

Mulching in Fruit Crops

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Summary

Mulching in fruit crops involves covering the soil around plants with organic or inorganic materials. This practice conserves soil moisture, regulates temperature, suppresses weeds, and prevents soil erosion. Organic mulches, such as straw, wood chips, and compost, also improve soil fertility as they decompose. Inorganic mulches, like plastic sheets and gravel, offer long-lasting weed control and moisture retention. Mulching enhances root development, reduces plant stress, and can improve fruit yield and quality. It's a sustainable agricultural practice that supports healthier crop growth and efficient resource use, benefiting both the environment and farmers.

Introduction

Mulch refers to the covering of soil, while mulching is the process of covering the soil around plants with organic or synthetic materials to create favorable conditions for plant growth, development, and efficient production. The term "mulch" was first coined by Waggoner in 1960. It likely originates from the German word "molsch," meaning soft to decay. Historically, it referred to gardeners using straw and leaves as soil cover. Mulching is also known as sheet composting (Barche, *et al*, 2015 & SK, *et al*, 2020)

Types of Mulches

The material used for mulching is known as mulching material. It may be organic or synthetic.

Organic mulches

Organic mulches degrade easily, are typically locally available, and are often produced on-farm. They do not pose any issues for post-utilization handling. Examples include leaves, straw, and grass.

- **Grass Clipping:** These materials are among the most abundant and easily accessible mulches nationwide. Freshly incorporated, they can add nitrogen to the soil. However, applying green grass during the rainy season can lead to the development of its own root system, which can be harmful to plant growth. Therefore, it is recommended to use dry grass as mulch material.
- **Straw:** Paddy and wheat straw are the most commonly used mulching materials for fruit and vegetable production. Although straw has low nutrient value, its decomposition enriches soil fertility. Compared to other organic mulches like grasses, leaves, and leaf mold, straw has a longer lifespan.
- **Compost:** Compost is one of the best mulching materials available. It boosts microbial populations, enhances soil structure, and supplies essential nutrients. Compost is an excellent choice for improving soil health.
- **Dry leaves:** Leaves, an easily available material, are good for mulching. Though leaves are good for protecting dormant plants during winter by keeping them warm and dry but due to lightweight they may be blown away even by light wind. To counter this problem, it requires anchoring which can be done with stones, chipped bark and covering with net or some form of sheet.
- **Sawdust:** Sawdust, a byproduct of wood finishing operations, has limited nutritive value, containing only half the nutrients found in straw. It decomposes at a slow rate. Due to its acidic nature, it is not recommended for use in acidic soils.
- **Newspaper:** Newspaper mulching helps to control weeds. One to two cm thick sheet of newspaper can be used and edges should be fastened with materials like pebbles, gravels, etc. The application of newspaper mulch should be avoided on a windy day.
- **Bark clippings:** These materials are beneficial for mulching because of their durability and ability to facilitate proper soil aeration. Hardwood bark clippings typically have more nutrients compared to softwood varieties. However, bark clippings are not always readily available in abundance, and certain bark products may pose risks of phytotoxicity. (Ranjan, *et al*, 2017)

Inorganic Mulch

Inorganic Mulch are synthesized ones and they need prior work before using them in the field. They are easily available, easy to handle, transport & lay. For example: - Plastic films.

- **Gravel, Pebbles and Crushed stones:** Soil is covered with pebbles to prevent transfer of heat from atmosphere. These materials are used for perennial crops. Small rock Layer of 3-4 cm provides good weed control. But they reflect solar radiation and can create a very hot soil environment during summer.
- **Plastic Mulch:** Both, black and transparent films are generally used for mulching. Advancement in plastic chemistry has resulted in development of films with optical properties that are ideal for a specific crop in a given location. These are two types.
- **Photo-degradable plastic mulch:** This type of plastic mulch film gets destroyed by sun light in a shorter period.
- **Bio-degradable plastic mulch:** This type of plastic mulch film is easily degraded in the soil over a period of time (SK, *et al*, 2020)

Generally, the following types of plastic mulch films are used in horticultural crops.

Type of Mulch	Purpose
❖ Perforated mulch -	Rainy season
❖ Thicker mulch -	Orchard and plantation Crops
❖ Thin transparent film	-Soil Solarization
❖ Transparent film -	Weed control through solarization
❖ Black film -	Weed control in cropped land Sandy soil & Saline water use
❖ White film -	Summer cropped land
❖ Silver coat film	- Insect repellent
❖ Thinner film	- Early germination

✚ **White plastic film:** It reflects more light to the plant as compared to black mulch. It is good under hot summer conditions. It has little effect on soil temperature. It keeps soil temperature down. It repels some insects.

✚ **Black plastic film:** It helps in conserving moisture, controlling weed and reducing outgoing radiation.

✚ **Reflective silver film:** It generally maintains the root-zone temperature cooler.

✚ **Transparent film:** It increases the soil temperature and preferably used for solarization (Chopra, *et al*, 2020)

Selection of organic mulches

Undecomposed or partially decomposed mulch materials should not exhibit

nitrogenous activity after application. They must not have any antagonistic effects on the crop and should be free from insect or pest infestations, particularly termites, and diseases. Determining the appropriate mulch depth and identifying plants' tolerance to moisture and oxygen are two crucial steps in organic mulching (SK, *et al*, 2020)

Selection of plastic mulch

The selection of mulch film depends on the specific purpose to be achieved, such as weed control, raising or lowering soil temperature, disease control, or enhancing plant growth. It also varies based on ecological conditions and the primary and secondary characteristics of the mulch.

Thickness of mulch: It depends on the type and age of the crop.

Crop duration	Thickness of mulch
❖ Annual crops	- 25 microns
❖ Biennial crops	- 50 microns
❖ Perennial crops	- 100 microns (SK, <i>et al</i> , 2020)

Advantages of Mulching

- ✚ **Moisture Conservation:** Forms a protective layer over the soil, reducing evaporation and conserving moisture for optimal hydration of plants.
- ✚ **Soil Structure Enhancement:** Alleviates soil compaction issues, enhancing soil structure and promoting better root development in cultivated crops (Prem, *et al*, 2020)
- ✚ **Insect Management:** Acts as a barrier, implementing effective insect management strategies by reducing the risk of pests reaching the plants.
- ✚ **Weed Suppression:** Minimizes weed growth, reducing competition for nutrients and sunlight and supporting the overall health of cultivated crops (Singh, *et al*, 2021)
- ✚ **Fumigation Aid:** Contributes to fumigation processes, creating a healthier soil environment for plant growth.
- ✚ **Promotion of Plant Growth:** Associated with an increase in plant growth, providing favorable conditions for robust and vigorous development.
- ✚ **Elimination of Root Pruning:** Eliminates root pruning, allowing plants to establish healthier root systems.
- ✚ **Soil Temperature Increase:** Contributes to an increase in soil temperature, particularly beneficial for heat-loving crops.

- ✚ **Reduced Fertilizer Leaching:** Reduces fertilizer leaching, helping retain essential nutrients in the root zone for efficient nutrient uptake by plants.
- ✚ **Cleaner Vegetable Produce:** Prevents soil splashing onto plants, resulting in cleaner vegetable produce.
- ✚ **Earlier Harvest:** Enables an earlier harvest, extending the growing season for crops.
- ✚ **Frost Protection:** Provides frost protection by insulating the soil and shielding sensitive plants during cold periods.
- ✚ **Overall Agricultural Sustainability:** The multifaceted advantages of mulching contribute to improved crop quality, increased yields, and sustainable agricultural practices (Abdelraouf, *et al*, 2020)

Disadvantages of Mulching

- ✚ Large scale mulching is cost intensive.
- ✚ Availability of mulching materials.
- ✚ Use of high C: N mulching materials viz., saw dust, straw results in temporary immobilization or starvation for nutrients in crops.
- ✚ Change in the soil reaction due to continuous use of same mulching material.
- ✚ Application of top-dressed fertilizers is difficult.
- ✚ Biodegradability of plastic materials
- ✚ Organic mulches may harbor termites needs frequent irrigation and spray of termiticides.
- ✚ Some of the organic mulches have allelopathic effects on crops (Govindappa, *et al*, 2015)

Conclusion

Mulching in fruit crops is a highly beneficial practice that enhances soil health, conserves moisture, suppresses weeds, and improves fruit quality and yield. Both organic and synthetic mulches provide these advantages, though organic mulches also contribute to soil fertility over time. By creating optimal growing conditions and reducing environmental stress, mulching supports sustainable and efficient fruit crop production, benefiting both farmers and the ecosystem.

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