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Controlling Weeds by Mulching

This factsheet outlines some of the benefits of mulching, advantages and disadvantages of different mulching options, and tips for successful application.

Why mulch?

Newly planted seedlings are very sensitive to competition from surrounding vegetation for light, nutrients, water, and space. Weeds and aggressive grasses (e.g. smooth brome, Kentucky bluegrass, etc.) can quickly overtake seedlings, reducing growth and survival rates. Applying mulch around seedlings prevents this from happening by starving competing vegetation of light. Mulching is particularly important when planting in areas with high levels of vegetation competition, or when other methods of long-term weed control are impractical (e.g. tilling, herbicides, mowing, etc.).

Different mulches can also provide a number of other benefits to seedling growth, including:

- **Water conservation.** During the growing season, mulch acts as a barrier against the drying effects of the sun and wind, preventing evaporation and keeping moisture in the soil. This cuts down the need for irrigation, reducing water use by 25-50% (CSU, 2015)!
- **Regulating soil temperature.** Extreme fluxes in soil temperature can adversely affect seedling health. Mulch acts as an insulator, moderating soil temperatures and thereby reducing plant stress. In the winters, mulch protects plant roots from frost-heaving, which can literally push seedlings out of the ground.
- **Improving soil condition**. Organic mulches gradually break down and become part of the soil structure. This has a number of benefits, including increased concentrations of soil organic carbon and other nutrients, increased activity of soil micro- and macro-organisms, and reduced soil compaction. Mulch also helps to control wind and water erosion of soil.

Choosing a Mulch

There are two basic types of mulch, consolidated and unconsolidated. **Consolidated mulches** come as intact sheets of material (e.g. plastic, pulp, etc.) that are laid on the ground and anchored with landscaping staples, rocks, or soil (Figure 1). These mulches usually offer more effective long-term weed protection. **Unconsolidated mulches** are made up of loose, often natural materials such as wood chips, straw, or grass clippings. These mulches improve soil condition as they decompose, but are generally less effective at controlling weeds and need to be re-applied yearly.

Figure 1. Pulp mats are a biodegradable consolidated mulching option.

Table 1 at the end of this document outlines properties, application techniques, costs, longevity, advantages and disadvantages of some commonly used consolidated mulches (i.e. plastic mulch, pulp mats, and newspaper/cardboard), and unconsolidated mulches (i.e. wood chips, straw, and grass clippings). There is no obvious "winner" among these mulches – each may be more or less appropriate for different planting projects. To help you decide which option is right for *your* project, consider the following questions:

Figure 2. Using a bale processor to apply straw mulch in rows reduces application time.

- **What equipment, materials, or labour can I access?** Access to certain equipment (e.g. wood chippers, wood chip spreaders, bale processors, hay rakes, mowers, etc.), materials (e.g. straw, wood chips, etc.) or volunteer labour can greatly reduce the cost and application time requirements of certain mulches (Figure 2).
- **How large is my planting project?** Applying mulches such as pulp mats or newspaper/cardboard by hand makes sense for small-scale plantings (<300 seedlings), but can be highly labour-intensive at larger scales without significant volunteer labour.
- **Will seedlings be planted in rows or distributed across an area?** If machinery can be used, then planting in rows greatly increases the speed and efficiency of applying plastic mulch, wood chips, straw, and grass clippings. If the planting area is not accessible by machinery or seedlings are being planted across an area, then light, easy-to-carry mulches such as pulp mats or newspaper/cardboard make more sense.
- **Is re-application possible or desirable over the first 3 years?** It is important to keep an effective mulch layer around seedlings during their first three years after planting, as this is when they are most vulnerable to vegetation competition. Unconsolidated mulches such as woodchips, straw, and grass clippings tend to decompose rapidly and require yearly re-application, whereas plastic mulch or pulp mats generally only require one application.
- **Are there rodents in the area?** Unconsolidated mulches such as woodchips, straw, and grass clippings create excellent rodent habitat around seedlings. These mulches are not recommended in areas with high rodent populations, as rodents can damage or kill seedlings by browsing or "girdling" them (i.e. scraping away a ring of bark at their base). Note that plastic or wire mesh tree tubes can be installed around seedlings to prevent this from happening.

Figure 3. Plastic mulch can be applied in straight rows using a tractor attachment, either before or after planting.

Tips for Effective Mulching

- Apply mulches early in the spring, immediately before or after seedlings are planted (Figure 3)

- Mow weeds before mulching and planting to suppress growth and reduce habitat for rodents that might feed on the seedlings
- Lay consolidated mulches as flat as possible on the ground
- Ensure that mulch covers a minimum area of 40cm x 40cm (16" x 16") around the seedling
- Pull back mulch from the stems of seedlings so that the base of the stem is exposed to the air (Figure 4)
- Secure consolidated mulches to the ground with landscape staples, rocks, or soil so that they do not blow over and injure seedlings
- Re-apply as necessary to maintain a weed-suppressing layer for at least three years after planting

Figure 4. Apply organic mulches in a donut shape around seedlings (picture on left) rather than piled up against their stem (picture on right).

Useful references

Ontario Woodlot Association (OWA). 1997. Extension Notes: "Mulches Help Trees Beat Weed Competition." Land Owner Resource Centre.

Colorado State University Extension (CSU). 2015. Colorado Master Gardener Program: "Mulching with Wood/Bark Chips, Grass Clippings, and Rock." CMG Garden Notes #245

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International Society of Arboriculture (ISA). 2011. "Proper Mulching Techniques." Available online: http://www.treesaregood.com/treecare/resources/propermulching.pdf

Pollock, T. 2012. Controlling Weeds in your Agroforestry Planting. Indian Head, SK: Agriculture and Agri-Food Canada.

Figure credits: Figures 1, 2, and 4 by AWES; Figure 3 courtesy County of Grande Prairie No. 1.

For more information on controlling weeds by mulching please contact:

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Table 1. Characteristics of consolidated and unconsolidated mulching options.

Mulch	Description	Application Technique	Material Cost	Effective lifetime	Advantages	Disadvantages
Plastic mulch	Black plastic, purchased as 457m (1500') rolls, 1.2m (4') wide, 2.3-2.8 mil.	By hand or using a tractor attachment (available for rent in many counties across Alberta), before or after planting.	$150-200 per roll	4+ years	Cheap Easy to apply in straight lines. Long lifetime. Dark-coloured plastics keep soil temperature high, facilitating a longer growing season.	Needs to be collected and landfilled as it breaks apart over a period of ~5 years. Livestock and ungulate hooves can puncture plastic, reducing its effectiveness. Can reduce suckering of planted species (e.g. prickly rose, chokecherry, etc.). Rolls can only be applied in straight lines.
Biodegradable plastic mulch	Corn-based plastic that biodegrades over time, purchased as 457m (1500') rolls, 1.2m (4') wide, 2 mil + thickness recommended.	By hand or using a tractor attachment (available for rent in many counties across Alberta), before or after planting.	$375-450 per roll	3 years	Easy to apply in straight lines. Biodegrades, eliminating the need to dispose of it. Dark-coloured plastics keep soil temperature high, facilitating a longer growing season.	Expensive. Livestock and ungulate hooves can puncture plastic, reducing its effectiveness. Rolls can only be applied in straight lines.
Rubber mats	Specialized tree mats or rings made of recycled rubber, 13mm or more thick	By hand, after planting. Sheets have a slit in the middle to slip around the seedling. No field staples necessary.	$4-8 per mat	5+ years expected	Long lifetime. Potentially reusable (can be picked up and used on another seedling). Dark-coloured plastics keep soil temperature high, facilitating a longer growing season.	Expensive. Lifetime (and potential reusability) is untested.
Pulp mats	Single sheets of raw pulp material, 40cm x 40cm. Purchased in bulk from pulp mills and cut to desired size, or purchased directly from AWES.	By hand, after planting. **3** landscape staples should be used to secure in place. Sheets have a slit in the middle to slip around the seedling.	$0.60-0.80 per mat	2-3 years	Relatively long lifetime. Work well for sites that are difficult to access with machinery.	Labour intensive to apply on larger plantings. Can blow over and damage seedlings if not secured properly.
Hemp mats	Single mats of tightly woven hemp material, 40cm x 40cm. Purchased from specific companies or directly from AWES	By hand, after planting. **2-3** landscape staples should be used to secure in place. Mats have a slit to slip around the seedling.	$0.70-1.00 per mat	2-4 years expected	Relatively long lifetime expected. Works well for sites that are difficult to access with machinery. Soaks into the ground better than pulp mats.	Labour intensive to apply on larger plantings. Can blow over and damage seedlings if not secured properly (although less likely than pulp mats). Lifetime unknown at this point, more long-term trials required.

Newspaper or cardboard	Use uncoloured newspapers with soy-based ink to avoid chemical leaching.	By hand, after planting. Newspaper laid as four sets of 10-16 overlapping sheets. Cardboard laid as a single layer. Secure with landscape staples, or by soaking.	Cheap to free	1-2 years	Works well for sites that are difficult to access with machinery.	Labour intensive to apply on larger plantings. Can blow over and damage seedlings if not secured properly.
Wood chips	Purchased from hardware stores, garden centres, sawmills, arboriculture companies, or chipped yourself. Composting wood chips prior to application can increase nutrient content.	By hand or with a wood chip spreader, before or after planting. Avoid piling up on seedling stem, as this will cause rot. Apply to a depth of 7-10cm (3-4”). Deeper applications can reduce soil oxygen flow.	$40 per m^3 to free	1 year	Can be easy to apply in rows with a wood chip spreader. Increases soil carbon and microbial activity. Improves soil structure, decreasing compaction.	Labour intensive to apply by hand. Requires yearly re-application. Creates habitat for rodents, which may damage seedlings. Can cause nitrogen deficiency in nutrient poor soils (watch for pale, yellow-coloured leaves on seedlings).
Straw	Purchased from farms or baled yourself. Ensure straw is weed-free.	By hand or with a bale processer, before or after planting. Avoid piling up on seedling stem, as this will cause rot. Minimum 10cm (4”) depth.	$50 per round bale to free	1 year	Can be easy to apply in rows with a bale processer. Increases soil carbon and microbial activity. Improves soil structure, decreasing compaction.	Labour intensive to apply by hand. Requires yearly re-application. Creates habitat for rodents, which may damage seedlings. Can cause nitrogen deficiency in nutrient poor soils (watch for pale, yellow-coloured leaves on seedlings). Can carry weed seed.
Grass clippings	Can be grown in between rows of seedlings, mowed down and raked onto seedlings. Planting nitrogen fixing species (e.g. clovers, vetches) in between rows will add nitrogen to the mulch.	Apply by mowing in between seedling rows using a tractor mower or scythe, and then raking mulch onto seedlings. Avoid piling up on seedling stem, as this will cause rot. Minimum 10cm (4”) depth.	Free	1 year	Can be easy to apply in rows with proper equipment. Increases soil carbon and microbial activity. Improves soil structure, decreasing compaction.	Requires that seedlings are planted in rows. Requires yearly re-application. Creates habitat for rodents, which may damage seedlings.