

Small Farms: Mulching

Overview



What is mulch?

Mulches are plant residues or other materials applied to the soil surface.

Mulches can be used to help with a variety of resource concerns, including:

- Improve the efficiency of moisture management
- Improve irrigation water efficiency
- Reduce pest pressure and erosion
- Improve plant productivity and health
- Maintain or build soil organic matter
- Reduce emissions of particulate matter, such as dust

How can mulching help urban and small-scale operations?

Many small-scale and urban operations use multiple types of mulch. This may be a combination of natural or synthetic mulches.

Mulching can increase soil health over time by protecting the soil and increasing soil organic matter. Mulching can be effective on its own, but pairing other management practices, including cover crop and crop rotation, may more quickly provide soil health benefits.

Mulches applied to the soil surface can help retain soil moisture and irrigation water use efficiency by reducing evaporation.

Depending on the material and application methods, mulches may also be effective at pest suppression including weeds, insects, and disease.

Where can mulch be applied?

Mulch materials are widely applied throughout farms and gardens on growing beds, pathways, and non-production areas.

What type of mulch is suitable?

Mulches have diverse uses in both production and non-production areas on operations of any size.

There are many different mulches for many different jobs! Consider crop nutrient needs, **C:N ratio** and potential leaching or runoff, residue management, and mulch duration when choosing mulch materials for various areas.

Natural mulches commonly include:

- Straw, hay, other chopped forages
- Compost from non-manure sources
- Dried leaves or cornstalks, shredded or chopped
- Wood chips, bark, or wood shavings, other wood materials
- Other biodegradable materials such as grass clippings and wool

The two most common **synthetic materials** used for mulching are:

- Plastic mulch
- Geotextile fabric, also called landscaping fabric

Plastic mulch is a thin, non-permeable material that typically lasts for one season. The plastic material may be black, for weed control – or white, for seed establishment. Large areas of plastic should have holes or slits cut to let rainfall percolate.

Non-woven geotextile fabric is well-suited in crop production because it is permeable and allows for water infiltration, while woven geotextile fabric is much less permeable and better suited for high-traffic, non-production areas. Both are durable materials that are typically reusable for up to five years.

Some plastic and geotextile materials are also used for weed and erosion control in tree plantings.

Considering mulching on your small farm?

USDA's Natural Resources Conservation Service (NRCS) can help you evaluate your options and develop a conservation plan to help you reach your goals.

USDA Service Centers are located in every Iowa county and can be easily found using the service center locator: nrcs.usda.gov/contact/find-a-service-center



What are C:N ratios?

The carbon (C) to nitrogen (N) ratio in mulch compares the amount of carbon to the amount of nitrogen. The C:N ratio affects decomposition rate, crop nutrient cycling, and risk of potential leaching or runoff.

The higher the C:N ratio, the longer it takes for the material to decompose. High carbon residues such as, woodchips, have low nutritional quality for microbes and will take longer to break down but still provide benefits like controlling weed pressure. Mulches with a C:N ratio greater than 30:1 such as those made from wood, corn, and grasses, may immobilize soil nitrogen, these mulches may not be suited for crops that require a lot of nitrogen – or where supplemental nitrogen cannot be applied.

The smaller the C:N ratio, the more rapidly the material will decompose. Low carbon mulches, such as chopped legume forage, may need to be re-applied throughout the growing season due to fast decomposition. But mulches with a C:N ratio less than 20:1 will release plant available nitrogen (nitrate) and should be avoided near streams and other water bodies to avoid negative impacts to water quality.

Optimum C:N ratio for soil microbes is 24:1 – mulch will feed soil microbes, increase soil organic matter, and present less risk to water quality.

The graph below illustrates general C:N ratios for a variety of common natural mulch materials. Keep in mind that C:N ratios fluctuate depending on the source and parent materials.

How much should I apply?

It is important to evenly apply enough mulch to meet the intended purpose. In most situations, 100% coverage is ideal – especially in walkways and between growing beds or for the purpose of weed control.

For NRCS purposes, the minimum depth for all coarse-textured organic mulch (e.g., woodchips or straw) is at least 2". Fine textured mulches (e.g., rice hulls) which allow less oxygen penetration than coarser materials should be no thicker than 2".

Avoid excessively thick or tightly packed mulches that can result in soggy anaerobic conditions at the soil surface during wet weather, prevent rainfall or irrigation from reaching the soil, or interfere with the movement of beneficial soil critters.

Most mulches "settle" after the first application and will need to be re-applied to maintain their final recommended depth and coverage.

Work with NRCS to determine the mulching rate and depth appropriate for your situation.

How does mulching affect soil temperature?

Dark mulch materials such as black synthetics and compost may warm the soil and promote spring crop germination. Light mulch materials such as white plastic can cool the soil and reduce the scorching of young plants. Straw, hay and wool can help insulate young transplants from frost.

How to manage mulch?

Over time, mulches "settle" and need to be re-applied to maintain good soil cover due to decomposition, compaction, or wind and water events. If areas lack adequate depth or coverage of mulch, weeds are likely to appear. The lifespan of the mulch treatment depends on the material.

- Straw, hay, grass clippings, leaves, etc. last roughly one season
- Wool can last up to 2 years
- Wood chips can last 2-3 years
- Organic mulches can be removed after initial use, raked-off into walkways, or sometimes applied directly on top of previous layers
- Black plastic (synthetic mulch) will typically last 1 year, removed after the growing season
- A sturdy commercial geotextile fabric can last for multiple growing seasons, removed after the growing season and stored until next year

Consider how the management of mulch residue will fit into a crop rotation, and the next crop's planting, weeding, and harvesting methods.

Where to get your mulch?

It is important to consider the source of mulch materials. Hay or straw may contain unwanted weed or other seeds. Municipal compost or wood chips may have trash residues and are typically not screened to be uniform in size. Residual herbicides may also be a concern in some mulch stocks. Knowing the source and asking questions can reduce these risks.

What are the costs?

If mulch is not made on-site and/or not reusable, there may be significant annual costs to the farm. However, costs may be offset by reduced weeding time and associated labor costs, reduced water from improved irrigation, clean marketable produce and reduced washing time, and long-term soil health improvements.

