Cover Crop Economics

The green behind the green

Jim Stute
Rock County *UWEX*

UW Extension
Cooperative Extension

Topics

Short vs. long term benefits

- Is economic analysis possible?

A framework for economic analysis

Two examples:

- Red clover with winter wheat
- Winter rye after corn silage

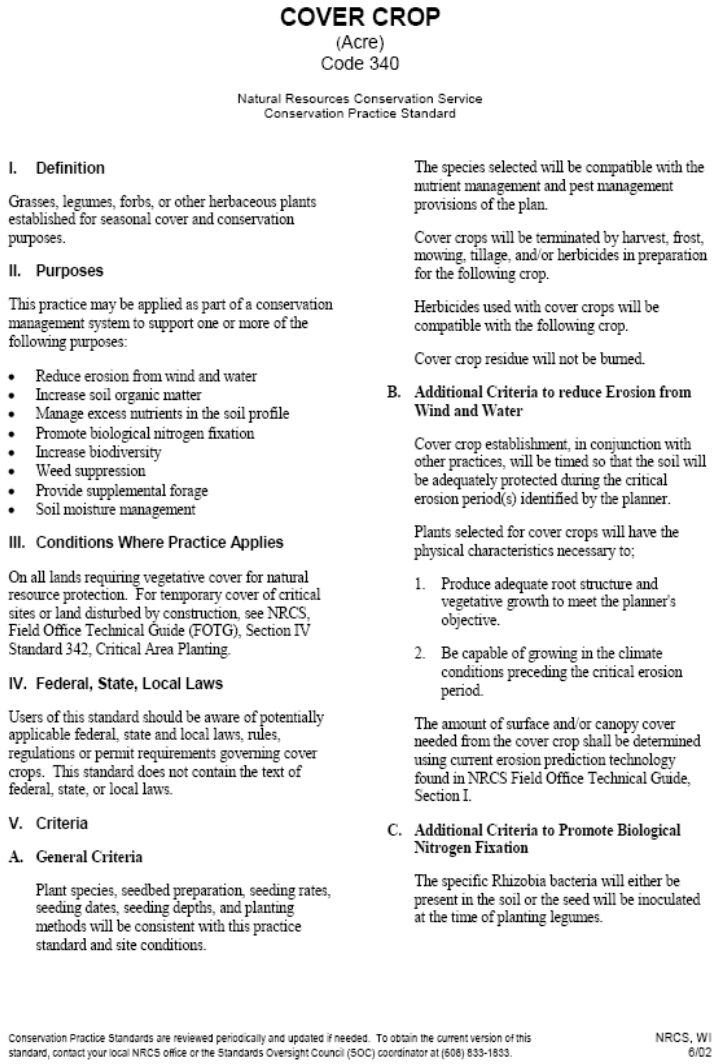
UWEX Cover Crop Work Group

Natural resource conservation drives effort

Goal: Adoption

Work with practices which have economic incentive

Conservation is a fringe benefit



COVER CROP
(Acre)
Code 340

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

Grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and conservation purposes.

II. Purposes

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- Reduce erosion from wind and water
- Increase soil organic matter
- Manage excess nutrients in the soil profile
- Promote biological nitrogen fixation
- Increase biodiversity
- Weed suppression
- Provide supplemental forage
- Soil moisture management

III. Conditions Where Practice Applies

On all lands requiring vegetative cover for natural resource protection. For temporary cover of critical sites or land disturbed by construction, see NRCS, Field Office Technical Guide (FOTG), Section IV Standard 342, Critical Area Planting.

IV. Federal, State, Local Laws

Users of this standard should be aware of potentially applicable federal, state and local laws, rules, regulations or permit requirements governing cover crops. This standard does not contain the text of federal, state, or local laws.

V. Criteria

A. General Criteria

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, and planting methods will be consistent with this practice standard and site conditions.

The species selected will be compatible with the nutrient management and pest management provisions of the plan.

Cover crops will be terminated by harvest, frost, mowing, tillage, and/or herbicides in preparation for the following crop.

Herbicides used with cover crops will be compatible with the following crop.

Cover crop residue will not be burned.

B. Additional Criteria to reduce Erosion from Wind and Water

Cover crop establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s) identified by the planner.

Plants selected for cover crops will have the physical characteristics necessary to;

1. Produce adequate root structure and vegetative growth to meet the planner's objective.
2. Be capable of growing in the climate conditions preceding the critical erosion period.

The amount of surface and/or canopy cover needed from the cover crop shall be determined using current erosion prediction technology found in NRCS Field Office Technical Guide, Section I.

C. Additional Criteria to Promote Biological Nitrogen Fixation

The specific Rhizobia bacteria will either be present in the soil or the seed will be inoculated at the time of planting legumes.

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local NRCS office or the Standards Oversight Council (SOC) coordinator at (608) 833-1833.

NRCS, WI
6/02

UW Extension
Cooperative Extension

What is a cover crop?

Wikipedia

"any plant grown to improve any number of conditions associated with agriculture"

The Ohio State University

"a crop grown to benefit the soil and other crops but not intended for harvest"

Economic benefits

from a cost/ benefit standpoint

Short-term

Directly applied to the immediate or following crop

Measurable

Examples:

- N credits for added nitrogen
- Creditable N accumulation
- Feed
- Weed suppression
- Maintenance of program eligibility, cropping flexibility
- Impact on subsequent crop

Long-term

Cumulative effects which impact the system

Not easily measurable

Examples:

- Soil protection
- Soil quality
  - Aggregation – OM addition
  - Aggregation – glomalin
- Improved water quality
- Enhanced nutrient cycling
- Carbon sequestration

Short-term

Often using cover crop to replace another input

- Direct economic comparison/ assessment possible
- Performance/ success directly related to management
- Often associated benefits tip scale in favor of cover crop

Long-term

Not replacing inputs, rather improving soil quality

Should result in long-term economic gain

- Improved yields soil health = plant health
- Ease of farming tilth, reduced weed pressure

To capitalize on either:

Costs should be minimized

- Seed, establishment and management
- Watch for pitfalls which could add expense

Look for efficiencies

-”piggyback” operations where ever possible

Town of La Prairie, Rock County
September 2003

UW Extension
Cooperative Extension

Evaluating Cover Crop Economics

What are the added costs?

- Seed
- Field operations
- Additional inputs
  - Termination
  - Nutrients

What are the returns?

- Fixed or scavenged nitrogen
- Weed control
- Feed

Evaluating Cover Crop Economics

What are the risks?

- Cover crop failure
- Impact on subsequent crop
  - Soil moisture
  - Insects/ diseases
  - Allelopathy
  - Crop insurance eligibility
- Forage quality (if harvested)

Framework

Partial budget analysis

- Measures cost and return for changing a practice
- Unaffected variables are not included
- Goal: $/unit for making a change

For analysis:

- Market costs for materials
- Field operations based on custom rate guide
  - Should ensure return to labor and capital
- 5% interest on operating costs

Framework

Partial budget analysis

Cost

- Seed
- Establishment
- Management
- Termination

Return

- Measurable benefit
  - N credit
  - Harvestable yield
- Impact on subsequent crop?

What are the costs and returns for the alternatives?

Two cover crop applications

Winter wheat + red clover

Corn silage + winter rye

- Applicability > 1 million acres in Wisconsin
- Scale neutral
- Easily implementable
- Economic incentive for use
- Meet NRCS 340 standard
- UWEX publications available

Material Costs

	2007	2008	2009
		$/unit	
Seed			
Medium red clover			
bag (#50)	80.00	112.50	117.50
pound	1.60	2.25	2.35
Winter rye, (bag, 50#)		12.00	
Fertilizer (booked in October)			
Anhydrous ammonia, ton			
Fall		985	430
Spring			520
UAN (32%), ton			
Spring		395	249
Herbicide			
Glyphosate (pt)			7.61
LV4 (pt)			2.05
Ammonium sulfate (lb)			0.52

Equipment Costs

Material Application	$/acre
Anhydrous Ammonia	
Tool bar applicator	10.20
Strip-till applicator	22.00
Dry fertilizer	4.85
Preemergence herbicide	7.30
Field Operations	
Field cultivator	11.50
Stalk chopper (clipping clover)	11.30
Rotary hoe (residue mgt.)	8.40
No-till drill	15.50
Mow/condition	11.70
Windrow merging	8.00
Chop, haul, pack	46.55

Source: NASS, Custom Rate Guide 2007

Interseeding red clover in winter wheat

Wheat + red clover

"Shovel Ready" system

- Easily "piggy backed" on current management/ field operations = efficiency + reduced cost

Nitrogen applied to wheat in spring

  - Red clover can be applied at same time using airflow equipment

Glyphosate applied to wheat stubble to control volunteer wheat

  - Growth regulator herbicide is only additional cost

Supplemental N (UAN) can be applied during PRE herbicide applications

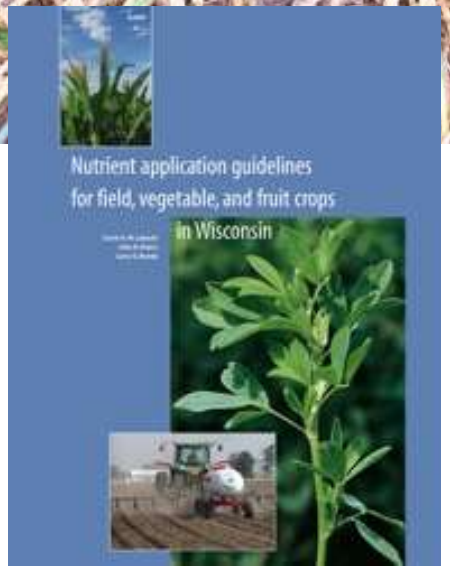
Town of Porter, Rock County
September 2009

UW Extension
Cooperative Extension

Assumptions

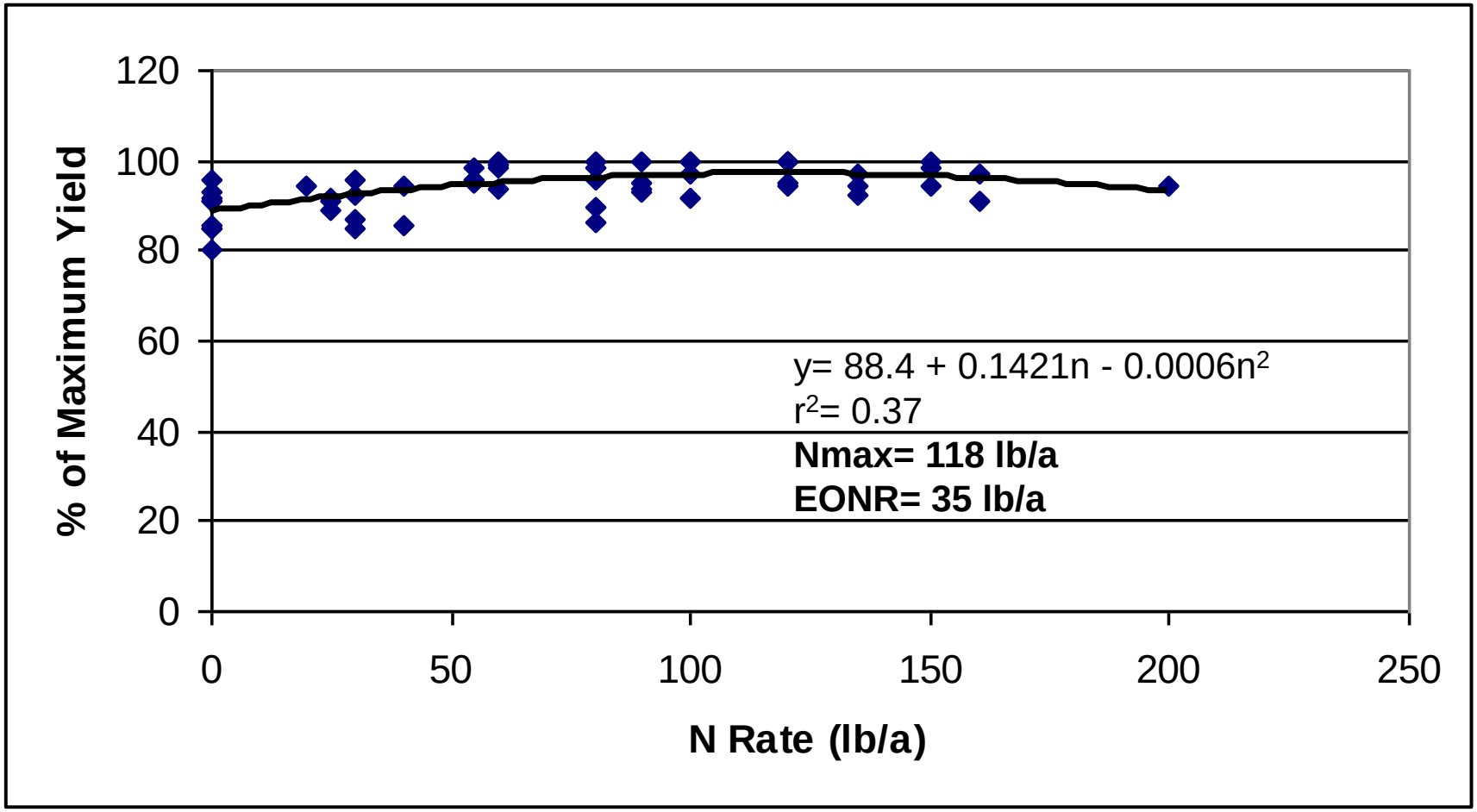
Clover does
not impact wheat

80 pound nitrogen credit
UWEX A2809



UW Extension
Cooperative Extension

Corn response to additional nitrogen



***Source**: Stute, unpublished*

Nitrogen costs: Red clover vs. fertilizer material and application

Comparison Framework

Cost	Red clover + UAN (spring)	UAN (spring)	Anhydrous NH3 (fall, toolbar)	Anhydrous NH3 (fall, strip-till)	Anhydrous NH3 (spring, toolbar)
Seed	12 lb	-	-	-	-
Herbicide (termination)	LV4 (1 qt)	-	-	-	-
Fertilizer	40 N	120 N	120 N	120 N	120 N
Application	w/ PRE	w/ PRE	tool bar field cultivate	tool bar	tool bar field cultivate
Interest*	seed herbicide fertilizer	fertilizer	fertilizer application spring tillage	fertilizer application	fertilizer application spring tillage
Wild cards	- seeding rate - cost share + clipping + "fluffing"		+ nitrification inhibitor	+ nitrification inhibitor	+ nitrification inhibitor

* from time of expense to December of harvest year

UW Extension Cooperative Extension

2009 - 2010

Cost	Red clover + UAN (spring)	UAN (spring, bdcst)	Anhydrous NH3 (fall, toolbar)	Anhydrous NH3 (fall, strip-till)	Anhydrous NH3 (spring, toolbar)
			$/acre		
Seed	28.20				
Herbicide (termination)	4.10				
Fertilizer	15.60	46.80	31.20	31.20	38.40
Application	0.00	0.00	21.70 (10.20)	22.00	21.70 (10.20)
Interest*	3.14	2.15	2.86 (2.43)	3.12	2.02 (1.63)
Total	51.04	48.95	55.76 (43.83)	56.32	62.12 (50.23)
Relative to red clover	-	-2.09	4.72 (-7.21)	5.28	11.08 (-0.81)

UW Extension
Cooperative Extension

2008 - 2009

Cost	Red clover + UAN (spring)	UAN (spring, bdcst)	Anhydrous NH3 (fall, toolbar)	Anhydrous NH3 (fall, strip-till)	Anhydrous NH3 (spring, toolbar)
			$/acre		
Seed	27.00				
Herbicide (termination)	4.12				
Fertilizer	24.80	74.40	72.00	72.00	not available
Application	0.00	0.00	21.70 (10.20)	22.00	
Interest*	3.30	3.42	5.24 (4.81)	5.50	
Total	59.22	77.82	98.94 (87.01)	99.50	
Relative to red clover	-	18.60	39.72 (27.79)	40.28	

Winter rye after corn silage

Assumptions

Fed on farm, nutrients cycled through manure

- serves as nutrient sponge
- no nutrient cost
- NM planning benefits, flexibility

Manure applied before corn silage

Winter rye after corn silage ($/acre)

Establishment	
seed (100 lb/a)	24.00
NT drill	15.50
	39.50

Two options:

Terminate		**Harvest as forage**	
glyphosate	7.61	mow/ condition	11.70
AMS	1.04	merge	8.00
application	7.30	chop, haul, pack	38.20
	15.95	Interest*	3.67
			61.57
Total	55.45		101.07

Wild cards	
storage costs	+
cost share	-

* includes establishment and harvest costs

How to value?

Cost of production

Yield (ton/acre)	
as fed	**6.43**
dry matter	**2.25**
Relative Feed Quality (RFQ)	**180**
Production cost ($/ ton DM)	**44.92**

Summary

Difficult to place an economic value on long-term benefits

Short term benefits can be profitable

- Depends on market prices
- Requires top management

Working with farmers to increase adoption

- Encourage them to consider long-term benefits along with the short-term
- Help them look for efficiencies
- Look for associated short-term benefits to help tip the scale

UW Extension
Cooperative Extension

For more information:

Jim Stute, Rock County UWEX
(608) 757-5696, cell (608) 921-9980
jim.stute@ces.uwex.edu
Kevin Shelley, UW NPM Program
(608) 262-7846, cell (608) 575-4746
kshelley@wisc.edu
Nancy Drummy
920-324-9594
ndrummy@powerweb.net

NPM Publications

Planting winter rye after corn silage: managing for forage

Frost seeding red clover in winter wheat

http://ipcm.wisc.edu/Publications/tabid/54/Default.aspx

UW Extension
Cooperative Extension