



SOUTH DAKOTA STATE UNIVERSITY EXTENSION

Cardboard in the Garden: Friend or Foe?

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Sheet mulching with cardboard

- No-till/no-dig method of site preparation that turns potential waste into soil.
 - Ruth Stout an early practitioner and advocate, Charles Dowding
- Layers of cardboard and organic matter
 - Compost, yard waste, straw, grass clippings, arborist wood chips
- Can create any type of garden: vegetable, perennial, food forest—just vary the depth of the mulch.
 - Deeper mulch layers for vegetables
 - Less mulch for native plants



<https://courses.charlesdowding.co.uk/new-no-dig-allotments/>



Why use sheet mulch with cardboard?

- If you have areas of poor soil—rocky, clay, compacted, etc.
- Create garden areas without disturbing the soil
- Suppresses weeds and builds soil
- Helps retain water
- Moderates soil temperature



No-till garden bed



No-till garden bed



Steps for no-till garden bed

1

Mow any grass or weeds in the space using the lowest setting.

2

Cover the entire area with overlapping pieces of brown, corrugated cardboard.

3

Add alternating layers of nitrogen and carbon. Each layer should be approximately 2" thick.

4

Wet the layers lightly with a hose or irrigation.

5

Allow the materials to decompose prior to planting, or else finish with a layer of soil if you want to seed or add transplants right away.

Nitrogen: compost, well-rotted manure, grass clippings
Carbon: dry leaves, sawdust, woodchips



No-till garden bed

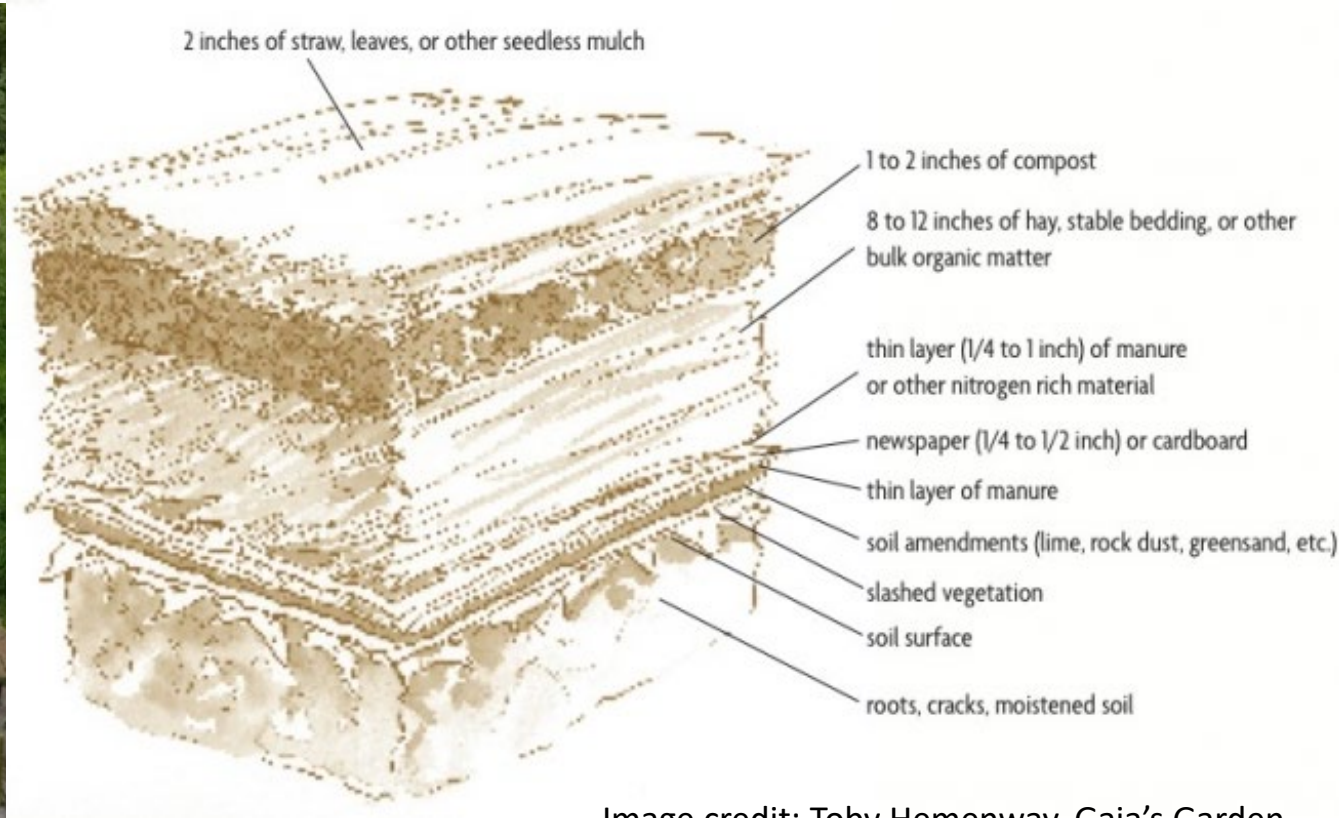


Image credit: Toby Hemenway, Gaia's Garden



Trees, shrubs, transplants



Trees, shrubs, transplants



- Mow any grass or weeds
- Plant trees or shrubs prior to putting down cardboard
- Place cardboard and woodchips around trees or shrubs, or over top of the planting area
- Let cardboard decompose before planting additional plants

A recent study (in Poultry Science) and a popular garden blog (Garden Professors) have raised concerns about using cardboard in the garden.

- Concerns include:
 - PFAS and other chemical contamination of cardboard
 - The types of cardboard used in litter, and the amount used for litter vs a thin layer on the soil are different than when using brown, corrugated cardboard
 - Reduced air exchange in soil covered with cardboard
 - But cardboard had better gas diffusion than landscape fabric or polyethylene mulch
 - Only tested cardboard in greenhouse, not full sheet mulch
 - Cardboard layer breaks down quickly in garden
- Important not to take results out of context



Research and Extension

Tackling Canada Thistle in an Organic Orchard
September 23, 2021
By Chris Michals

Organic apple growers Chris and Juli Michals were concerned about the establishment of Canada thistle in their Lathropville, Ontario, organic orchard. The Michalses are the first generation of apple growers in their family and have been growing apples for over 40 years. They are now organic growers and are looking for ways to control Canada thistle in their orchard. They have tried several methods, including hand pulling, mowing, and using organic herbicides, but have not had much success. They are looking for other growers who have had success in controlling Canada thistle in their orchards.

From our Newsletter
This story appears in the Summer 2021 issue of the newsletter. You can find it on page 10.

development of treated cardboard waste injection machine into the sandy soils
Journal of Agricultural Engineering
Volume 10, Issue 1, 2021

Abstract
The study aimed at developing a machine for injecting treated cardboard waste into the sandy soils. The machine was designed and built using a 10 HP diesel engine, a 10 HP electric motor, and a 10 HP hydraulic pump. The machine was tested in the field and found to be effective in injecting the waste into the soil. The results showed that the machine was able to inject the waste into the soil at a depth of 10 cm. The machine was also found to be effective in reducing the soil erosion and improving the soil fertility.

Effects of organic mulches on soil microflora in the root zone of apple: implications for nutrient fluxes and functional diversity of the soil food web
Journal of Agricultural Engineering
Volume 10, Issue 1, 2021

Abstract
The study aimed at investigating the effects of organic mulches on soil microflora in the root zone of apple. The study was conducted in a field experiment with three treatments: no mulch, straw mulch, and compost mulch. The results showed that the organic mulches significantly increased the soil microflora in the root zone of apple. The straw mulch treatment was found to be the most effective in increasing the soil microflora. The results also showed that the organic mulches significantly increased the nutrient fluxes and functional diversity of the soil food web.

Soil and Plant Properties in Cardboard Mulch Prepared No-Till Beds
Final Report for FNE10-677
Project Information
Summary

The study aimed at investigating the effects of cardboard mulch on soil and plant properties in no-till beds. The study was conducted in a field experiment with two treatments: no mulch and cardboard mulch. The results showed that the cardboard mulch significantly increased the soil organic matter and soil moisture. The cardboard mulch also significantly increased the plant growth and yield. The results also showed that the cardboard mulch significantly reduced the soil erosion and improved the soil fertility.

Experimental justification for converting paper, cardboard and plant waste into biomats
Journal of Agricultural Engineering
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The study aimed at investigating the experimental justification for converting paper, cardboard and plant waste into biomats. The study was conducted in a field experiment with two treatments: no biomats and biomats. The results showed that the biomats significantly increased the soil organic matter and soil moisture. The biomats also significantly increased the plant growth and yield. The results also showed that the biomats significantly reduced the soil erosion and improved the soil fertility.

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Cardboard layering deep compost mulch for weed suppression, soil health, and profitability
Final report for FW22-392
Project Information
Summary

The study aimed at investigating the effects of cardboard layering deep compost mulch on weed suppression, soil health, and profitability. The study was conducted in a field experiment with two treatments: no mulch and cardboard layering deep compost mulch. The results showed that the cardboard layering deep compost mulch significantly reduced the weed growth and yield. The cardboard layering deep compost mulch also significantly increased the soil organic matter and soil moisture. The results also showed that the cardboard layering deep compost mulch significantly increased the plant growth and yield.

Cardboard Layering and Deep Compost Mulch for Rocky Mountain West Specialty Crops
Progress report for WRG23-007
Project Information
Summary

The study aimed at investigating the effects of cardboard layering and deep compost mulch on specialty crops in the Rocky Mountain West region. The study was conducted in a field experiment with two treatments: no mulch and cardboard layering deep compost mulch. The results showed that the cardboard layering deep compost mulch significantly reduced the weed growth and yield. The cardboard layering deep compost mulch also significantly increased the soil organic matter and soil moisture. The results also showed that the cardboard layering deep compost mulch significantly increased the plant growth and yield.

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away the tiller and try cardnly sheet mulching for den beds
The Dallas Morning News
October 10, 2021

The article discusses the benefits of sheet mulching for den beds. Sheet mulching is a technique where a layer of cardboard is placed over the soil, followed by a layer of compost. This technique is used to suppress weeds and improve soil health. The article also discusses the benefits of sheet mulching for den beds, which are beds that are used for growing plants that do not require tilling. Sheet mulching for den beds can help to reduce the need for tilling, which can help to reduce soil erosion and improve soil fertility.

Extension Gardener
Smart Gardening: Sheet mulching
Sheet mulching is a technique where a layer of cardboard is placed over the soil, followed by a layer of compost. This technique is used to suppress weeds and improve soil health. The article also discusses the benefits of sheet mulching for den beds, which are beds that are used for growing plants that do not require tilling. Sheet mulching for den beds can help to reduce the need for tilling, which can help to reduce soil erosion and improve soil fertility.

Sheet Mulching
University of Georgia
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Sheet mulching — aka lasagna composting — builds soil, saves time
Oregon State University
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Sheet Mulching: Lawn to Garden Bed in 3 Steps
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Organic Mulches
Organic mulches are made from natural materials such as straw, wood chips, and compost. They are used to suppress weeds and improve soil health. The article also discusses the benefits of organic mulches for den beds, which are beds that are used for growing plants that do not require tilling. Organic mulches for den beds can help to reduce the need for tilling, which can help to reduce soil erosion and improve soil fertility.



Things to Consider when using Cardboard

Use corrugated, brown cardboard with minimal to no colored print

- Remove tape, staples

Full sheet mulching requires a lot of organic material

- Takes time to break down those materials (6-12 months)

If fewer layers are used weeds can still become an issue

- Thistle, creeping bellflower

Do not mulch up onto tree trunks or directly around plant stems

Not appropriate for all soil conditions, especially continuously moist or saturated poorly draining or clay soils—can create anaerobic conditions

Not every technique is appropriate for every area



Creeping
bellflower in
thin layer of
cardboard
and wood
chips



Sheet mulching with cardboard has been researched and advocated for by organic gardening organizations, universities, and gardening experts.

- Builds soil—especially if compact or clay
- Reduces weeding
- Conserves water
- Increases soil health-water holding capacity, organic matter
- Reduces waste
- Increases earthworm and mycorrhizal fungi—soil life



<https://www.smilinggardener.com/organic-soil-management/sheet-mulching/>



References

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- Soil and Plant Properties in Cardboard Mulch Prepared No-Till Beds, <https://projects.sare.org/project-reports/fne10-677/>
- Potential contaminants and hazards in alternative chicken bedding materials and proposed guidance levels: a review. <https://pmc.ncbi.nlm.nih.gov/articles/PMC7705057/>
- Carbon dioxide and oxygen exchange at the soil-atmosphere boundary as affected by various mulch materials. <https://www.sciencedirect.com/science/article/pii/S016719871930580X>





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