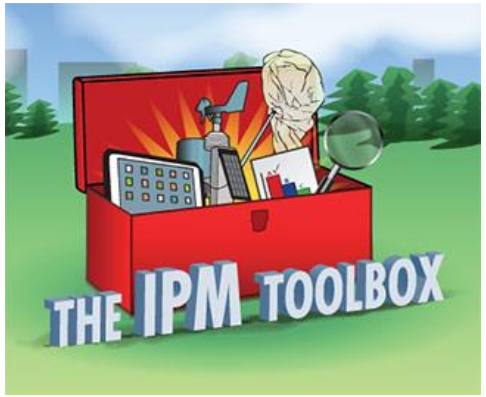
Northeastern IPM Center

Tarping in the Northeast: A Guide for Small Farmers

March 16, 2022



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Webinar Details

Welcome

A recording of this webinar will be available within a week at

http://www.neipmc.org/go/ipmtoolbox

We Welcome Your Questions

Please submit a question **at any time** using the Q&A feature to your right at any time

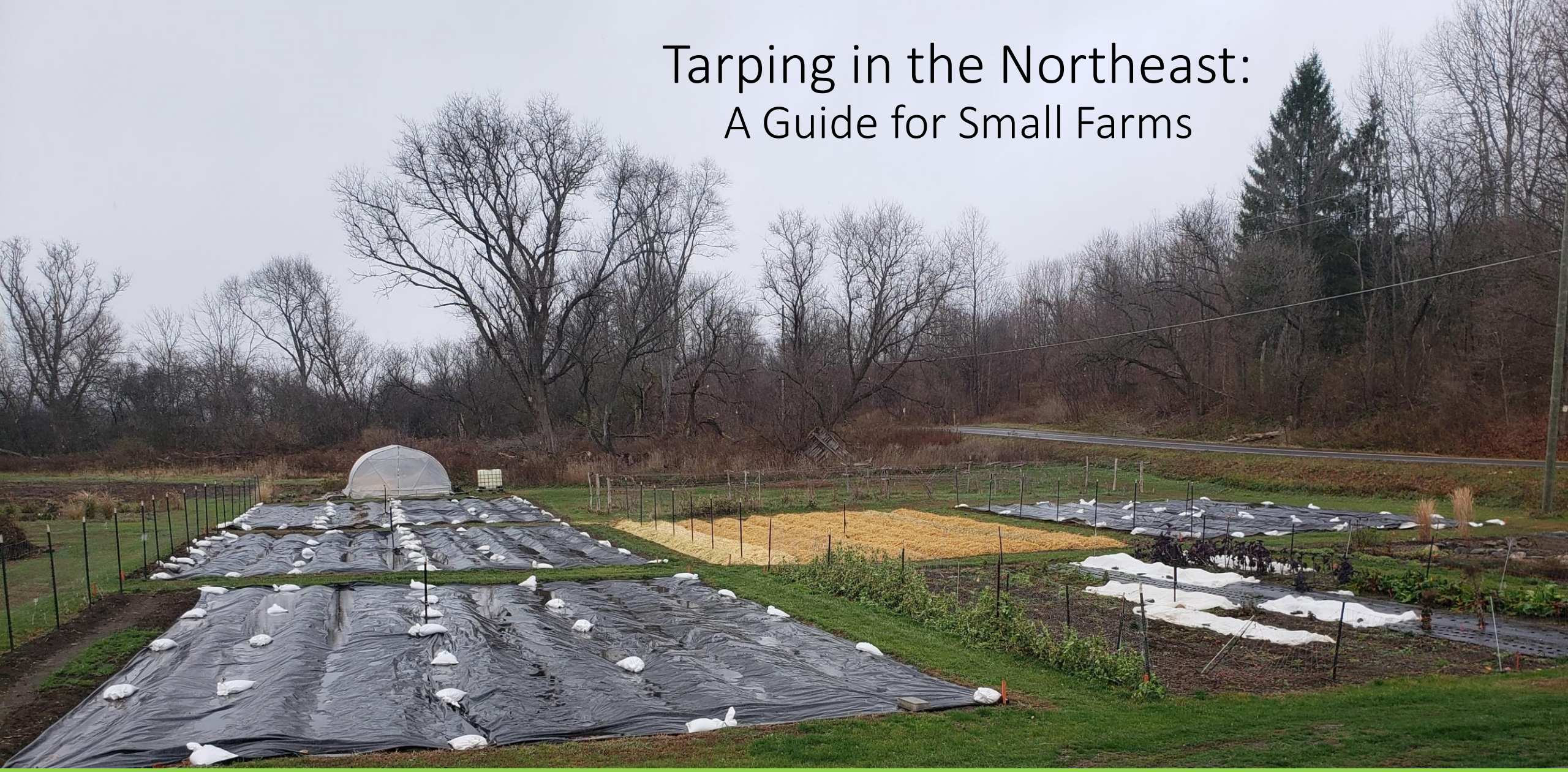
If you'd like to ask a question anonymously, please indicate that at the beginning of your query.

Extension Speaker/Introductions

Sonja Birthisel

Some Questions for You

Tarping in the Northeast:
A Guide for Small Farms



Sonja K. Birthisel | NEIPM Center Webinar | 16 March 2022

Outline for Today!

- What is tarping?
- Types of tarps + how they work
- General logistics of tarp management
- Tarping practices
  - Stale seedbedding
  - Minimizing tillage
  - Cover-crop based rotational no-till
  - Continuous no-till with deep compost
  - Bringing sod into production
  - Overwintering
- Conclusions + discussion!

https://extension.umaine.edu/publications/1075e/

Bulletin #1075, Tarping in the Northeast: A Guide for Small Farms

Authors:

- ***Natalie Lounsbury***, *Postdoctoral Research Associate, University of New Hampshire Department of Natural Resources and the Environment*
- ***Sonja Birthisel***, *Faculty Associate, University of Maine School of Forest Resources and Ecology and Environmental Sciences Program*
- ***Jason Lilley***, *Sustainable Agriculture Professional, University of Maine Cooperative Extension*
- ***Ryan Maher***, *Research and Extension Specialist, Cornell Small Farms Program, Cornell University*

What Is Tarping?

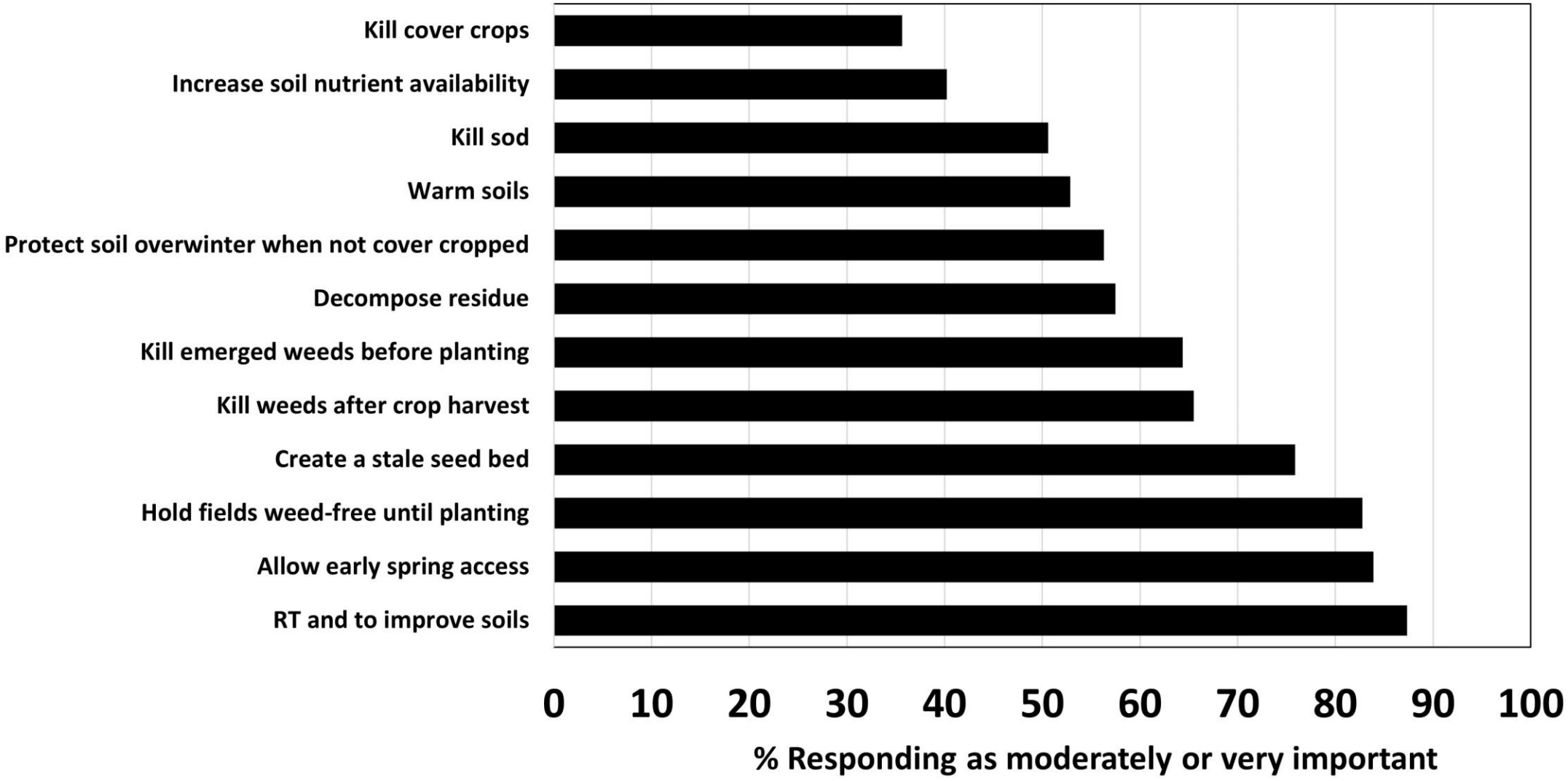
Definitions

Solarization is the practice of using clear tarps to capture solar energy and heat the soil surface. The effects of solarization on pests (weeds and pathogens) and beneficial organisms are highly dependent on weather conditions.

Occultation is the practice of using opaque (typically black) tarps to block light and therefore prevent photosynthesis. The word has Latin origins, meaning “to block.” The effects of occultation are less dependent on, but nonetheless affected by, weather conditions.

*We use **tarping** is a general term that includes both*

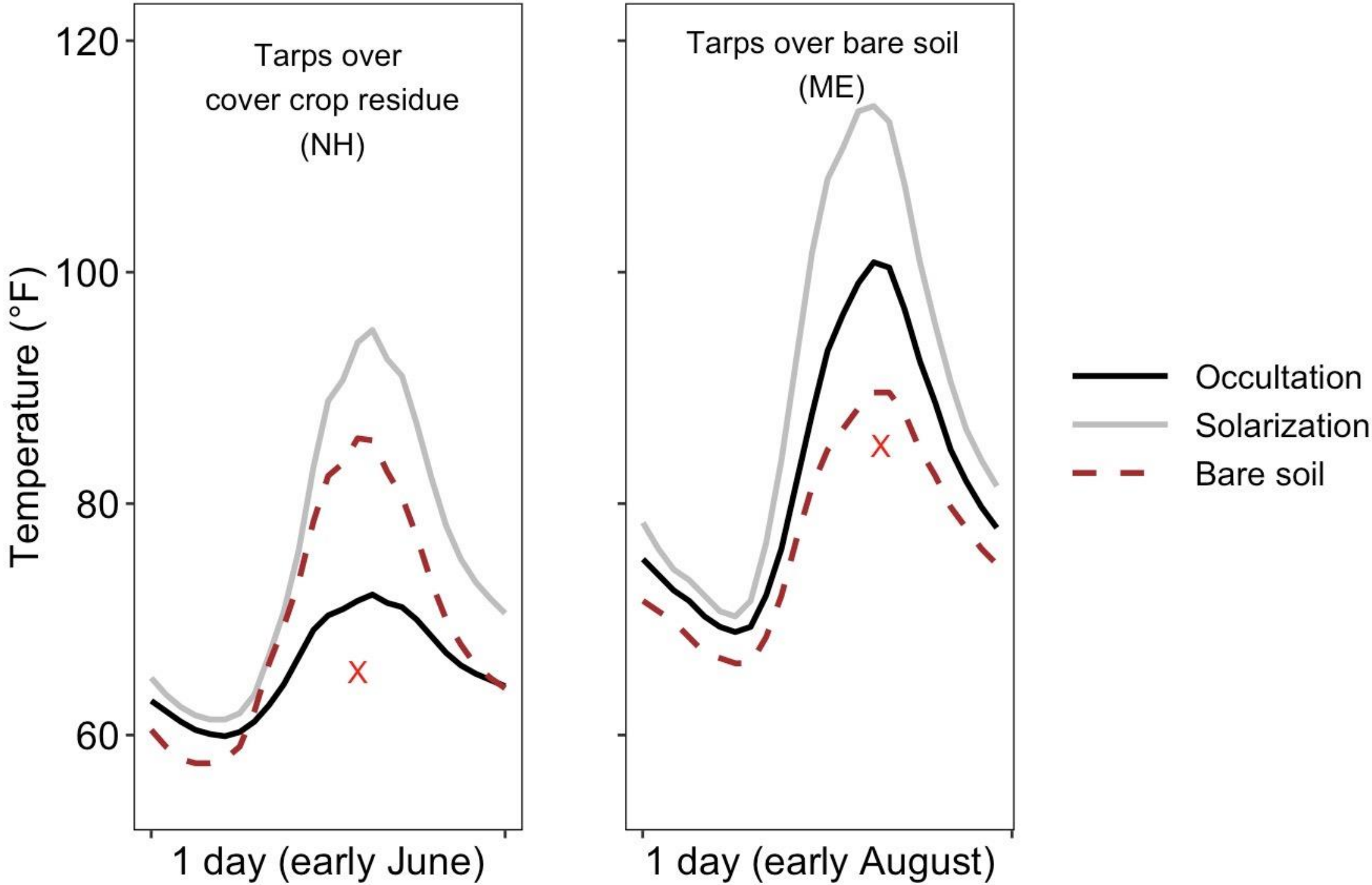
Goals of Tarping

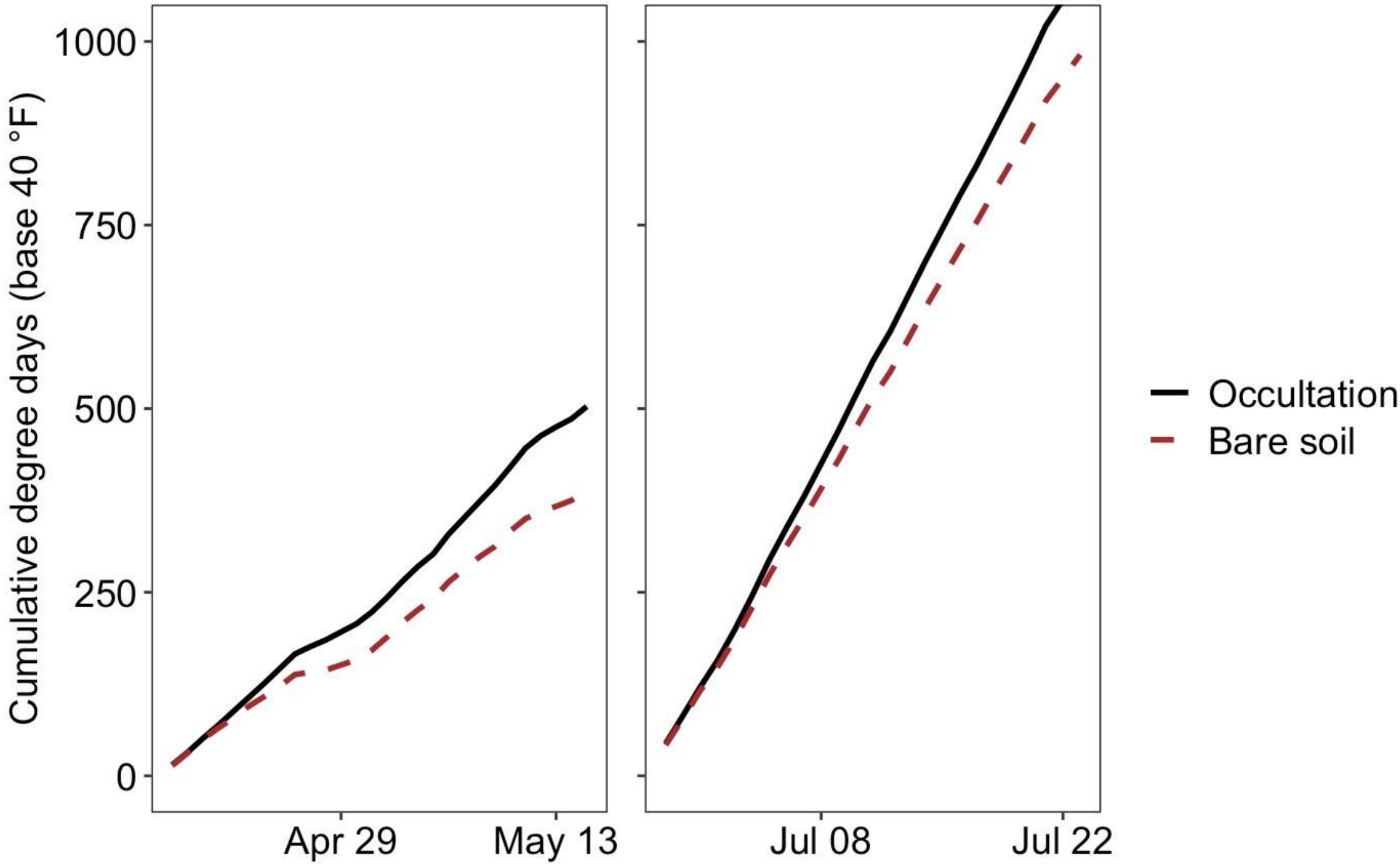


How tarps work

Occultation and solarization change light, temperature, and moisture dynamics at the soil surface. Effects on these conditions, in turn, affect biological processes such as photosynthesis, weed germination, and insect and microbial activity, which regulate the availability of nutrients like nitrogen. Understanding the mechanisms through which tarps work can help inform which type of tarp to use and how long to deploy it in a given context.

See the Guide for more on light, moisture, insects, microbes, and nutrients!


Tarps over
cover crop residue
(NH)
Tarps over bare soil
(ME)
Temperature (°F)
120
100
80
60
1 day (early June)
1 day (early August)
Occultation
Solarization
Bare soil

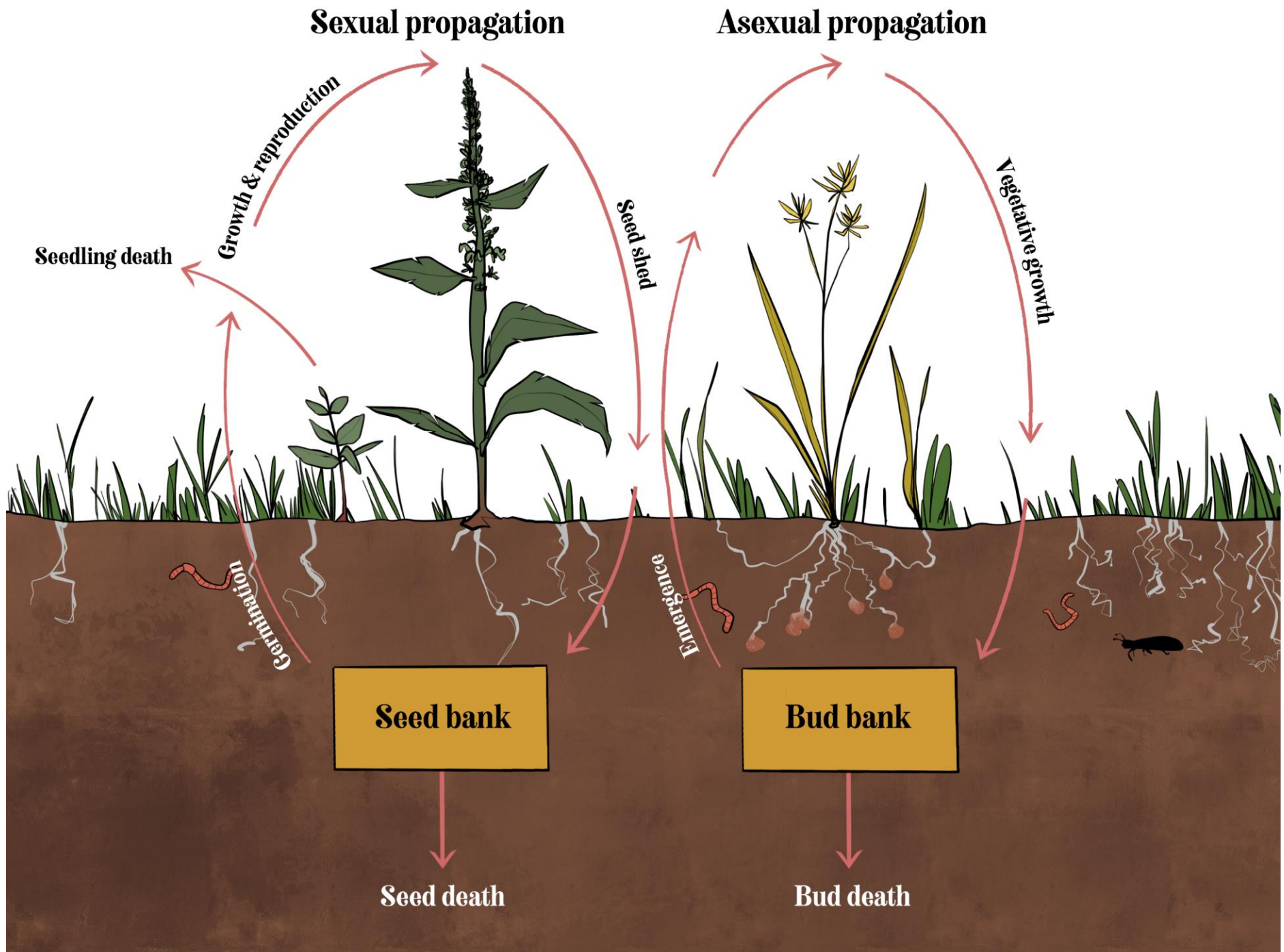

Cumulative degree days (base 40 °F)
1000
750
500
250
0
Apr 29
May 13
Jul 08
Jul 22
Occultation
Bare soil

Effects on Weeds

Definitions

Seed bank: weed seeds in the soil that will germinate when they have the right combination of germination cues. These seeds can be of annual or perennial weed species.

Bud bank: belowground storage organs of perennial weeds including roots, rhizomes, tubers, and bulbs. New plants can emerge from these storage organs, and some types of organs (e.g. rhizomes) can help species spread.


Sexual propagation
Asexual propagation
Growth & reproduction
Seedling death
Seed shed
Vegetative growth
Germination
Emergence
Seed bank
Bud bank
Seed death
Bud death

If perennial weeds are present in fields, farmers should be aware that tarping alone may not be sufficient to avoid problematic levels of these species. Using multiple tactics to deplete the storage organs of challenging perennial weeds may be necessary before relying on short-duration tarping.

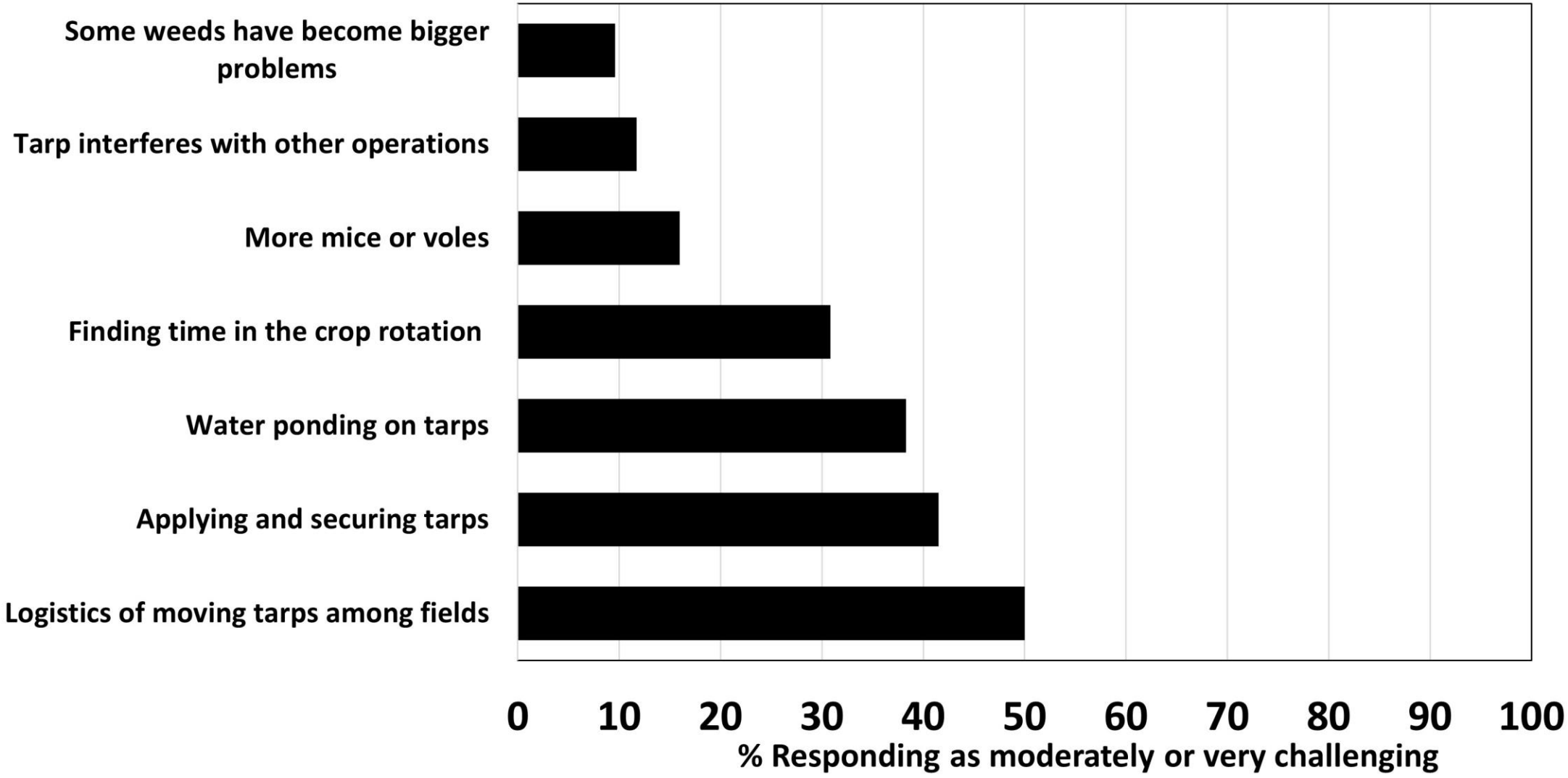
<- Nutsedge

General Logistics

- Size + thickness
- Price comparisons
- Securing tarps
- Labor requirements
- Longevity + storage
- Drawbacks + considerations

All labor is not equal and adding tarping labor in early spring or late fall when wet field conditions limit field access, or when other farm demands are not at their peak, can have clear advantages.

Challenges of Tarping



Price Comparisons

The following chart compares the cost to cover a 32’ x 100’ area with the various tarp types. Sourcing tarps through local suppliers (e.g. farm supply and equipment dealers) can avoid substantial shipping costs.

Tarp Type	Material	Years Use	Thickness	Range of Prices to Cover 32’x100’ (New)	Estimated price per Year	Permeability	NOTES
Silage or Ag Plastic	Polyethylene	3-5	5-6 mil	$130-202	$26-67	Impermeable	One side black, one side white or black on black.
Landscape / Woven Fabric	Polypropylene	5-7	2.2 – 4 oz	$184-224	$26-45	Semi-permeable	Usually available in narrow rolls (7-16′ wide)

…clear plastic + billboard + blue tarp

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Questions

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Stale seedbedding with tarps

Highlights

- Apply tarps for several weeks after field preparation
- Stimulates “flush” of annual weed emergence
- Can use throughout season + in hoophouses

Case Study

- Farmers: Dave McDaniel and Heather Selin.
- Farm Name: Earth Dharma Farm.
- Location: Jackson, ME.

Field of spinach that has been uncovered bed by bed throughout the season. Note the “tarp sausage roll” on the left, leaving one bed to be uncovered for the next succession planting.

Minimizing tillage with tarps

Lettuce at planting in a conventional tillage system (left) and a continuous no-till system using tarps (right) at the Cornell Thompson Vegetable Research Farm in Freeville, NY. Repeated tillage events were used in spring to prepare tilled beds for planting while tarps were applied for several weeks, removed, and beds transplanted without soil disturbance. Photo: Ryan Maher.

Plan Within Your Rotation

Sequences that farmers and researchers have employed include:

1. Fall cash crop → overwintering or early spring tarp → spring or summer cash crop
2. Spring cash crop → summer tarp → fall cash crop
3. Winter-killed or overwintering cover crop → early spring tarp → spring or summer cash crop

No-till tarped beds planted to lettuce in spring after tarping directly over winter annual weeds and residue (winter squash) from the previous fall. Cornell Thompson Vegetable Research Farm in Freeville, NY.

Key Considerations

- Residue management
- Seedbed quality

Tarps suppress living annual weeds in no-till beds (left) in comparison to conventionally tilled and untarped beds (right). Cornell Thompson Vegetable Research Farm in Freeville, NY." Photo: Ryan Maher.

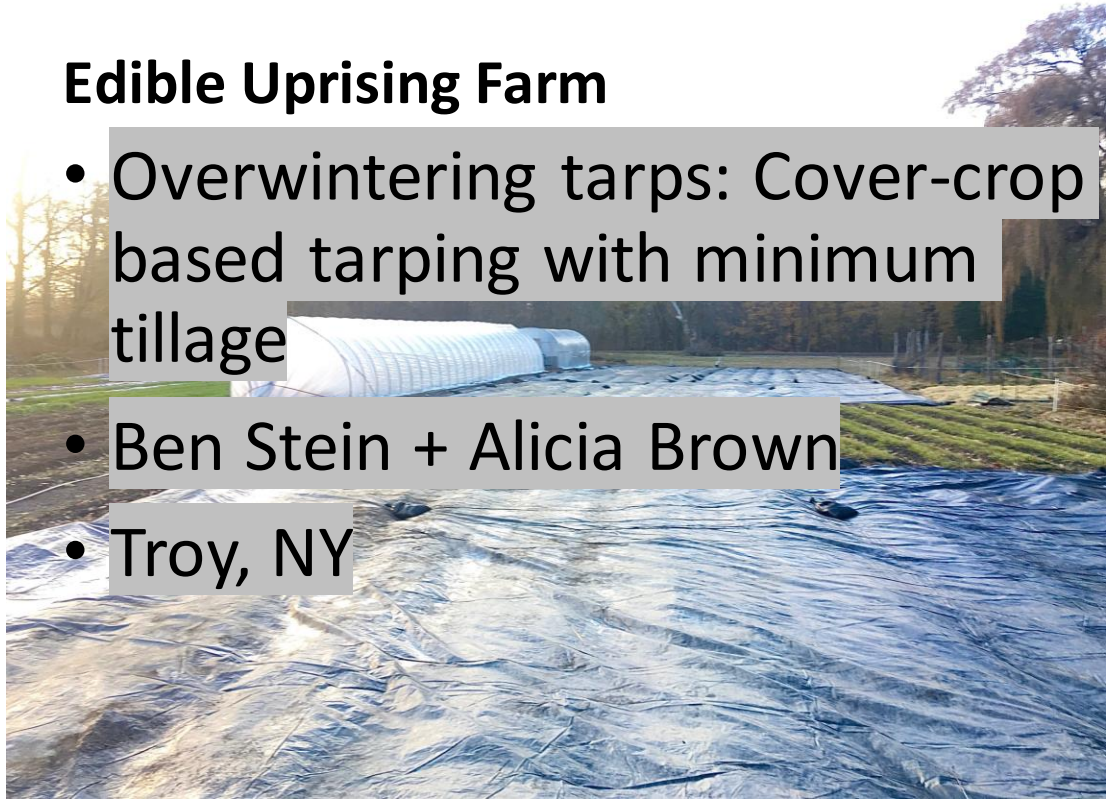
Case Studies Involving Minimal Tillage

Colefax Farm

- Breaking ground: Bringing sod intro production and no-till bed management with tarps
- Molly Comstock
- Alford, MA

Edible Uprising Farm

- Overwintering tarps: Cover-crop based tarping with minimum tillage
- Ben Stein + Alicia Brown
- Troy, NY



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Cover-crop based rotational no-till with tarps

Transplanted Brassica crops growing through tarped rye cover crop mulch at Frith Farm in Scarborough, ME. Photo: Jason Lilley.

Highlights

- Many benefits!
  - Suppresses weeds
  - Conserves moisture
  - Protects soil
  - N from legume cover crops
- Must commit time and space
- Requires even, high-biomass cover crop stand

Tools

Rolling a rye-vetch cover crop with a riding mower and water-filled lawn roller attachment, prior to tarping. Photo: Bonnie Lounsbury.

Upright tree dibbling tools allow for creating holes relatively easily for transplanting through heavy cover crop residue. Photo: Natalie Lounsbury.

Timing

June 10, 2018– 3066 kg/ha

June 21, 2018—3908 kg/ha

July 1, 2018—5228 kg/ha

May 21, 2019– 3893 kg/ha

May 31, 2019– 5647 kg/ha

June 10, 2019– 6929 kg/ha

Note

Some soils require additional soil-health building practices as well as drawdown of the weed seed bank and bud bank before implementing no-till practices, even when using tarps. Photo: Jason Lilley.

Case Study

- Farmers: Ryan and Kara Fitzbeauchamp.
- Farm Name: Evening Song Farm.
- Location: Shrewsbury, VT.

The coolest toolbar in the Northeast with 3 wavy coulters trailed by repurposed injector knives. This implement is pulled through tarped winter rye residue to improve transplanting of fall brassicas and cucurbit crops. Photo: Ryan Fitzbeauchamp.

Continuous no-till with deep compost and tarps

Compost applied at mulching rates helps bury weeds seeds in native soils. Cornell Thompson Vegetable Research Farm, Freeville, NY. Photo: Ryan Maher.

Highlights

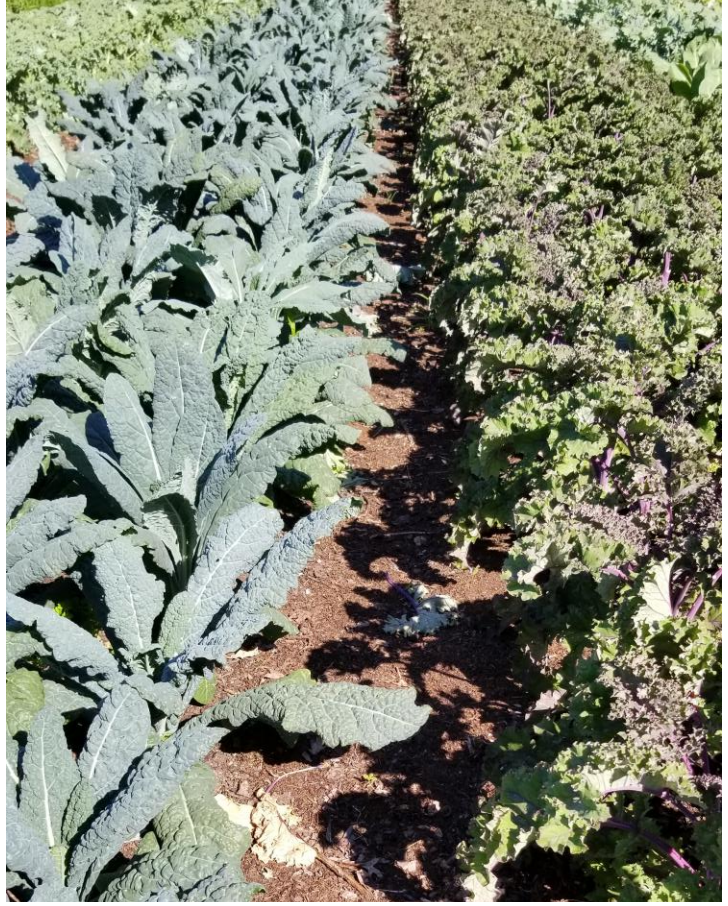
- Major weed control benefits
- Potential for nutrient loading

Compost applied annually at >1″ rate creates a new soil layer, quickly raising organic matter content and elevating soil nutrients beyond crop needs. Cornell Thompson Vegetable Research Farm, Freeville, NY. Photo: Ryan Maher.

Weed escapes are still a problem in no-till compost mulch compared to beds where tarps have been applied over winter or in early spring ahead of planting. Cornell Thompson Vegetable Research Farm, Freeville, NY. Photo: Ryan Maher.

Case Study

- Farmer: Daniel Mays.
- Farm Name: Frith Farm.
- Location: Scarborough, ME.



Tarps are now used as a central component of the soil health plan on the farm. Tarps are utilized between plantings of salad greens to disrupt weed and crop growth, as well as to terminate cover crops, without disturbing soil.

Tools + tricks

> ***Daniel prefers to knock down the cover crop to get the tarp closer to the soil. To accomplish this, he has developed a human powered "walker crimper" by tying ropes to either end of a t-post…." The crew "step(s) on the post in unison with each step, in effect knocking and crimping the cover crop.***

Palletized "tarp kits." On each pallet the crew stack the 30 concrete blocks followed by the folded 24' x 100' tarp. These kits are left next to the field where they will be deployed

Bringing sod into production

Lanscape fabric used to directly transition sod to elderberry production with no tillage required. Photo: John Hayden.

Highlights

- Details will be site specific
- Compacted soils require amendments
- Up to a full season may be necessary (though not always)

Case Studies: Bringing Sod into Production

Colefax Farm

- Breaking ground: Bringing sod intro production and no-till bed management with tarps
- Molly Comstock
- Alford, MA

The Farm Between

- Breaking sod and weed management in perennial fruit crops with tarps
- John Hayden
- Jeffersonville, VT

Overwintering for early-season production

A tarp under the late winter snow. This overwintered tarp will allow for additional tarp time prior to the first spring crop. Photo: Photo: D. McDaniel, Earth Dharma Farm

Benefits

- Keep soils from waterlogging
- Help them warm earlier in spring
- Retain nitrate

- *Especially beneficial in fields with heavy, poorly drained soils / where you want early spring field access*

Another Case Study on Overwintering

Edible Uprising – Troy, NY

> ***The main reason Edible Uprising does bed prep and tarps in the fall is to relieve the spring workload. Prepping beds in the spring was a huge workload and doing as much as possible in the fall helps.***

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Conclusions

Tarping encompasses several valuable management techniques for different cropping niches on small farms. These techniques complement—but are not substitutes for—other soil health-building and weed management tactics. Increasingly important, tarping can help farmers adapt to climate change by regulating moisture dynamics and facilitating reduced tillage with or without high levels of residue. While the use of plastic in agriculture has drawbacks, tarping can provide some environmental benefits; specifically, retaining mobile nutrients like nitrate reduces nutrient pollution and reduces the need for fertilizer, and overwintering tarps can protect vulnerable soil from erosion when it is impossible to seed a cover crop.

+ knowledge gaps and next steps

https://extension.umaine.edu/publications/1075e/

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Some Questions for You

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Recording of IPM Toolbox Webinar Series

- Past recordings and today's Webinar will be available to view **on demand** in a few business days.
- http://www.neipmc.org/go/ipmtoolbox
- You can watch as often as you like.

Upcoming Toolbox Webinars & Research Update Conference

2022 Northeast Integrated Pest Management Research Update Conference, March 24, 10:30am-12:00pm

The rapid style conference will feature 5-minute pre-recorded presentations in which the speakers will discuss 1 or 2 highlights from their projects followed by a live Q&A. The purpose of the conference is to increase collaboration and awareness about current IPM-related research and extension in the Northeast in a fun way.

Pesticides: Part of the IPM Toolbox March 30, 2pm ET

A common misconception about integrated pest management (IPM) is that it is opposed to pesticides. While it's true that IPM encompasses many non-pesticide management tactics, it recognizes the importance of pesticides as part of its arsenal of pest-control measures. Mary Centrella, Director and Dan Wixted, Extension Support Specialist of the Cornell University Pesticide Management Education Program Presenters.

Combatting Slugs as Pests of Soybeans and Corn, April 6, 11am ET

Slugs pose a significant pest problem for growers of seedling grain crops—particularly corn and soybeans—in the Mid-Atlantic region. David Owens, Extension Specialist at the University of Delaware, presenter.

Taking a Closer Look: How Strawberry Disease Risk Varies with Microclimates at the Canopy Level, May 4, 11am ET

Weather stations in strawberry fields might seem like good sources of highly local environmental data, but this assumes sun, wind, and shade affect an area evenly. There can be microclimate variations at the canopy level, especially when row covers are used for plasticulture strawberry production. Mengjun Hu, assistant professor of plant pathology in the Department of Plant Science and Landscape Architecture at the University of Maryland, Presenter.

Land Acknowledgment

The Northeastern IPM Center is based at Cornell University in Ithaca, New York.

Cornell University is located on the traditional homelands of the Gayogo̱hó꞉nǫ' (the Cayuga Nation). The Gayogo̱hó꞉nǫ' are members of the Haudenosaunee Confederacy, an alliance of six sovereign Nations with a historic and contemporary presence on this land. The Confederacy precedes the establishment of Cornell University, New York state, and the United States of America. We acknowledge the painful history of Gayogo̱hó꞉nǫ' dispossession, and honor the ongoing connection of Gayogo̱hó꞉nǫ' people, past and present, to these lands and waters.

This land acknowledgment has been reviewed and approved by the traditional Gayogo̱hó꞉nǫ' leadership.

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Funding Acknowledgment

- *This presentation was funded in part by the Northeastern IPM Center through Grant #2018-70006-28882 from the National Institute of Food and Agriculture, Crop Protection and Pest Management, Regional Coordination Program.*

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