

Is There a Role For Mulch in Christmas Tree Plantations?



Photo 1. Overview of Christmas tree mulch study at Michigan State University Southwest Research and Extension Center near Benton Harbor, MI.

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The use of organic mulches such as ground bark or wood chips is a common practice in managing trees and shrubs in landscapes. Mulches can provide a range of benefits including weed control, soil moisture conservation, and addition of soil organic matter. Because of the widely recognized benefits of mulch for trees in landscapes, the question of using mulch for Christmas trees often arises among growers. In fact, numerous recent posts on the Great Lakes Christmas Tree Growers Facebook group have touched on the topic of mulch in Christmas trees. In this article, I will draw from some of our past research at Michigan State University and discuss some of the positive aspects of mulch as well as some of the potential negative impacts of mulch in Christmas trees.



Photo 2. Close-up of wood chip mulch ring and soil temperature and soil moisture probes.

Why mulch?

The use of organic mulches can promote a range of benefits for the tree's environment that can translate into improved growth, health, and survival of Christmas trees. The potential for mulch to improve growth and survival of newly planted Christmas trees was demonstrated in a research trial we conducted at the Michigan State University Southwest Research and Extension Center (SWMREC) near Benton Harbor, Michigan (Photo 1). We spring-planted 2+2 transplants of Fraser fir and blue spruce on a sandy loam soil. The newly planted trees were then assigned to a series of irrigation and mulch treatments. To simplify the

discussion here we'll focus on four treatments: 1) no irrigation + no weed control; 2) no irrigation + weed control; 3) irrigation + weed control and 4) no irrigation + wood chip mulch. We also tested plastic mulches in the trial but these are not practical for most growers and are not discussed here. For the irrigated plots, irrigation was supplied weekly via a drip irrigation system. Weed control plots were maintained through a combination of hand weeding and spot sprays of glyphosate. Wood chip mulch was provided from poplar trees that had been removed at the research station and run through a large chipper. We mulched to a depth of 2-3" in a 12" radius around each tree

after planting (Photo 2). For all treatments we tracked soil conditions, growth, and physiological responses of the trees for two growing seasons. After two years, survival of trees that were mulched (survival = 98%) was nearly as high as plots that were irrigated (100%) and higher than plots without irrigation that had weed control (91.5%) or no weed control (69%). Mulching increased height growth compared to non-irrigated trees, with or without weed control (Fig.1). Remarkably, trees on the mulched plots were as tall (or taller) as the trees that had been irrigated, even though the mulched trees did not receive any supplemental water and each summer had a period of at least 30 days with less than 0.5" of rain. So what's going on? How can mulching – without irrigation – result in growth and survival after two years that is similar to that from weekly irrigation? The first part of the answer is weed control. If we look at Figure 1 and compare the two bars on the right side, we see that there is large bump in growth just from weed control, even if we don't do anything else. Weeds shade young trees and they are efficient at competing for water and nutrients. But weed control is not the whole story. Looking at the middle bars in Figure 1 and comparing mulching to keeping the site weed-free by applying herbicides and hand-weeding, we see there is another step up in growth from mulching beyond the growth increase attributable to weed control. This additional increase in growth from mulching is likely due to a couple of factors. First, mulch conserves soil moisture by reducing evaporation from the soil surface and increasing rainfall infiltration. In this study and others, we have seen increased soil moisture and reduced stress on trees that are mulched, compared to keeping the ground bare. Another benefit of mulch is reduced soil temperatures in the root zone. We monitored soil temperatures in the study at SWMREC and found that on a day when the air temperature reached 89 deg. F (31.7deg. C), the soil temperatures at 3" depth on

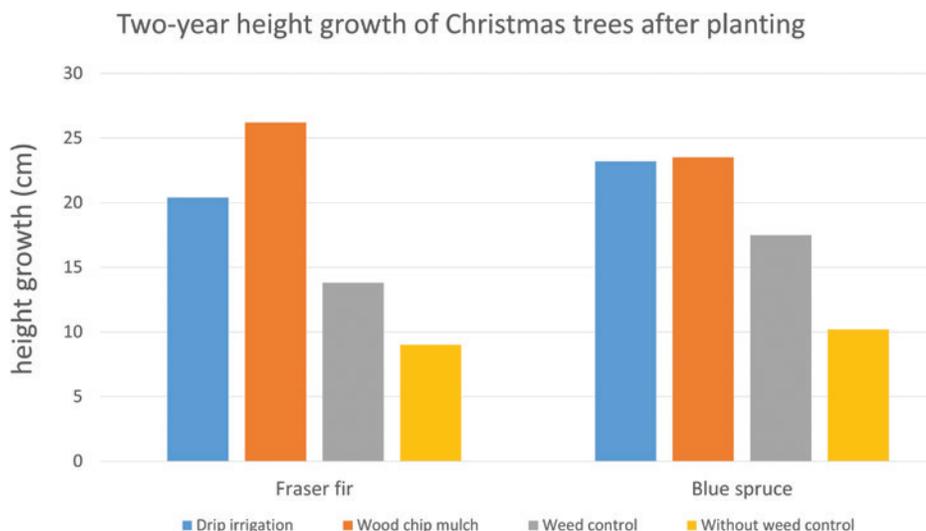


Figure 1. Two-year height growth of 2+2 Fraser fir and blue spruce transplants. Note: Tree in plots denoted as wood chip mulch, weed control, and without weed control were not irrigated.

the mulched plots averaged 82 deg. F (27.7 deg. C), while soil temperatures on the bare ground plots soared to 100 deg. F (37.7 deg. C)(Fig.2). Extremely warm soils can reduce tree growth by damaging roots through excessive root respiration. Over the long term, mulch can provide additional benefits as it breaks down and provides increased soil organic matter. Improving soil organic matter increases soil cation exchange capacity, which increases the soils' ability to serve as a reservoir for important plant nutrients. Increased organic matter also improves overall soil health by improving soil structure and increasing soil biological activity.

So, what's the catch?

If mulch is so great, why isn't everybody doing it? As with most inputs on your farm, the first consideration is cost. The cost of mulch varies widely depending

on the source. At most landscape suppliers, the cost of mulch usually ranges between \$25-45 per yard depending on the quality of mulch. If a grower mulches individual trees with 12" radius circles of mulch that is 2" deep, one yard will cover about 50 trees. At the lower price, this works out to about \$0.50 per tree. In some areas, growers may be able to get wood chips for less or even free from arborists or municipal sources. For farms that have access to a commercial-grade tree chipper, they may be able to chip up their cull trees and other wood waste as a source of mulch.

Even if a grower can find a low-cost or free source of mulch, the next limitation is material handling. Back to the example of mulching trees with 2" deep rings of mulch with a 12" radius, if we assume 1,200 trees per acre (6' x 6' spacing), this works out to about 23 yards of mulch for an acre of trees. If you've ever

had landscape mulch dumped on your driveway, you know that's a big pile. A front-end loader and a dump trailer can make the job more manageable, but someone still needs to form the mulch ring around each tree – a time and labor intensive process. An option to reduce the labor involved is to spread mulch in strips using a manure spreader or compost spreader. A spreader will greatly reduce the time and labor involved in mulching but will also increase the amount of mulch required. Again assuming 1,200 trees/acre, mulching 24" wide strips to a 2" depth will require 90 yards of mulch per acre.

What about nutrient 'tie-up'?

One of the commonly mentioned concerns when discussing mulch is the fear that applying mulches will 'rob' the soil of nitrogen. This is based on the fact that wood-based mulches have a

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material handling. The most likely scenario for successful implementation of mulch in Christmas trees is for small- to medium-sized choose and cut operations where material handling logistics are manageable. Mulch can be especially beneficial for growers that are not able to irrigate and/or for growers that are looking for environmentally friendly ways to reduce their reliance on chemical weed control. 🌲

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