DUST MULCH EFFICACY IN GARDENS AND LANDSCAPES

Home Garden Series

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Dust Mulch Efficacy in Gardens and Landscapes

Dust mulching is a soil-water conservation practice recommended by some popular gardening books and web sites for home gardeners. Dust mulches are made by breaking up the top few inches of the soil with a hoe or rake, creating a finely textured layer (Figure 1). Proponents of dust mulching claim that this process reduces soil evaporation by disrupting channels that move water from the ground into the atmosphere and is superior to organic mulches in conserving soil moisture.

Figure 1. Dust mulching creates a finely textured layer of soil.

Do dust mulches conserve soil moisture better than other mulches?

Much of the research on dust mulching comes from studying arid lands in subtropical and tropical agricultural areas. Some of these studies (De and Giri 1978; Sharma 1991) found that dust mulches were effective in improving soil moisture conservation compared to bare soil conditions. But most research has found dust mulch to be less effective in conserving water compared to organic mulches, such as straw (Figure 2), hay, leaves, and ground corn cobs (Chaudhary et al. 2007; Gargi and Gautam 2003; Prasad and Singh 1998; Sarkar and Singh 2007; Sharma and Chakor 1995).

Can dust mulches provide other benefits to soils?

Another benefit of mulching is moderating soil temperature. Mulched soils are usually warmer in the winter and cooler in the summer. However, researchers have found that dust mulches do not lower daytime soil temperatures as effectively as organic mulches (Sarkar and Singh 2007). In warm climates, dust mulches can raise the soil temperature enough to increase evaporation and possibly damage or kill fine roots.

Figure 2. Straw mulch used in a garden setting.

Good mulches also prevent soil erosion. Since dust mulching deliberately creates fine particles of soil, there will be more erosion by wind or rain. Dust mulching was identified as one of the primary causes of agricultural erosion many decades ago. More recently, researchers have found dust mulching to be a major source of particulate air pollution (Bewick et al. 2008; Thorne et al. 2003). These airborne particles are associated with human health and global climate concerns (Kjelgaard et al. 2004).

Are dust mulches useful in vegetable gardens?

Much of the research on dust mulching has examined food crop yields in Africa and Asia. In several studies, crop yields increased in dust-mulched fields compared to bare soil conditions. However, in nearly every instance where dust mulching was compared to organic mulching, organic mulches were found to be superior in enhancing crop yields. Table 1 summarizes the results of the most recent studies.

As Table 1 shows, dust mulches are usually less effective than organic mulches for improving yields of a variety of different crop species.

Since dust mulches cost nothing, can they be economically sound choices?

Researchers have addressed the economics of dust mulching recently (Bewick et al. 2008; Mandal and Saren 2012; Rajput et al. 2014b; Verma et al. 2008). Only one study found dust mulching to be the most cost effective, and this result was inconsistent between years (Verma et al. 2008).
Table 1. Comparative effects of dust and organic mulches upon crop yields. Mulches are listed in order of best to worst. (DM = dust mulch; OM = organic mulch; DM+OM = dust and organic mulches used together.)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Ranking of mulches</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley (Hordeum vulgare)</td>
<td>OM &gt; DM</td>
<td>Sarkar and Singh 2007</td>
</tr>
<tr>
<td>Corn/maize (Zea mays)</td>
<td>OM+DM &gt; OM</td>
<td>Shivran and Rana 2003</td>
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<tr>
<td></td>
<td>OM &gt; DM</td>
<td>Rajput et al. 2014a, 2014b</td>
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<tr>
<td>Cotton (Gossypium spp.)</td>
<td>OM &gt; DM</td>
<td>Senthivel et al. 2008</td>
</tr>
<tr>
<td>Cowpea (Vigna unguiculata)</td>
<td>OM &gt; DM</td>
<td>Choudhary et al. 2013</td>
</tr>
<tr>
<td>Fennel (Foeniculum vulgare)</td>
<td>OM &gt; DM</td>
<td>Meena et al. 2014</td>
</tr>
<tr>
<td>Mung (Vigna radiata)</td>
<td>OM &gt; DM</td>
<td>De and Giri 1978</td>
</tr>
<tr>
<td></td>
<td>DM &gt; OM</td>
<td>Verma et al. 2008</td>
</tr>
<tr>
<td>Niger seed (Guizotia abyssinica)</td>
<td>OM &gt; DM</td>
<td>Mandal and Saren 2012</td>
</tr>
<tr>
<td>Pearl millet (Pennisetum spp.)</td>
<td>OM &gt; DM</td>
<td>Gargi and Gautam 2003</td>
</tr>
<tr>
<td>Sesame (Sesamum spp.)</td>
<td>OM &gt; DM</td>
<td>Singh et al. 1997</td>
</tr>
<tr>
<td>Sorghum spp.</td>
<td>OM &gt; DM</td>
<td>Mandal et al. 2012; Singh et al. 2014</td>
</tr>
<tr>
<td>Wheat (Triticum spp.)</td>
<td>DM+OM &gt; OM &gt; OM &gt; DM</td>
<td>Prasad and Singh 1998</td>
</tr>
<tr>
<td></td>
<td>OM &gt; DM</td>
<td>Sharma and Chakor 1995</td>
</tr>
<tr>
<td></td>
<td>OM = DM</td>
<td>Sharma 1991</td>
</tr>
</tbody>
</table>

While dust mulching requires no material input, it is labor intensive and requires repeated application to prevent weed invasion (Figure 3). In contrast, organic mulches made from local crop residues were consistently the best economic choices, possibly due to reduced labor costs. These results align with the information in Table 1. Mulches that provide the best crop yield will also provide the highest economic benefit.

While they may be better than bare soil in conserving soil moisture, dust mulches are not as effective as organic mulches. Organic mulches also reduce erosion, keep soils cooler in the summer, and consistently produce greater yields of vegetables. And because they are organic, they provide a constant source of nutrients throughout the growing season.

This publication was adapted from Chalker-Scott, L. 2008. Dust mulches. MasterGardener Magazine 2(3): 47–49.

**References**


**Summary: Use of dust mulch in home gardens**

Decades of research provide strong evidence that dust mulches are not the best choice for either soil management or vegetable production.


Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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