

Covering Ground: Interseeded Cover Crops in Late Season Vegetables



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Project # LNE22-451R



The Agroecology Lab



United States Department of Agriculture
National Institute of Food and Agriculture

Background

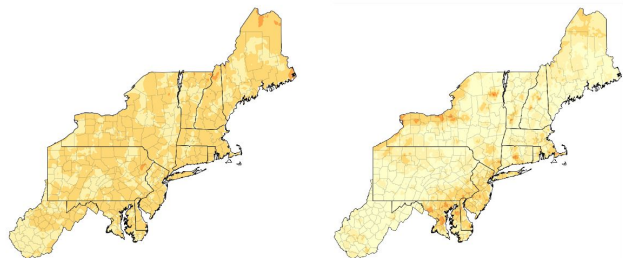


- Results from a survey about cover cropping practices on Maine farms (n=27), showed that 77.8% of respondents (n=21) are limited in their ability to plant cover crops due to “late season cash crops coming out too late”.
- 74.1% of respondents (n=20) stated that research-based data about interseeding in the Northeast would help them with decision making about late season cover cropping.

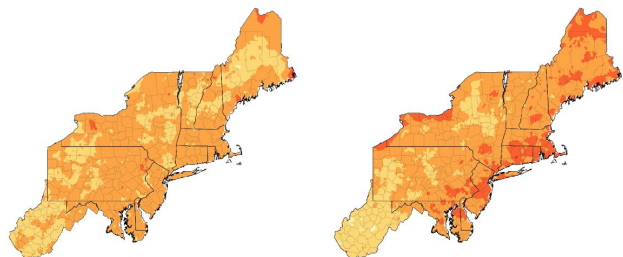
Last Spring Freeze

First Fall Freeze

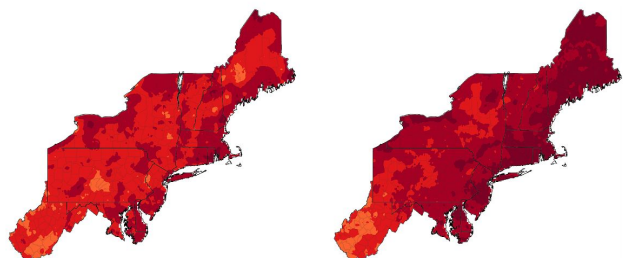
2040–2069, Lower Scenario (RCP4.5)



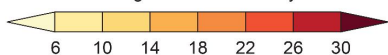
2040–2069, Higher Scenario (RCP8.5)



2070–2099, Higher Scenario (RCP8.5)



Change in Number of Days



Background

Climate change forecasts relevant to the northeast suggest that the region is likely to experience longer spring wet periods in coming decades, making bare spring soils increasingly vulnerable.

Background

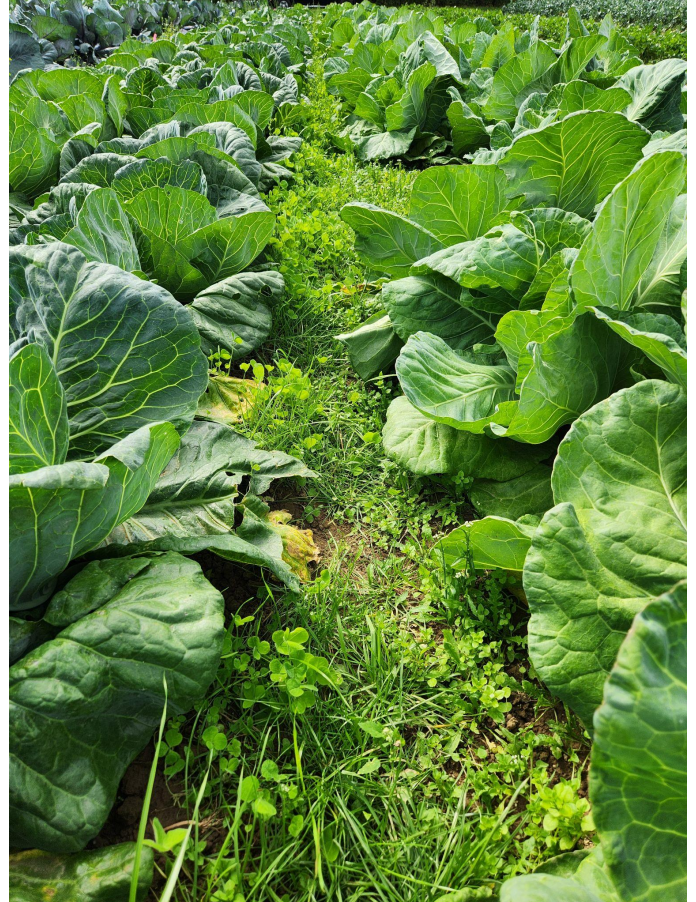
Mid-Atlantic



Background

Aim

To assist Northeast vegetable farmers to plant more acres in cover crops and improve soil health, this project will develop evidence-based recommendations for interseeding cover crops into late season vegetables. We will assess timing of cover crop seeding, seeding methods, and species selection.



Research Questions

1. How does interseeding cover crops in late season cabbage and, separately, sweet corn affect crop productivity?
2. What planting methods work best to establish interseeded cover crops?
3. What planting dates (based on crop growth stage) will optimize both cover crop biomass development and cash crop productivity in the Northeast?
4. What cover crop species are best suited for late-season establishment in our region?
5. What are the equipment, timing, labor and other barriers to establishing a cover crop in an established sweet corn or fall brassica crop in Northern New England?

Hypothesis

1. Interseeding at an appropriate growth stage of sweet corn and fall cabbage will result in high cover crop biomass with no negative effects on the crops.
2. Incorporation of cover crop seed into the soil will result in the best cover crop germination, biomass, and weed control.
3. Utilizing lower biomass cover crops such as annual ryegrass and crimson clover will minimize nutrient and water competition with cash crops.

Materials and Methods

Experimental Plot

- 3 Trials at University of Maine Roger's Farm over 2 seasons (2022 and 2023 growing seasons).
- 4 On-Farm Demos.

The 4 proposed research farm trials were

Trial A

- Timing x seeding method in **Sweet Corn** (Annual Ryegrass+Crimson Clover).
- Timing x seeding method in **Cabbage** (Annual Ryegrass+Crimson Clover).
 - 25 lb/A 60% ryegrass:40% clover



Trial B

Cover crop species trial in Sweet corn (Annual Ryegrass+Crimson Clover : Oat+Pea : Winter Rye+Hairy Vetch).

Materials and Methods

Trial A: Cabbage Timing Trial

Timing treatments

- Cabbage- 17 Days After Transplanting (DAT), 23DAT, 31DAT, Post Harvest

Seeding method treatments

- Broadcast cover crop seed, Broadcast and Incorporate, Drill (Earthway Seeder)

Variety

- Storage #4

Spacing

- Beds 5.5ft center to center.
- 18" between-rows in bed, 18" in-row spacing.



Materials and Methods

Trial A: Corn Timing Trial

Timing treatments

- Corn- v3, v5, v7, and Post Harvest

Seeding method treatments

- Broadcast cover crop seed, Broadcast and Incorporate, Drill (Earthway Seeder)

Variety

- Montauk

Spacing

- 30" between rows. seeded with corn seeder.

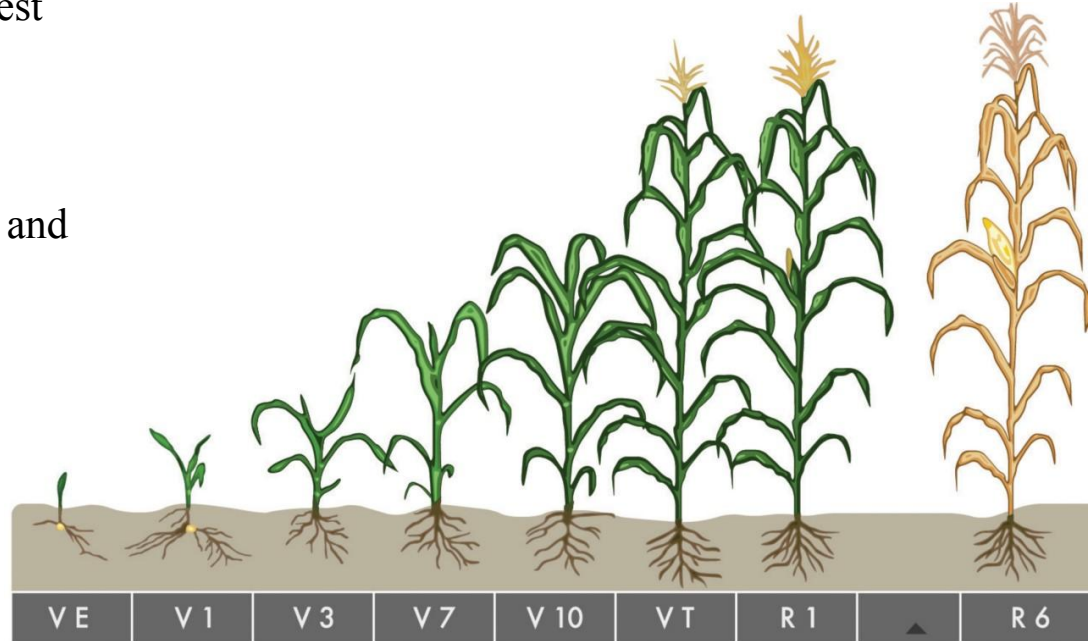


Figure 1: Corn growth stages

Cabbage being watered after transplanting



Corn seeder planting corn



Research Layout

Buffer Crop Bed	Between row zone 1 (Cover Crop Data Plot 1)	Data Crop Bed	BRZ #2 (Cover Crop Data Plot 1)	Buffer Crop Bed	BRZ #3 (Cover Crop Data Plot 2)	Data Crop Bed	BRZ #4 (Cover Crop Data Plot 2)	Buffer Crop Bed	BRZ#5 (Cover Crop Data Plot 3)	Data Crop Bed	BRZ# 6 (Cover Crop Data Plot 3)	Buffer Crop Bed	BRZ#7 (Cover Crop Data Plot 4)	Data Crop Bed	BRZ# 8 (Cover Crop Data Plot 4)	Buffer Crop Bed
Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		5
	Mtd-Dr (C)	Tm-14 DAT(1)	Mtd-Dr (C)		Mtd-Bc (A)	Tm- 21 DAT(2)	Mtd-Bc (A)		Mtd-BcIn (B)	Tm-30 DAT(3)	Mtd-BcIn (B)		Mtd-BcIn (B)	Tm-PstHt (4)	Mtd-BcIn (B)	15
	Mtd-Bc (A)		Mtd-Bc (A)		Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)	15
	Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Bc (A)	15
	Mtd-Dr (C)	Tm- 21 DAT(2)	Mtd-Dr (C)		Mtd-BcIn (B)	Tm-30 DAT(3)	Mtd-BcIn (B)		Mtd-Bc (A)	Tm-PstHt (4)	Mtd-Bc (A)		Mtd-Bc (A)	Tm-14 DAT (1)	Mtd-Bc (A)	15
	Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-BcIn (B)	15
	Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)	15
Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		5
Entry point to blocks 2 and 3 to minimize compaction in blocks 1 and 4																25
Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		5
	Mtd-Bc (A)	Tm-14 DAT (1)	Mtd-Bc (A)		Mtd-Dr (C)	Tm-PstHt (4)	Mtd-Dr (C)		Mtd-BcIn (B)	Tm-21 DAT(2)	Mtd-BcIn (B)		Mtd-BcIn (B)	Tm-301 DAT(3)	Mtd-BcIn (B)	15
	Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)	15
	Mtd-Dr (C)		Mtd-Dr (C)		Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Bc (A)	15
	Mtd-Bc (A)	Tm-30 DAT (3)	Mtd-Bc (A)		Mtd-BcIn (B)	Tm-14 DAT (1)	Mtd-BcIn (B)		Mtd-Bc (A)	Tm-21 DAT (2)	Mtd-Bc (A)		Mtd-Bc (A)	Tm-PstHt (4)	Mtd-Bc (A)	15
	Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-BcIn (B)	15
	Mtd-BcIn (B)		Mtd-BcIn (B)		Mtd-Bc (A)		Mtd-Bc (A)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)		Mtd-Dr (C)	15
Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		Buffer Cabbage		5
	6		6		6		6		6		6		6		6	
54 Trial Width																

Materials and Methods

Parameters

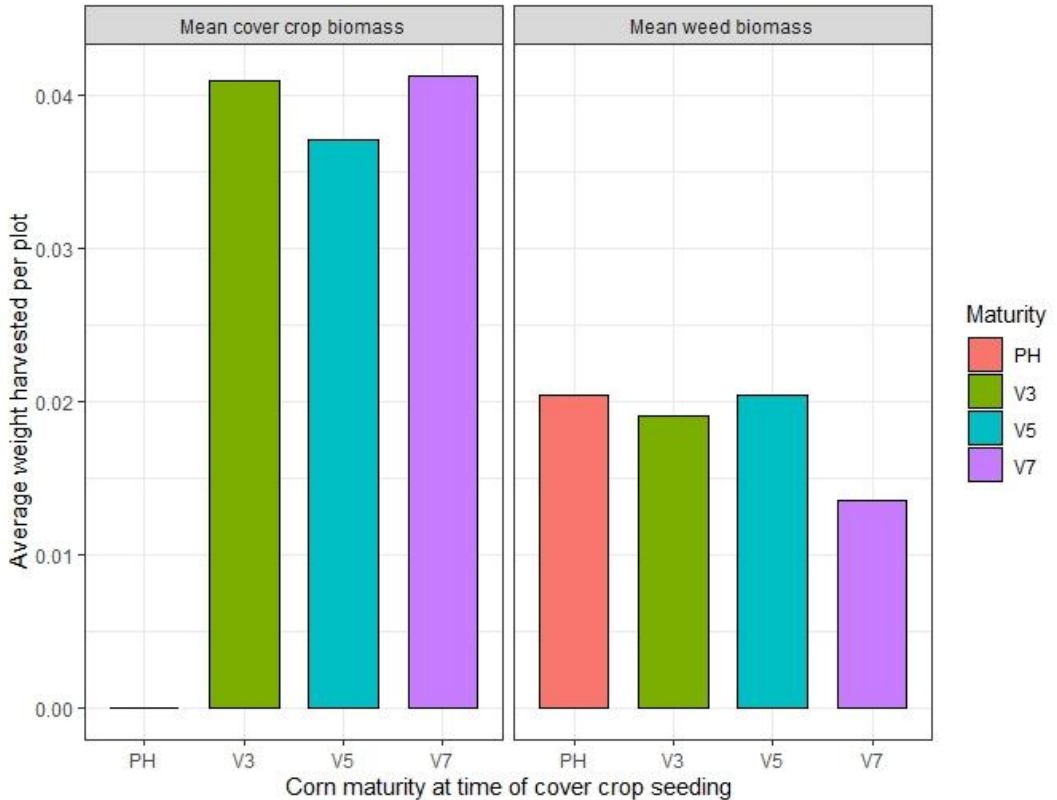
- Soil Nitrate
- Soil Moisture
- Weed Biomass
- Crop Yield
- Cover Crop Biomass

<u>PROJECT TIMELINE</u>	Corn Trial	Cabbage Trial
Crop Planted/Transplanted	July 5	July 26
1st Cover Crop Seeding	August 3 (V3)	August 12 (17 DAT)
2nd Cover Crop Seeding	August 18 (V5)	August 18 (23 DAT)
3rd Cover Crop Seeding	August 30 (V7)	August 26 (31 DAT)
Harvest	September 27	October 20

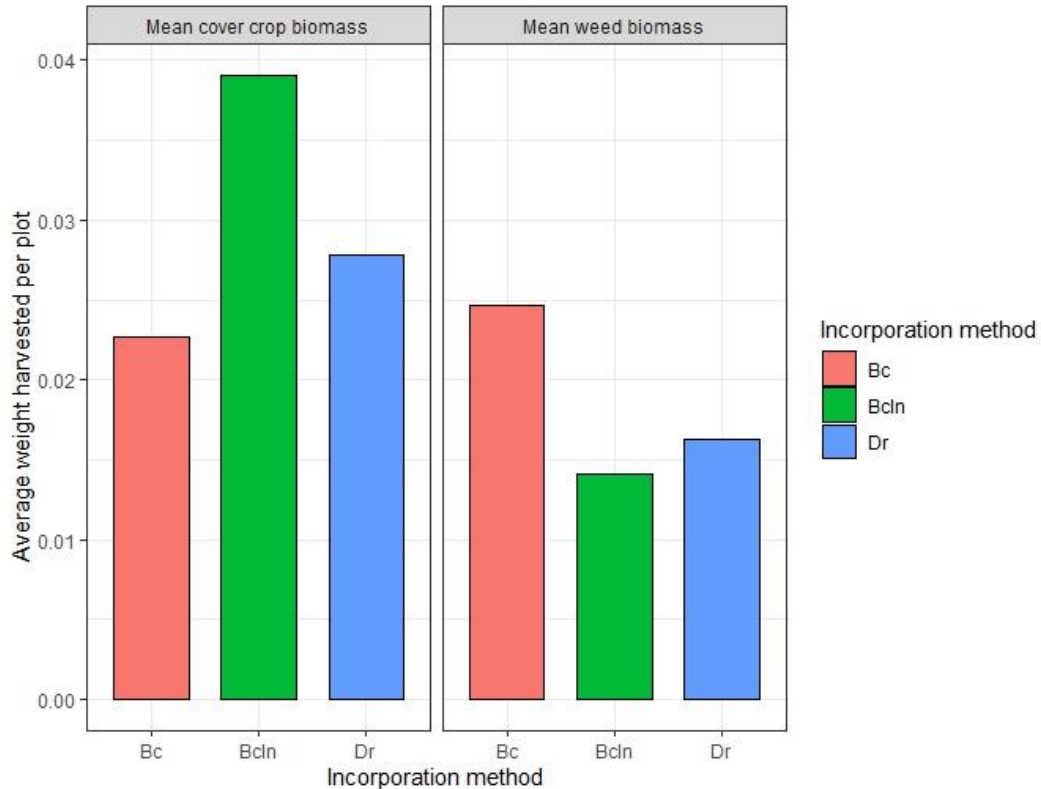
Results



There is no statistical difference observed when cover crop is planted at different corn development stages.



Broadcasting and incorporation of cover crop seeds leads to higher cover crop biomass, and lower weed biomass



Corn species cover crop biomass assessment



Annual Ryegrass+
Crimson Clover



Control

Winter Rye+Hairy
Vetch



Oats+Field Peas





Potential Drawbacks

- Row Spacing
- Herbicide Interactions
- Labor Demands at Seeding Time
- Pest Concerns



Equipment Options

- Seed mixed with Fertilizer in spin spreader at sidedressing and last cultivation
- G-Cultivator with front mounted drop spreader, and belly seeding units.
- Strawberry Rotovator can be adjusted to work in seed over plastic or between rows
- Orbit Air Seeder for sidedressing or interseeding in corn.
 - Drop tube has deflectors to spread seed
 - Lilliston cultivators for incorporation



Next Steps

- Analysing results of 1st year trials.
- Second year of trials Fall 2023.
- Publications, guides and outreaches through field days.

Wrap Up

- The cover crop timing treatments showed no significant differences on crop yields.
- Final cultivation lines up well with previous research findings of optimal timing for interseeding.
- Incorporation of seeds lead to a better cover crop biomass, and reduced weed density.
- Growers are using a diversity of available equipment to streamline this practice.
- Get creative and trial on a small scale. Feel free to reach out and keep us posted with your experiences.



References

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THANK YOU!

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