



Cover Crop Management

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- 1. List benefits of cover crops
- 2. Identify the different plant functional groups
 - Name 2-3 representative species in each group that are common to the region
 - List key benefits of the representative species
- 3. How to manage cover crops







Cover Crop Purposes

Identify Resource Concerns & Objectives

- Crop diversity (habitat)
- Soil surface armor (erosion)
- Build stable soil aggregates
- Improve water cycle/ availability
- IPM/beneficial insects
- Build or improve soil organic matter

- Nutrient cycling/ efficiency
- Air Quality
- Adjust carbon/nitrogen ratios
- Wildlife winter food & shelter
- Livestock integration
- N fixation



Cover Crop Purposes

Identify Resource Concerns & Objectives Talking with the producer

340 Standard 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.

Plain Language

Soil surface armor (erosion)

Build or improve soil organic matter Build stable soil aggregates Crop diversity (habitat) Adjust carbon/nitrogen ratios

Nutrient cycling Nutrient efficiency Nutrient scavenging/retention

Reduce Pesticide use/beneficial insects Weed suppression

Improve water cycle/availability Manage excess water

Build stable soil aggregates Break up compaction layers



340 IA IR Cover Crop 2021 Crop Districts Worksheet

Iowa Cover Crop guidance was updated in 2021 to align seeding rates and dates with the Midwest Cover Crop Council. A new Implementation Requirements (seed plan) was developed based on the 9 crop districts in Iowa. This allowed for seeding periods to be more closely aligned with historical weather data.





340 IA IR Cover Crop 2021

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Crop YearManned Crop: 2022/Com Plan Map must be attached.														
Goals and Objectives: Provide erosion protection and living root.							low a	ty Safety/ One-Call System Information: aOneCall.com or Call 811						
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Description of work:														
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n the spring.														
ractice Purpose:														
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Approved by:		Date:		Job Approval Authority (JAA):	
	Approved by signature only required if Planner does not have proper JAA or for ARC appr	oval of non-l	listed species.		
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	b. I have obtained all necessary permits and/or rights in	advance	of practice app	lication, and will comply	
	with all ordina nees and laws partaining to the applies	tion of t	this practice		
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Iowa NRCS May 2021 Page 2 of 2



Cover Crop Considerations

for Successful Planning

- Site preparation
- Early weed control
- Timing and species (adequate growing season)
- Crop rotation/diversity • Mo
- Seed quality (bin run, PLS, certified)

- Seeding method seed-soil contact (broadcast vs. drilling)
- Seed size/seeding depth
- Legume inoculation
- Moisture management (cover benefits, water use)
- <u>Producer's goals</u>

Slide 7 10:01 AM



Cover Crop Considerations

for Successful Planning

- Residue management (cash crop) before & after cover crop emergence
- Nutrient cycling (C:N ratio, residual NO₃)
- Weed, insect & disease management
- Termination method/timing
 - Know how you are going to terminate before you plant

• Economics

 Yield impacts (+/-), cost of establishment, soil improvement, can we afford not to use them (preventative maintenance)?



What is your Seeding Timeframe ?

- Spring Fallow ground, prevented planting or prior to a summer crop
- Early Summer After early vegetable harvest, winter grain or small grain forage harvest, after first crop hay, inter-seeded into row crop
- Late Summer After grain harvest, over-seeding into corn or soybean, cotton etc.
- Fall After fall crop harvest

Seeding Times and Seeding Rates

- Earlier seeding results in better seed germination, tillering, growth, survival and more biomass.
- Be aware of planting dates based on species in the mix (warm / cool season; winter grains /cool season legumes and brassicas).
 Seed when the seed will germinate, and the seedling will thrive.
- Delaying termination in spring can partially compensate for delayed planting in the fall (some producers have learned to plant green)
- Drilling is much more efficient than surface broadcast. Increase seeding rate by 10-30% when broadcasting.
- Higher seeding rates are not necessarily good can be detrimental (i.e., increases competition for limited resources)

United State

United States Department of Agriculture Agriculture Annual Crops





What Characteristics Should Be Considered?

- Growth cycle
- Growth habit
- Root architecture
- Growth rate
- Chemical composition
- Stress tolerance
- Time to flowering
- Pest resistance or susceptibility



Cover Crop Chart



- Annual Ryegrass
- Cereal Rye

United States Department of Agriculture

- Barley
- Oats

USDA

- Wheat
- Triticale





Cereal Rye



Warm Season Grasses

- Pearl Millet
- Japanese Millet
- Sorghum-Sudan grass
- Forage Sorghum
- Teff



Brown rib sorghum - sudan grass

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Pearl Millet



Cool Season Broadleaf

- Radish
- Turnip and Rape
- Kale and Collards
- Mustard
- Phacelia







Know How & When Cover Crops Produce Seed

- CC's that go to seed could become a weed problem:
- Radishes are photoperiod sensitive Longer days = seed set
 - Avoid spring/early summer
- Mustards mature quickly, blooming in 45-60 days after planting
- Turnips, kale, collards, cabbage & rapeseed require vernalization to set seed



Warm Season Broadleaves

- Buckwheat
- Safflower
- Sunflower









• Vetch

United States Department of Agriculture

ISDA

- Hairy, Purple, Common, Woolypod
- Crimson Clover
- Perennial Clovers
 - Red, White, Alsike
- Winter Pea

Crop Manager

Austrian, Canadian





Slide 19 10:01 AM



Warm Season Legumes

- Cowpea
- Soybean
- Sunn hemp
- Chickpea
- Mungbean
- Chickling vetch



Need for Legume Inoculation

 Rhizobium bacteria fix nitrogen that becomes available to legumes

United States Department of Agriculture

- Inoculants are species specific
- Inoculants are alive and has a maximum storage life
- Keep inoculant refrigerated out of direct sunlight and Use prior to expiration date.





Bin Run Seed





Certified or VNS? What is PLS?

PLS = Germ % X Purity % Germination includes hard seed 65.5 X 90 = 59% PLS



PURE SEED:	65.50%	GERMINATION:	80%
OTHER CROP	0.00%	HARD SEED:	10%
INERT MATTER:	0.45%	ORIGIN:	WA
WEED SEED:	0.05%	AMS#	
COATING MATER	RIAL 34%	NET WEIGHT:	50 LBS
NOXIOUS: NONE	FOUND	DATE TESTED:	1/2013

INOCULANT USED IS A ORGANIC PEAT BASED PRODUCT



340 IA IR Cover Crop 2021

Iowa specific guidance

- For all seed lots with a PLS of 80% or greater, use bulk rate for pounds per acre. All other seed lots will be seeded based on PLS pounds per acre.
- Bin run seed is allowed with a test for germination and purity by a certified lab no older than 12 months from date of seeding.
- Up to 20% of the seed mix may be 'non-listed species with approval from the Area Office.



Cultivars Vary

black oats (Av	vena strigosa <u>)</u>	daikon radish (<i>Raphanus sativus</i>)				
S	SoilSaver	Big Dog	Graza			
black-seeded wir	nter oats (<i>Avena sativa</i>)	Concorde	Groundhog			
(Cosaque	Control	Lunch			
		Defender	Nitro			
balansa clover (<i>Trif</i>	<u>olium michelianum)</u>	Driller	Sodbuster			
Fixation	Frontier	Eco-till	Tilllage			
<u>crimson clover (<i>Trif</i></u>	<u>folium incarnatum)</u>	<u>cereal rye (Secale</u>	<u>cereale</u>)			
AU Robin	Contea	Aroostook	Maton II			
AU Sunrise	Dixie	Bates	Merced			
AU Sunup	KY Pride	Brasetto	Oklon			
		Elbon	Rymin			
field peas (Pis	<u>sum sativum)</u>	FL 401	Wheeler			
Arvica	Lynx	Guardian	Wintergrazer			
Dunn	Maxum	Hazlet	Abruzzi			
Frostmaster	Survivor-15	Ma	iton			
Windham	Whistler					
red clover (<i>Trif</i>	folium pratense <u>)</u>	<u>hairy vetch (Vicia villosa)</u>				
Cinnamon Plus	Kenland	CCS-Groff	Purple Prosperity			
Cyclone II	Mammoth	Lana	TNT			
Dynamite	Starfire	Purple Bounty	Vilana			
Freedon	Wildcat					



How will you seed it? Drill

- Most time consuming
- •\$16-\$18/ac
- Provides row plant spacing
- Consistent results
- Good soil to seed contact





Air Seeder on a Harrow or Vertical tillage

- •Wide swath at 10 mph
- Fast
- Cheap? \$17.30/ac plus \$12.50/ac broadcasting
- Provides a random plant spacing
- Soil disturbance





How will you seed it? Fly it on

- Most flexible timing
- Fast
- \$12-\$18/ac
- Provides a random plant spacing
- No seed to soil contact/moisture dependent
- Higher seeding rates may become impractical
- Uniformity across spread pattern dependent on seed aerodynamics





How will you seed it? Fly it on...When?...Who?

- •Target the optimum window
- Balance sunlight and moisture
- •Growing Degree Days
- •Some species are more adapted
- Lack of soil to seed contact/Moisture dependent NRCS | SHD | Cover Crop Management | v2.3





Highboy for establishing into standing corn





Air Seeder on Combine Head

Ray McCormick, Vincennes, IN

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





Precision planting in narrow rows (15" rows)

- •Use existing bean planter
- •Less seed per acre
- •\$12-\$18/ac
- Provides precision row/ plant spacing
- Consistent results
- Good soil to seed contact





Inter seeding possibility

Interseeding into V6 Corn

Crimson clover about 8 weeks after interseeding



Annual ryegrass Oct 30th Central NY



Planting Green

Advantages:

- increased biomass for weed control
- better planter performance in standing cover vs a thick mat
- more biomass reduces evaporation and erosion



Disadvantages:

- increased pest pressure
- more risk of wrapping on planter drives and wheels; hairpinning
- pollen shed plugging breathers or air flow devices
- over utilization of moisture.

Cover Crop Termination Methods

- Herbicide burn down
- Tillage

Jnited States Department of Agriculture

- Frost termination
- Crimper / Roller (mature enough to kink the stem)
- Grazing– Not in Term Guidelines
- Shredding / mowing
- Combination of methods





COVER CROP -Termination When and How?



- What are your goals?
- Be adaptive to the season
- Wet springs happen! NRCS | SHD | Cover Crop Management | v2.3



Cereal Rye seeded in Southern Iowa

Late Fall

Early Spring

Late Spring

Photo Credits: Jason Steele/Rick Bednarek



Allowing the rye to grow a few more weeks in the spring massively increased shoot/root mass. Keep the photosynthetic engine running as long as possible to convert sunlight energy to chemical energy/organic carbon.



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)





Herbicide Persistence

- 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.



MATADOR®-S EPA REG. NO. 34704-1067

TABLE 9: CROP ROTATION INTERVALS

•	Crop Rotation		Crop Rotation
Crop	Intervals (Months)	Crop	Intervals (Months)
Alfalfa	4.5	Popcorn ⁵	18
Asparagus	40	Potatoes ⁶	26
Bahiagrass ⁶	40	Rice	40
Barley, spring (except North Dakota) ²	9.5	Root crops	40
Barley, winter (except North Dakota) ²	9.5	Rye (except in North Dakota, and in Minnesot	a
Cabbage ⁶	40	north of Highway #210)	12
Canola ⁷	40	Rye in North Dakota, and in Minnesota north	
Cantaloupe ⁶	40	of Highway #210	18
Clearfield® Corn	8	Sainfoin	40
Clover	12	Safflower	18
Cotton	18	Southern peas	12
Cucumber ⁶	40	Sorghum	18
Edible beans	12	Soybeans	0
Field corn ^{3,4}	8.5	Sugarcane	40
Field corn (seed) ^{3,4}	8.5	Sunflower	18
Flax	26	Sweet corn ⁵	18
Forage grasses	40	Sweet pepper transplants ⁶	40
Lentils	40	Sweet potato transplants ⁶	40
Lettuce	18	Tobacco	12
Lima	12	Tomatoes	40
Oats	18	Tomato transplants ⁶	40
Onion ⁶	40	Watermelon ⁶	40
Peanuts	12	Wheat, spring	8
Peas	8	Wheat, winter ¹	4.5
		Other crops not listed	40

Product is used for rotational restriction example purposes only; use does not indicate any endorsement or recommendation of product. USDA-NRCS does not endorse or provide pesticide recommendations.



NRCS Cover Crop Termination Guidelines Version 4: June 2019





NRCS Cover Crop Termination Guidelines Version 4: June 2019

- The purpose of these Guidelines is to provide an additional level of comfort for producers that may be unfamiliar with cover crops and want up front assurance that their crop is insured and their cover cropping management decisions will be considered a GFP. These Guidelines serve as a recognized nationally applicable agricultural expert resource for cover crop termination in cover cropping management systems. However, producers may also be implementing innovative cover cropping systems that fall outside these Guidelines. To help maximize additional flexibility and up - front assurance, producers can choose to pursue any one of the following options to assure that their cover cropping management system is a GFP.
 - 1. A producer can follow the generalized zonal guidance provided in these Guidelines,
 - 2. A producer can utilize already available published materials from agricultural experts (e.g., from a university) that are applicable for the crop and the area that support the cover crop management practice as a GFP determination (per the GFP Handbook
 - 3. In rare instance where 1 and 2 do not cover a specific cover cropping management system, request an exception to these Guidelines by receiving agricultural expert support in writing in accordance with the GFP Handbook.



Cover Crop Planning Tools

- Cover Crop 340 Practice Standard
- Cover Crop Councils
- Resources and Publications—Soil Health Division
- Sustainable Agriculture Research & Education (SARE)
 - Online Book and Topic Room on Cover Crops
- Cover Crops for Sustainable Crop Rotation and Soil Health and the SARE cover crops topic room
- No-Till Farmer: The Pluses And Minuses Of Today's Most Popular Cover Crops
- Various industry cover crop calculators



Soil Health Principles to Support High Functioning Soils





This information is provided as a public service and constitutes no endorsement by the United States Department of Agriculture or the Natural Resources Conservation Service of any service, supply, or equipment listed. While an effort has been made to provide a complete and accurate listing of services, supplies, and equipment, omissions or other errors may occur and, therefore, other available sources of information should be consulted The USDA is an equal opportunity provider and employer.

Meeh, NRCS