

Use of Mulches to Control Weeds in Landscapes

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Mulches are materials placed on the soil surface. When used in landscapes, they serve both aesthetic and practical functions. Mulches can be organic, synthetic or mineral—mulches can even be composed of rubber or any material that does not easily degrade or harm the plants that grow under them. Mulches prevent evaporation from soil surfaces and thus will cut evaporative loss of moisture from soils. Organic mulches made from recycled greenwastes have the advantage of breaking down into mineral nutrients that plants can use and will also add carbon to soils thus improving their porosity, structure and microbiology (Downer, 2008). Organic mulches are also aesthetic if they are prepared in a uniform size by screening or fine chipping. Recycling organic wastes back into landscapes is also beneficial to the environment as it reduces waste volume disposed in landfills while also reducing the need for petrochemical-based fertilizers.

Organic mulches must have several characteristics in order to perform adequately in

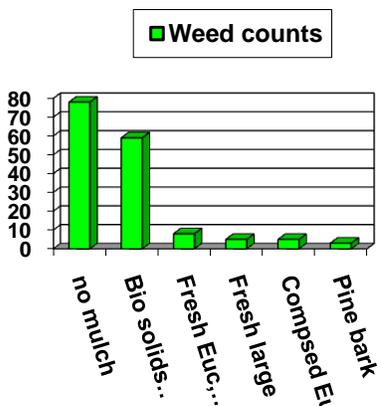


Figure 1. Downer and Faber, 2005

landscapes for weed suppression. Mulch particles must be of large enough so that the mulch layer does not hold more water than underlying soil layers. This provides a vapor barrier necessary to slow evaporation. Mulches should not hold enough water to allow seed germination, so particles must be large, at least 3-6 cm chips or larger. Mulches must have some longevity as it is expensive to reapply them frequently. Lignified organic materials such as wood and bark make the best mulching materials. Chopped tree branches or trimmings are excellent feedstock for mulch. Manures,

composts or other fine materials should be avoided. They may allow germination of weed seeds (Downer and Faber, 2005), and may contain weed contaminants (Daugovich et al., 2006). In a biosolids compost weed suppression effects were lost (Figure 1.). Another disadvantage of using composted materials is that they have already been degraded in the composting process thus shortening their useful mulch life. Mulches made from freshly chipped woody plants are best

because decomposition has not begun and thus they have the maximum time available for breakdown. There is no published evidence of chipped tree branches drawing the nitrogen from underlying soils. In time, mulch will break down and eventually add nitrogen to the soil (Valenzuela-Solano et al.,2004). The thicker the mulch layer the greater the nutrient contribution.

Effect of composting on Eucalyptus mulch weed suppression

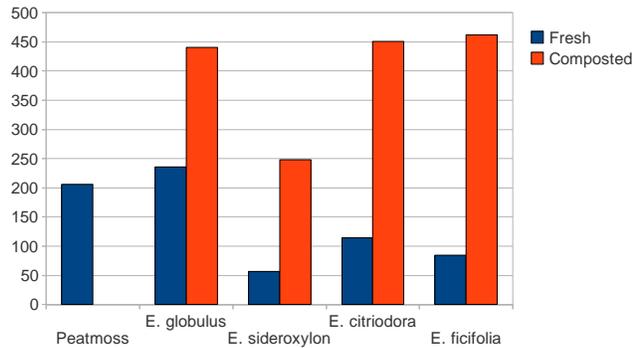


Figure 2. Downer, 1993

Mulch thickness effect on weed density

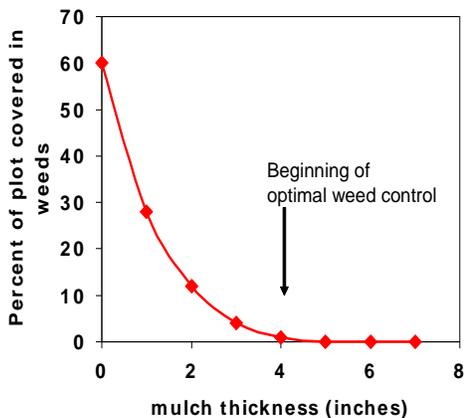


Figure 3. Optimal weed control with mulch

Yardwaste mulches made from Eucalyptus are common in municipal settings. Despite the popular fear of using Eucalyptus as a mulch, Eucalyptus mulches are safe for most horticultural uses and will promote growth of most plants under them. In a study of several different eucalyptus sources we found that different species of eucalyptus when made into mulch have different abilities to inhibit weed seed germination in flats (Figure 2.) *E. globulus* was the least suppressive to weeds while *E. sideroxylon* was very inhibitory to weed germination. When composted, the Eucalyptus mulches were stimulatory to weed seeds under them. Eucalyptus trees are known to contain allelochemicals that inhibit seedling germination; however the compost made from Eucalyptus leaves and small branches stimulated the germination and growth of weed seeds.

When these two eucalyptus species were tested in a field setting for their phytochemical potential there were no significant difference between *E. globulus* and *E. sideroxylon* in their ability to inhibit a variety of weeds such as red root pigweed, malva, fillaree, smooth crabgrass and lambsquarters. In the same study there was a very significant effect based on mulch thickness. As mulches of either source approach 4 inches in depth almost 100% weed suppression can be attained of common annual weed species (Figure 3). The four inch depth has been shown in a number of studies to

inhibit most weed seed germination, probably from prevention of light breaking dormancy of the seeds. Mulches should be applied at greater depth than 4 inches because settling will result in shallower depths a few weeks after application.

Some caution should be taken when applying organic mulches. Mulches can be the sources of noxious weeds such as yellow and purple nutsedge. We have shown that nutsedge can survive composting temperatures in yardwaste stockpiles of up to 70C for as many as 56 days. Empirical data suggest that nutsedge is commonly spread in yardwastes and is frequently found invading landscapes from yardwaste mulched shrub and flower beds.

Mulches breakdown: losing over sixty percent of their carbon each year (Figure 4). The

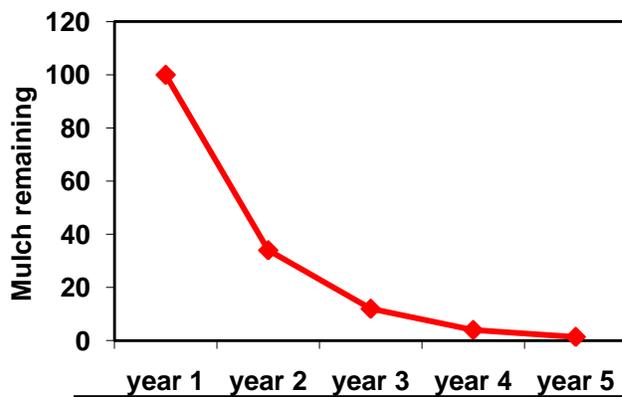


Figure 4. disappearance of mulch over time

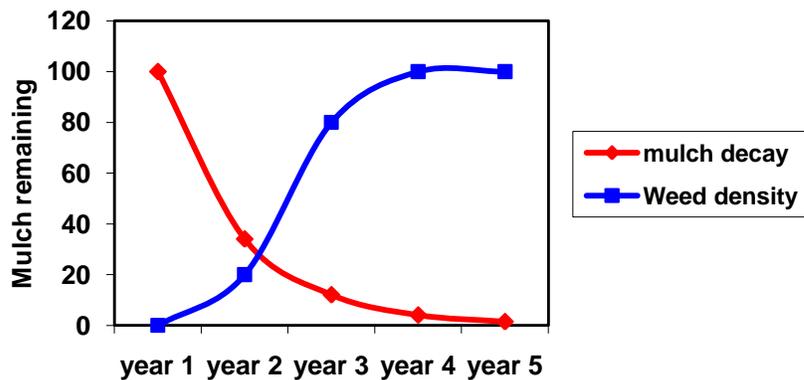


Figure 5. Weed emergence as a function of mulch disappearance

decay curve for mulch loss in a landscape approximates the chart to the left. This is for an ideal wood chip mulch of large particle size. By the end of year two, the mulch has lost most of its thickness and ability to suppress weed seed germination. As mulch degrades it also builds up fine materials that store water and allow for germination. Mulch should be applied at least once per year in a 4 inch thick layer to account for decay and mineralization. If mulches are not replenished weeds will

“escape” through the mulch and the weed control effects of the mulch will be lost as weeds grow through it, set seed and thus more weeds are produced. It is not uncommon for abandoned mulched areas to become 100% covered by weeds as the decayed mulch materials are nutritive and will now hold more water than unmulched

surface soil layers (Figure 5).

Mulches can be used in landscapes to prevent establishment of annual weeds or perennial weeds that have not yet germinated. Mulches should consist of coarsely chopped tree wastes with a high content of wood. Application should be four inches or greater and mulches should be reapplied on an annual basis. Eucalyptus chips make excellent mulches but they have little or no phytochemical effect in field settings.

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