

Module 6 Cover Crop Management

Soil Health and Sustainability for Field Employees



Soil Health Principles To Support High Functioning Soils



USDA | NRCS | Module Cover Crop Management





Cover Crops Designing for what you don't have!

Identify Resource Concerns/Objectives

- Provide crop diversity (habitat)
- Provide soil surface armor (erosion)
- Build stable soil aggregates
- Improve the water cycle/ availability
- Integrated Pest Management
- Build/improve soil organic matter
- Nutrient cycling/ efficiency
- Air Quality
- Enhance pollinator/predator habitat
- Adjust carbon/nitrogen ratios
- Wildlife winter food & shelter
- Livestock integration
- Nitrogen fixation



What is your resource concern?



Cover Crop (340)

Shows the importance of conservation planning and how standards relate to the planning process.

Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content

Cover crop species will be selected on the basis of producing higher volumes of organic material and root mass to maintain or increase soil organic matter.

The planned crop rotation including the cover crop and associated management activities will score a Soil Conditioning Index (SCI) value > 0, as determined using the current approved NRCS Soil Conditioning Index (SCI) procedure with appropriate adjustments for additions to, and or subtractions from, plant biomass.

The cover crop shall be planted as early as possible and be terminated as late as practical for the producer's cropping system to maximize plant biomass production, considering crop insurance criteria, the time needed to prepare the field for planting the next crop and soil moisture depletion. NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

COVER CROP

(Ac.)

CODE 340

DEFINITION

Grasses, legumes, and forbs planted for seasonal vegetative cover.

PURPOSE

This practice is applied to support one or more of the following purposes:

- Reduce erosion from wind and water.
- · Maintain or increase soil health and organic matter content.
- Reduce water quality degradation by utilizing excessive soil nutrients.
- Suppress excessive weed pressures and break pest cycles.
- Improve soil moisture use efficiency.
- Minimize soil compaction.

CONDITIONS WHERE PRACTICE APPLIES

All lands requiring seasonal vegetative cover for natural resource protection or improvement.

CRITERIA

General Criteria Applicable to All Purposes

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with applicable local criteria and soil/site conditions.

Select species that are compatible with other components of the cropping system.

Ensure herbicides used with crops are compatible with cover crop selections and purpose(s).

Cover crops may be established between successive production crops, or companion-planted or relayplanted into production crops. Select species and planting dates that will not compete with the production crop yield or harvest.

Do not burn cover crop residue.

340 - 1

Agronomy Technical Note 33



Natural Resources Conservation Service Minnesota Agronomy Technical Note 33 *Cover Crop Seeding Guide*

1

Table 1										
		Common Cover Crops Reco	mmended f	or Pla	nting in Minnesota					
	FULL SEED	ING RATES			SEEDI	ING DATES				
SPECIES	¹ Minimum Seeding Rate in Ibs./ac PLS (Incorporated Seed)	num Seeding Rate ² Minimum Seeding Rate in Ibs./ac PLS in Ibs./ac PLS (Non- orporated Seed) Incorporated Seed)		CROP TYPE	NORTH OF INTERSTATE 94	SOUTH OF INTERSTATE 94				
			GRASSES							
SPRING BARLEY*	50 lbs/acre PLS	75 lbs/acre PLS	0.75-1.5	CG	April 15-September 15	April 1-October 1				
WINTER BARLEY	50 lbs/acre PLS	75 lbs/acre PLS	0.75-1.5	CG	July 15-October 15	July 15-November 1				
OATS*	30 lbs/acre PLS	45 lbs/acre PLS	0.5-1	CG	April 15-September 15	April 1-October 1				
ANNUAL RYEGRASS	15 lbs/acre PLS	23 lbs/acre PLS	0-0.5	CG	April 15-September 15	April 1-October 1				
WINTER CEREAL RYE	55 lbs/acre PLS	83 lbs/acre PLS	0.75-1.5	CG	July 15-October 15	July 15-November 1				
WINTER TRITICALE	50 lbs/acre PLS	75 lbs/acre PLS	0.75-1.5	CG	July 15-October 15	July 15-November 1				
SPRING WHEAT*	50 lbs/acre PLS	75 lbs/acre PLS	0.75-1.5	CG	April 15-September 15	April 1-October 1				
WINTER WHEAT	50 lbs/acre PLS	75 lbs/acre PLS	0.75-1.5	CG	July 15-October 15	July 15-November 1				
FOXTAIL MILLET	20 lbs/acre PLS	30 lbs/acre PLS	0.5-1	WG	June 1-August 1	May 15-September 1				
JAPANESE MILLET ¹	20 lbs/acre PLS	30 lbs/acre PLS	0.5-0.75	WG	June 1-August 1	May 15-September 1				
PEARL MILLET	20 lbs/acre PLS	30 lbs/acre PLS	0.5-1	WG	June 1-August 1	May 15-September 1				
PROSO MILLET ¹	20 lbs/acre PLS	30 lbs/acre PLS	0.5-1	WG	June 1-August 1	May 15-September 1				
SORGHUM- SUDANGRASS	25 lbs/acre PLS	38 lbs/acre PLS	0.5-1.5	WG	June 1-August 1	May 15-September 1				
SUDANGRASS ¹	25 lbs/acre PLS	38 lbs/acre PLS	0.5-1	WG	June 1-August 1	May 15-September 1				

Table 2 La Marine and Construction of Constructions and Landin in Landa



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Considerations for successful cover crop planning



- Site preparation/Early weed control is essential
- Herbicide carryover and label restrictions
- Timing and species (adequate growing season)
- Crop rotation/diversity
- Seeding method seed-soil contact (broadcast vs. drilling, adequate equipment)
- Seed size/seeding depth
- Seed quality (bin run, PLS, certified)
- Legume inoculation
- Site and moisture conditions



Considerations for successful cover crop planning (cont.)



- Residue management (cash crop) before and after cover crop emergence
- Moisture management (cover benefits, water use)
- Nutrient cycling considerations (C:N ratio, residual nitrogen, living root)
- Weed, insect and disease management
- Termination method/timing know before you plant how your are going to terminate
- Establishment of next cash crop
- Economics (yield impacts, cost of establishment, soil improvement,)
 - ("can we afford not to use a cover crop" J. Fuhrer, 2016)

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Cover Crop Herbicide Restrictions

- Forage and grain (food chain)
 - Herbicide must be labeled for all crops
 - Rotation/plant back restrictions
 - Forage restrictions (grazing, haying)
- Cover only (soil building or erosion)
 - At your own risk (some labels lack info)
 - Review labels/experience
 - Climate & soils (biological activity)





- Carryover potential
 - Challenging to predict potential carryover of herbicides to cover crops with exhaustive variables.
 - Careful planning can help increase confidence.
 - When in doubt, perform a bioassay.
- Resources:
 - PSU Bill Curran and Dwight Lingenfelter
 <u>https://extension.psu.edu/the-penn-state-agronomy-guide</u>
 - Univ. of Missouri Kevin Bradley (<u>http://weedscience.missouri.edu/extension/pdf/cover%20crop</u> <u>%20carryover.pdf</u>)
 - Purdue University- Brian Young- Good summary of Literature and input from CC Experts.



Important information: Common name/ active ingredient, half-lives, cash crop restrictions, modes of degradation and potential to injure fall cover crops

	HERBICIDE	Active Ingredient	Normal Rate/acre	Half Life (days)1	Cash Crop Restrictions	Fall Cov OK to Plant	ver Crops Concern for	Other
	2,4-D 4S	2,4-D	1-2 pt	7	Plant anything 30 days after application	All grasses	Wait 30 days before planting sensitive broadleaves	Amine formulations more water soluble and can leach into seed zone
	Accent 75DF/ Steadfast 75DF	nicosulfuron/ nicosulfuron + rimsulfuron	0.66 oz/ 0.75 oz	21	Sensitive crops have 10-18 month restriction	Fall cereal grains, ryegrass	Small seeded legumes, mustards, sorghum	More persistent in high pH soils (> 7)
	Atrazine 4L	atrazine	1-2 qt	60	Can plant corn, sorghum, and soybean the following year (some products)	Sorghum species	Cereals, ryegrass, legumes and mustards	More persistent in high pH soils (> 7). Rates < 1 lb/acre can allow more flexibility
	Balance Pro 4L	isoxaflutole	2 fl. oz	50-120	Small seeded legumes and vegetables have a 10 to 18 month restriction	Fall cereal grains	Cereals, ryegrass, legumes and mustards	15" of total precipitatio required from application to planting rotation crops except soybean, barley, wheat, sorghum, sunflower
(incl	Callisto Iudes Lumax, Lexar, Halex GT)	mesotrione	3-6 lf. oz	5-32	10 to 18 months for legumes and vegetables	All grasses	Small seeded legumes, mustards	Sequential applications (PRE fb POST) increase the potential for injury
C (Di	Clarity/Banvel 4S istinct and Status)	dicamba	16-24 fl. oz	5-14	15 days per 8 fl. oz/acre for small grains	All crops	Only at high rates or less than 120 days after application	Anything can be planted after 120 days with 24 fl. oz/acre or less
	Dual II Mag 7.62E/Cinch	metolachlor	1.67 pt	15-50	Labeled for use on many crops	Almost anything	Annual ryegrass or other small seeded grasses	Higher rates and later applications more of a potential problem
	Capreno 3.45SC	tembotrione + thiencarbazone	3 fl. oz	50-120	Four months for wheat, 10 months for barley, sorghum, oats and alfalfa	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	15" of total precipitation required from application to planting rotation crops except wheat
	Corvus 2.63SC	isoxaflutole + thiencarbazone	5.6 fl. oz	50-120	Four mo. for wheat, 9 mo. for barley and 17 mo. For alfalfa, oats, sorghum, and canola	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	15-30" of total precipitation from application to planting for sensitive crops

Disclaimer: Always follow the label. Some of this information pertains to the eastern US and is an example of an Extension Publication (Penn State)



What is your seeding timeframe ?

- 1. Spring fallow ground, prevented planting or prior to a summer crop, seed into winter grain
- 2. Early Summer After early vegetable harvest, winter grain or forage harvest
- 3. Late Summer After grain harvest, Interseeding into corn or soybean, etc.
- 4. Fall After fall crop harvest

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Cover crops niches for summer annual crops



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Cover Crop Plant Character Diversity

- Above ground- (erect, spreading, single/multistemmed, height, leaf character)
- Root architecture- (tap, fibrous, rhizomatous, depth)
- Rate of growth- (also differs by growth stage i.e. seedling vigor)
- Chemical composition- (allelopathy C:N ratio, root exudates)
- Tolerance to stress- (drainage, pH, shade, low fertility)
- Time to flowering- (termination or self seeding issue)
- Pest resistance or susceptibility
- Growth Cycle- Perennial, Biennial, Annual?



Bin Run Seed





Certified or VNS What is PLS?



PURE SEED: 65.50% OTHER CROP 0.00% INERT MATTER: 0.45% WEED SEED: 0.05% COATING MATERIAL 34% NOXIOUS: NONE FOUND

GERMINATION: 80% HARD SEED: 10% ORIGIN: WA AMS# NET WEIGHT: 50 LBS DATE TESTED: 1/2013

INOCULANT USED IS A ORGANIC PEAT BASED PRODUCT

Each species has multiple cultivars

black oats (Ave	ena strigosa) 60 lb/A	daikon radish (<i>Raphanus sativus</i>) 9 lb/A					
Se	oilSaver	Big Dog	Graza				
black-seeded wint	ter oats (<i>Avena sativa</i>)	Concorde	Groundhog				
С	osaque	Control	Lunch				
		Defender	Nitro				
balansa clover (<i>Trifo</i>	lium michelianum) 5 lb/A	Driller	Sodbuster				
Fixation	Frontier	Eco-till	Tilllage				
crimson clover (<i>Trifo</i>	olium incarnatum) 18 lb/A	<u>cereal rye (Secala</u>	<u>e cereale) 100 lb/A</u>				
AU Robin	Contea	Aroostook	Maton II				
AU Sunrise	Dixie	Bates	Merced				
AU Sunup	KY Pride	Brasetto	Oklon				
		Elbon	Rymin				
field peas (Pist	<u>um sativum) 70 lb/A</u>	FL 401	Wheeler				
Arvica	Lynx	Guardian	Wintergrazer				
Dunn	Maxum	Hazlet	Abruzzi				
Frostmaster	Survivor-15	Ma	aton				
Windham	Whistler						
red clover (<i>Trifo</i>	olium pratense) 9 lb/A	hairy vetch (<i>Vici</i>	<u>a villosa)</u> 18 lb/A				
Cinnamon Plus	Kenland	CCS-Groff	Purple Prosperity				
Cyclone II	Mammoth	Lana	TNT				
Dynamite	Starfire	Purple Bounty	Vilana				
Freedon	Wildcat						

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Cool Season Grasses

Cereal Rye

- Annual Ryegrass
- Cereal Rye
- Barley
- Oats
- Winter Wheat
- Triticale







Differences in seeds/lb of different cultivars of Cereal Rye

variety	seeds/ lb	seeds/ acre	seeds/sq ft
Merced	33,022	3,302,200	76
Elbon	30,609	3,060,900	70
Aroostook	24,438	2,443,800	56
Wintergrazer-70	23,759	2,375,900	55
Maton	21,860	2,186,024	50
Maton II	21,860	2,186,024	50
Abruzzi	20,855	2,085,517	48
Oklon	19,970	1,997,000	46
Wheeler	14,515	1,451,520	33
Hazlet	14,088	1,408,800	32
Prima	12,870	1,287,000	30
Guardian	12,760	1,276,000	29
Brasetto	11,413	1,141,300	26

Cereal rye when seeded for example at 100 lb/a, will have different # of seeds per acre or sq ft ranged from 26-76. This is more important at late seeding dates



Warm Season Grasses

- Pearl Millet
- Sorghum-Sudan grass
- Forage Sorghum

Pearl Millet

Brown rib sorghum - sudan grass





Photos: Michael Kucera & Jodie Reisner

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Cool Season Grasses

Cereal Rye

- Annual Ryegrass
- Cereal Rye
- Barley
- Oats
- Winter Wheat
- Triticale







Cool Season Broadleaf

- Oilseed Radish
- Turnip and Rape
- Kale
- Phacelia









Warm Season Broadleaves

- Buckwheat (NRCS planning restrictions)
- Safflower

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• Sunflower



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- Hairy Vetch
- **Crimson Clover**
- Winter Pea

Cool Season Legumes

Crimson Clover





Warm Season Legumes

- Cowpea
- Soybean
- Sunn hemp
- Chickpea
- Mungbean



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- With the help of rhizobia bacteria legume cover crops can supply some or all of the N needed by succeeding crops.
- You must carefully match the correct bacterial inoculant strain with your legume cover crop species for the most effective N production.
- Most inoculants have very short viability times (days) depending on storage conditions.
- Pre-inoculated seed shipped and stored for extended periods of time has reduced inoculum viability.
- Keep inoculant refrigerated out of direct sunlight and Use prior to expiration date.

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	Unite	ed Sta	tes	Depar	tment of	Agric	ulture	F	Se	20	50	U	rces		
							Midwes Cove Crop Counc	st r s il							Man Crop
					Illi	nois	Indiana	Iow	7a	Kansas	Michi	igan	Minnesota Missouri		a state
Note: Yellow area	s indicate requi	Minnes red data. Blue at	iota (Cover Cro	Cover Resources	Home Crop rces orkshee	Cove with prim The g facilit Mi	WHA r crops are pla nin or outside nary purpose of oal of the <i>Mid</i> ate widesprea idwest, to imp	T ARE (ants seede of the reg of improv. qu hwest Cor ud adoptic prove ecol	COVER (d into agr ular grow ing or ma ality. <i>er Crops</i> n of cove ogical, ec	CROPS? iccultural fields ing season, wi initianing ecosy Council (MCC r crops through conomic, and se	, either th the ystem C) is to tout the social	NEWS NEWS The MCCC is hiring a <u>Program Manager</u> , please visit the link for details! NDSU is hiring a <u>postdoctoral research</u> <u>fellow</u> twork on cover crops.		
Name: Address:					C	Program: ontract #:					THE	5			Sec.
Section:		Township:		Range:	Lontract	Item No.: Acres:			_				The Ohio State University		
Indicate the	decision-i	naker's ob	jective 	e(s) for appl	ying cover crop	, in priorit	y order (1, 2,	3,etc.)			odin	g,	has just posted several slide presentations relating		10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Improve So Minimize So	il Moisture us pil Compactio	se efficie on	ency	Maint Redu soil n	ain or increa ce water qu utrients.	ase soil health & ality degradatio	organic matter	content.				to cover crops and the environment and sustainable farming, check		
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Consideratio	of M Use i	ecommendat	ions. Sp	ecies marked w	ith an asterisk (*) req	uire Athlachd	im inoculation.						Learn About 👻	Courses and Events	Conne
		Full Seed	Pla	anned Cove	r Crop Mixture			Seeding	Seeds		st		Cover crops		
Cover Crop -	Species	Rate of PLS Ib/ac	Acres	Full Rate of PLS	Rate of PLS Ib/ac	Total PLS lbs	Crop Type -	Depth (inches)	per Sg/Ft 0.00		COL		Home > Crop production > Solir and water		
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-		-					-	-	0.00				Cover crops can provide many benefits to a	cropping system. They incl	lude
-		-					-	-	0.00	1			- Improved water infiltration		
				0%	Total Ibs/PLS	0.0	otal	Seeds per Sq/I	F 0.00				Reduced soil erosion.		
ated PLS see	ding rate (lbs/acre):			Planned	Seeding	Depth (inche	s): *DIV/0!					 Ability to scavenge excess nitrogen and 	I phosphorus.	

aging Cover s Profitably



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- · Provide additional nutrients.
- · Utilize excess moisture.

< Crop production

Soil and water Irrigation > Soil management and health > Agricultural drainage >



USDA – ARS Cover Crop Chart

USDA United States Department of	of Agriculture			ARE								
Agricultural Research S	Service	<u>GROWTH (</u> A = Anr B = Bier P = Pera]	SCI								
GRASS												
A BARLEY		A AMARANIH										
									A PEARL MILLET			
SPELI OPH	ACELIA		BERSEEM CLOVER	^ • <u>PEA</u> ~	^ ♦ LUPIN Ƴ	A/P LABLAB			A PROSO MILLET			
A A A A A A A A A A A A A A A A A A A	FLAX	A ♦♦♦ <u>RADISH</u> *	CRIMSON CLOVER	^ ▲ LENTIL	A FABA BEAN	A/P FENUGREEK YP	A VELVET BEAN					
		^B ♦♦● <u>IURNIP</u> ★		۸/۳ <u>LESPEDEZA</u> ۵۵ 🔹 ۲۲	A/B <u>SWEET</u> <u>CLOVER</u>	A/P <u>PIGEONPEA</u>	A MUNG BEAN		A <u>SUDAN</u> GRASS			
		B <u>BEET</u>	P WHITE CLOVER	BIRDSFOOT TREFOIL	P • • • • • • • • • • • • • • • • • • •	A AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	SOYBEAN	A AND SAFFLOWER	A IEFF			
	HARD	CARROT		A/B ••	P AAA SAINFOIN	A <u>SUNNHEMP</u> γ	A/P <u>PEANUT</u> RR *	SUNFLOWER				

V 3.0 February 2018

Additional Information

Cover Crop Chart USDA-ARS NGPRL





Why Diverse Cover Crop Mixes

- **Multiple** uses of cover crops, why not use multiple species for multi-benefits
- Takes advantage of filling **niches** in time and space above and below ground diversity, increase biomass
- Balance C:N ratio for potential synchrony of N release for next crop
- Synergy between species; vetch climbing on cereal, uptake N by cereal and stimulate more N by legume
- **Dilute** monoculture CC problems; allelopathy, pest interactions, reduce amount of spring growth competition



More types of seeds more stable is the mix... less seed separation/ settling

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Key points on seeding times and seeding rates

- Earlier seeding results in better seed germination, tillering, growth, survival and more biomass.
- Delaying termination in spring can compensate for delayed planting in the fall (some producers have learned to plant green)
- Be aware of planting dates based on species in the mix (warm / cool season; winter grains /cool season legumes and brassicas)
- Drilling is much more efficient than surface broadcast. Increase seeding rate by 1.5 times when broadcasting.

Interseeding 4 species into corn

Turnip, Rapeseed, Oats drilled after Sweet Corn

Broadcast Cereal Rye

Highboy Cover Crop Mixture late August



United States Department of Agriculture



Radish 2 lb/ac with wheat 40 lb/ac and red clover 10 lb/ac

Radish at 8 lb/ac



Drill it

- Most time consuming
- •\$13-\$24/ac
- Provides row plant spacing
- Consistent results
- Good soil to seed contact

How will you seed it?





Air Seeder attached to tillage equipment

- •Wide swath at 10 mph
- Fast
- \$12-26/ac plus
 \$8-18/ac broadcasting
- Provides a random plant spacing
- Soil disturbance



Fly it on

- Most flexible timing
- Fast
- \$15-\$35/ac
- Provides a random plant spacing
- No seed to soil contact/moisture dependent
- Higher seeding rates may become impractical

How will you seed it?





How will you seed it?

Fly it on...When?...Who?

- Target the optimum window
- Balance sunlight and moisture
- Some species are more adapted
 Lack of soil to seed contact/Moisture dependent





Using Highboy for cover crop establishment into standing corn





Precision planting in narrow rows (15" rows)

- •Use existing bean planter
- •Less seed per acre
- •\$14.25-\$30/ac
- Provides precision row/ plant spacing
- Consistent results
- Good soil to seed contact





Air Seeder on Combine Head

- Concurrent operation
- •Cheap / Fast
- Provides a random
- plant spacing
- Seed placed beneath the residue





Interseeding possibility

United States Department of Agriculture

Interseeding into V6 Corn

Crimson clover about 8 weeks after interseeding

Annual Rye Grass, legume mix

Annual ryegrass Oct 30th Central NY



Cover Crop Termination Methods

- Frost termination
- Crimper / Roller (mature enough to kink the stem)
- Herbicide burn down
- Grazing
- Shredding / mowing
- Tillage
- Combination of methods





COVER CROP -Termination When and How?

As for How!

IT DEPENDS!

EXPERTS AGREE



COVER CROP Termination



- Have a good GAME PLAN...
 - What are your goals?
- Be adaptive to the season
 - Wet springs happen!







Timing of termination decisions **IT DEPENDS!**

- Herbicide options- Cereal Rye Example
 - Spray 2 weeks before planting, and when cereal rye is 6-12 inches tall
 - Herbicide works effectively on undamaged cereal rye plants
 - Cover is dead and crispy before planting
 - Less residue to plant through
 - If weather is turning dry -preserve moisture (hard to predict)



- Alternatives under very wet conditions or experienced CC managers- "Planting Green"
 - Spray 1-2 days BEFORE planting
 - Spray AFTER planting (same day or within 1-2 days)
 - Advantages and risks with each option



Annual ryegrass cover crop termination guide sheet

to mid-April egrass can be oped, although management. are a must for

roplet sizes and rol. The use of <u>parse</u> droplets Additional NIS surfactant, if called for, is normally added last. Weather conditions affect how well glyphosate controls annual ryegrass and may require a second application.

- Spray with a daytime minimum temperature of 55° F (above 60° F optimum).
- Wait until all the annual ryegrass is actively growing for best results (5-7 days).
- If night temperatures drop below 38° F, wait three days before spraying.
- Soil temperatures should be above 45° F.
- Spray at least 4 hours prior to sunset to allow for maximum translocation of the glyphosate within the plant.

Early termination of the cover crop makes control easier a reduces the amount of residue into which you'll plant of beans. Early control also facilitates soil dry-down decomposition of the ryegrass resid



COVER CROP Termination- Translocating herbicides

- Evening shade reduces photosynthesis and translocation
- Actively growing plants die best
- Use of multiple herbicides
- Best time to apply Herbicides: Sunny day 10 AM to 2 PM.



COVER CROP Termination-Translocating herbicides

 Sprayer Water Quality and Management

glyphosate example

- Use AMS to buffer hard water
- Consider citric acid -4.5-5.5 pH is optimum
- Use 8-10 gallons of water or less
- Medium droplet size (turbo twinjet, Flat Fans)
- Medium pressure (30-40 psi)





COVER CROP Termination



RMA crop insurance guidelines for cover crop termination





Cover Crop Planning Tools

- Cover Crop 340 Practice Standard and supporting documents
- Midwest Cover Crop Council <u>http://www.mccc.msu.edu/index.htm</u>
- Resources and Publications <u>http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health</u> <u>/resource/</u>
- Sustainable Agriculture Research & Education (SARE)
 - Online Book and Topic Room on Cover Crops
- <u>Cover Crops for Sustainable Crop Rotation and Soil</u> <u>Health</u> and the SARE cover crops topic room at <u>http://www.sare.org/Learning-Center/Topic-Rooms/Cover-Crops</u>
- No Till Farmer Pulses and Minuses
- Various industry cover crop calculators

USDA | NRCS | Module Name



Lets make a mix for your scenario (Exercise)

- Build your own mix.
- When and how is it planted/ when and how is it terminated?
- Where does it fit in the crop rotation?
- What resource concerns does it address?



<u>USDA</u>

Incorporated Seed







Vertical tillage and Gandy Box



15 in corn/Bean Planter





Non-Incorporated Seed







