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Living Mulch

On-farm Innovation with Cover Crops

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Roadmap for this Session

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Everyone: Discussion of weeds, cover crops, and your on-farm practices

- Polls, chat box, and discussion

Rhoda: Definition and overview of living mulch

Kristine: Overview of Research Trial for 2022 and 2023

Everyone: Your feedback on our ideas

- Polls, chat box, and discussion

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Poll 1: Are weeds a problem on your farm?

Choose the answer you feel is best

1. Yes, weeds are a major problem most years
2. Yes, weeds are a minor problem most years
3. Sometimes, weeds can be a problem in certain years
4. No, weeds are not a problem at all most years
5. Unsure



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Poll 2: What weed(s) do you deal with on your farm?

Select All that Apply

- | | |
|-------------------------------------|-----------------------------------|
| • Buttonweed (Velvetleaf) | • Lamb's Quarters |
| • Cocklebur | • Pennycress |
| • Crabgrass | • Pigweed |
| • Dandelion | • Purslane |
| • Field Bindweed | • Quackgrass |
| • Foxtail | • Thistle |
| • Knotweed (Pennsylvania Smartweed) | • Other (Please list in the chat) |

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Poll 3: Have you ever used cover crops on your farm?



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Choose the answer you feel is best:

1. Yes, and I still use cover crops every season
2. Yes, but I don't use cover crops every season
3. Yes, but I no longer use cover crops at all
4. No, but I would like to use cover crops on my farm in the future
5. No, and I have no interest in using cover crops on my farm

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What is a Living Mulch?



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Living Mulch

*Management
is KEY!*

Advantages

- Weed suppression
- Reduced erosion
- Reduced leaching
- Maintains healthy microbial populations
- Increases ecosystem diversity

Concerns

Competition with cash crop
Effectiveness

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Why Living Mulch vs. Terminated Cover Crop??

- ▶ If perennial, no need to precisely time cover crop seeding and establishment each cropping cycle
- ▶ Continues weed control throughout season
- ▶ Avoids possible allelopathy of freshly terminated cover crop residue
- ▶ Continuously feeds soil microbial community and may provide habitat for beneficial insects

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Conflicting results



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- ▶ Two kinds of clover controlled weeds in broccoli raab *without yield loss* when seeded 2 days before transplanting the raab
- ▶ White clover *increased* tomato yield, as long as the clover was kept short
- ▶ Perennial white clover *decreased* yields of tomatoes, cabbage & lettuce, but no effect on carrot, melon, and cucumber

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New York (Cornell)

Cover crops: Rye+clover, rye, barley, or barley+clover

Crops: Pepper, Onion, Tomato

Results: Rye+clover gave best weed control; Pepper, onion & tomato yield basically unaffected by rye-clover; rye decreased tomato yield & increased insect damage



Wisconsin

Cover crops: buckwheat, field pea, crimson clover and medium red clover planted 4 wks before transplanting

Crops: Peppers, broccoli, snap beans

Results: Lowered yields for all cover crop trts

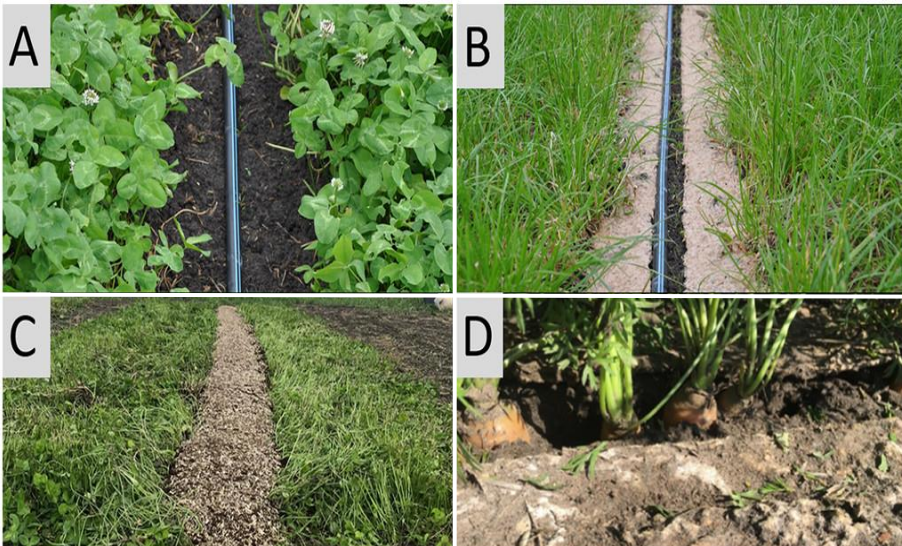


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Tillage Zone
management



HortTechnology hortte 31, 1; 10.21273/HORTTECH04745-20

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Traits of successful living mulches

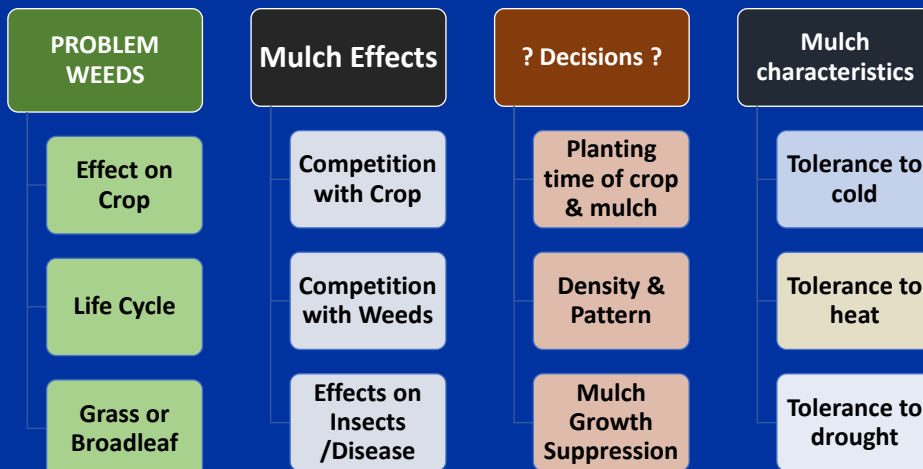
- ▶ Provide dense ground cover early in the season to prevent weed germination/establishment
 - Delayed green-up in the spring may reduce competition with crop
- ▶ Remain short to avoid shading main crop - or amenable to mowing
- ▶ If seeded in spring, can be timed to avoid crop competition
- ▶ Reduce weed seed production

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Selecting a cover crop



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Discussion: Cover Crops on Your Farm

If you have used cover crops:

What cover crops have you used on your farm?

How did you manage them?

Were you happy or unhappy with the results?



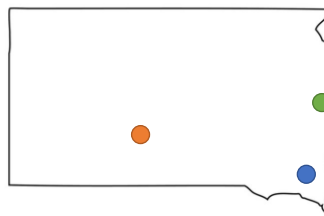
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Integrating Early Season Cover Crops to Improve Sustainability of South Dakota Vegetable Farms

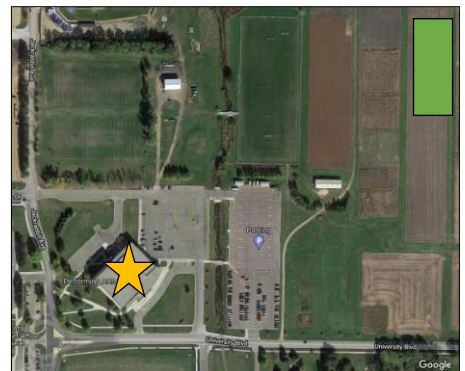
SDSU Southeast Research Farm
 [SERF] Beresford, SD



2021-2024

*This project is supported by the
 USDA Specialty Crop Block Grant
 Program administered by the South
 Dakota Department of Agriculture
 and Natural Resources.*

SDSU Specialty Crop Research Field
 [Campus] Brookings, SD



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Project Objectives

Objective 1: Assess three perennial clovers (under multiple management systems) as an early season cover crop and summer living mulch for production of solanaceous, brassica, and cucurbit crops to develop more sustainable and resilient cropping systems.

Objective 2: Engage specialty crop producers as project advisors, on-farm trial collaborators, and peer educators to improve on-farm practices and empower producers to scale up operations.

Objective 3: Share research results and crop production best practices with current and aspiring specialty crop producers through field days, an annual South Dakota Vegetable Short Course, and a variety of print and digital media.

Objective 4: Engage Master Gardeners, consumers, undergraduate students, and youth in research field tours and presentations to increase awareness of the South Dakota specialty crop industry.

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Research Question #1: What Clover will Work Best?



Red
(Trifolium pratense)
 Biennial



Yellow Sweet
(Melilotus officinalis)
 Biennial



Dutch White
(Trifolium repens)
 Perennial



No Clover
(Bare ground)

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Research Question #3: How to Manage the Living Mulch?

1. No Fabric | Flail Mow + Till strip
2. No Fabric | Flail Mow + No-till strip
3. Landscape Fabric | Flail Mow + Till strip
4. Landscape Fabric | Flail Mow + No-till strip

Other Options:

- Plastic Mulch Raised Beds
- Till Strip Width | 12" vs. 30"



Image: Farmers Friend

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Poll 5: What types of mulch have you used on your farm?



Please select all types of mulch you have used:

1. Disposable Black Plastic Mulch (Raised Beds)
2. Reusable Landscape Fabric
3. Living Mulch (Cover crop)
4. Straw
5. Hay
6. Woodchips
7. Corn Stover
8. I have never used mulch (Bare ground only)
9. Other (Please list in the chat)

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Research Question #4: How do different cash crops perform?



Bell Pepper (SDSU)
 Transplants
 May-June

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Broccoli (SDSU)
 Transplants
 July-August



Acorn Squash (SERF)
 Transplants and/or Direct Seed
 June

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Discussion/Chat Box: Your Favorite Vegetable Varieties

What are your preferred varieties of:

- Bell Pepper
- Broccoli
- Acorn Squash
 - Direct Seed or Transplants?

What spacing do you use for each of these crops?

- Single row vs. Double rows?
- What spacing between rows/beds?



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Research Question #5: How does this idea work on a real farm?



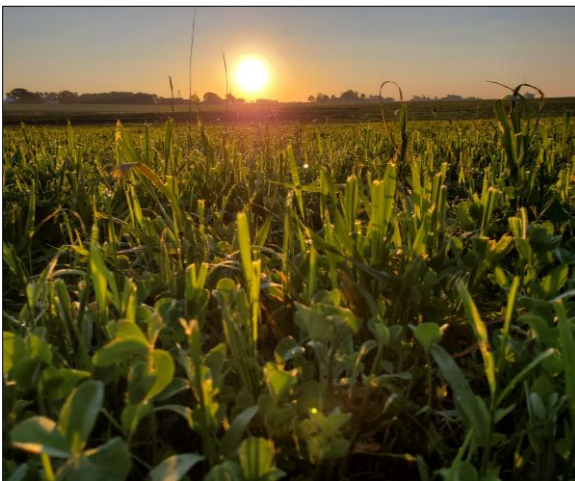
Cedar Creek Gardens near Midland, SD
Peggy Martin + Bud Manke

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Discussion: Your Feedback on our Research Plan



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What have we overlooked?

What should we change?

What other data would be helpful?

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Project Timeline

2022

Research Season #1 [February-October]
 Field Day on Campus [July or August]
 Master Gardener Update Conference Tour [September]
 Research Update at SD Local Foods Conference [November]

2023

Virtual Vegetable Short Course #1 [January]
 Research Season #2 [February-October]
 Field Days [July-September]: Campus, SERF, and Cedar Creek Gardens

2024

Virtual Vegetable Short Course #2 [January]



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Recommended Resources

SARE Managing Cover Crops Profitably 3rd Edition
[\[https://www.sare.org/resources/managing-cover-crops-profitably-3rd-edition/\]](https://www.sare.org/resources/managing-cover-crops-profitably-3rd-edition/)

USDA NRCS Cover Crops and Soil Health
[\[https://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/\]](https://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/)

Midwest Cover Crops Council / Cover Crop Decision Tool
[\[https://mccc.msu.edu/covercroptool/\]](https://mccc.msu.edu/covercroptool/)

Midwest Cover Crops Field Guide 2nd Edition
[\[https://ag.purdue.edu\]](https://ag.purdue.edu)

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