

Mulching Practices for Soil Moisture Conservation in Fruit Orchards

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Soil moisture is one of the most critical factors influencing the growth, yield, and quality of fruit crops. In many orchard systems, especially in semi-arid and arid regions, water scarcity poses a significant challenge. Mulching has emerged as an effective cultural practice for conserving soil moisture, improving soil health, and enhancing the productivity of fruit orchards. Mulching is an effective practice for conserving soil moisture and improving soil health in fruit orchards. It involves covering the soil around fruit trees with organic materials such as straw, dry leaves, grass clippings, wood chips, or compost, or with inorganic materials like black polyethylene sheets, stones, or landscape fabric. Mulches reduce water loss by minimizing evaporation, regulate soil temperature, suppress weed growth, and, in the case of organic mulches, enhance soil fertility as they decompose. Proper mulching involves applying a 5–10 cm layer of organic material around the base of the tree, while keeping it slightly away from the trunk, and replenishing it periodically. When combined with efficient irrigation methods like drip irrigation, mulching ensures consistent moisture availability to the roots, promotes healthy growth, and improves fruit yield and quality. This practice is especially beneficial in crops like mango, guava, citrus, apple, pomegranate, and papaya, making it a simple, sustainable, and cost-effective strategy for modern orchard management.

What is Mulching?

Mulching involves covering the soil around plants with organic or inorganic materials to reduce water loss, suppress weeds, and improve soil conditions. This protective layer acts as a barrier, reducing the direct impact of sunlight and wind on the soil surface, thereby minimizing evaporation.



Types of Mulches

1. **Organic Mulches:** Organic mulches are derived from natural sources and gradually decompose, adding nutrients to the soil. Common organic mulches in fruit orchards include:

- Straw and hay
- Dry leaves
- Grass clippings
- Wood chips and bark
- Compost

Benefits: Organic mulches improve soil fertility, enhance microbial activity, and provide a slow release of nutrients as they decompose.



2. **Inorganic Mulches:** Inorganic mulches are non-degradable materials used mainly to conserve moisture and control weeds. Examples include:

3. Black or colored polyethylene sheets
4. Gravel or stones
5. Landscape fabric

Benefits: They are long-lasting, do not decompose, and are highly effective in reducing evaporation, but they do not improve soil fertility.

Benefits of Mulching for Soil Moisture Conservation

1. **Reduction of Evaporation:** Mulches act as a physical barrier, reducing direct soil exposure to sunlight and wind, thereby significantly decreasing water loss through evaporation.
2. **Improved Water Retention:** Mulching increases the soil's ability to retain moisture, ensuring that fruit crops have a more consistent water supply, particularly during dry spells.
3. **Soil Temperature Regulation:** Mulches moderate soil temperature by insulating roots from extreme heat in summer and cold in winter. This regulation supports healthy root growth and nutrient uptake.
4. **Weed Suppression:** By blocking sunlight, mulches prevent weed germination and growth. Reduced competition from weeds allows fruit trees to utilize soil moisture more efficiently.
5. **Enhanced Soil Structure and Fertility:** Organic mulches decompose over time, adding organic matter to the soil. This improves soil structure, aeration, and nutrient availability, indirectly aiding moisture retention.

Recommended Mulching Practices in Fruit Orchards

1. **Timing:** Apply mulch at the beginning of the growing season or just after planting. This ensures maximum moisture retention and protection throughout the critical growth stages.
2. **Depth:**
 - Organic mulch: 5–10 cm thick layer around the base of fruit trees.
 - Inorganic mulch: Thin sheets (2–5 cm) are sufficient, as excessive thickness may restrict air circulation.
3. **Placement:** Mulch should be spread evenly around the tree canopy but kept 5–10 cm away from the trunk to prevent rotting and pest infestation.

4. **Maintenance:** Organic mulches need periodic replenishment as they decompose over time. Monitor mulch layers to ensure consistent soil coverage.
5. **Integration with Irrigation:** Mulching is most effective when combined with efficient irrigation systems like drip irrigation, which delivers water directly to the root zone with minimal loss.

Common Fruit Crops Benefiting from Mulching

- Mango
- Guava
- Citrus (orange, lemon)
- Apple
- Pomegranate
- Papaya

In these crops, studies have shown that mulching can improve soil moisture content by 15–30%, enhance fruit yield, and improve fruit quality.

Conclusion

Mulching is a simple, cost-effective, and sustainable practice for conserving soil moisture in fruit orchards. Whether using organic or inorganic materials, proper mulching reduces water loss, controls weeds, enhances soil fertility, and promotes healthier fruit crops. With increasing water scarcity and the need for sustainable orchard management, mulching is an indispensable practice for modern fruit production systems.