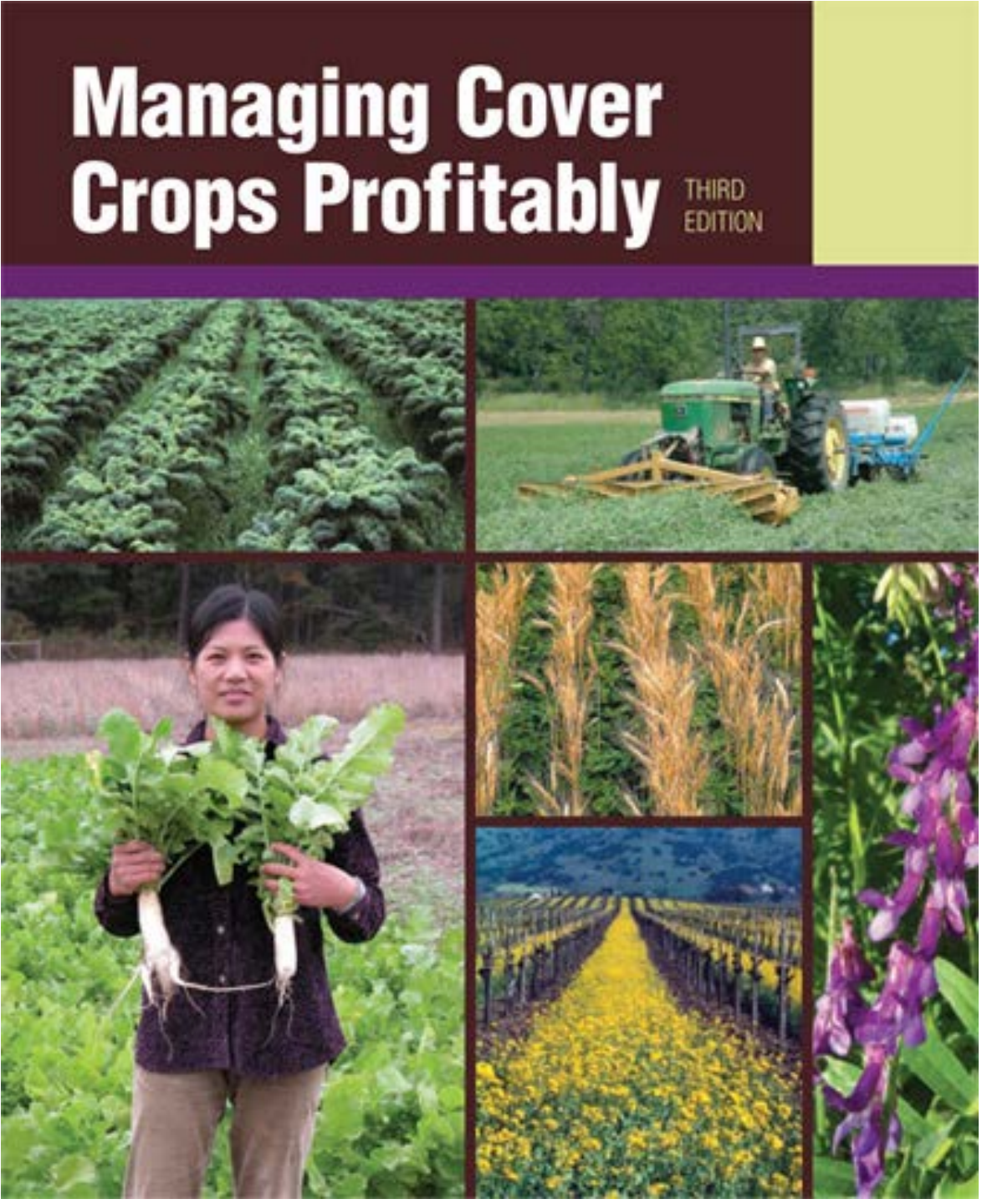
We will have another tour in about 2 weeks.

Reply New Post Forums List -> Crop Talk Threaded Go

Jim

Posted 10/11/2010 12:35 (#1391385)
Subject: Fall fertilizer, spring strip till, tillage radishes & rocks (pics) - evolution of a system?

Quote Reply Alert



Best single reference on cover crops available.

The entire book is available on-line for free.

http://www.mccc.msu.edu/documents/ManagingCCProfitably.pdf

SELECTING THE BEST COVER CROPS FOR YOUR FARM

by Marianne Sarrantonio

Cover crops provide many benefits, but they're not do-it-all "wonder crops." To find a suitable cover crop or mix of covers:

- **Clarify** your primary **needs**
- **Identify** the best **time** and **place** for a cover crop in your system
- **Test** a few options

This book makes selection of cover crops a little easier by focusing on some proven ones. Thousands of species and varieties exist, however. The steps that follow can help you find crops that will work best with a mi

1. Ident
Review
what yo
Narrowi
perhaps
fy your
common

- Provid
- Add organic matter
- Improve soil structure
- Reduce soil erosion
- Provide weed control
- Manage nutrients
- Furnish moisture-conserving mulch

You might also want the cover crops to provide habitat for beneficial organisms, better traction during harvest, faster drainage or another benefit.

2. Identify the Best Place and Time

Sometimes it's obvious where and when to use a cover crop. You might want some nitrogen before a corn crop, or a perennial ground cover in a vineyard or orchard to reduce erosion or improve weed control. For some goals, such as building soil, it may be hard to decide where and when to schedule cover crops.

To plan how and where to use cover crops, try the following exercise:

Look at your rotation. Make a timeline of 18 to 36 monthly increments across a piece of paper. For each field, pencil in current or probable rotations, showing when you typically seed crops and when you harvest them.

If possible, add other key information, such as rainfall, frost-free periods and times of heavy labor or equipment demand.

Look for open periods in each field that correspond to good conditions for cover crop establ
farm, as
l work
overlap
n some
ns, seed
a hard
exception and can be planted a little later. If ground cover and N recycling needs are minimal, rye can be planted as late as the frost period for successful overwintering.

You might seed a cover right after harvesting a summer crop, when the weather is still mild. In cooler climates, consider extending the window by **overseeding** (some call this **undersowing**) a shade-tolerant cover before cash crop harvest. White clover, annual ryegrass, rye, hairy vetch, crimson clover, red clover and sweetclover tolerate some shading.

If overseeding, irrigate afterwards if possible, or seed just before a soaking rain is forecast. Species with small seeds, such as clovers, don't need a lot of moisture to germinate and can work their way through tiny gaps in residue, but larger-seeded species need several days of moist conditions to germinate.

Lots of good chapters on cover crop biology

Chart 3A CULTURAL TRAITS

	Species	Aliases	Type[1]	Hardy through Zone[2]	Tolerances					Habit[3]	pH (Pref.)	Best Established[4]	Min. Germin. Temp.
NONLEGUMES	Annual ryegrass *p. 74*	Italian ryegrass	WA	6						U	6.0–7.0	ESp, LSu, EE, F	40F
	Barley *p. 77*		WA	7						U	6.0–8.5	F,W,Sp	38F
	Oats *p. 93*	spring oats	CSA	8						U	4.5–7.5	LSu, ESp W in 8+	38F
	Rye *p. 98*	winter, cereal, or grain rye	CSA	3						U	5.0–7.0	LSu, F	34F
	Wheat *p. 111*		WA	4						U	6.0–7.5	LSu, F	38F
	Buckwheat *p. 90*		SA	NFT						U/SU SU	5.0–7.0	Sp to LSu	50F
	Sorghum–sudan *p.*											LSp, ES	65F
BRASSICAS	Mustards *p.81*											Sp, LSu	40F
	Radish *p. 81*											Sp, LSu, EF	45F
	Rapeseed *p. 81*											F,Sp	41F
	Berseem clover *p.*											ESp, EF	42F
LEGUMES	Cowpeas *p. 125*	crowder peas, southern peas	SA	NFT						SU/C	5.5–6.5	ESu	58F
	Crimson clover *p. 130*		WA, SA	7						U/SU	5.5–7.0	LSu/ESu	
	Medics *p. 152*		SP, SA	4/7						P/Su	6.0–7.0	EF, ESp, ES	45F
	Red clover *p. 159*		SP, B	4						U	6.2–7.0	LSu; ESp	41F
	Subterr												38F
	Sweetc												42F
	White clover *p. 179*	white dutch ladino	LP,WA	4						P/SU	6.0–7.0	LW, E to LSp, EF	40F
	Woollypod vetch *p. 185*	Lana	CSA	7						SP/C	6.0–8.0	F	

Lots of good tables comparing species

Not much info on planting or termination technologies

VERY LITTLE INFO ON COVER CROP ECONOMICS

Results of cover crop seed price survey

Vendor	Cereal rye	Annual ryegrass	Hairy vetch	Medium red clover
1 (WI)	0.188	0.52 (0.69)	1.60 (1.98)	1.22 (1.62)
2 (IL)				
3 (MN)				66 (1.84)
4 (NE)				65 (1.95)
5 (IL)				60)
6 (IL)				
7 (MO)				21
8 (IL)				75)
9 (IA)	(0.195)	(0.62)	(2.00)	2.00
10 (IN)	(0.239)	(0.75)	(2.20)	
11 (ILfarmer)*	0.125	0.48	1.05	

Prices were obtained through direct communication with vendors via phone or email during September 2010. Prices represent cheapest variety available (often VNS). Wholesale and retail prices were requested when available. Prices in parentheses are retail prices. All other prices are wholesale prices.

Examples of total cover crop management programs ($/ac)

Costs	Program 1	Program 2	Program 3	Program 4
Seed	11.25	7.50	11.25	9.00
Seeding operation	4.15	15.00	10.00	10.00
Seed incorporation	6.50			
Herbicide	2.00	2.00		
Termination operation	6.50	6.50		
Total	30.40	31.00	21.25	19.00

Program 1
Seed: 90 lbs/ac cereal rye
Seeding operation: spread w/fertilizer buggy
Seed incorporation: rolling stalk chopper
Herbicide: 24 oz. glyphosate
Termination operation: 90’ boom spray rig

Program 2
Seed: 60 lbs/ac cereal rye
Seed bed preparation: none
Seeding operation: no-till drill
Herbicide: 24 oz. glyphosate
Termination operation: 90’ boom spray rig

Program 3
Seed: 90 lbs of cereal rye
Seed bed preparation: none
Seeding operation: aerial seeding
Herbicide: no added cost, burn-down standard
Termination operation: no added cost, burn-down standard

Program 4
Seed: 3 bushels of bin-run oats
Seed bed preparation: none
Seeding operation: aerial seeding
Herbicide: none – winter-kill
Termination operation: none – winter-kill

Traditional cover cropping in the Midwest

Frost seeding opportunities

Hairy vetch can be successfully planted after wheat harvest. On the two occasions (out of 18 site-years of the WI Cropping Systems Trial) when the red clover failed to establish well, the vetch produced an average of 115 lbs./a of nitrogen, providing an excellent “back-up plan” that reduces one of the potential risks of relying on a companion-seeded cover crop for nitrogen.

July/August plantings of vetch or other cover crops are riskier than frost seeding clover.

There are many other options after small grain harvest

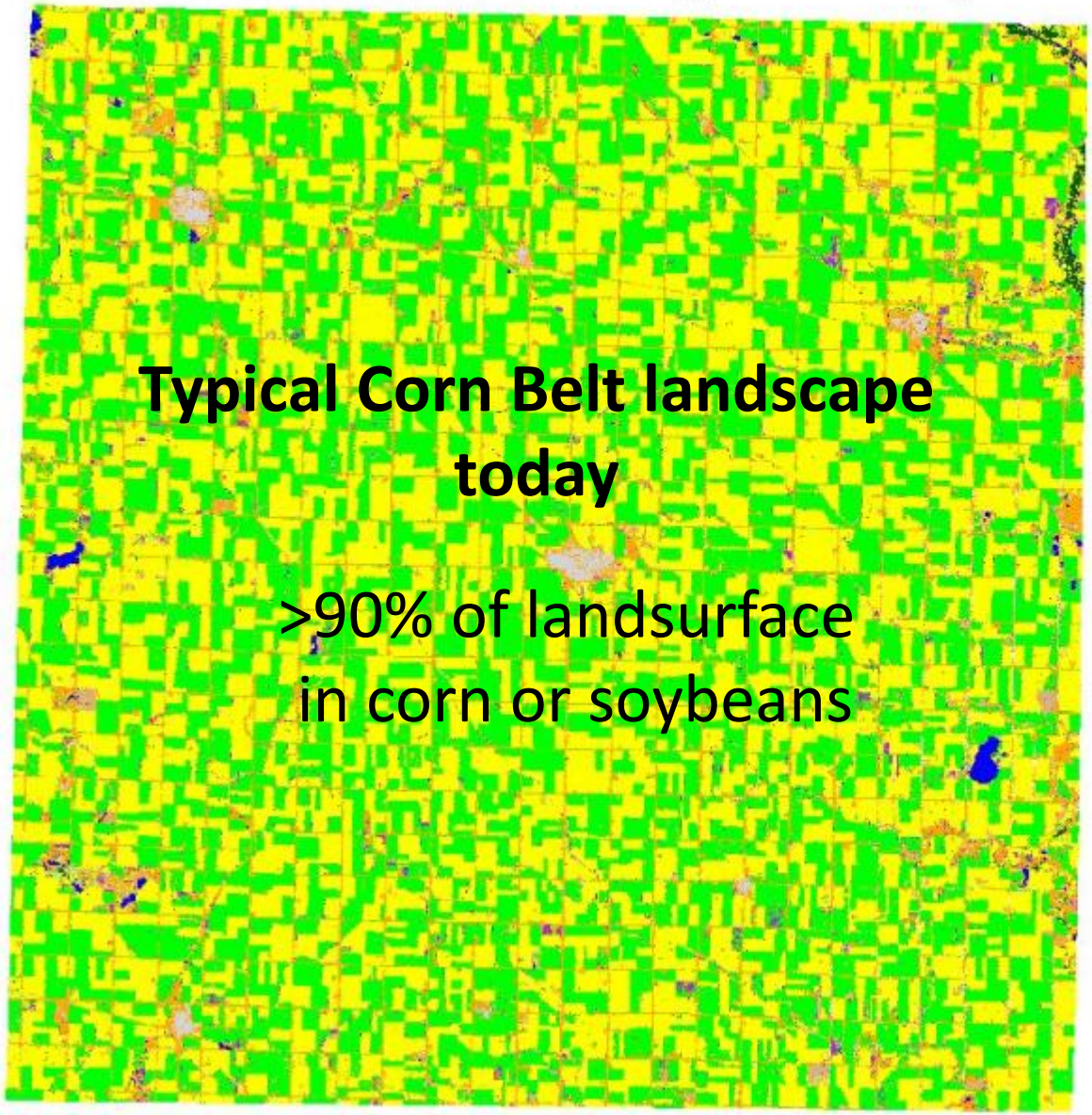
REALITY CHECK

PLANTED ACREAGE - PRINCIPAL CROPS

Crop	Illinois		United States	
	2009	Indicated 2010	2009	Indicated 2010
	Thousand acres			
Corn - All purposes	12,000	12,600	86,482	88,798
Soybeans	9,400	9,500	77,451	78,098
Winter Wheat 1/	850	350	43,311	37,698
Sorghum - All purposes	40	40	6,633	6,360
Oats	40	40	3,404	3,364
All Hay 2/	610	610	59,755	60,460

1/ Includes acreage sown preceding fall.
2/ Hay acres for harvest.

2004 Pocahontas County, Iowa Cropland Data Layer



Typical Corn Belt landscape today

>90% of landsurface in corn or soybeans

USDA

NASS


Drilling annual ryegrass after harvest
on Ed Winkle's farm in OH

Broadcasting cover crop seed with fertilizer on Ed Winkle's farm in OH

Planting cover crops with a Salford tool equipped with a Valmar air-seeder on Dan DeSutter's farm in IN

The CC planting methods shown on the previous slides work well but can only cover a limited # of acres after harvest in the Corn Belt

Other options are clearly needed!

Student: Which cover crops have you tried? how many acres? following/preceding which crops?

Joe Nester replied:

We just inter-seeded 14,000 acres of corn and soybeans with annual ryegrass. We used a helicopter service out of Minnesota to seed it. We used annual ryegrass a year ago, seeding with drills after wheat and soybeans, but the planting date was too late to wait after beans. Excellent where seeded after wheat about Sept. 1. Our experience is limited, but the idea is really taking off, to hold the soil in place over the winter, keep nutrients within the field, and help with timely no-till planting in the spring.

Photo from Joe Nester

Farmers have been using aerial seeding to improve post-harvest grazing for a long time


Cliff Schuette's farm in S IL
Barkant Turnips-3 lbs
Rye 2 Bu
Airplane $8/Acre
Corn 183 Bu/acre
Atrazine 1 lb
Partner April 28

Aerial seeded radishes in OH on Oct 29, about **6** weeks after aerial seeding and **4** weeks after corn harvest.

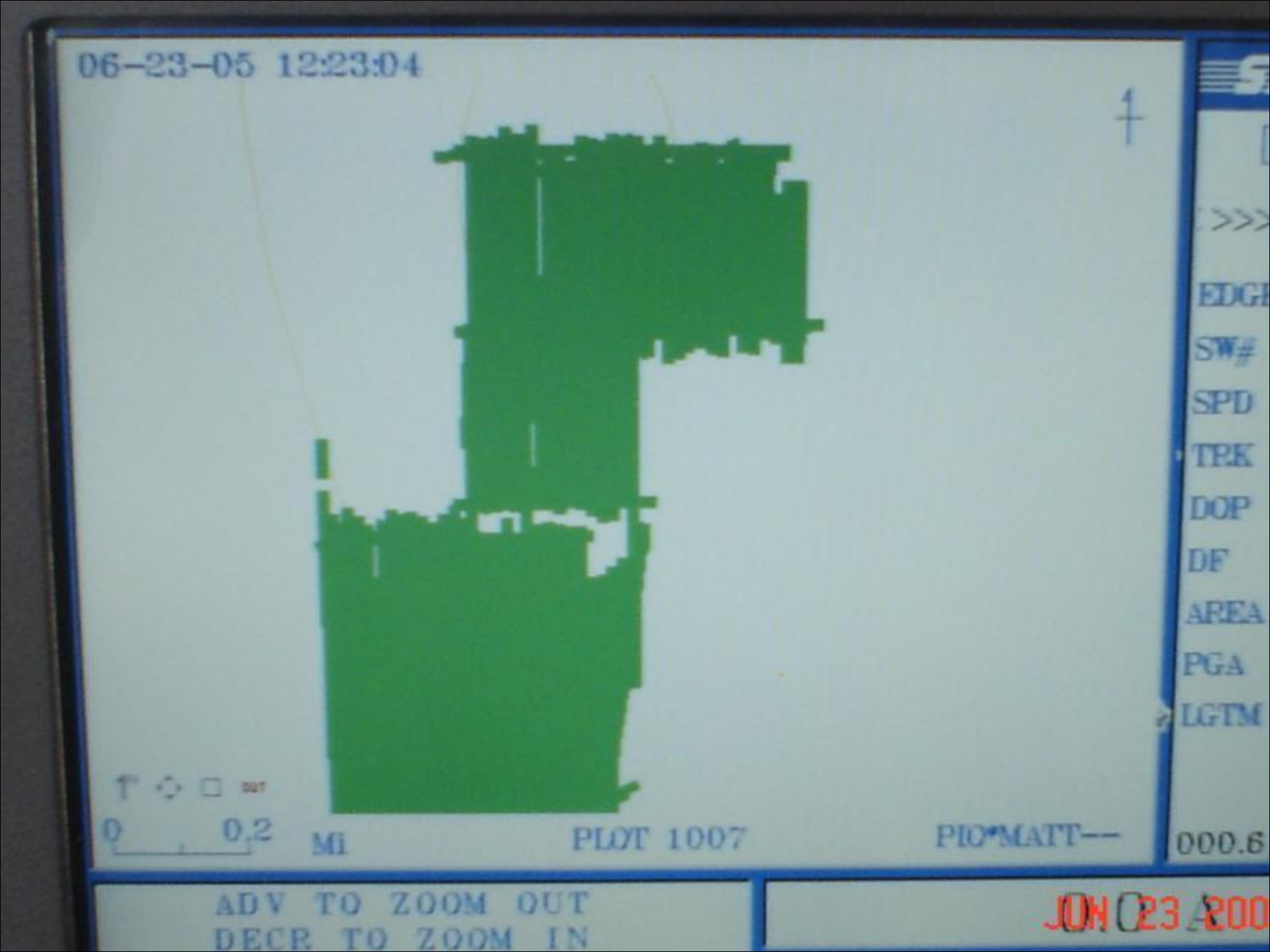
Set-up for efficient aerial seeding in SE IA

Steve Nebel


Steve Nebel


Steve Nebel

Aerial application is getting high-tech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EDGE
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JUN 23 200

IA and IL Aerial Applicator Survey (May-June 2010)

Name	Location	Experience w/CC	Cost
Cady Aerial Spray	Rock Falls, IL	no exp., no customer interest	$8.00/a norm app $8.50/a cc
Benoit Aerial Spraying	Kankakee, IL	turnips and rye	$8.00/a norm app $10.00/a cc
Franks Flying Service	Morrison, IL	ryegrass and c. rye	$8.00/a norm app $10.00/a cc
Reeds Fly-on Farming	Mattoon, IL	yes, c. rye, small part of business	$8.00/a norm app $12.00/a cc
Killiam Flying Service	Carlinville, IL	rye, wheat on beans, rye on corn	$8.00/a norm app $10.00/ac or 10/lb
Curless Flying Service	Astoria, IL	ryegrass and turnips	$8-15.00/a all app.
Klein Flying Service	St. Francisville, IL	annual rye and turnips	~$12.50/a cc, $9.00/a liquid app
Agriflite Services	Wakarusa, IN	rye, wheat, ryegrass	ave $15.00/a for cc app.
Al's Aerial Spraying	Ovid, MI	rye and wheat	$10-15.00/a cc $10.00/a liquid

Recommended Aerial Seeding Dates in Central IL

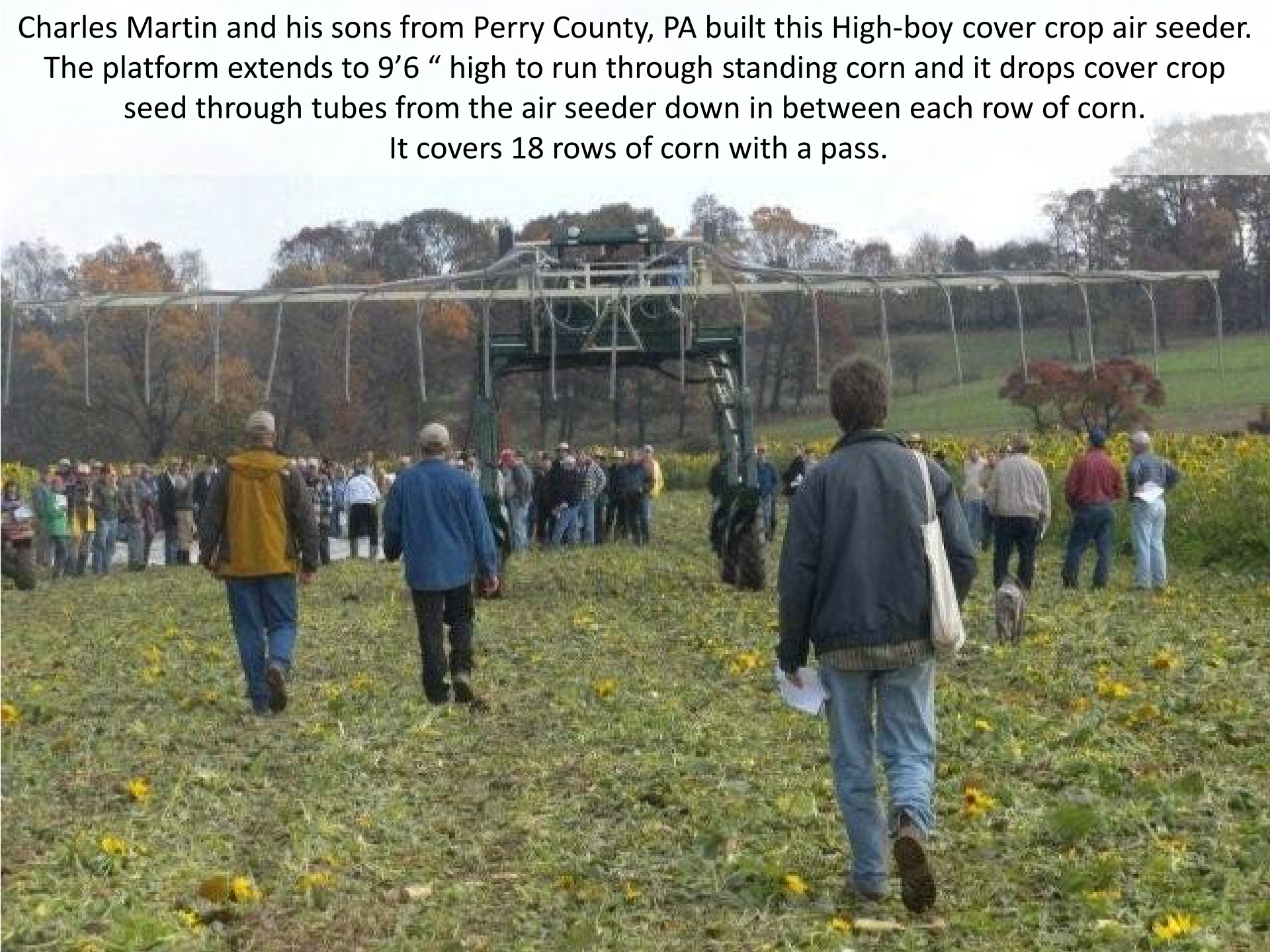
- **Small Grains**
  - Late August into standing soybeans
  - Mid-to-Late September into standing corn
- **Seeding Legumes**
  - Early August into standing soybeans
  - Early September into standing corn

Recommended Aerial Seeding Rates

- Cereal rye 1.5 – 2.0 bu / acre
- Turnips 3.0 lb / acre
- Millet 1.5 lb / acre
- Wheat 1.0 – 2.0 bu / acre
- Soybeans 2 bu / acre

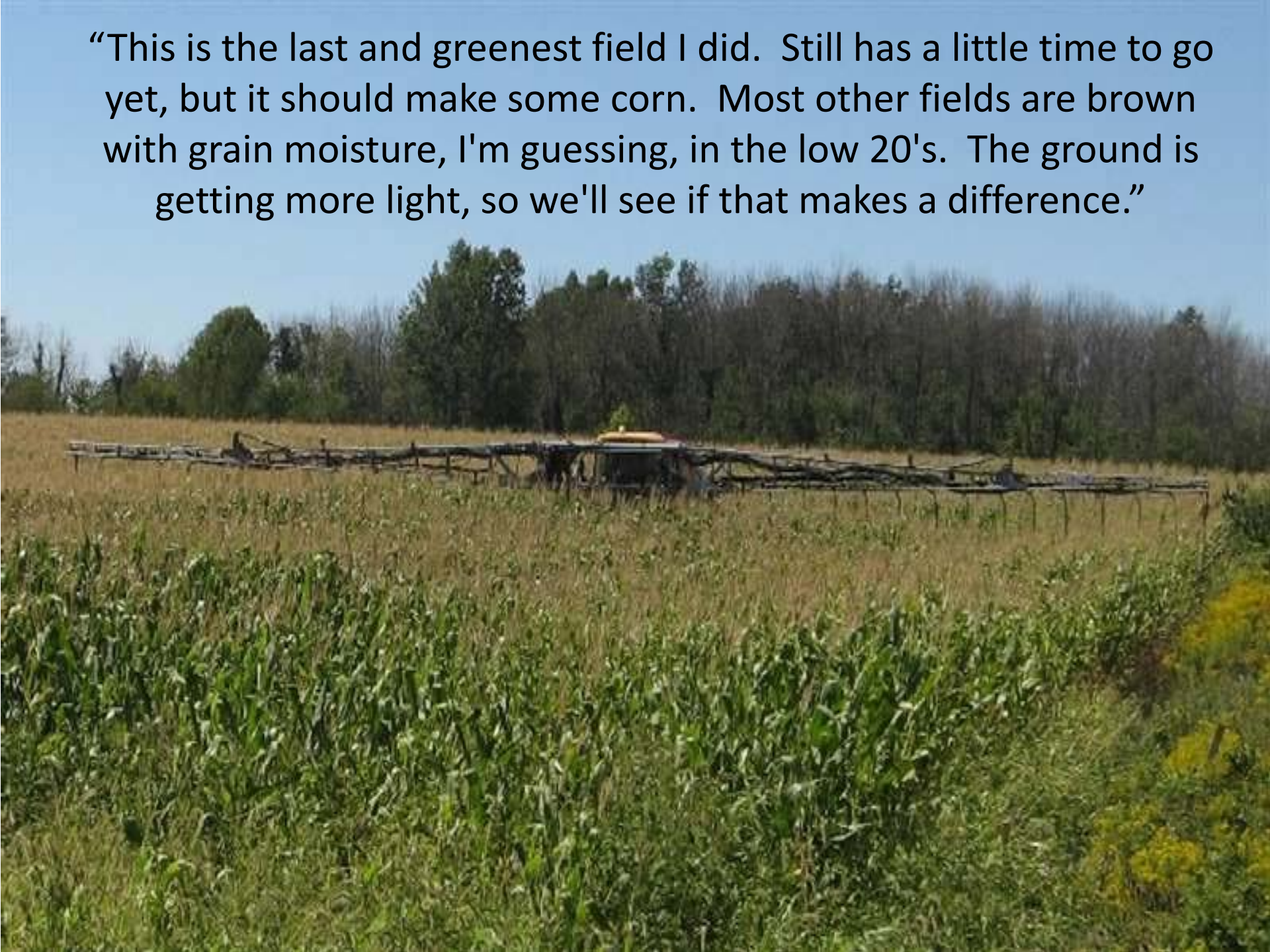

Another
option…

Charles Martin and his sons from Perry County, PA built this High-boy cover crop air seeder. The platform extends to 9’6 “ high to run through standing corn and it drops cover crop seed through tubes from the air seeder down in between each row of corn.
It covers 18 rows of corn with a pass.



“I have been working to build this seeder to seed cover crops into corn & beans. I'm using a Hagie STS 12 with a Gandy Orbit Air seed box. I can cover 90 feet / 36 rows and the hopper holds 65 bu. “

Andy Ambriole’s Highboy air seeder


“This is the last and greenest field I did. Still has a little time to go yet, but it should make some corn. Most other fields are brown with grain moisture, I'm guessing, in the low 20's. The ground is getting more light, so we'll see if that makes a difference.”

“It's kinda hard to tell the seed from the corn pollen. The big lighter pieces are pollen. The smaller darker ones are ryegrass and the little orange balls are crimson clover. The seed mix was 80/20 ryegrass/clover”


Don Birky's
seeder in
Central IL

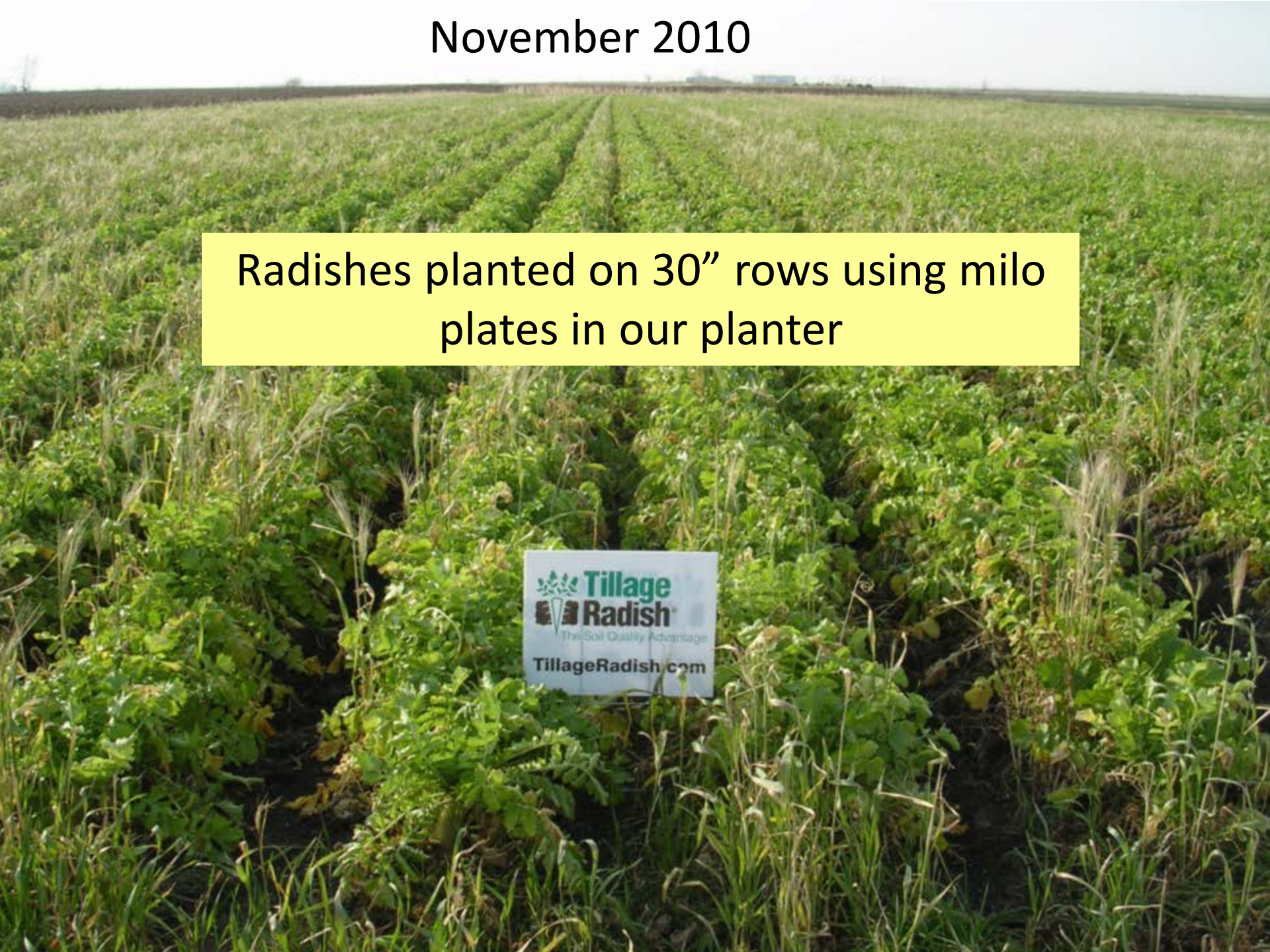
Don and Matt Birky's unique highboy with 10 feet and six inches of clearance could attract a crowd for its high-rising maneuvers, but the father-son team created the special equipment for a tough job.

The highboy, dubbed High Roller, was developed to air seed legumes and other cover crops into standing corn in August. The Birkys, who operate On Track Farming Inc. in rural Gibson City, put the highboy through its paces last week.


Precision Seeding of Cover Crops
Bio-strip till
Attempt #1 – radishes planted on
30” rows with a push seeder

Attempt #2

November 2010



Radishes planted on 30” rows using milo plates in our planter


Steve Carruther's farm in Ontario, Canada

Terry Taylor’s new bio-strip-till rig

Terry Taylor planted radishes on 30” rows w/ hairy vetch, crimson clover and Austrian winter peas in fall 2010

Seeding cover crops with liquid manure

Seeding cover crops while harvesting


AUTOCAST V2

Interseeding Small-seeded Forages into Sod with Conventional Corn/Soybean Planters

Since the advent of the 15th Conservation Reserve Program (CRP) sign-up that ended in May 1997 and the 16th CRP sign-up that ended in November 1997, farmers have been looking for ways to interseed legumes and native grasses into established CRP sod. Aproximately 523,000 and 341,000 acres, respectively, were accepted in the 15th and 16th CRP sign-ups in Iowa.

Corn/Soybean Planters Are an Option

Small-seeded legumes and several of the small-seeded grasses can be interseeded through the insecticide boxes of most corn/soybean planters. Just like granular insecticides, many of the small-seeded forages can be accurately metered directly infurrow or banded just in front of the press wheel. Setting the double disk openers about 1/2" to 3/4" deep and running the seed infurrow will give the best seed-to-soil contact and probably the best chance of success.

One advantage of placing the seed infurrow and closing with the press wheels is that herbicides can be sprayed over the row for sod suppression at the same time the seed is planted. Roundup Ultra (Monsanto), Touchdown (Zeneca), and Gramoxone Extra (Zeneca) are burndown herbicides that can be used this way. For switchgrass and some of the other warm-season grasses, Atrazine can be combined with the burndown herbicides or sprayed alone over the row with the planter.

Table 1. Ounces to pounds per acre calibration conversion for a time period equal to 3 and 4 mph.

	—400 ft of row length equals—	
	Acres	Each oz collected equals lb/acre
15" row width =	0.011	5.44
20" row width =	0.015	4.08
30" row width =	0.023	2.72
36" row width =	0.028	2.26
38" row width =	0.029	2.15
40" row width =	0.030	2.04

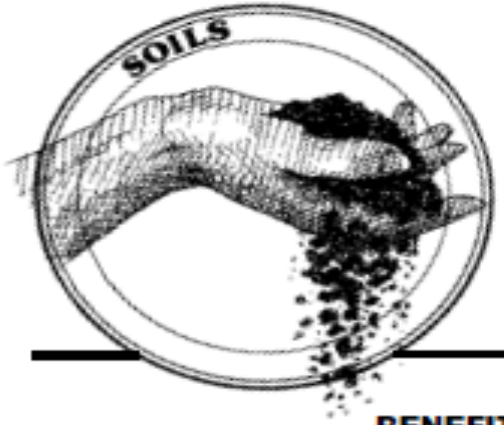
3 mph = 91 seconds per 400 ft
4 mph = 68 seconds per 400 ft

Small-seeded legumes and grasses can be interseeded through the insecticide boxes of most corn/soybean planters. Just like granular insecticides, many of the small-seeded forages can be accurately metered directly infurrow or banded just in front of the press wheel. Setting the double disk openers about 1/2” to 3/4” deep and running the seed in-furrow will give the best seed-to-soil contact and probably the best chance of success.

Actual planter calibrated: 1987 Kinze, 6-row, 30”
Representative of: Kinze planters

	#s/acre on 30” rows box setting at 3 mph					
Seed type	5	10	15	20	25	30
Alfalfa	2.1	6.2	10.3	14.4	——	——
Alsike clover	3.1	8.9	12.7	19.5	——	——
Birdsfoot trefoil	4.4	10.9	16.7	23.4	——	——
Medium red clover	2.9	7.6	11.5	16.3	——	——
Switchgrass	1.7	3.9	5.1	6.6	10.2	15.6
Sweetclover	2.6	6.7	10.5	14.1	——	——

Brand new bulletin from Penn State



Agronomy Facts 67

Management of Red Clover as a Cover Crop

Red clover can be frost seeded into small grains in early spring, over seeded into corn in early-summer and over seeded into soybeans just before leaf drop.

BENEFITS

Red clover is a short-lived perennial that is winter hardy throughout Pennsylvania. Red clover can be used as a cover crop that provides many benefits such as fixing nitrogen (N) to meet needs of
sion, improving
supplying forage

Red clover is ad
winter hardy in
clover survives
does best on wel
drained soil. It p
are two types of red clover: medium red and mammoth red clover. Medium red is most common. It is quicker to establish than mammoth and grows back well after it is cut.

NITROGEN FIXATION

In a study in Wisconsin, red clover fixed enough nitrogen to supply the equivalent of 160 pounds per acre of nitrogen fertilizer. A lower nitrogen contribution is more common, however. A study in Pennsylvania showed that a one-year-old red clover stand (without harvest) contributed 70 pounds of nitrogen per acre to the first corn crop following it, while

approximately 75 percent of that supplied in the first year (in our example this would be 40 x 0.75 = 30 pounds of N in the second year). If the red clover is established in late summer or early fall, it might not fix as much nitrogen as calculated
e nitrogen benefit
ncorporated or left
ng the mulch at the
ol and will lead to

er than 0.5 inch.
deeper. So, check
n using a no-till drill. Settings may need to be changed depending on field conditions and residue cover. Use seed that has been inoculated with the appropriate *Rhizobium* strain to guarantee nitrogen fixation. The preferred time of establishment is in early spring or early summer, although establishing it after small grain crops come off is possible. The earlier the red clover is established, the more benefits it can be expected to produce the following year.

An easy method of establishment is to frost-seed red clover into standing winter wheat or barley from February to April. With this method, the red clover seed is simply broadcast

Rig for mid-summer over-seeding into corn in Ontario

le réservoir du pulvérisateur et la rampe d'épandage. On

laire du ray-grass lors d'une conférence donnée par Dan Towery, d'Ag Conservation Solutions. Il a été si convaincu des bienfaits du ray-grass annuel qu'il

totale de la rampe.

Pour ne pas faire de compétition au maïs, le ray-grass

Anatomie de l'appareil

À l'avant de l'arroseuse automotrice, branché sur une sortie hydraulique, on retrouve un réservoir à grains. « Pour une autonomie au champ, c'était important d'inclure

pneumatique (ARL1500P) de la compagnie et sert aussi à l'application de chaux granulaire, chez les Tétreault. « Le réservoir est multifonctionnel, il peut appliquer de la

Distributeur avec les tubes acheminant la semence aux pendillards

Tubes amenant la semence au distributeur

Réserve de grains (distributeur d'engrais pneumatique ARL1500P)

Pendillards

We have a serious challenge!

Nitrogen uptake by corn

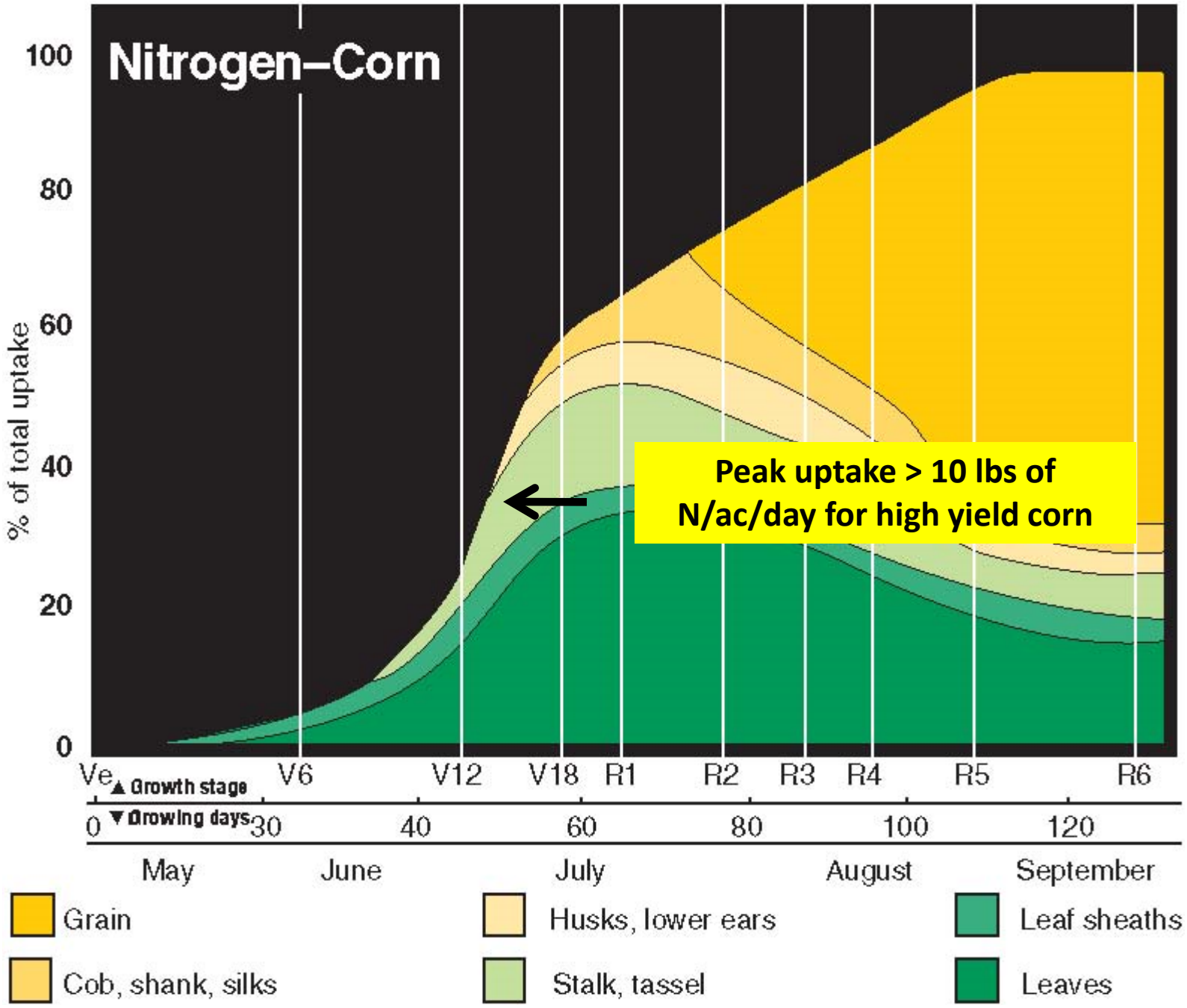
	lb/acre
• 160 bu/acre corn grain	120
• stover (above ground)	70
• roots	30
• Total	220

- Water transpiration by corn:
  18 inches; equals 4 million lb/acre

- 220 lbs of N / 4 million lbs of water = 0.000055

55 ppm

The EPA drinking water standard is 10 ppm NO_3-N

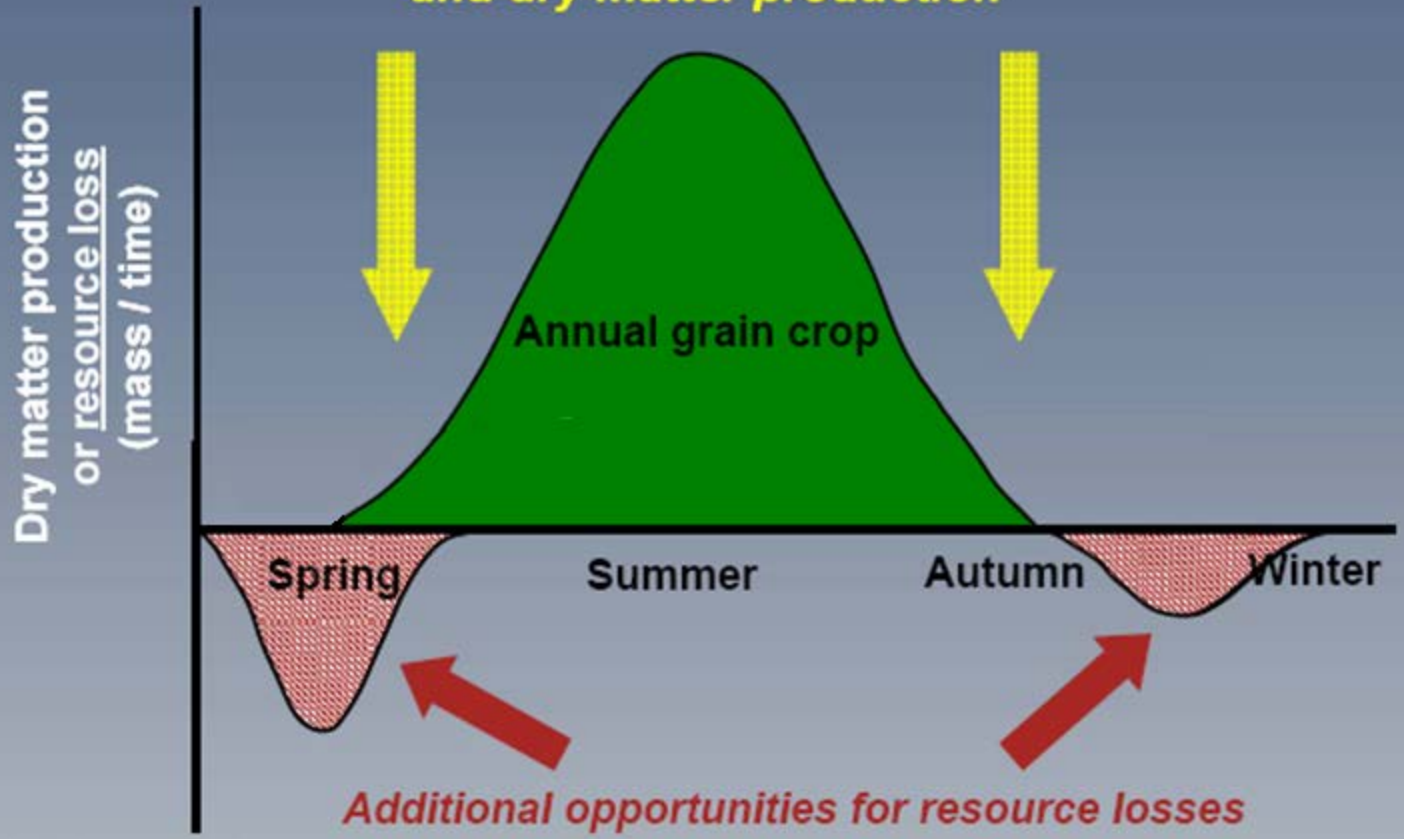

Nitrogen–Corn
% of total uptake
100
80
60
40
20
0
Peak uptake > 10 lbs of N/ac/day for high yield corn
Ve
V6
V12
V18
R1
R2
R3
R4
R5
R6
Growth stage
Growing days
0
30
40
60
80
100
120
May
June
July
August
September
Grain
Husks, lower ears
Leaf sheaths
Cob, shank, silks
Stalk, tassel
Leaves

Potential relative reductions in nitrate leaching in Corn Belt for specific corn/soybean mgt. changes

PRACTICE	CHANGE	REDUCTION POTENTIAL
N rate on corn	150 reduced to 125 lb/ac	
timing	no fall N-fertilizer applications	
cropping	switch to perennials	
	combine summer annuals with winter annuals	
buffer strips	1-5% of area	
tillage	plow to long-term, continuous no-till	
wetlands	1-5% of area	

Annual Cropping Systems

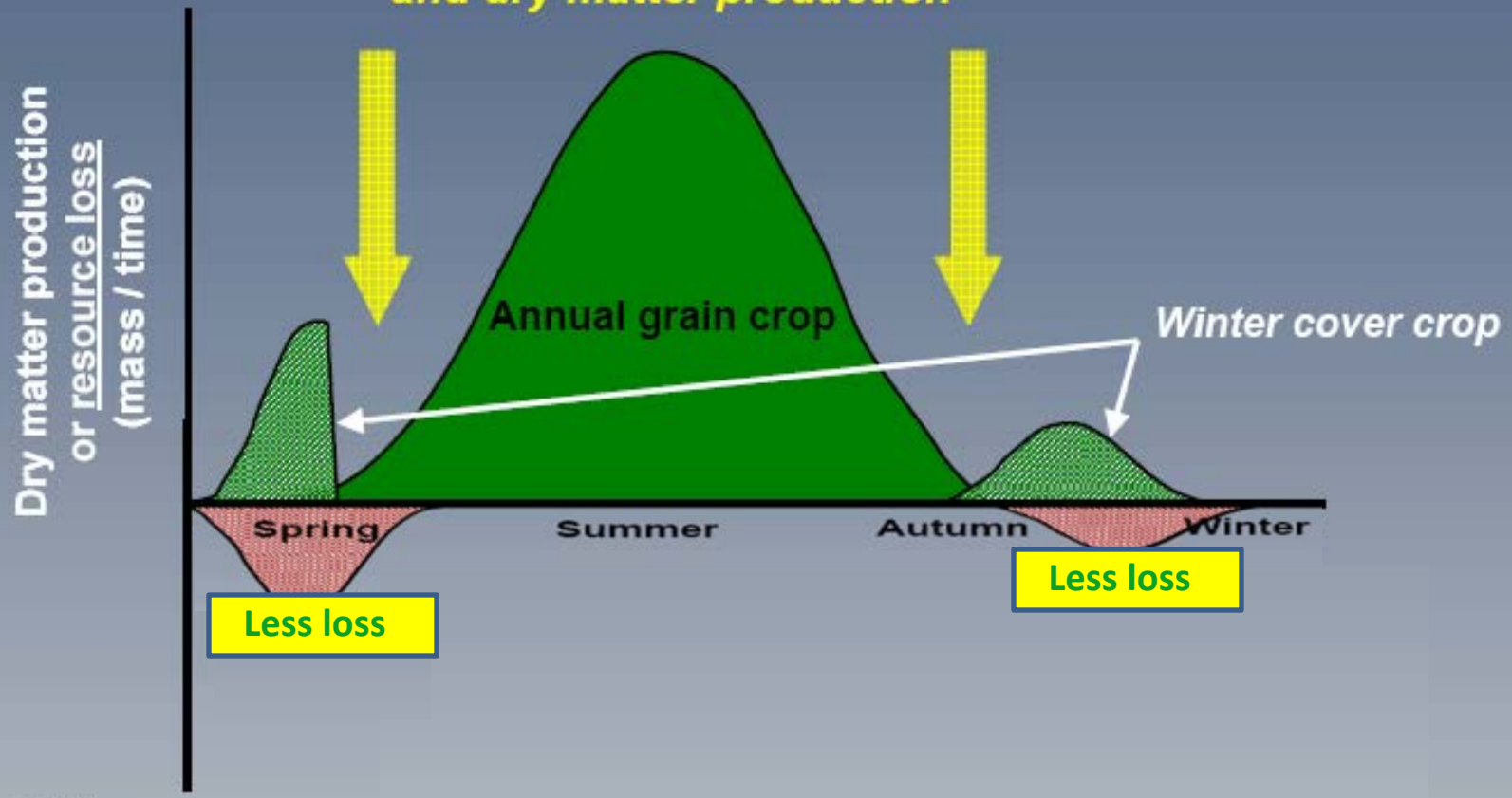
Missed opportunities for resource assimilation and dry matter production



after A.H. Heggenstaller

Annual Cropping Systems

Cover crops *for resource assimilation and dry matter production*



after A.H. Heggenstaller

Matching *objectives* with species

Nutrient scavenging/cycling

brassicas, small grains, annual ryegrass

Bio-drilling

brassicas, sugarbeet, sunflower,
sorghum-sudan sweet clover, alfalfa

N-fixation

clovers, vetches, lentil, winter pea, chickling vetch, sun hemp, cowpea, soybean

Grazing

brassicas, clovers, small grains, a. ryegrass, sorghum-sudan

Bio-activation/fumigation

brassicas, sorghum-sudan, sun hemp, sesame

Weed suppression

brassicas, sorghum-sudan, cereal rye, buckwheat


Be realistic about potential cover crop challenges
Start planning today!