



Mulching Materials:

- Compost
- Straw
- Landscape Fabric

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Why Mulch?

Pros:

Conserve Moisture
Reduce Weeds / Reduce Labor
Improve Crop Quality
Raise or Lower Soil Temperature

Cons:

Material Cost
Removal / Storage / Disposal
Nutrient Tie-up



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Water Management

Influenced by:

- Soil mix
- Crop density
- Mulch
- Exposure

Source: Umass Extension Vegetable Program.
2017. *Irrigating Vegetable Crops*. →

Table 1. Critical Periods of Water Need (by crop)

CROP	CRITICAL PERIOD
Asparagus	Brush
Beans, lima	Pollination and pod development
Beans, snap	Flowering and pod enlargement
Broccoli	Head development
Cabbage	Head development
Carrots	Root enlargement
Cauliflower	Head development
Corn	Silking and tasseling, ear development
Cucumbers	Flowering and fruit development
Eggplants	Flowering and fruit development
Greens Continuous	Lettuce Head development
Melons (musk melons& watermelons)	Flowering and fruit development
Onions (dry)	Bulb enlargement
Peas	Seed enlargement and flowering
Peppers	Flowering and fruit development
Potatoes (white)	Tuber set and tuber enlargement
Potatoes (sweet)	Root enlargement
Radishes	Root enlargement
Spinach	Continuous
Squash (summer)	Bud development and flowering
Tomatoes	Early flowering, fruit set, and enlargement
Turnips	Root enlargement

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Rooting Depth



Table 1. Effective root zone moisture depth in unrestricted soils (top 50 percent of root zone).

Truck Crops	Effective Root Zone Depth (Inches)	Truck Crops	Effective Root Zone Depth (Inches)
Asparagus	36	Melons	24
Beets	18	Okra	18
Broccoli	18	Onions, bunch	6
Cabbage	18	Onions, dry	12
Carrots	18	Parsnips	24
Cauliflower	18	Peas	18
Celery	12	Peppers	18
Chives	6	Potatoes	18
Collards	18	Pumpkins	24
Corn (sweet)	24	Radish	6
Cucumbers	18	Rutabagas	18
Dandelion	6	Shallots	12
Eggplant	18	Snap beans	18
Endive	6	Spinach	6
Escarole	6	Squash	24
Fennel	6	Sweet potatoes	18
Horseradish	18	Swiss chard	12
Kale	18	Tomatoes	24
Kohlrabi	18	Turnips	18
Lettuce	6	Watermelons	24
Lima beans	24		

Source: Lott and Hammond. 2013. *Water Wise Vegetable and Fruit Production*. Adapted from USDA NRCS Irrigation Guide.

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Compost Considerations



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“Deep Compost Mulch”

- 4-6” depth, typically no-till beds
- Direct seed or transplant
- Neutral yields compared to plastic
- Yield increases over un-mulched or other organic materials
- Deeper Mulch = Better Weed Control
 - Consider if compost was heated enough to kill weed seeds
- Compost insulates soil better than other mulch materials
 - Temperature regulation during the night
- Regulation of Moisture + Nutrient Inputs
 - Really dry compost is hydrophobic
 - Overapplication of nitrogen (this research) + phosphorus (UMN)

Excessive Nitrate Limits the Sustainability of Deep Compost Mulch in Organic Market Gardening

by Benjamin Fleck¹ , Margitta Hofner^{1*}  and André Bradnick² ¹ Organic Farming and Cropping Systems, University of Kassel, Nordbahnhofstr. 1a, 37213 Wattenhausen, Germany² Leibniz Institute of Vegetable and Ornamental Crops (IGZ) e.V., Theodor-Eckertstr. 1, 14875 Großbeeren, Germany

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Compost: Too much of a good thing!?

Do we over-fertilize our gardens?

[Home](#) > [News](#) > Do we over-fertilize our gardens?

September 7, 2022

University of Minnesota Extension Educator, Natalie Hoidal, recently forwarded information about fertilizer use in our home gardens. The information she shared was worrisome to me, and important enough to pass along to my readers. An analysis of soil tests completed at the University of Minnesota soil lab between 1988 and 2021 revealed that many Minnesota lawns and gardens have much more phosphorus than they need. The median statewide soil phosphorus reading was 68 ppm (Bray) for lawns and gardens, compared to only 26 ppm (Bray) in farm fields (Bray is one method to extract phosphorus in soils with a pH of 7.4 or less. Some Minnesota soil tests may report phosphorus levels using the Olson extraction method if the soil pH is more than 7.4). A reading of 20 ppm is considered sufficient for growing vegetables, and more than sufficient for lawns. In general, using too much phosphorus is a problem for water quality, and over-fertilizing is expensive. At high enough rates, it can also negatively impact plant growth.



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Herbicides in Compost

- Herbicide breakdown influenced by:
 - Sunlight
 - Soil microbes
 - Heat
 - Moisture
 - Depending on chemical 30 days to 3 years
- Know the source
- Pot Bioassay
 - 1 part compost : 1 part soil (3-6 pots) + 1 pot with JUST soil
 - 3 pea or bean seeds per pot
- For a deep dive:

<https://content.ces.ncsu.edu/herbicide-carryover>



Washington State University Bioassay Test for Herbicide Residues in Compost:
<https://puyallup.wsu.edu/soils/clopyralid/>



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Manure Considerations



Food safety:
120+ days

Weed seeds
(compost!)

Avoid burning –
reduce high levels of
ammonium and/or
other salts

Must be aged or composted

Courtesy of Dr. Rhoda Burrows

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Stick to Straw?



Straw Mulch

- 4-6" depth is most effective, it will "settle"
- Easier Access in SD due to small grain production?
- Hand Spread vs. Grind + Blow Across a Field
 - Complete bed prep/planting prior to application
 - Will it blow away?
 - Allergy Concerns?
- Yield increases over un-mulched, may be lower than compost, neutral w/ plastic mulch
- Cooler soils, moisture regulation
- Weed/herbicide free source?
- Carbon additions
 - If you till into the soil at the end of the season
 - Possible N tie-up --- > observations w/ corn stover @ ISU



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Landscape Fabric: The Re-useable Answer?



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Black, Woven Landscape Fabric

- 10, 20, or 30-year fabric + Lots of “Sod staples”
- Full soil coverage (wider)
- Installation / Removal...labor considerations?
- Caulterize vs. Cut
- Moisture conservation compared to bare-ground, but may be less than other organic mulches
- Excellent weed control except for holes/edges
- Yields similar to other plastics, better than un-mulched
- Where to store? How to clean?
 - Food safety concerns? *research indicates, yes
 - Microplastic concerns? *research indicates, yes
- Warmer soils *Next slide



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Temperature Impacts of Plastic/Fabric

Table 1. Plastic mulch effects on soil temperature¹

Mulch Type	Soil temperature increase (+) or decrease (-) (°F)
Black	+5
Clear	+8-14
IRT ²	+5-10
White	-2

¹Soil Temperature at the 2" depth.

²Infrared transmissible

Source: Penn State University Center for Plasticulture and University of Missouri.



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Horticulture Research

ALL HORTICULTURE RESEARCH CONTENT



2023 On-Farm Experiences Growing Cucurbits in Newly Established Clover Living Mulch in Eastern South Dakota

Research report determining the impact of two established clover species on weed suppression, crop growth, and yield of squash.



McCrory Gardens Trial Report

Trial reports for McCrory Gardens



Broccolini Performance in Three Established Clover Living Mulches in Eastern South Dakota

Research report determining the impact of three established clover species on weed suppression, crop growth, and broccolini yield.



Did the Deer Persevere? 2023 Evaluation of Clover Cover Crops as a Living Mulch for Pepper Production in Eastern South Dakota

Research report analyzing the relationship between four different clover species and four different soil management practices and their effects on pepper growth and yield as well as weed suppression.



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