Interseeded Cover Crop in Corn Grain

Study Overview

Interseeding is a method used to establish cover crops earlier in the growing season by planting cover crops when corn is still growing. The objective of this protocol is to determine the effects of interseeding a cereal rye cover crop into corn grain on corn yield, cover crop biomass, and cover crop forage quality. Results from this project will help determine the economic benefits of incorporating harvestable cover crops into corn grain systems.

Rationale

Establishing cover crops after corn harvest for fall growth is difficult due to the short growing season after harvest. Interseeding cover crops into corn at the V3-V7 growth stage (three to seven leaf collars) may allow for improved cover crop establishment and biomass production because the cover crop is allowed to grow until corn canopy closure occurs. The idea is that the cover crop emerges but remains relatively inactive during the corn growing season, with a rapid increase in cover crop growth expected when the corn reaches maturity and throughout the remainder of the fall. Interseeding cover crops into corn during the growing season may overcome barriers related to cover crop establishment following corn harvest. These challenges generally include remaining heat units, day length, and unpredictable soil moisture content in the fall.

Cover crops have several soil health and conservation benefits, but also have many uses beyond conservation, including forage production. Cover cropping as a practice comes with a production cost, generally from seed, planting, and termination. There are also potential risks associated with growing cover crops that may reduce yield of some cash crops. Interseeding cover crops into corn grain for use as value-added alternative forages has the potential to turn cover crops into profitable short-term investments as well as long-term ones.

This collaborative demonstration and research project is meant to showcase the potential for interseeding cover crops into corn, obtain more data about this practice, and determine the value of interseeded cover crops as forage. The value of cover crops as forage could be an important

About collaborative producer-led protocols

This project is a collaborative effort of DATCP's Producer-Led Watershed Protection Grant Program, UW-Madison Division of Extension, and many local partners and collaborators to support producer-led research, demonstration and education. Protocols are designed with producers to support farmer-driven conservation solutions, farmer-to farmer mentorship, and local data on conservation practice performance across Wisconsin.

Read more about this collaboration, potential partners, and how to receive support and technical assistance in implementing this protocol in the Supplemental Information.

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factor in cover crop adoption in Wisconsin, especially for dairy operations and as an added value to grain operations.

Outcomes

Why participate? Through collaborative research and demonstration projects, participating farmers will receive:

- Insights into how conservation practices perform for their fields, cropping systems and growing conditions.
- Individualized report of their results (cover crop biomass, forage quality, and corn yield) and what they might mean for soil erosion protection, forage inventory and profitability.
- A statewide summary report: as producers complete this protocol, individual results will be anonymized and aggregated to increase our understanding of this practice across Wisconsin farms.
- If interested, receive technical assistance with research implementation, including laying out the trial, sampling cover crop biomass, collecting yield data, etc. Consult the PLWPG Program Partner Guide or reach out to UW-Madison Extension or DATCP's conservation agronomist (DATCPProdLed@wisconsin.gov) to connect with partners.
- Learn from others! As part of a collaborative demonstration and research project, learn from others participating in this project, or similar projects, and gain insights into what others are finding.

Results from this Collaborative Research & Demonstration project will support learning around conservation practices throughout producer-led watershed groups and among Wisconsin farmers and stakeholders more broadly. Results will be anonymized and shared on *UW-Madison Extension's On-Farm Research Results* page and at various educational events throughout the state. Interested participants are encouraged to share their findings or host a field day as part of their producer-led watershed group's educational events.

Protocol: Interseeded Cover Crop vs. No Interseeded Cover Crop in Corn Grain

The following protocol is designed to compare two treatments: corn grain interseeded with a cereal rye cover crop versus corn grain with no interseeded cover crop (called the "control"). Everything else is kept constant (i.e., the plots should be treated the same except for the interseeding) and with replication, project participants and their collaborators can assess if interseeding cover crops into corn grain is a good fit for farms in Wisconsin. For this protocol, two replications are required, but 3-4 replications are recommended.

Interested in investigating a third treatment? Recognizing that cover crop management, including species selection, seeding method, rate and timing, can vary, adding an additional cover crop treatment to the study design provides flexibility to evaluate additional cover crop management factors. Refer to Supplemental Information for guidance on exploring an additional management factor.

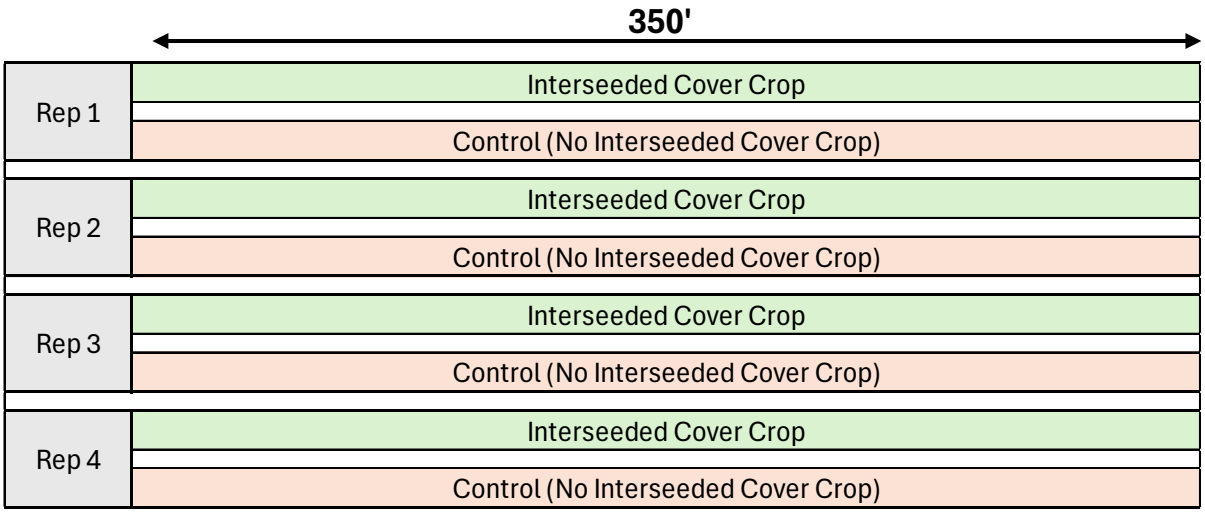
While collaborative research and demonstration projects are designed to be simple and comprehensive so that any interested producer can implement the project on their own, there are many collaborators available to provide assistance from designing trial layout to submitting data. DATCP's Conservation Agronomist, Extension's on-farm research team, and local collaborators, including county conservation departments, Extension regional educators & outreach specialists, nonprofit organizations,

Wisconsin Department of Natural Resources, and agronomists, can provide support and technical assistance to facilitate implementation. See the Supplemental Information to connect with potential partners or reach out to DATCP's Conservation Agronomist to get started.

Example layout

Treatments:

- Control: Corn grain with no cover crop interseeding.
- Interseeding treatment: Corn grain with cereal rye cover crop interseeding at the V3-V7 corn growth stage.



1. A control plot is required. This is the plot that is *not* interseeded with cereal rye.

2. Include buffer rows between each treatment plot and replication. Buffer rows serve to shelter the middle rows of a replication from the effects of neighboring treatments (for example, drift of the cereal rye cover crop being broadcast).

3. Individual plot width will be based on the width of the equipment used to implement the protocol, including cover crop seeding equipment and corn harvester.

4. The minimum length of rows must be 350 feet. If the field is relatively short, plots that are the full length of the field tend to be easier to implement and collect yield data.

5. The plots should be established in a uniform area of the field to better evaluate the effect of the treatments. Avoid the field edge/headlands or any irregular areas (ex: atypical soil type, stray tile line, etc.) of the field that could unintentionally bias the results.

6. Replication: It is recommended that participants include a minimum of 3-4 replications of each treatment (two replications are required for this protocol). Randomization is not required for this protocol. However, it is recommended that replicates are distributed across the trial area (like in the layout above), rather than splitting the field (ex: half the field no cover crop and half the field interseeded rye), which could unintentionally favor one treatment over the other based on field position.

7. Participants should establish their cover crop plots in whatever direction they plan to plant the following corn crop. However, participants can choose the orientation that they plant corn.

Local and state partners can provide assistance developing a trial layout that meets the criteria for this research project and works well with your fields, equipment and any other requests. Reach out to your local partners, including Extension regional educators & outreach specialists, county conservation departments, or an agronomist, or DATCP's conservation agronomist for support.

Implementation

This document will walk project participants through steps to implement this protocol: 1) how to select the demonstration and research plot location; 2) corn planting protocol; 3) interseeding protocol; 4) harvest protocol; 5) cover crop monitoring & sampling; and 6) data collection.

Recommendations and requirements throughout the protocol have a rationale that can be explored further in the Supplemental Information section. Additional resources, including the cover crop sampling protocol and data collection sheets, can also be found in the Supplemental Information.

1. Site Selection for the Demonstration and Research Plot

General recommendations:

- Participants are encouraged to select a site that is relatively uniform, which will help to discern if there was any effect of the treatments.
- It is recommended that fields are accessible to aid in data collection and scouting throughout the season and create opportunities to host field days.
- The minimum row length for a plot must be 350', so choose a field that will accommodate this row length.

Field recommendations:

- Participants are required to select a field in no-till to establish the plots.
- Field should not have received manure application the previous fall and spring prior to planting.
- If participants planted all their fields with overwintering cover crops the previous fall, try to select a field where the cover crop has lower biomass in the spring prior to planting.
    - If possible, consider selecting a field where the previously planted cover crop was winterkilled.
- Selecting a field with minimal residue or weed pressure will improve the chances of establishing an interseeded cover crop.
- Field history must be reported (Field Management Data Collection Sheet).

2. Corn Planting

- Participants are required to plant corn grain in 30-inch rows. Participants can choose corn variety and population. Corn variety and population must be reported (Field Management Data Collection Sheet).
- Participants should use their standard fertilizer program. Please don't try to increase fertilizer to account for the interseeded cereal rye or field residue removal.
  - Fertilizer programs should be identical for the control plots and the interseeded plots.
  - Fertilizer program must be reported (Field Management Data Collection Sheet).
- Herbicide program considerations:
  - Herbicide recommendations are ultimately up to the farmers decision, and they should be sure to read herbicide labels before application. A second-pass system is the best option for keeping a clean field. DATCP's conservation agronomist can help assist farmers in making herbicide protocol (refer to Supplemental Information section).
  - If harvesting this cover crop for forage use, the farmer becomes limited due to herbicide restrictions versus a farmer who will keep the rye as a true cover crop.
- *Photo-taking:* After corn planting (before interseeding), take one photo in each replicate to capture the conditions and percent ground cover at the time of planting. Photos not only provide insights into the results but also help share participants' stories within their producer-led groups and with others. To take a photo, hold your phone out to the side, parallel to the ground, and avoid including your feet (see Cover Crop Sampling Protocol for a reference). Label the photo with the appropriate rep and date (ex: "Field ID_ CC1_May_15_2026").

3. Interseeding Protocol

- Timing: Participants should plan to interseed cereal rye at the V3-V7 corn growth stage (refer to Supplemental Information section). However, you will have the best chances of success interseeding between V4-V5.
- Interseeding application: Participants must interseed their cover crops using a broadcast method.
  - We recommend participants consult with the equipment operators (if possible) to discuss the treatment plot layout to best accommodate the broadcaster's (e.g. drone, airflow seeder, etc.) capabilities. Ensuring accurate and consistent seeding rates across the demonstration site is of high importance.
- Seeding rate: Participants are required to use cereal rye as their interseeded cover crop.
  - Participants can select the variety of cereal rye they wish to use.
  - Participants should use a seeding rate of 60 lbs. per acre. regardless of broadcast application method. If you plan to use a drone, check with your drone operator of choice that their equipment can ensure an application rate of 60 lbs. per acre.
  - If this seeding rate is not possible, seeding rate must be reported (Cover Crop Treatment Details Data Sheet).

Things to Consider After Cereal Rye Interseeding

- Photo-taking: 30 days after interseeding (mid-July) take one photo in each replicate to capture early season conditions and cover crop establishment. Label the photo with the appropriate rep and date (ex: "Field ID_ CC1_July_15_2026").
- During this period, the corn and cereal rye should be growing. Here are a couple things to consider:

- As mentioned, participants should not deviate from their standard fertilizer program. If using a split-application, please apply at the standard rate and method. Again, ensure that the control and interseeded treatment plots are treated identically.
- Second-pass herbicide if applicable (refer to Supplemental Information section). DATCP's conservation agronomist can help assist farmers in making herbicide protocol for a second pass.

5. Corn Harvest

- Photo-taking: Prior to harvest, take one photo in each replicate to capture late season conditions and cover crop performance. Label the photo with the appropriate rep and date (ex: "Field ID_ CC1_October_25_2026").
- Yield can be measured with a calibrated yield monitor or a weigh wagon.
  - Participants using a calibrated yield monitor to collect trial yield data can either collect yield data per plot or submit a yield shapefile for the entire field. If submitting a yield shapefile for the entire field, trial layout details (including a plot map, plot dimensions, and plot locations within the field) are required to geolocate the trial plots from the yield monitor data and analyze them correctly. Reach out to Extension's On-Farm Research Coordinator with any questions about this step.
  - If using a weigh wagon, coordinate with your Ag-retailer to bring a weigh wagon or reach out for assistance borrowing a weigh wagon for the trial. Each plot must be weighed separately and reported on the Yield Data Collection Sheet.

6. Cover Crop Sampling protocol

- Fall cover crop sampling: Sample cover crops prior to a killing frost. Follow the detailed cover crop sampling protocol in the Supplemental Information for instructions on how to collect fresh cover crop biomass weights, photos to determine percent green cover, and submit samples to the lab for the basic forage quality analysis package. (Note: a basic forage analysis package is all that is required for this protocol, but participants can add on any additional analyses if they are of interest).
  - Cover crop sampling summary: Since cover crop establishment and performance can be variable within the field due to seeding inconsistencies, field conditions, and other sources of in-field variability, this protocol takes multiple samples per cover crop replicate to best obtain representative data for the entire area. Within each cover crop replicate, you will have three random subsample locations where you measure and record the fresh weight of cover crop biomass and percent green cover (photo). These samples are combined to receive one forage analysis per cover crop replicate. This method provides an accurate estimate of cover crop biomass across the trial, while minimizing analysis costs.
- Spring cover crop sampling:
  - If the interseeded cover crop overwinters, repeat the same cover crop sampling process from the fall. Sample cover crops prior to termination, using the detailed protocol in the Supplemental Information. *Note*: Participants can choose how they wish to manage the cover crops in the spring, selecting termination method and timing that works best for them and their goals.
  - If the cover crop does not overwinter, take photos to capture the soil coverage that the residue provides. Photos: take one photo in each replicate and label the photo with the appropriate rep and date (ex: "Field ID_ CC1_April_15_2027").

Data Collection

Required sampling and data collection for this protocol are necessary to address the study objectives and provide context to interpret results. Field history, management information and any observations during the trial will help understand trial results and provide insight so other farmers can gauge how practices might perform under their own field and growing conditions.

Required data and sampling:

- Cover crop sampling: including cover crop biomass & forage quality (fall & spring).
- Photos to determine percent green cover (at planting, after interseeding, prior to corn harvest, fall-prior to killing freeze, spring-prior to termination)
- Corn yield: using a calibrated yield monitor or weigh wagon
- Recent routine soil test (past 3 years): If unavailable, it is recommended to take a soil sample in the fall prior to cover crop seeding.
- Field Management Data (including field history, planting and tillage details, fertility and pest management inputs, and cover crop management)

Additional optional sampling: Select any additional metrics of interest

- Cover crop nutrient uptake analysis (fall & spring). It is recommended to submit a sample per replicate and budget $50/sample analysis and shipping.
- Yield of following year's crop: Evaluate any second year impacts due to the interseeded cover crop on the following year's cash crop performance.
- Slug monitoring: Visit https://slug-net.com/ to learn more about protocols and sign up. Recommended budget is $30 for supplies.
- Spring soil coverage: Visual estimate of soil coverage (including both green material and dead residue) prior to cover crop termination or harvest.
- NRCS Soil health assessment: Reach out DATCP's Soil Health Program Manager to learn more (randy.zogbaum@wisconsin.gov)

Data collection & submission: Data collection sheets are provided in the Supplemental Information. At the end of the season, participants will submit this information to UW-Madison Extension's on-farm research team so they can analyze results and provide participants with individual trial results. Individual trial data will not be distributed or shared without consent of participating farmers. However, participants are encouraged to share findings from their trial within their producer-led groups, at local events, and on UW-Madison Extension's On-Farm Research Results page, with the option to have results anonymized.

For the *Interseeded Cover Crop in Corn Grain Protocol*, participants will submit the following information: Project Background, Field Management Data Sheet, Cover Crop Treatment Details Data Sheet, Cover Crop Biomass Data Sheet, cover crop photos, forage quality lab analysis results, Yield Data Sheet, yield monitor shapefile (if applicable), and any other relevant information or data from additional metrics. Please reach out to Extension's On-Farm Research Coordinator with any questions on data submission or data use.

Budget

In their grant application, participants should include budgeted money for cover crop seed, cover crop planting costs, fall and spring biomass analysis, and any additional costs they wish to cover. Seeding costs will vary depending on method. For example, drone application costs have been estimated to be around $20 per acre.

Cover crop analysis costs: A typical forage analysis at Dairyland Labs will cost $30/sample, but participants are free to use the lab of their choice (cost per sample are subject to change with annual price increases and participants should consult their lab of choice when budgeting for lab analyses). There will be 1 forage sample collected per treatment in each replication. For example, if you have 3 replications, you will submit 3 cover crop samples for a forage analysis and would budget $90 for forage analysis per sampling time (so a total of $180 for forage analysis if sampling in the fall and spring). *Note: recommended cover crop sampling falls across two grant cycles.*

Additional costs include shipping of cover crop samples, mileage, farmer stipends for participation, cover crop sampling equipment (if needed), and the costs for any additional measurements or sampling you wish to add on. Producer-led groups are encouraged to budget for cover crop seed/seeding, farmer stipends, and any miscellaneous costs however feels most appropriate based on their group's priorities for their grant.

Example Budget:

Category	Item					Total Cost
Cover Crop	Seed (based on cover crop species selected and trial acreage)					
	Seeding cost (based on application method and trial acreage)					
Cover crop biomass sampling		Cost per sample*	Reps**	Treatments	Sampling time***	
	Forage quality	$30	3	1	2	$180
	Sampling equipment					$100
Misc	Shipping					$40
	Farmer stipend					
	Any additional metrics or measurements (see optional data collection)					

*Cost per sample is subject to change with annual price increases and participants should consult their lab of choice when budgeting for lab analyses

**Number of replications will be based on trial design (see trial design section for more information).

***If cover crops do not overwinter, there will just be one sampling time.

Supplemental Information

The following supplemental information includes 1) cover crop sampling protocol, 2) data collection sheets, and 3) rationale for recommendations in this protocol and additional resources.

Cover Crop Sampling Protocol

Cover Crop Sampling for *Interseeded Cover Crop in Corn Grain Protocol*

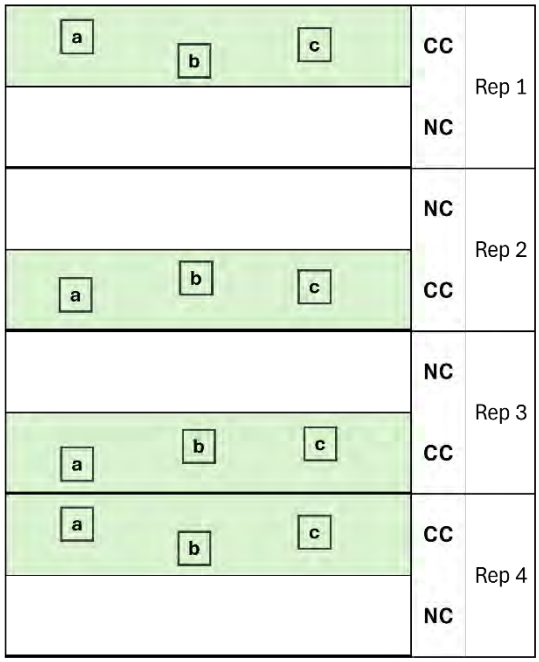
Includes instructions for fresh biomass collection, percent green cover (photo), and sample submission for forage quality/moisture. Read more about these metrics and what we learn from them at the end of the protocol.

***Cover Crop Sampling Protocol Summary*:**

Since cover crop establishment and performance can be variable within the field due to seeding inconsistencies, field conditions, and other sources of in-field variability, this protocol takes multiple samples per cover crop plot (or replicate) to best obtain representative data for the entire area. Within each cover crop replicate, you will have three random subsample locations where you measure and record the fresh weight of cover crop biomass and percent green cover (photo). These samples are combined to receive one forage analysis per replicate. For example, if you have 4 cover crop replications in your research trial, you will record 12 fresh biomass weights and receive 4 lab analyses (see diagram). This method provides an accurate estimate of cover crop biomass across the trial, while minimizing analysis costs.

Example cover crop sampling map

☐ Boxes indicate subsample locations: a, b, c



Example Cover Crop Sample Labels, with numbers pertaining to the reps:

1. Field ID_Fall 25 CC1
2. Field ID_Fall 25 CC2
3. Field ID_Fall 25 CC3
4. Field ID_Fall 25 CC4

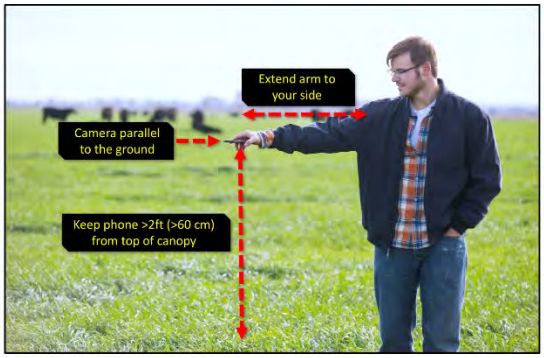
Supplies:

- 2, 5-gal buckets: 1 for weighing individual biomass samples, 1 for collecting biomass per replicate
- Sampling area: recommend 2x2 foot quadrat, but other sizes can be used (record on datasheet)
- A battery operated, portable scale (ex: hanging scale)
- Scissors or pruner to cut the cover crop
- Sampling bags for appropriate lab analyses
- Tape measure
- Smart phone or camera
- Data collection sheet & pen/pencil

Cover Crop Sampling Protocol

Sampling protocol

1. Collect all the necessary supplies
2. Label the sampling bags for each replicate. Use consistent language throughout your research trial so you know which cover crop sample aligns with which plot. We recommend you create a map like the one above to ensure consistent labels are used.
3. Weigh the empty bucket, then use the TARE button to account for the bucket weight. You can also write down the weight and subtract it from your sample total.
4. Start with the first replicate. Find a random area in the field. Toss the quadrat and make sure the square is laying flat on the ground.
5. Use scissors or pruners to cut the above-ground cover crop inside the square or sampling area and flush with the soil surface. Place the above-ground cover crop inside the empty bucket after sampling.
6. From your cover crop sample remove any soil, crop residue, and weeds.
7. Weigh the bucket with the cover crop biomass. *Ensure the bucket weight is not included!*
8. Record fresh cover crop biomass weight on the data collection sheet. Transfer biomass to second bucket, which will be used to collect cover crop biomass for the entire replicate.
9. *Collecting percent green cover:* In each biomass sample location, take a representative photo of the cover crop. Hold your phone out to the side, parallel to the ground, and avoid including your feet (see image). Label the photo with the appropriate rep (ex: “Field ID_Fall 25 CC1 a”). Participants can submit photos to be analyzed in Canopeo, or, if they are comfortable, determine percent green cover directly in the Canopeo phone app and record in the data sheet.



Reference: Canopeo

10. Repeat steps 4-9 in a second and third random location in the first replicate.
11. From the bucket with all three fresh biomass samples, mix the cover crop sample thoroughly. Place a representative sample of cover crop biomass (0.5-1 lb) into an appropriately labeled bag to send to the lab for a basic forage quality analysis (make sure percent moisture is included in the forage analysis package).
12. Empty any remaining biomass in the bucket.
13. Repeat steps 4-12 for the remaining cover crop replications.
14. Record any other observations of note, including field and soil conditions, cover crop variability, weeds or volunteer plants throughout the trial area, etc.
15. Immediately after sampling, deliver cover crop biomass samples to lab drop-off locations or ship (preferably overnight or expedited shipping). Timely drop-off is important for accurate moisture readings and biomass measurements.
16. Submit cover crop biomass datasheet and lab analyses with other research trial data to UW-Madison Extension.

Cover Crop Sampling Protocol

Why measure cover crop biomass, percent green cover, and forage quality?

Cover Crop Biomass: Cover crop biomass is an important metric to link cover crop performance to important outcomes such as soil protection from erosion and runoff, weed suppression, nitrogen uptake and nitrate leaching mitigation, potential forage tonnage, crop yield and many others. While biomass is the amount of plant material a cover crop produces, both aboveground shoots and belowground roots, measuring aboveground plant material provides an accessible way to measure cover crop growth that can be compared to research-based biomass benchmarks and research outcomes.

Percent green cover: Percent green cover, measured using Canopeo, is a useful metric to evaluate soil protection and runoff risk.

Forage quality: Forage quality provides additional information about the forage potential of your standing cover crop for harvest or grazing.

This protocol requires percent green cover and forage quality, but additional metrics can provide additional context to evaluate cover crop biomass relative to agronomic and conservation goals and research outcomes. For example, nutrient analysis offers insights into nutrient uptake and cycling that may impact productivity and water quality, such as nitrogen leaching risk and nutrient availability in the soil.

As you navigate this protocol, reach out to UW-Madison Extension for additional guidance or clarification.

Cover Crop Biomass Data Sheet

Project Name		**Participant Name**	
Field ID		**People collecting data**	
Sampling Time *(select one)*	☐ fall ☐ spring	**Sampling date:**	
Sampling Method *(select one)*	Quadrat: ☐ 2ftx2ft ☐ Other (include sample area and units): _____ ☐ 3ftx3ft		
Data collected *(select all)*	☐ photos ☐ height ☐ forage quality ☐ moisture ☐ nutrient concentrations		
Observations, notes & in-field variability. *Take special note of in-field variability or patterns of cover crop biomass and volunteer wheat as this can influence trial results. If helpful, indicate on a map*.			

Additional notes:

- When recording fresh biomass weights, record to as many decimals as the scale allows to provide for greater accuracy.
- Submit data collection sheets, photos, and lab analysis results at the end of season.
- Fill out as many data tables as you require for your research project and trial design.

Cover Crop Biomass Data Sheet

Field ID: **Sample Date:**

COVER CROP BIOMASS DATA					
Required				Optional	
Plot ID (Ex: "CC1")	Sub sample	Fresh biomass weight (lb)	Average fresh biomass weight (lb)	Green Cover (%) (Estimate using Canopeo or submit photo)	Height (in) by species
_____	a				
	b				
	c				
_____	a				
	b				
	c				
_____	a				
	b				
	c				
_____	a				
	b				
	c				

Cover Crop Biomass Data Sheet

Field ID: **Sample Date:**

COVER CROP BIOMASS DATA					
Required				Optional	
Plot ID (Ex: "CC1")	Sub sample	Fresh biomass weight (lb)	Average fresh biomass weight (lb)	Green Cover (%) (Estimate using Canopeo or submit photo)	Height (in) by species
_____	a				
	b				
	c				
_____	a				
	b				
	c				
_____	a				
	b				
	c				
_____	a				
	b				
	c				

Cover Crop Treatment Details: Interseeded Cover Crop in Corn Grain

*Complete the following cover crop management information for the interseeded cover crop treatment (CC) for the **Interseeded Cover Crop in Corn Grain** protocol.*

Treatment ID / Description		**Interseeded Rye Cover Crop (CC)**		
Cover crop species *List all species or cover crop mix name*	***Example species*** *Cereal (winter) rye*	**Species** *See list of examples or write mix name*	**Seeding rate** *(Per species)*	**Rate units** *(lbs/ac, bu/ac, seeds/ac)*
	Winter wheat			
	Annual ryegrass			
	Oats			
	Red clover			
	Crimson clover			
	Berseem clover			
	Hairy vetch			
	Radish			
	Turnip			
	Other (Be specific)			
Cost ($/ac) per cover crop treatment *Include cost per seed and planting (required to conduct economic analysis)*				
Planting date *(If known, MM/DD/YYYY)*				
Planting date category		☐ Frost seeded ☐ Early season interseeded into standing crop	☐ Late season interseeded into standing crop ☐ After crop harvest	
Planting method		☐ Drilled ☐ Broadcasted	☐ Broadcasted & incorporated ☐ Drone	☐ Plane / helicopter ☐ Other
Growth stage at interseeding and approximate height				
Soil conditions at time of planting		☐ Dry ☐ Somewhat dry	☐ Neither dry or wet	☐ Somewhat wet ☐ Wet
After seeding, within how much time did you receive rainfall?		☐ <2 days ☐ 2-7 days	☐ 1-2 weeks ☐ >2 weeks	
If you had rain within a week, approximately how much rain did you receive?		☐ <1 in ☐ 1-2 in	☐ >2 in	
Was manure or fertilizer applied to the cover crop?		☐ No ☐ Manure	☐ Synthetic fertilizer	

How uniform is the cover crop?	☐ Very uniform ☐ Fairly uniform ☐ Somewhat variable ☐ Very variable
Termination date *(If known, MM/DD/YYYY)*	
Termination timing	☐ Fall / winterkill ☐ Early spring ☐ <2 weeks before planting ☐ At / after planting
Termination method	☐ Winterkill ☐ Herbicide ☐ Harvested ☐ Tillage ☐ Roller crimper ☐ Other
Approximate height at termination *(in)*	
Percent ground cover at termination	☐ 0-20% ☐ 21-40% ☐ 41-60% ☐ >60%
Additional cover crop details / notes	
How satisfied were you with the results from this cover crop? *Share any observations around establishment, growth, overwintering, uniformity, etc. that contributed to your degree of satisfaction.*	

Cover Crop Treatment Details:

*If you investigated additional cover crop treatments besides the 1) interseeded rye cover crop and 2) no cover crop control that was included in the **Interseeded Cover Crop in Corn Grain** protocol, complete the cover crop management information for each additional treatment. Make sure to record the appropriate Treatment ID or Treatment Description on the top of the table.*

Treatment ID / Description				
Cover crop species *List all species or cover crop mix name*	***Example species*** *Cereal (winter) rye*	**Species** *See list of examples or write mix name*	**Seeding rate** *(Per species)*	**Rate units** *(lbs/ac, bu/ac, seeds/ac)*
	Winter wheat			
	Annual ryegrass			
	Oats			
	Red clover			
	Crimson clover			
	Berseem clover			
	Hairy vetch			
	Radish			
	Turnip			
	Other (Be specific)			
Cost ($/ac) per cover crop treatment *Include cost per seed and planting (required to conduct economic analysis)*				
Planting date *(If known, MM/DD/YYYY)*				
Planting date category	☐ Frost seeded ☐ Early season interseeded into standing crop	☐ Late season interseeded into standing crop ☐ After crop harvest		
Planting method	☐ Drilled ☐ Broadcasted	☐ Broadcasted & incorporated ☐ Drone	☐ Plane / helicopter ☐ Other	
Growth stage at interseeding and approximate height	*If the cover crop was interseeded.*			
Soil conditions at time of planting	☐ Dry ☐ Somewhat dry	☐ Neither dry or wet	☐ Somewhat wet	☐ Wet
After seeding, within how much time did you receive rainfall?	☐ <2 days	☐ 2-7 days	☐ 1-2 weeks ☐ >2 weeks	
If you had rain within a week, approximately how much rain did you receive?	☐ <1 in	☐ 1-2 in	☐ >2 in	

Was manure or fertilizer applied to the cover crop?	☐ No ☐ Manure ☐ Synthetic fertilizer
How uniform is the cover crop?	☐ Very uniform ☐ Fairly uniform ☐ Somewhat variable ☐ Very variable
Termination date *(If known, MM/DD/YYYY)*	
Termination timing	☐ Fall / winterkill ☐ Early spring ☐ <2 weeks before planting ☐ At / after planting
Termination method	☐ Winterkill ☐ Herbicide ☐ Harvested ☐ Tillage ☐ Roller crimper ☐ Other
Approximate height at termination *(in)*	
Percent ground cover at termination	☐ 0-20% ☐ 21-40% ☐ 41-60% ☐ >60%
Additional cover crop details / notes	
How satisfied were you with the results from this cover crop? *Share any observations around establishment, growth, overwintering, uniformity, etc. that contributed to your degree of satisfaction.*	

Project Overview

Project Information	
Project Title	
Protocol *(if applicable)*	
Year	
Preferred Point of Contact	
Producer-Led Watershed Group *(if applicable)*	

Participants: List the farmers, collaborators and partners participating in this project.

Contact Information

Farm / Organization Name	**First & Last Name**	**Phone**	**Email**	**Preferred Method of Contact** *(Check one)*
				☐ Text ☐ Phone Call ☐ Email
				☐ Text ☐ Phone Call ☐ Email
				☐ Text ☐ Phone Call ☐ Email
				☐ Text ☐ Phone Call ☐ Email
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				☐ Text ☐ Phone Call ☐ Email

Field Management Data Collection Sheet

FIELD INFORMATION	
Farmer Name	
Field Name	
GPS (Lat / Long)	*Recommended to retrieve soils and weather information*
Field description	*Include known sources of variability, slope, etc.*
Pattern tile drainage	☐ Yes ☐ No
Irrigation	☐ Yes ☐ No

SOIL BACKGROUND					
Predominant soil name *Ex. Plano silt loam*					
Soil texture *Check one*	☐ Sand ☐ Loamy sand ☐ Sandy loam	☐ Loam ☐ Silt loam ☐ Silt	☐ Sandy clay loam ☐ Clay loam ☐ Silty clay loam	☐ Sandy clay ☐ Silty clay ☐ Clay	☐ Muck ☐ Unknown
Recent routine soil test (past 3 years)?	☐ Yes ☐ No				
Date of most recent soil test	*Record month and year*				

SOIL LAB ANALYSIS *Complete information below or submit a copy of lab results with data collection sheets.*	
Lab *Ex. AgSource*	
Analysis Method (for P and K) *Ex. Bray*	
pH	
OM (%)	
P (ppm)	
K (ppm)	

Field Name: **Year:**

FIELD HISTORY	
Estimate the number of years this field has been in crop production	
Rotation description *Ex. corn grain (1 yr) – soybean (1 yr) – alfalfa (3 yrs)*	*Include typical number of years in each phase of rotation. Specify if corn is for grain or silage.*
Crop(s) planted in the past 2 years *Specify if corn is for grain or silage.*	2 years ago: Last year:
Did you remove the crop residue after last year's crop?	☐ Yes ☐ No
If alfalfa is in the rotation, include a description of the most recent alfalfa crop.	*Include termination management (month and year), termination method, whether it is incorporated, stand density (poor, fair, or good), and regrowth (in).*
In the past 10 years, how many years has a cover crop been planted?	
Historical tillage *Check one*	☐ Conventional tillage (<15% residue) – *Ex. chisel plow, moldboard, disc* ☐ Reduced tillage (15-30% residue) ☐ Conservation tillage (>30% residue) – *Mulch/vertical tillage* ☐ Conservation tillage (>30% residue) – *Strip tillage* ☐ Rotational no-tillage – *Alternating no-tillage and conservation tillage depending on crop rotation phase* ☐ No-tillage – *Continuous*
How many years has the current tillage practice been used in this field?	
What is the typical tillage timing? *Check all that apply*	☐ Fall ☐ Spring
In the past 10 years, how many years has manure been applied?	
Additional field history details that may influence trial results	

Field Name: **Year:**

Field Management for the Trial Year

Record details for management practices that were consistent across the whole trial area during the previous fall through harvest. Any management practices that varied as part of your trial design will be recorded separately.

CROP DETAILS	
Crop planted	
Planting date *(MM/DD/YYYY)*	
Relative maturity	
Variety *(If known)*	
Row spacing (in)	
Seeding rate	Rate: ☐ lbs/ac ☐ seeds/ac
Seed treatments	*List or submit a photo of seed tag. Recommended for pest-related research projects.*
Planting method description *Ex. no-till corn planter*	
Percent residue at planting	☐ 0-15% ☐ 15-30% ☐ 30-50% ☐ >50%
Field conditions when planted *Ex. very wet*	
Additional planting details that may influence trial results	*Include examples such as variable seeding conditions, seeding depth, crop emergence, etc*
If this field was irrigated, how much was applied during the season? *(in)*	
Cropping season description and other observations	*Include notes about general weather trends, extreme weather events, pest outbreaks, etc.*

Field Name: **Year:**

COVER CROP DETAILS *If there was a uniform cover crop prior to this year's crop or cover crop interseeded uniformly into this year's crop, complete the following details. If not, skip this section.* *Note: for research trials where cover crop management varied across treatments, complete Cover Crop Treatment Data Sheet.*				
Cover crop species *List all species or cover crop mix name*	***Example species*** *Cereal (winter) rye* *Winter wheat* *Annual ryegrass* *Oats* *Red clover* *Crimson clover* *Berseem clover* *Hairy vetch* *Radish* *Turnip* *Other (Be specific)*	**Species** *See list of examples or write mix name*	**Seeding rate** *(Per species)*	**Rate units** *(lbs/ac, bu/ac, seeds/ac)*
Planting date *(If known, MM/DD/YYYY)*				
Planting date category	☐ Frost seeded ☐ Early season interseeded into standing crop	☐ Late season interseeded into standing crop ☐ After crop harvest		
Planting method	☐ Drilled ☐ Broadcasted	☐ Broadcasted & incorporated ☐ Drone	☐ Plane / helicopter ☐ Other	
Growth stage at interseeding and approximate height	*If the cover crop was interseeded.*			
Was manure or fertilizer applied to the cover crop?	☐ No	☐ Manure	☐ Synthetic fertilizer	
How uniform was the cover crop?	☐ Very uniform	☐ Fairly uniform	☐ Somewhat variable	☐ Very variable
Termination date *(If known, MM/DD/YYYY)*				
Termination timing	☐ Fall / winterkill	☐ Early spring	☐ <2 weeks before planting	☐ At / after planting
Termination method	☐ Winterkill	☐ Herbicide	☐ Harvested	☐ Tillage
Approximate height at termination *(in)*				
Percent ground cover at termination	☐ 0-20%	☐ 21-40%	☐ 41-60%	☐ >60%
Additional cover crop details that may influence trial results	*Include details that may have contributed to cover crop growth, such as weather or soil conditions at seeding.*			

Field Name: **Year:**

TILLAGE DETAILS
Record tillage details that occurred across the whole field from the previous fall through harvest. If no tillage occurred, skip this section.

	Approximate Date	Number of passes	Approximate Depth (in)	Implement(s) See list of examples	*Example implements*
Tillage pass details					*Vertical till*
					Strip till
					Soil finisher
					Chisel plow
					Moldboard plow
					Disk
					Field cultivator
					Ridge till
					Subsoiler / ripper
					Other (Be specific)

Additional tillage details that may influence trial results	

MANURE *To accurately credit manure, enter previous 2 years of manure application history. If no manure was applied in the previous two years, skip this section. Submit SnapPlus if available and preferred.*

Date Applied *(MM/DD/YYYY)*	**Manure Source** *Dairy, Beef, Chicken, Turkey, Swine, Other (Be specific)*	**Consistency** *Liquid (<4% DM) Liquid (4-11% DM) Solid (11-20% DM) Solid (>20% DM)*	**Rate** *(Include units: gal/ac, t/ac)*	**Application Method** *Surface Incorporated within 3 days Injected Grazing*

Was manure analysis done?	☐ Yes *(Submit with other trial data)* ☐ No
Grazing details *(If applicable)*	*Include animal type, number of animals, average weight, area grazed, dates, etc.*
Additional manure details that may influence trial results	*If incorporated, record how many days between application and incorporation. Include description of manure storage and processing, as this can influence nutrient content.*

Field Name: **Year:**

FERTILIZER, LIME, & FERTILIZER ADDITIVES *If none were applied, skip this section. If SnapPlus records are available, you can submit those records if preferred.*					
	Date Applied *(MM/DD/YYYY)*	**Product** *(Ex. Urea, AMS, Starter: 10-34-0)*	**Rate** *(Include units: gal/ac, lbs/ac)*	**Application Method(s)** *See list of examples*	***Example Application Methods***
Fertilizer					2x2 In-furrow Broadcast Incorporated Surface banding Injection Fertigation Foliar Y-Drop
Lime					
Fertilizer Additives *(Nitrogen stabilizers, biologicals, etc.)*					

If there were more applications than what fits in the table above, list additional applications below following the same format:

Field Name: **Year:**

PEST MANAGEMENT *Herbicides, insecticides, & fungicide. If none were applied, skip this section*					
	Date Applied *(MM/DD/YYYY)*	**Timing** *Choose burndown, pre, post, or 2nd post for herbicides and specify crop growth stage for non-herbicides*	**Product**	**Rate** *(Include units)*	**Application Method**
Herbicide					
Insecticide *Foliar and soil*					
Fungicide					

If there were more applications than what fits in the table above, list additional applications below following the same format:

Field Name: **Year:**

Yield Data Collection Sheet

CORN YIELD DATA				
Field Name				
Harvest Date *(MM/DD/YYYY)*				
Method of yield data collection *Select one*	☐ Calibrated yield monitor	☐ Weigh wagon	☐ Plot combine	☐ Hand harvest
Record additional information or observations regarding harvest, harvest conditions or yield data that would be valuable to report.				

Instructions for Plot Level Yield Data:

Yield Monitor: Participants using a calibrated yield monitor to collect trial data can either collect yield data per plot and record below or submit a yield shapefile for the entire field. If submitting a yield shapefile for the entire field, you will also need to provide trial layout details (including a plot map, plot dimensions, and where the plots are within the field) to geolocate the trial plots within the yield monitor data and analyze them correctly.

Weigh wagon: If using a weigh wagon, the fresh weight, grain moisture (%), and area of each plot will be measured to calculate yield per acre. Participants can submit this field data and/or convert weights to yield per acre (see UW-Madison Extension On-Farm Research Resources to calculate yields using a weigh wagon).

Field Name: **Year:**

PLOT-LEVEL YIELD DATA					
Plot ID	Weigh Wagon Only		Moisture (%)	Yield	Units (bu/ac or t/ac)
	Weight per plot (lbs)	Area per plot (sq ft)			

Supplemental Information: Rationale & Resources

Interseeded Cover Crop in Corn Grain Protocol

About Collaborative Research & Demonstration Projects

Collaborative research and demonstration projects are designed to be simple and comprehensive so that any interested producer can implement the project on their own. However, for those interested, DATCP's Conservation Agronomist, UW-Madison Extension's on-farm research team, and local collaborators, including county conservation departments, UW-Madison Extension regional educators & outreach specialists, nonprofit organizations, Wisconsin Department of Natural Resources, and agronomists, may be available to provide support and technical assistance to facilitate implementation.

DATCP's Producer-Led Watershed Protection Grant Program and UW-Madison Extension's On-Farm Research team are available to support farmers and local collaborators navigate the protocol: from designing the trial layout for specific fields and implementing the protocol, to submitting data and sharing out results.

Protocols are available for *all* of Wisconsin's producers and partners, regardless of their involvement with a producer-led watershed group. For those interested in conducting any of the Collaborative Research & Demonstration projects outside of the Producer-Led Watershed Grant Protection Program, reach out to UW-Madison Extension's On-Farm Research Coordinator (aaugaten@wisc.edu) with any questions or to receive assistance.

- DATCP's Conservation Agronomist (DATCPProdLed@wisconsin.gov) is available to assist those implementing this protocol as part of their producer-led group. They can help with plot layout, agronomic support (ex: navigating fertilizer and herbicide programs), clarify questions about the protocol, or connect you to the best person for your question or request.
- UW-Madison Extension's On-Farm Research Team provides support with data analysis, interpretation and statewide outreach. UW-Madison Extension has a network of regional educators and outreach specialists who can provide technical assistance with on-farm research trials and share research results and related content at local events. Connect with Extension's On-Farm Research Coordinator (aaugarten@wisc.edu) with any questions.
- Local partners, including Extension regional educators & outreach specialists, county conservation departments, nonprofit organizations, Wisconsin Department of Natural Resources, and agronomists may be available to provide assistance with laying out plots, sample collection throughout the season (ex: cover crop biomass, soil samples, yield, etc), in-season scouting, recording and submitting any data, and coordinating any relevant outreach activities like field days. If you are interested in collaborating with partners, make sure to reach out to them in advance to see if they can provide support.

Not sure who to reach out to or are having trouble finding someone available to support your research efforts? Consult the PLWPG Program Partner Guide or reach out to DATCP's conservation agronomist (DATCPProdLed@wisconsin.gov).

Trial Layout

Plot Size and Location.

A plot, the area to which an individual treatment is applied, must be 350 feet long and width should reflect the equipment you have to plant, harvest, apply treatments, etc.

If possible, avoid having demonstration and research plots on the edge of a field, as headlands can influence crop performance and research trial results. This problem could be reduced by using buffer rows (rows that shelter the rows of a treatment from the effects of neighboring treatments or field edges) at the field edges, or by simply not using the rows at the edge of a field in your demonstration and research plots.

As with all new technologies and systems, there is an associated risk and interseeding is no different. It is a good idea to temper expectations and be conservative.

Why replicate the research and demonstration plots?

Replication refers to repeating experimental treatments (e.g., interseeded cover crop vs. no interseeded cover crop) across field conditions. Replication can help identify if a specific result is true or not. If the same result is observed across multiple plots with variation within a field or across multiple locations, it is less likely this result is due to chance. Ultimately, replication improves the ability to detect differences in treatments and provides more data across a field so you can more confidently trust your results. Two replications are required for this protocol, but 3-4 replications are recommended.

Potential to improve a low-yielding field/marginal ground?

Interseeding cover crops could add value to marginal ground via soil health benefits or allowing earlier access to a field that is historically wetter. Additionally, using the rye as added value forage or for grazing can potentially allow for recuperating some financial loss from lower yielding corn. This is an important perspective to keep in mind when determining goals for interseeding or any conservation practices you may implement.

Interseeding: Species, Timing, and Seeding Rate

Why does this project focus on interseeding?

The small amount of growing season that remains after corn and soybean harvest in Wisconsin can create many challenges when trying to successfully integrate cover crops into a rotation. Interseeding cover crops is one potential way to overcome these challenges associated with a shorter growing season. It allows cover crops to establish earlier in the season to maximize soil health benefits and provides opportunities for fall and/or spring forage. The competitiveness of the corn crop and environmental stress (heat, drought, flooding, etc.) will affect the potential for success, fall biomass, forage quality, and potential interseeding management.

Refer to the University of Wisconsin Interseeding Cover Crops in Row Cultivated Corn (A4175) for more information on interseeding.

Why seed during the V3-V7 corn growth stage?

The interseeding planting window was selected based on research results. We also wanted to provide a wider window for interseeding because corn can rapidly move between stages depending on heat and moisture. Ideally, cover crops will be interseeded when the corn is big enough that the cover crops do not compete with it but early enough before corn canopy closure (e.g., anywhere between V3-V7).

Interseeding too early has the potential to negatively affect corn yields. Interseeding up to V7 has been successful, but you run the risk of the corn canopy closing too quickly the later you interseed. The potential for injury from short residual preemergence herbicides is also reduced at later timing. Wisconsin research on successful interseeding into corn has targeted the V5-V6 growth stage. You have the best chances of success seeding between V4-V5.

To improve chances of success at interseeding, the corn crop should be weed free, have adequate soil moisture, and precipitation should be forecasted following interseeding (especially for broadcast interseeding because it improves seed to soil contact). Along with environmental conditions, corn growth rate and hybrid will affect success. For example, hybrids with upright leaf structures may allow more sunlight to cover crops between the rows.

Refer to the University of Wisconsin Visual Guide to Corn Development for photos and more information on corn growth stages.

Why choose cereal rye as the interseeded cover crop?

Cereal rye (*Secale cereale*) is a winter annual grass that is able to survive the winter in Wisconsin. There is a strong research background on winter rye as a cover crop. The seed is also affordable (VNS is the most affordable option but lacks predictable characteristics of specific varieties) and accessible. Rye aggressively competes with weeds and can provide effective weed suppression. Rye can also be used as forage. Be prepared to act quickly in the spring and have a spring management plan. Cereal rye can rapidly add biomass in the spring.

University of Wisconsin-Madison Extension generally recommends seeding rye for cover at 40-60 lbs. per acre. Using the higher seeding rate (60 lbs. per acre) should help establishment and support fall and early spring forage potential.

Interseeding Establishment Methods

Common interseeding methods - Why apply with a drone as opposed to other broadcast method?

Common cover crop interseeding methods include modified grain drills (removal of row units to avoid damaging the main crop); fertilizer spinners; air spreaders; tractor-mounted seed spreaders; and aerial applications, including airplanes and helicopters. Modified grain drills (i.e. direct seeding) generally result in the best stand establishment as compared to broadcast application methods but often times equipment access is a problem for some growers. With most of these methods, excluding planes and helicopters (which can be relatively expensive methods, especially for smaller farms), driving equipment through the actively growing

cash crop is required for seeding to occur. With this comes the risk of crop damage and contributing to soil compaction (pending soil conditions).

Using drones for cover crop seeding is a relatively new approach compared to other common seeding methods in the state. By using a drone, cover crop seeding can occur even when field conditions would otherwise prevent larger equipment from getting in the field. This is especially advantageous when the target seeding window happens to occur while soil conditions are excessively wet, for example. With the drone application, rutting the field and/or inducing compaction is no longer a risk and the cover crop is getting seeded at the right time. In addition to overcoming field-soil condition barriers, drones do not pose the threat of damaging the actively growing cash crop, unlike traditional seeding methods. Drone-seeding cover crops potentially results in enhanced seed-to-soil contact compared to traditional broadcast methods due to the down pressure of the "prop-wash" of the drone's propellors.

The use of drones also comes with a few things to be aware of. Operation of a drone requires several licenses to be attained and several regulations and restrictions to be aware of. Drones also have a limited payload capacity (i.e. relatively small amounts of seed on board) generally due to drone-battery life and drone size, although technology is advancing rapidly in this space. Flight path planning is another logistic that must be considered ahead of time. For many growers, these realities lead them to partnering with service providers that offer drone services for hire. In summary, drones are a great option for interseeding cover crops early in the growing season (i.e. V3-V7 corn) and later in the season (i.e. R6 corn) to give the covers a head start in growth. As with any surface broadcast method, adequate moisture around the time of seeding remains a critical component for effective germination and establishment.

For more Information, visit https://ipcm.wisc.edu/blog/2022/06/interseeding-cover-crops.

Interseeded Cover Crop in Corn Grain: Adding an additional cover crop treatment

The *Interseeded Cover Crop in Corn Grain* protocol evaluates the effects of interseeding a cereal rye cover crop into corn grain at V3-V7 on corn yield, cover crop biomass, and cover crop forage quality. For those interested in a more ambitious research trial, adding a third treatment can tailor the protocol to your specific research interests & needs, and better inform management practices on your farm. You may choose to investigate an additional cover crop species mix, seeding method, seeding rate, or timing.

Evaluating two cover crop species or mixes

Treatments:

- Treatment 1: corn grain interseeded with a cereal rye cover crop*
- Treatment 2: no interseeded cover crop (i.e. the "control").
- Treatment 3: corn grain interseeded with a cover crop species or mix of your choice*

Additional considerations

- *Both cover crop treatments will be seeded using the same broadcast method at the same time (V3-V7). Depending on what cover crop you select for treatment 3, you may need to adjust the seeding rate based on what is recommended for your cover crop of choice.

- Cover crop selection: Explore the Midwest cover crop selector tools to find a good fit for your operation, or reach out for any assistance in selecting an additional cover crop species or mix to evaluate for this protocol.
- Follow the same protocols for implementation and data collection as what is outlined in the *Interseeded Cover Crop in Corn Grain Protocol*.
- Considerations: When drone seeding, the different cover crops or mixes may behave differently in how they spread. Work with the drone operator to ensure you achieve the appropriate spread across the plot width.

Evaluating cover crop seeding method

Treatments:
- Treatment 1: corn grain interseeded with a cereal rye cover crop- broadcast method*
- Treatment 2: no interseeded cover crop (i.e. the "control").
- Treatment 3: corn grain interseeded with a cereal rye cover crop- drilled method*

Additional considerations
- *Both cover crop treatments will be planted with cereal rye at 60 lb/ac at the same time (V3-V7).
- Follow the same protocols for implementation and data collection as what is outlined in the *Interseeded Cover Crop in Corn Grain Protocol*.
- Considerations with drilling interseeded cover crop: If using a drill, consider the logistics of the equipment (clearance, tire spacing, etc.) and how that may influence the implementation of this protocol.

Evaluating seeding rate

Treatments:
- Treatment 1: corn grain interseeded with a cereal rye cover crop at 60 lb/ac*
- Treatment 2: no interseeded cover crop (i.e. the "control").
- Treatment 3: corn grain interseeded with a cereal rye cover crop at a seeding rate of your choice*

Additional considerations
- *Both cover crop treatments will be seeded with cereal rye, using the same broadcast method at the same time (V3-V7).
- Follow the same protocols for implementation and data collection as what is outlined in the *Interseeded Cover Crop in Corn Grain Protocol*.
- Seeding rate recommendation: Select a seeding rate aligned with your cover crop biomass production goal, while considering cover crop seed costs. For example, you may wish to investigate a lower seeding rate to see if you can achieve comparable biomass production to 60 lb/ac, while reducing cover crop seed and seeding cost.

Evaluating interseeding time

Treatments:
- Treatment 1: corn grain interseeded with a cereal rye cover crop at V3-V7*

- Treatment 2: no interseeded cover crop (i.e. the "control").
- Treatment 3: corn grain interseeded with a cereal rye cover crop later in the season*

Additional considerations

- *Both cover crop treatments will be seeded with cereal rye, using the same broadcast method and rate (60 lb/ac).
- Follow the same protocols for implementation and data collection as what is outlined in the *Interseeded Cover Crop in Corn Grain Protocol*.
- Considerations: Late-season interseeding might be more challenging to seed below the canopy and gain good seed to soil contact. For corn grain fields, timing late-season drone seeding when the corn has begun to dry down and is projected to be harvested by mid-October, typically provides more favorable results. In general, timing drone interseeding when the soil has adequate moisture and/or a light rain is in the forecast will be beneficial for establishment.

Herbicide Program

There are few select herbicides that can be used in a corn/ interseeded rye cropping system. A second-pass system is recommended to help start clean and stay clean. Using residuals are difficult due to the restrictions with rye as a forage component. Starting out with an herbicide pass to terminate early season weeds is recommended. Coming back with a second pass before rye inter-seeding or after rye establishment is also recommended. The use of Round-up, 2,4-D, and Aim EC are all products that can be used pre-plant or pre-emerge on rye interseeding. 2,4-D, and Aim EC are also products that can be used post emergence on rye inter-seeding and corn. Make sure to consult with your local agronomist and to read and follow herbicide label.

Forage Components

Collecting a representative forage sample per treatment in each replication will help us determine market value for the cover crop forage. The forage analysis will determine nutritive value and dry matter percentage, both being required to determine pricing utilizing the UW Extension Hay Market Report.

Of the analysis values, Relative Forage Quality (RFQ) will be utilized as it includes digestible fiber which is most representative of the way an animal would perform on a given forage and is the value recommended to use with any mixed or grass hay. On a numeric scale, RFQ ranges from 100 to 200, based on intake of Total Digestible Nutrients (TDN) of all forages. The higher the RFQ, the better the quality.

Nutrient Management

For this trial, we would like the participants keep their normal fertilizer protocols for their chosen field. The goal of this trial is not to add extra cost to the farmer, but to help come up with an additional economic option with value to a field they already manage. Taking the rye for forage would include corn stalks being harvested as well. Managing nutrient removal for corn grain versus a corn silage (corn stalks being harvested) situation should be considered when applying nutrients. Consult your agronomist for how to adjust for the following year's fertility program if the field residue has been removed.

Protocol developed in collaboration with:

Dani Heisler, Wrangler Jones, *Wisconsin Department of Agriculture, Trade and Consumer Protection*

Dane Elmquist, Chris Bandura, *University of Wisconsin-Madison Division of Extension*

We would like to acknowledge and thank the following reviewers for their constructive feedback on this protocol: Andrea Topper, Dan Richter, Mark Witecha, Randy Zogbaum (Wisconsin Department of Agriculture, Trade and Consumer Protection); Bethany Canales, and Jason Cavadini (University of Wisconsin-Madison Division of Extension); and Karl Dallefeld (President, Prairie Creek Seed).

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