



Rubber Mulch Use in Home Landscapes

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Introduction

Vulcanized rubber is a durable material used in many consumer products including car and truck tires. While durability is important for tires on a vehicle, it becomes a problem once those tires are discarded. The EPA estimated that in 2003 there were at least 290 million scrap tires generated across the United States (USEPA 2014). Discarded tires are often called the bane of waste management because of the difficulty in disposing of them. Scrap tire stockpiles can create significant fire hazards, such as the infamous 1983 tire fire in Virginia that burned for 9 months. Tires dumped illegally are environmentally dangerous enough to be defined as pollutants.

To address this solid-waste problem, researchers have been studying ways to reuse discarded tires. Generating energy and rubberizing asphalt are two successful strategies for using this discarded material. Old tires can also be ground up as a mulch for use on playgrounds and landscapes (Figure 1). However, this practice places recycled rubber products into greater contact with people, pets, and the environment.



Figure 1. Dyed rubber landscape mulch.

The purpose of this fact sheet is to summarize the current scientific research on the use of recycled rubber products in home landscapes.

Benefits and drawbacks of rubber mulch

Rubber mulches are widely available, easy to apply, and come in a variety of colors (Figure 2). These attributes appeal to many home gardeners. From a practical standpoint, however, these mulches are not particularly good choices for either garden or landscape use. Studies have found mulches and mats made from tires to be less effective in tree establishment or in controlling weeds than mulches and mats made from organic materials such as wood chips or natural fibers (Arthur and Wang 1999; Calkins et al. 1996; Stokes 2012).

Furthermore, researchers have observed leaf yellowing, reduced tree growth, and increased tree mortality when rubber mulch is used (Stokes 2012). Soil tests revealed high levels of zinc, which is incorporated during tire manufacturing. Zinc is accumulated by plants and can result in the symptoms previously noted (Bush et al. 2001, 2003).



Figure 2. Advertised benefits of rubber mulch.

This fact sheet is part of the WSU Extension Home Garden Series.

Rubber mulches have other undesirable characteristics as well. Compared to a dozen organic mulches, rubber mulch was the most likely to ignite and most difficult to extinguish (Steward et al. 2003). And rubber mulches can also lead to pest problems. A recent study reported that female Asian cockroaches preferred rubber mulches for shelter, as did their offspring. In contrast, wood chips were least preferred by roaches (Snoddy and Appel 2013).

Decomposition and toxicity of rubber mulch

Ground rubber is advertised as permanent mulch, but permanent is a relative term here. Tires contain rubber and other naturally occurring chemicals, which are broken down by microbes over time. Many bacterial species can use rubber as their sole energy source. Naturally occurring white-rot and brown-rot fungal species also break down the chemicals found in tires.

Decomposition of rubber means that breakdown products, including heavy metals and other chemicals of concern, leach into the surrounding soil and water. Rubber leachates also contain various plasticizers and accelerators used during the vulcanizing process, a process in which rubber is chemically treated to give it useful properties such as strength or elasticity. Decades of research have confirmed that entire aquatic communities of algae, zooplankton, snails, and fish can be killed when exposed to rubber leachates.

The leaching problem increases as the particle size of recycled tires decreases. In other words, the smaller the particle size, the greater the potential for leaching. Toxins associated with crumb rubber (Figure 3), a more finely ground type of rubber used on athletic fields, are well documented (Li et al. 2010; Llompert et al. 2012; Menichini et al. 2011; Simcox et al. 2011). Benzothiazole, a toxic, airborne contaminant from crumb rubber, is the primary rubber-related chemical found in synthetic turf studies. Polycyclic aromatic hydrocarbons (PAH) such as naphthalene, phthalates, butylated hydroxytoluene, and other



Figure 3. Crumb rubber is a more finely ground version of rubber mulch.

chemicals of concern have been found in the air, water, and soil adjacent to crumb rubber and other recycled tire products. In one recent study, the levels of PAH reported were significantly higher than allowable for agricultural or industrial soils (Llompert et al. 2012).

Research provides additional evidence regarding the potential health risks associated with exposure to crumb rubber in turf fields and playgrounds (Bocca et al. 2009; Kim et al. 2012; Llompert et al. 2012; Menichini et al. 2011; Sadiktsis et al. 2012; Simcox et al. 2011). To date, however, there are no similar studies that focus on the health risks posed by rubber mulches used in home gardens and landscapes. It is difficult to apply the findings from athletic field and playground studies to the home landscapes. However, home gardeners should be aware of potential contaminants should they choose to use rubber mulches.

Overall recommendation

Rubber mulches can be attractive, easy to find and apply, and may not need frequent re-application. However, there are significant problems associated with using these mulches. In the short term, rubber mulch is not as effective as other organic mulch choices in controlling weeds. Furthermore, rubber mulches can attract insects (e.g., cockroaches), and they are highly flammable. In the long term, decomposing rubber mulch releases heavy metals and organic chemicals with unknown effects on human and environmental health. Other organic mulch choices, especially wood chips, are better performers and pose none of the environmental risks attributed to rubber mulch.

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Further Reading

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