



WILD HOPE FARM



Summer Cover Crops for Roller-Crimped No-till Fall Planted Broccoli

SARE research findings by Wild Hope Farm

Wild Hope Farm

Introduction

At Wild Hope Farm, we are passionate about bringing high-quality, USDA Certified Organic produce into our local communities through sustainable farming.

- 12 acres of diverse vegetables
- 1 acre of perennial and annual flowers
- 350-400 Member CSA
- 2 Farmer's Markets + Some wholesale
- 10-15 employees throughout the season
- On-farm events: workshops, retreats, celebrations, u-pick, etc.



Types of No-till

Introduction

- Conventional No-till
 - Uses chemical to kill cover crops/weeds
- Organic No-till
 - Cover crops grown then terminated using a roller crimper
 - Deep mulching/compost system
 - Occultation or tarping



Why no-till?

Introduction

- Prevents soil erosion through low disturbance
- Preserves soil biology
- Builds soil organic matter
- Reduces weather related soil erosion
- Reduces pest problems by providing a habitat for predatory insects
- Lowered consumption of fuel



Challenges to a no-till system

Introduction

- Timing of cover crop seeding and crimping
- Weed management
- Soil temperature
- Pre-plant fertility integration



Presentation Contents

Introduction

Part 1: Research Objectives

Part 2: Cover Crop Mixes & Performance

Part 3: Crimping Event

Part 4: Labor Hours, Weed Analysis and
Total Yields

Part 5: Conclusion and Q&A





Part 1: Research Objectives

Grant Contributors

Part 1: Research Overview



Wild Hope Farm Crew:

Rachel Klein - farm manager

Sophia Friis - grant coordinator

Shawn Jadrnicek - past farm manager

Katherine Belk - outreach coordinator

Collaborators:

Mark Dempsey, CFSA Farm Services Manager

Summer Cover Crops for Roller-Crimped No-till Fall Planted Broccoli



Cover Crop Selection

Part 1: Research Objectives

Analyze the success of 5 cover crop treatments through:

- tracking labor hours
- weed suppression
- Broccoli yields

Treatments:

1. Tilled after Sunn Hemp (100 lbs/acre)
2. Crimped Sunn Hemp (100 lbs/acre)
3. Crimped Sunn Hemp (100 lbs/acre) & Millet (50 lbs/acre)
4. Crimped Sunn Hemp (75 lbs/acre), Millet (50 lbs/acre) & Buckwheat (50 lbs/acre)
5. 2020 - Crimped Sunn Hemp (75 lbs/acre), Soybeans (50 lbs/acre) & Buckwheat (50 lbs/acre)
2021 - Crimped Sunn Hemp (75 lbs/acre) & Soybeans (50 lbs/acre)

Timeline

Part 1: Research Objectives

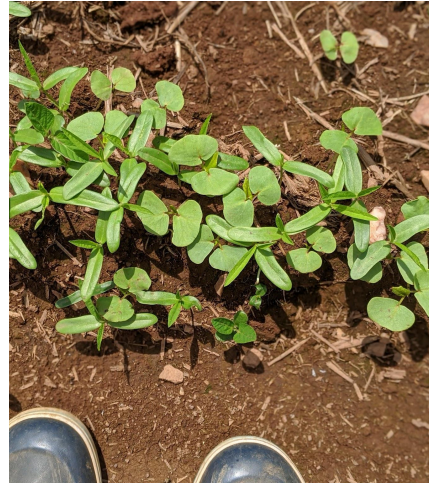
- Year 2: Soybeans moved to earlier seed date. Broccoli Transplant moved 1 week later



5/1

PREP

Winter rye & clover
mowed and disked.



5/15 + 5/24

SEED

Beds shaped
5/15 - #1 & #2 Seeded
5/24 - #5 Sunn Hemp &
Soybeans Seeded



6/15

SEED

Treatments 3 & 4 seeded
after stale seed
bedding.



7/15

PREP

Treatment 1 Sunn Hemp flail
mowed and disked.

Timeline - Year 2

Part 1: Research Objectives



7/29

CRIMP

Terminate all treatments with a roller crimper.

Till and bed shape Treatment 1.



8/3

TRANSPLANT

Broccoli transplanted by hand.

2 rows, 12", 2 lines of drip tape/bed.



9/15

HARVEST

Broccoli harvest begins and yields are tracked.

A photograph of a lush, green cover crop field. The plants are dense and appear to be a mix of different species, with some showing serrated leaves. The background shows a clear blue sky with a few wispy white clouds. A white rectangular box is superimposed over the middle of the image, containing the title text.

Part 2: Cover Crop Mixes and Performance

Cover Crop Mixes & Performance

1. Sunn Hemp

- Suppressed most annual weeds
- Perennial horse nettle still thrived

1. Sunn Hemp & Millet

- Millet provided a great understory
- Variability in days to crimping due to weather/water conditions

2. Sunn Hemp, Millet & Buckwheat

- Buckwheat outcompeted millet
- Buckwheat grew tall but didn't provide great weed suppression in areas where Sunn Hemp was not dense

3. Sunn Hemp, Soybeans & (Buckwheat)

- Sunn Hemp and Buckwheat outcompeted Soybeans
- Buckwheat was removed from the mix Year 2
- Method of incorporation didn't lead to great germination



Cover Crop Mixes & Performance

Other things to note:

- Bed shaping as an incorporation technique resulted in heavier density on shoulders & sparse on bed top
- Both Sunn Hemp and Buckwheat lodged shortly before crimping due to a storm with high winds.
- Hose reel used twice to germinate and start cover crop.



Cover Crop Mixes & Performance

Variability in cover crop crimping readiness depending on drought or rain conditions

- We shifted the planting date of the Millet to be later in the 2nd year to stop the Millet from going to seed before crimping.
- We discovered that the maturity of the Millet seemed to be affected by how much rain we were receiving. In year 2, we were not in drought and the Millet was just barely starting to enter the milk phase.



A photograph of a field of green cover crops, likely a mix of legumes and grasses, growing in rows. A dirt path with visible tire tracks runs through the center of the field. In the background, there is a dense line of trees under a clear blue sky. The text "Part 3: Crimping" is overlaid in the center of the image.

Part 3: Crimping

Crimping - 2020 / 1st Year



Crimping - 2021 / 2nd Year



Crimped Treatments



Tilled after Sunn Hemp



Crimped Sunn Hemp



Crimped Sunn Hemp + Millet



Crimped Sunn Hemp, Millet + Buckwheat



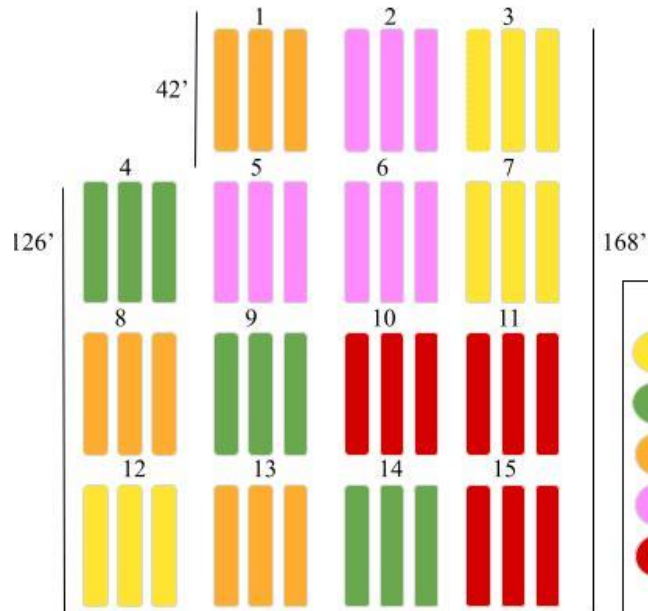
Crimped Sunn Hemp + Soybeans

A group of people are gathered in a field, likely for a field study or agricultural demonstration. In the foreground, a person wearing a large, wide-brimmed straw hat is holding a small plant specimen in their hand. Behind them, several other individuals, including a man in a red shirt and straw hat, a woman in a white shirt, and a man in a grey hoodie, are looking on. In the background, a utility vehicle is parked on a grassy area, and a line of trees is visible under a blue sky with scattered clouds.

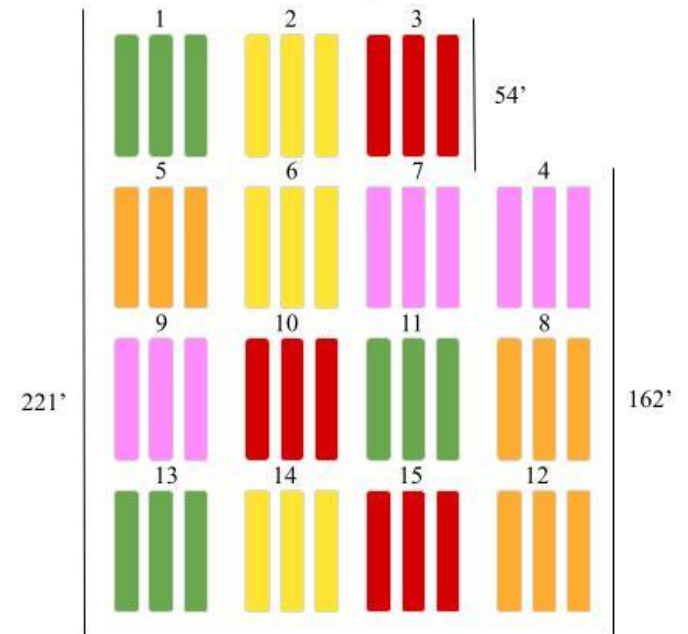
Part 4: Labor, Weed Analysis and Total Yields

Plot Map

2021 Plot Design

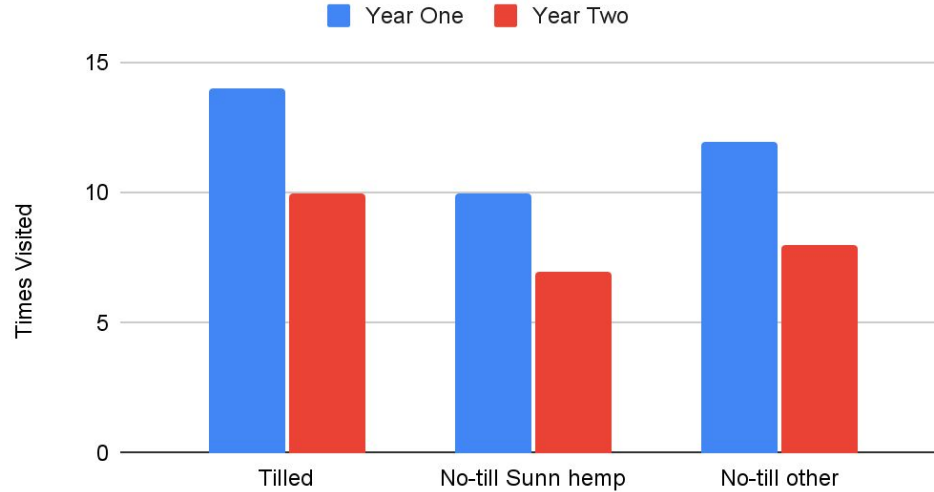


2020 Plot Design



Labor Hours

Tractor Visits



- The tilled area has additional tractor visits from the 2nd mowing, disking, tilling and bed shaping to prep for planting
- The Sunn Hemp only plot is planted earlier and receives one less stale seed bed.
- As expected, no-till areas require fewer tractor labor hours.

Year 1: Sunn Hemp Treatment

8/15/20



9/15/20



9/29/20



Year 1: Sunn Hemp, Soybeans and Buckwheat Treatment

8/15/20



9/15/20



9/29/20



Year 1: Sunn Hemp and Millet Treatment

8/15/20



9/15/20



9/29/20



Year 2: Weeding



- Most regrowth was due to side shoot growth or immature plants that didn't die back with crimping.
- While not feasible at larger scale, we hand weeded any regrowth and perennial weeds to save the broccoli crop in Year 2.
 - Data for weed suppression was tracked through timed weeding.

Year 2: Weeding - Tracking by time



Treatment	Time Spent Weeding	Method
#1 Tilled	30 minutes	Tractor
#2 Sunn Hemp	46 minutes	Hand
#3 Sunn Hemp & Millet	34 minutes	Hand
#4 Sunn Hemp, Millet & Buckwheat	45 minutes	Hand
#5 Sunn Hemp & Soybeans	49 minutes	Hand

- Only weeded once
- Time tracked only for middle bed of each treatment
- #3 Millet had best weed suppression

Sunn Hemp, Soybeans and Buckwheat plot pictured

Disease



The following diseases were noticed in the field Year 1:

- Alternaria head rot
- Bacterial head rot

This is possibly due to poor air circulation and competition with the cover crop regrowth.

We saw less of this in Year 2, most likely due to less cover crop regrowth and the benefits of hand weeding.

Year 2: Abnormal Growth in the Tilled Plot



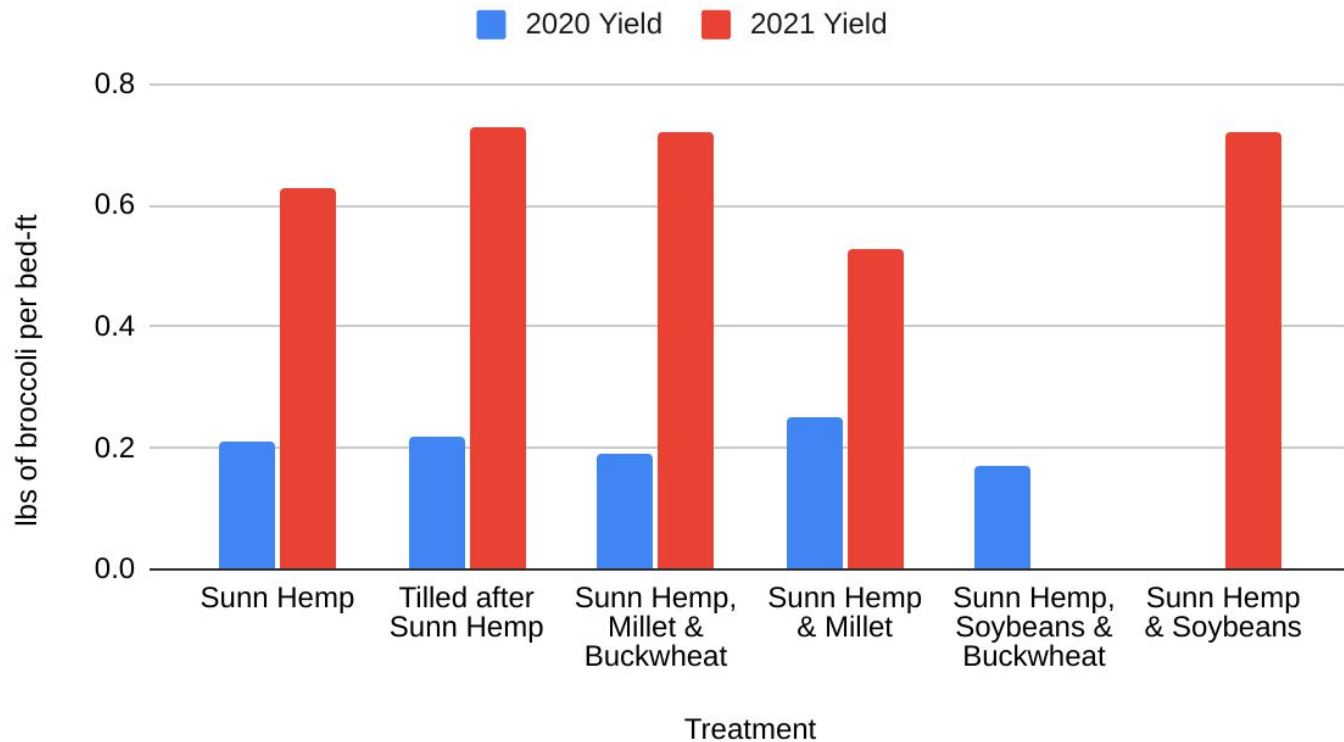
We saw abnormal growth in the tilled plot shortly after transplant.

We noticed stunting, small leaves, darker and wrinkled leaves. Some aphid infestation but we believe they were secondary.

Although the plants rebounded, the heads came in later and we saw the most disease in this plot.

Yield

Broccoli Yields



A group of five people are in a field of green plants. In the foreground, a woman in a blue long-sleeved shirt and dark pants is bent over, examining a plant. Next to her, a man with a beard and a blue and white baseball cap is also looking at the plants. To his left, a young girl in a pink shirt and overalls is standing. In the background, two more people are standing and looking at the plants. The field is filled with green plants, and there are trees in the distance under a cloudy sky.

Part 5: Conclusion

Reflections



CC Seeding / Mix Selection

- Trial new method of seeding and incorporation for more even stands.
- While a Sunn Hemp/Millet mix seem to produce a great mat, it did not produce high yields.
- Including other cover crops with Sunn Hemp complicate the timing of seeding and crimping.

Weed Suppression / CC Regrowth

- Perennial weeds need to be dealt with before roller crimping can be successful.
- Crimping twice produced better results. Allow for more time between crimping and transplanting.
- CC regrowth needs to be further investigated.

A man with long hair and a beard, wearing a dark baseball cap with a logo and an orange t-shirt that says "2019 AUG-ART TOUR", is harvesting green herbs into a black plastic crate. He is holding a large knife. In the background, a woman in a yellow tank top and white visor stands in a field of rows of green plants. The sun is low on the horizon, creating a warm, golden glow. The text "Interested in a job? Work with us!" is overlaid in the center.

Interested in a job?
Work with us!

A photograph of a dense, green hedge or row of plants, possibly a field of young trees or shrubs, with a central path or gap. The plants are vibrant green and appear to be in a field setting. The text "Questions?" is overlaid on the image in a white serif font.

Questions?