

Fits, Misfits, and “Mightfits”

On-farm cover crop demonstrations in Michigan Cropping Systems

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Area Crop Statistics

Crop	Acres	Typical Yields
Corn	48,000	130-150 bu/ac
Soybeans	52,000	40-45 bu/ac
Wheat	18,800	65-110 bu/ac

Background

- **Teachable moment**
 - High and volatile fertilizer prices 2007-2009
- **Reduce input costs**
- **Focus on nitrogen**
- **Interest in soil biology**
- **Indicators**
 - Soil testing
 - Poultry manure prices
 - Surveys



Four Niches

- **Winter wheat**
 - Nothing happening mid-July through early-May
- **Corn silage**
 - Bare soil
 - Manure application
 - Secondary forage opportunity?
- **Soybeans**
 - Limited window
- **Corn grain**
 - Very challenging; one must be very intentional

Reasons for Cover Crops

Farmer Perspective

Strong

- Improve yield or profit
- Fix/scavenge nitrogen
- Improve soil quality
 - OM, structure, bio
- Control weeds
- Reduce erosion
- Low risk

Weak

- Carbon sequestration
- Ecosystem services

On-Farm Research and Demonstrations

- Capital Area Innovative Farmers (CAIF)
- Partnering with SARE and seed companies
- In-kind donation of acreage, equipment and labor
- Three Years

Individuals and Companies

- Dale Mutch & Todd Martin
- Tony Igl (CAIF)
- Maynard Beery
- Mike Smalley
- Cisco Companies
 - Dave Robison and Brian Haynes
- Dakota Frontier Seed

Year 1

Two locations:

- Tony Igl (CAIF)
 - Recruited
- Mike Smalley
 - Volunteered
- No replication

Species

- Oats
- Spring peas
- Winter peas
- Grass pea (chickling vetch)
- Sunn hemp
- Sorghum X Sudangrass
- Cowpeas
- Annual ryegrass
- 'Tillage' radish
- Cereal Rye
- Red Clover!

Field Day

- Widely promoted
- Attendance
 - Early adopters
 - Those already using red clover



Newsletter Article

- “Energy-Efficient Wheat Production”
 - [..\..\AgNotes\November 2008.pdf](#)
 - Missed opportunities
 - Important virtues
 - Observations
 - Forage value
- Virtues**
- N-fix/scav
 - Water-holding cap.
 - Erosion
 - Compaction
 - Biological factors

Other Outreach

- MSU On-Farm Research and Demonstration
- Visits with individuals and small groups



	Oats	Oats + Sp. Peas	Oats + W. Peas	Sp. Peas	W. Peas	Grass Pea	Red Clover	Units
Above-ground N	42	149	82	90	134	84	121	Lbs/acre
Tons/acre DM	1.7	2.8	2.2	1.2	1.5	1.0	2.1	% DM
Crude Protein	7.9	16.6	11.7	24.4	28.8	26.9	18.0	% DM
TDN	65.9	63.8	64.9	67.8	74.2	66.7	61.3	%DM
Net Energy Lactation	0.68	0.66	0.67	0.7	0.78	0.69	.63	Mcal/lb
Net Energy Maintenance	0.68	0.65	0.67	0.71	0.8	0.69	.62	Mcal/lb
Net Energy Gain	0.41	0.39	0.40	0.44	0.52	0.42	.35	Mcal/lb
ADF	29.1	31.9	29.6	28.9	19.3	27.9	34.9	% DM
NDF	48.8	44.9	45.4	34.7	26.7	34.9	48.1	% DM
NDF 30 hr-Dgst	70.3	69.1	70.1	42.4	59.3	43.1	N/A	% NDF
Crude Fat	2.5	3.2	3.2	3.2	4.3	3.6	1.1	% DM
Starch	4.8	3.2	4.7	4.3	4.7	1.8	N/A	% DM
Sugar	21.6	15.7	17.8	18.3	19.4	11.2	N/A	% DM





Year Two

- **Spring: PSNT**
 - Austrian winter-peas – 30 lb/ac credit
 - N-credits were scarce, even with manure
- **Fall: Stalk nitrate test (anecdotally)**
 - Winter peas alone: 4263 ppm
 - Others involving peas: 733-3609 ppm
 - Oats: 418
 - No cover: 440 ppm
- Replicated plots in August of 2009
- One field day focused on forages



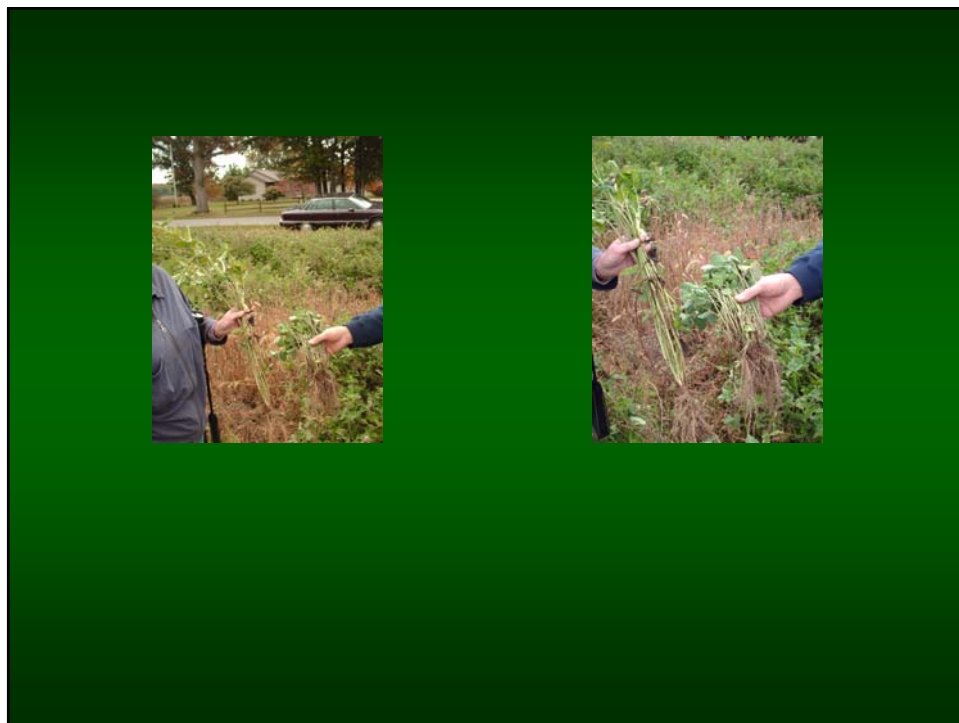
Next Year

- PSNT
- Stalk Nitrate Testing
- More needs to be done!

Frost-seeding Red Clover in Wheat



	wheat yield (bu/ac)	std dev
wheat with RC	107 a	3
wheat w/o RC	113 a	3.2



Observations

- Nitrogen
- Organic matter (water holding capacity)
- Rotational effect – benefit for corn and beans?
- Mammoth or medium red?
 - What a difference!
- Forage potential
- Wheat yield loss?
- Difference in weed control?
 - In the wheat crop
 - After wheat harvest

Canola??





5/9/2008



5/21/2008





Canola Yields

Variety	Average yield (lb/acre)*	Std. Dev.
Baldur	3630	12
Hornet	3135	388
Kronos	3588	595
Rally	3365	343
Taurus	4168	551
Visby	3445	612

What Resonates with Producers

- Using free solar energy to fix/scavenge N
- Wheat: little happening from mid-July through early-May
- Organic matter
- What are the options?
 - What is the pay-off?

It's GOOD for You!

- **Avocados contain the antioxidant glutathione – they are “good for you”**
 - Enough to make a noticeable difference?
- **Cover crops**
 - Same cost vs. benefit analysis
 - Significant benefit to central issues must be clearly demonstrated
 - Economic benefit, risk management
 - Short and mid-term

What doesn't resonate...

- **Guilt trips**
- **Buzz-words**
- **Ideology without pragmatism**

Primary Farmer Concerns

- Will it pay me back?
- Are there associated problems that will set me back or slow me down?
 - Can I kill it?
 - Excessive residue?
 - White grubs?
 - N-immobilization
- Will it be a waste of time?
- Will the neighbors think it is strange?
 - Can be a pro or con!

Primary Concerns

- Seed cost
 - Has to 'seem' reasonable
- Ease of establishment
 - Slam dunk (for most farmers)
- Cost of establishment
 - Broadcast, fly-on, no-till
- Season of establishment
 - How busy is it?
- Winter-hardiness (either way)

Other Considerations

- Host for SCN
- Wrapping around rotating parts
- Depletion of soil moisture
- Rampant spring growth
- Nitrogen immobilization
- Plugging tiles
- Volunteer radish, etc
- Allelopathy
- Seedcorn maggots, white grubs, etc
- Potential weediness
- Sensitivity to management



Red Clover

- Inexpensive
- Good timing
- Non-host for SCN
- Nitrogen
- Inexpensive
- Low risk
- Can be very competitive against weeds
- Inexpensive
- Fear of “catching” wheat
- Herbicide limitations
 - 2,4-DB



Winter Wheat?

- Winter Wheat
- Inexpensive
- Very available
- Well-understood
- Scavenges N
- Low-risk won't get out of hand
- Survives the winter
- Not as hardy as fall rye when planted late



Oats

- Readily available
- Should be inexpensive
- Forgiving
- Scavenge N
 - Match scavenger & fixer
- Organic matter
- Forage?
- **Winter-kill**
- Rapid establishment
- Excessive residue?
- N Immobilization?
- **Winter-kill**





Forage/Daikon/Oilseed Radish

- Rapid establishment
- Inexpensive?
- Winter-kill
- Scavenge N
- Compaction relief?
- Volunteer?
- Benefits from companion legume?
- Volunteer radish if planted too early
- Frost sensitive in certain situations



Fall Rye or Triticale

- Covers/stabilizes soil
- Soil structure
- Tough when planted late (rye)
- Weed suppression
- Fears about spring
 - N immobilization
 - RAPID growth
- Allelopathy?
- Cost of seed



Winter Canola

- Relatively inexpensive
- Competitive against weeds
- Compaction relief?
- Scavenge N
- Harvest a crop?!
- Marketing/processing
- Shares some disease concerns with soybeans
 - Rotation concerns
- Equipment and facilities
- Unknown

MISFITS?



Sunn Hemp

- Interesting
- More expensive
- Late-summer/fall: cool, short days, no time
- Deer and Japanese beetles like it
- Not fit for traditional cropping systems



Cowpea

- Cowpeas
- More expensive
- Dies when you say "frost": MI growing season is too short
- Not fit for traditional cropping systems
- Other varieties??
- SCN host



“Mightfits”

- Annual Ryegrass
- Crimson Clover
- Austrian Winter Peas
- Spring peas
- Chickling Vetch
- Triticale
- Spring Barley or Triticale
- Other species



Annual ryegrass

- Scavenging N
- Vigorous
- Covers ground well by fall
- Fits well with manure
- Forage
- Cost of seed
- Slower to start
- Less forgiving
 - Seed placement
 - Soil conditions
- Variable winter-survival
- What to do in the spring



Crimson Clover

- N fixation
- Works well with annual ryegrass
- Availability
- Winter-hardiness?
- Compared to red clover?
- Quite sensitive to seed placement



Austrian Winter Peas

- Fall vegetative growth
- Lots of nitrogen
 - Low C:N
- Forage potential
- Low C:N?
- More effort required to get uniform stand
- Cost of seed
- SCN Host
- Frost sensitivity in some circumstances



Spring (Field) Peas

- Excellent growth into mid-fall
- Nitrogen
- Forage
- Higher C:N than winter peas
- SCN host
- Wrapping/plugging
- Will not fix N as far into the fall
 - If planted in early August
- Cost of seed



Chickling Vetch

- Similar to winter peas
- Fall vegetative growth
- Low C:N
- Cost of seed
- More difficult to establish
- Probable host for SCN
- Timing of N-release?
- Less competitive early

Spring Triticale or Barley

- Better nurse crop than oats
 - Less competitive
- Less competitive than oats
- Less tillering
- Narrower leaves
- Difficult to see the short- or mid-term payback



Questions?

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