



TREE RESOURCES
SADDLE HILLS COUNTY
AGRICULTURAL SERVICES



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TREE RESOURCES

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TREE PLANTING TIPS

“*Involve friends and family members in planting and look forward to a beautiful reward for your hard work in your yard or forest.*”

Once you have decided what tree and shrub species you would like to plant, and have done proper planning, design, and site preparation, it is time to start planting. There are several steps involved:



PURCHASE OF SEEDLINGS

You can either buy large amounts of tree seedlings from large forestry tree nurseries or small tree nursery outfits that sell small seedlings. If you have a few trees to plant you can choose a local tree nursery or a retail store. The key thing in purchasing is to ask where the stock came from, as many trees are not adapted to Alberta's harsher climate. Get your order in promptly, as some suppliers may run out of the trees and shrub species that you want. If you don't get a tree that suits your needs, wait for next season and order in advance.



TRANSPORT TREES AND SHRUBS

Do not leave seedlings in your vehicle for long periods of time on hot and windy days as their roots dry rapidly. Do not expose them to direct sunlight, cover them or put them in a box. If you must wait one or two hours, cover the seedlings with ice or use a reflective tarp. Having a canopy on your pickup truck can also help. **DO NOT** use canvas as it holds heat and warms seedlings.



SEEDLINGS TO PLANTING SITE

Take only the amount of seedlings that you can plant for the day. Keep them cool and moist, in shade or under a cover, and not exposed to wind or direct sunlight. If they are getting dried out sprinkle them with water to keep them moist. You can also dip seedlings in water prior to planting but **DO NOT** keep them in water for long as you can drown them and cause damage, due to oxygen starvation. Poplar and willow cuttings can be soaked in water a day prior to planting.



HANDLING TREES AND SHRUBS AT HOME

The best method is to plant your trees and shrubs within a few days of arrival at your home. Don't wait too long as you may expose them to various diseases, mould, drying, and other problems. If you can't plant them immediately store them in a cool place for a few days, such as a cooler, cold storage, the root cellar, or shady corner of your shed. After a few days check the roots, if they are dry, spray mist water and cover them again. Don't let your seedlings freeze.



PLANTING

The best time to plant trees or shrubs is early morning, late afternoon, or during a cloudy day. Do not plant trees during hot noon or afternoon, as they will dry up very quickly. There are two common methods of planting, manual or mechanical. Each of these methods has advantages and disadvantages.

For manual, or hand planting, don't pull the tree out until you have made a hole. Create the hole large enough to keep the roots straight. Trees should be planted in the same depth as they were planted in the nursery. You may notice changes in

the colour of the seedlings' bark close to the roots. You will see the soil line, which is the depth that you need to plant the trees. Once you have large enough to keep the roots straight. Trees should be planted in the same depth as they were planted in the nursery. You may notice changes in the colour of the seedlings' bark close to the roots. You will see the soil line, which is the depth that you need to plant the trees. Once you have put the tree properly in the hole, put soil around it and step on the soil to make it firm. The easiest way to test it is to try to gently pull the trees out. If it comes out easily you have not used enough soil and pressure. Keep seedlings as straight as possible. For mechanical planting have the soil prepared prior to planting. Regulate the speed of planting by adjusting the speed of the tractor and planter to the time needed for proper planting and spacing. You will need to have somebody go after the tree planter to make the soil firm around the trees and ensure they are properly planted.



WATERING

Water immediately after planting. Watering can be done with drip irrigation or by leaving a small bucket with holes next to the trees. Do not run water too quickly as water will run off and nothing will get to the roots, or it will create surface roots for trees that may die during a drought. The goal is to create trees and shrubs with deep roots that can withstand drought. Check soil moisture regularly, by putting a sharp object, such as a knife, into the soil. Do not water if there is soil on the knife. If the knife comes out dry, you may water.



WEED CONTROL

Weed control is an ongoing process in the first few years following planting. There are several methods of weed control, including mechanical weed control, herbicides, and using various mulches. In any case, without proper weed control you have a greater chance for your trees to die. It may require up to five years to control weeds, until the tree can stand by itself.



INSECTS, DISEASE AND ANIMALS

It is crucial in the first few years to monitor your trees once a week for potential damages by insects, diseases, and animals.

TREES & WATER

“The challenges to trees with too much water are simple, roots do not get enough oxygen to breathe, therefore flooding can be damaging to trees.”

Trees are natural sponges with the amazing ability to collect and filter rainfall, slowly releasing it into streams and rivers. Trees also significantly improve water quality and quantity. During a rain event in an open field, up to 80% of water runs off the field, while at the same time trees keep 80% of the water in their canopy and vast root system.

Some studies show that one tree can evaporate up to 2000l of water per day, with an average of 250-400l a day, which is an incredible amount of water that is exchanged between the soil, trees, and the atmosphere.

Most of the time a water deficiency causes big issues for trees in Alberta, but occasionally we do get a wet year, where many trees may not be best adapted to handle too much water.

TOO MUCH WATER IN THE SOIL

The challenges to trees with too much water are simple - roots do not get enough oxygen to breathe, therefore flooding can be very damaging to the trees. Due to the lack of oxygen (anaerobic conditions) in soil, the water will suffocate roots, which can lead to fermentation in root cells, no access to nutrients, and built-up mineral toxicity. Too much water will also damage and harm the soil fauna ecosystem, which is crucial for trees to grow. Water holding capacity is determined by soil types and drainage, but also by soil compaction and the amount of existing vegetation. Some trees handle large volumes of water after the storms or flooding better than

others. It is well known that willows, cottonwoods, and balsam poplar naturally grow along rivers or other water bodies and can handle flooding and stagnant water for a long period.

KEY FACTORS: TIMING, TEMPERATURE, DEPTH, AND MOVEMENT

There are many factors to consider the impact of flooding, or too much water, on trees health and survival. In early spring, when trees are still dormant or just start to leaf out, flooding is less stressful than when flooding happens during a growing season. Trees can handle spring flooding for several days, which may not be the case during the summer, or early spring. The longer water stays in the soil, the more the tree deteriorates. For some species, just a few hours underneath standing water or flooding will shut down photosynthesis and water transpiration will decline. Also, if water is colder and is moving during flooding, it will cause less stress than stagnant and warm water. Depth of water plays a critical role as well. Flooding, or water that saturates the surface, is less damaging than deep water that is covering the trunk or canopy of young trees.

Generally speaking, short periods of flooding or wet soil can be tolerated by most tree species in Alberta. Prolonged flooding and too much water in the soil, can have short and long-term consequences on the health and vigor of the tree. Understanding tree, soil, and flood characteristics will help determine the damage to the trees. To determine the negative impact of flooding, or too much water in the soil, it is important to recognize and identify the flooding as the cause for the tree's decline. Asking landowners about the history of flooding is the first step. Several symptoms

could be overlapping with drought and other environmental stresses.

These are several symptoms of flooding:

- Chlorotic leaves and smaller leaf size in some tree species
- Early leaves dropping and changing colours before autumn
- Scorched leaves can also be indicators of flooding
- Wilting is common due to a lack of oxygen
- Dieback mostly starts from the top or tips of branches
- Roots are black and usually exposed to the surface of the soil
- Following flooding or a wet period a tree will weaken, creating good conditions for disease and insect infestations. Usually after flooding, in the spring or summer, there is an increased level of outbreaks of disease and stem boring insects.

TREE SELECTION

Some trees handle better volumes of water after a storm or flooding than others would. One of the key characteristics of water-tolerant trees is their extensive, large root systems. It is well known that willows, cottonwoods, and balsam poplar naturally grow along rivers, or other water bodies, that others, that can't handle too much water, would not be able to tolerate.

The following tree and shrub species are flood or excessive water tolerant, or intermediate tolerant: varieties of willow, black poplar, cottonwood, some hybrid poplars, water birch, green ash, river and speckled alder, aspen, Manitoba maple, american elm, as well as black psurce and tamarack. European larch is not flood tolerant.



MANAGEMENT

Several management activities can reduce the stress on trees during flooding

or access to water:

- Pruning of dead and diseased branches
- Plant 'the right tree in the right spot' - choosing a tree that can tolerate a higher water table, flooding, or excess water is crucial to avoid long term problems
- Improve drainage in lower areas by improving slope grade and drainage flow
- Avoid soil compaction by parking vehicles or heavy equipment in a flood-prone area
- Inspect trees for hazards and damage to the root system - trees can topple much more easily after flooding, due to soil instability
- Install drain tiles and improve slope grades in areas with poor drainage
- Prune dead and diseased branches
- Build up soil around roots where flooding has washed out the soil
- Monitor trees following flooding or excessive water events for fungus and insect outbreaks

WOOD WIDE WEB

HEALTHY ROOTS, HEALTHY TREES

“Soil forms the foundation of all our vegetable gardening efforts, yet we often overlook, or miss, key steps when preparing soil for planting”

Many recent studies show that ‘trees do talk to each other’ through a vast network through their root systems. This is what is called the ‘Wood Wide Web’. This happens mostly due to a fungus and bacteria symbiotic mycorrhizal relationship and interaction with the tree root system through sharing water and nutrients.

Besides many other functions, these vast mycorrhizal networks are extremely important for tree health during times of danger and stress. Studies show that certain species of fungi can facilitate tree resilience against certain environmental stressors such as predators, toxins, and pathogenic microbes that invade an ecosystem. These stress signals received through the root system by non-affected trees will facilitate the release of volatile hormones or chemicals, to discourage predators or pathogenic bugs.



SOIL & TREE ROOTS

All plant life in the forest originates from the thin layer of minerals, organic matter, water, and air that we all commonly call soil. Tree roots are very opportunistic as they will grow wherever and whenever there is available oxygen, water, nutrients, and a warm environment. The soil surface is the place where most of these preferable environments are and that is why the majority of tree roots are in the upper 45-60cm (18-24in) of soil. To understand how roots function,

it is important to understand the relationship between the above-ground tree growth and its roots, as well as proper balancing between the two. If a portion of root dies, a certain amount of leaves and branches will die too, and vice versa.

The fine roots are the place where the production of essential nitrogen and mineral nutrients happens. They are transported together with water throughout wood tissue. Many studies show the surface area of roots is several times larger than the surface area of leaves. A good example is the native aspen tree in Alberta. The distance of roots from the main trunk can be as much as twice the height of the tree itself ie. an 80ft aspen can produce roots 160ft from the main trunk.

Overall tree root systems provide several key functions, including the following: an anchor portion for the trees above ground, storing essential food reserves, and transporting water and minerals from the soil to the rest of the trees. Root damage will disrupt these key functions and, together with pest or environmental issues, such as drought, salt, frost, and mechanical damages, will contribute to the decline and mortality of the whole tree.



TREE ROOT INJURIES & PROBLEMS

There are many ways to damage and destroy a root system, which ultimately leads to the decline and death of trees above ground. Once a tree is established, anything that changes the soil condition or the oxygen and water supply can be extremely detrimental for tree growth and survival.

Some of the main causes of root injuries and declines are:

- Compaction - this is the most common and damaging cause for root decline.
- Mechanical Damages - using various equipment to disc, dig, and trench with the purpose of physical cutting of the roots from the main tree.
- Chemical Damages - using various improper herbicides, salt for de-icing, and other chemicals.
- Watering and Fertilization - over and under watering and improper fertilization will lead to root damage.
- Pests - there are several pests (insects and diseases) that can damage and kill the root system.
- Improper Tree Selection and Planting - choosing trees that are not adaptable to existing soil conditions will lead to root decline and speed up mortality.

These causes are very common on a farm, as well as in urban and town settings, but the severity of impact is quite different. Trees in urban and town settings are exposed to more severe impacts from these causes and the overall lifespan of the trees is less than in farm or natural settings.

Compaction is caused when the soil particles squeeze air and moisture out of the pore spaces. It may occur during the development of a new house and road, construction, livestock grazing, timber harvesting, recreation, and a host of other activities. Compaction in farm settings is less common than in urban settings, where it is one of the biggest killers of urban trees. In urban settings the use of heavy clay subsoils, instead of topsoil, causes compaction. Sandy soils compact the least, while clays and loams are the most susceptible. Moist soils are more likely to compact than dry or frozen soils.

Mechanical damage is caused by severing fine feed and major roots. Mature trees contain 4-7 major roots, with thousands of medium, small, and fine feeder roots. Cutting one major root just a few feet away from the trunk can reduce the root system by up to 25%. Mechanical damage to the surface of the roots is the main entry point for many fungal diseases of trees.

Chemical damage is a very common cause, both on farms and in urban and town settings. In farm settings constant crop-spraying near trees, where tree root systems absorb chemicals, can weaken or kill them in the long run. Salt, de-icing, and herbicide use are also very detrimental to the survival of roots.

Over or under-watering and fertilizing can damage roots. Too much water will fill the soil air pockets and drown roots. Under-watering will cause improper root development, not allowing the roots the ability to absorb nutrients. Over-fertilizing will ‘burn’ the roots, while under-fertilizing will not allow roots to absorb the necessary minerals for the trees to grow.

There are a variety of pests that can damage roots. The majority of root pests are related to fungal diseases, with few exceptions (i.e. insects). Fungal diseases can damage roots, attacking the small and fine feeder roots or large roots, resulting in root rot. It is very common to see in trees planted in soil that is not preferable to that tree species. Choosing a sandy and dry soil-loving species, such as pine, and planting it in waterlogged or swampy areas will not allow its roots to be established or thrive because of the environment. Many root injuries happen due to improper planting or damage during the planting.



SYMPTOMS

It is sometimes very hard to identify root problems, as they are associated with other symptoms that cause trees to decline. Proper identification of root injury causes and symptoms is crucial for the determination of tree decline or mortality.

There are several symptoms to identify root problems including:

- Leaves – yellow, small, and chlorotic foliage. Leaves are tufted and scorched looking.
- Branch Dieback – a portion of a small or large branch is entirely dead.
- Bark – fungal fruiting bodies (mushrooms or conks) on or under the bark.
- Mechanical Root Damage – it sometimes takes years to identify the cause of decline and mortality of trees.
- Dead vegetation due to chemical damages
- Roots are black or brown vs white or light coloured (indication of health of roots)
- Changes in soil slopes.
- Past construction and activities on the soil.



RECOMMENDATIONS:

Avoid practices that cause root damages ie. compaction, mechanical, chemical, watering damages, etc.

- Use tilling to break up heavily compacted soil prior to tree planting.
- Add some soil amendments if the topsoil is poor or has been removed.
- Apply 2 - 4in of a thick mulch layer to protect soil.
- Improve drainage by ensuring ditches and culverts are kept clear to allow free flow of water.
- Perform soil testing to determine nutrient deficiency and availability.
- Consider tree species suitability for different soil types.
- Avoid any weed control – especially discing and

spraying, once trees are established.

- Avoid spraying or using chemicals on nearby trees.
- Provide adequate watering and fertilizing based on tests, not by guessing.
- Avoid grade changes and use directional drilling to avoid root damage.
- Avoid planting trees near sewage lines, sidewalks, and house foundations
- Perform proper tree planting to avoid too deep or shallow planting, by looking into changes in colour between the trunk and roots. There should be a visible root flare after a tree is planted.
- In an urban and town areas use alternative sidewalk designs and materials.
- Keep leaves on the ground (do not rake leaves) in the fall as this is a source of minerals, micro-nutrients, and organic material to roots.
- Keep leaves in fall as they will act as a mulch to protect roots from deep freezing.

Knowing and understanding where tree roots are located, what they require to grow, how they interact, and the cause and symptoms are crucial to the overall survival and thriving of trees. Protect the tree roots to have long-lasting healthy trees.

WEED CONTROL & TREES

“ Weed control is an ongoing process in the first few years following the planting of trees ”

Weed control is an ongoing process in the first few years following the planting of a tree. Many weeds will compete with trees and shrubs for moisture, sunlight, space, and nutrients. Without weed control, many trees and shrubs will not survive, the establishment and growth of trees will be poor, and money spent on trees and site preparation will be wasted. Many studies show that regardless of which form of weed control you use that tree survival will increase, as well as the vigor and overall health of trees and shrubs.

There are three methods of weed control, including mechanical, chemical, and barrier (mulches) weed control. In any case, without proper weed control the chances of the trees dying increase. It may require up to five years of controlling weeds until the tree can stand by itself. There are several considerations before planting trees to decide what weed control is best for your situation. It is important to understand and evaluate these options to know what will be best suited for you. Before you plant the trees, you may want to think about the following:

- Time – Do you have time for weed control for your trees? Many folks are too busy planting agriculture crops, or other spring activities, where time becomes a huge issue, to do the work of weed control. It will take a certain amount of time to keep the weeds out. You will need to deal with weeds in trees at least three times during the year.

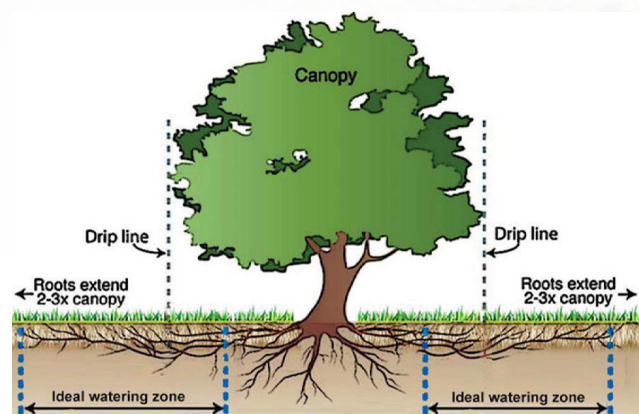
- Equipment – What kind of equipment do you have, or may need to acquire, to do weed control? If you are putting down plastic mulch, you will need a plastic mulch applicator available to you. Do you have small equipment to do mechanical control in the soil? The same thing applies to chemical spraying. Using wood chips requires hauling materials and spreading them among trees. Make sure that you have the equipment that is best suited for you and your weed control.
- Cost – The cost of trees is relatively low compared to five years of weed control. Whatever weed control method you decide to use, make sure that you are aware of the costs related to the project and prepare a budget for it. Mechanical weed control could be a higher cost compared to plastic mulch, or some other weed control measures. Also, you may not be able to purchase some chemicals due to certain regulations.
- Physical Fitness – Weed control is hard work and it requires a certain level of physical fitness to do weed control during hot and humid days.
- Labour – If you don't have the time or resources, you may choose to hire somebody to do tree planting and weed control. This could be your family member or a local contractor, but make sure they are qualified and reliable for the services that you are asking to be completed.
- Weather – There is not much you can do about the weather, but it plays a big role when it comes to mechanical and chemical control. Using data from local weather stations, or other online sources, will help you when determining when to do weed control.

DROUGHT & WATERING TREES

“ There are several key factors to consider before watering ”

The direct impact of drought on trees is characterized by slowed or eliminating growth, a serious health threat that can cause injury or death. Drought also impacts trees indirectly, by increasing their susceptibility to wildfire, insect pests, and disease, and overall long-term decline. Severe droughts cause widespread tree mortality across the landscape (urban, acreage, farm, county, or province-wide) with profound effects on the function of tree or forestry ecosystems and the overall environment.

Alberta’s native plant communities (grass, shrubs, and trees) are well adapted for dry summer and fall, as well as for a period of prolonged drought, but still, the effect and impact of drought on trees is devastating and long-lasting. Trees that were already stressed by some other issue, like harsh winter or winterkill, poor soil quality, salt content in the soil, herbicides and mechanical damages, or insect infestations, are likely to decline even more following a drought. Watering trees is extremely important for the well-being and survival of your trees during drought conditions.



WATERING CONSIDERATIONS

Water is scarce in the prairies, and water requirements for trees can be substantial, particularly for large trees. The amount of water a tree needs during a drought is difficult to determine. Some large trees can use nearly 200 - 500 gallons of water on a hot, summer day. To understand water requirements for your tree, there are several key factors to consider before watering, which include:

- Soil types – clay vs sandy soil, poor vs rich, compacted vs natural, age of trees - newly planted vs few years old vs mature trees.
- Tree species – water-loving vs. drought resistant, shallow vs. deep-rooted, wide vs. narrow roots.
- Water Quality and Quantity– overall availability of water.
- Water Delivery System– irrigation vs. hand vs. bags.
- Time of Day – morning vs. late in the day.
- Cost of Watering.
- Mulching - using arborist wood chips, is the best way to keep moisture long term

Each of these considerations will determine how much watering you need to provide to your trees.



PROPER WATERING DURING DROUGHT

Unfortunately, lots of people do not perform proper watering during drought. There are several steps to consider:

1. Test your water for sodium before watering your trees. If it contains high levels of sodium, it will kill your trees fast, and not provide a chance for them to survive.

2. Check the moisture level in the soil by using a garden trowel or knife to a depth of 4-6in. If you can, easily push or insert a 6in screwdriver into the soil, there is enough water.
3. Amount of Water - even today, science does not provide an exact amount of water for each tree, but there are some rules of thumb. During drought, trees grown in sites without lawn irrigation need approximately 10 gallons (38l) of water each week per inch (2.5cm) of trunk diameter measured. For example, for a tree that is 4in (10 cm) in diameter, it will require 40 gallons (152l) of water. Some trees can handle drought better than others. For example pine trees are more drought tolerant than poplars, elms, and many others.
4. Timing – the optimal time to water trees is early in the morning. Try to avoid watering late at night due to the potential of developing a fungus. Also, it is extremely important to water trees when the temperature is scorching during the day. If your trees are showing signs of water stress in the middle of the day, by all means, you should water them.
5. Where to Water – a very common mistake people practice is to put a water hose right next to the trunk. The fine mesh roots are responsible for nutrients.
6. Water Delivery Mechanism - drip irrigation is the best way to water trees as you can control the amount of water delivered, as well as the speed of water droplets. If you don't have drip irrigation and are using a hose, sprinklers, water gator bags, or buckets, it is extremely important to perform long and slow soaking at the outer edge of the drip line. Avoid any water run-offs and water hitting the trunk.
7. Frequency of Watering – once a week with the slow soaking water. Avoid over-watering, even during drought, as you can 'drown' your root system if you have heavy clay in your soil.
8. Mulching – add 4-6in of arborist wood chips.

9. Do not forget to water trees in the fall.



Drip Irrigation



Sprinklers



Hose



Gator Bags

Mulching is a must, and the most important root protection that you can do. Mulching provides a very important function during drought by protecting roots from extreme heat and keeping the moisture around trees. Create a donut-shaped wood chip cover around your tree to keep the water inside. Applying 4-6in (10 -15 cm) of arborist wood chip mulch will greatly reduce the loss of moisture in the soil. A layer of wood chip mulch will maintain more constant soil temperatures and moisture.

Overall, supplemental watering during dry or drought conditions, and the use of wood chip mulch, will go a long way to helping trees survive, remain healthy, and avoid the long-term negative impact of drought stress. Many trees have survived extreme droughts in the past. With a little help, trees can survive and thrive.

MULCHING

TREES & SHRUBS: WHY & HOW

“ *Mulching is the most beneficial treatment that you can provide to your newly planted, or established, trees and shrubs.* ”

Mulching is the most beneficial treatment that you can provide to your newly planted, or established, trees and shrubs. It feeds and protects their roots, (roots act like an ‘engine’) by providing necessary water and nutrients for trees to grow. Of course, roots are also anchors to keep trees and shrubs standing when exposed to natural environments and the atmosphere.

NATURAL VS. URBAN MULCHING
A natural undisturbed forest environment provides trees with well-aerated soil with no compaction or soil disturbances. A wide range of living organisms (viruses, bacteria, fungus, or soil microorganisms) greatly contribute to the health and well-being of trees and shrubs. Tree roots in a natural forest are covered with organic material, replenished by leaves, twigs, or wood – a natural mulch.

Tree and shrubs growing in urban and disturbed areas, where soil structure is significantly changed, have a harder time surviving or thriving. Root development is usually limited due to poor soil quality, lack of nutrient replenishment, and more exposure to constant soil fluctuations.

THE BENEFITS OF MULCH
There are several benefits that mulch provides to trees and shrubs:

- Increases soil moisture levels.

- Prevents erosion and water run-off.
- Reduces weed competition and germination.
- Protects roots from extreme hot or cold temperatures.
- Reduces the likelihood of trunk or root damages caused by lawn mowers or ‘weed whackers’.
- Improves soil fertility through organic decomposition.
- Improves soil structure and drainage over time.
- Reduces the likelihood of soil compaction.
- Improves visual aesthetics.

Organic mulch provides a favourable environment for micro-organisms that improves overall soil health.

TYPES OF MULCH
There are organic and inorganic mulches. Organic mulches are natural materials such as wood chips, straw, flax shives, or bark. Inorganic mulches are inanimate materials like various types of plastic mulch, stone, lava rock, pulverized rubber, and geotextile fabrics. Both of these mulches have positive and negative qualities. Organic mulches provide necessary nutrients to the soil, improving the soil structure, but will need to be replenished. Inorganic mulches do not provide any nutrients to the soil or the soil structure, but they do not need to be replenished, saving on related costs.

IMPORTANCE OF PROPER MULCHING
Improper mulching can be detrimental to trees and shrubs, therefore proper mulching is especially important. Here are some key considerations for proper mulching:

- If you already have organic mulch, check the depth of it. Make sure that you don’t over mulch. Over mulching is common with organic mulch as it reduces in volume over time.
- Create a ‘donut’ of mulch around the tree trunk, not a ‘volcano’. Do not pile up mulch around the tree trunk.



- Organic mulches on nutrient-poor soil can decompose in the first year, creating a nitrogen deficiency. Proper mulching is key to maintaining healthy trees and shrubs for all to enjoy. Using mulch to protect roots from human-induced damage, like compaction and construction, or environmental damages, such as frost or flood, is one way to ensure the health and vitality of your trees and shrubs.

- Understand soil drainage. For well-drained sites apply 2-4in (5-10cm) of mulch, while for less-drained sites, apply less than 2in of mulch. Avoid putting any mulch on soils with very poor drainage. Apply mulch outside the tree crown line (drip line) or beyond, as most of the roots are further away from the trunk.
- Keep the roots moist and the trunk dry.

- BE AWARE:**
- Some grass, straw, or flax mulches may have chemical residues in them that can be detrimental to your tree.
 - Inorganic mulches, like rubber or plastic, can have a negative effect on trees, soil, and the overall environment.
 - Do not apply very fine sawdust as it can create a water-resistant layer on the soil.
 - Inorganic mulches, such as lava rock, marble chips, gravel, or other hard, non-organic mulches could lead to soil compaction, and do nothing to cool the soil or add organic matter.
 - Dark coloured mulches absorb heat during the day and may sometimes injure the bark of the tree or shrub.

IMPACTS OF WINDBREAK REMOVAL

“ *The value of field windbreaks, either planted or naturally occurring, has been known for many decades in Alberta.* ”

The value of field windbreaks, either planted or naturally occurring, has been known for many decades in Alberta. Since the 1930s, farmers and ranchers have planted trees to reduce the negative effect of the wind on their homes, soil, crops, livestock, water, and infrastructure.

ADVANTAGES OF FIELD WINDBREAKS

Well-designed field windbreaks have proper tree or shrub density and stand perpendicular to the prevailing winter wind. Properly planted field windbreaks prevent soil erosion, reduce crop damage, protect livestock from extreme cold wind chill, and reduce overland field flooding in the spring. Field windbreaks in Southern Alberta also slow down prairie fires that rapidly move through landscapes due to high wind and warm weather. In farm field settings, windbreaks will provide good snow distribution across a field, to a distance of 10 to 15 times the height of the trees. Windbreaks also reduce snowdrifts into highway ditches. Snow does not melt as quickly in treed areas and the land holds more water than in open fields and grasslands.

REMOVED WINDBREAKS

As farm operations become larger and more automated, many windbreaks

are removed from fields due to larger equipment and the convenience of not being required to operate around the field windbreaks. Even though science proves that yields are higher with properly designed windbreaks, as trees are cleared for more land for cultivation. Also, due to windbreaks, snow stays longer on the field, delaying seeding times.

CONSEQUENCES

Weather in Alberta is quite variable in spring, with sudden warm temperatures causing fast snowmelt, and consequently flooding, in many parts of the province. Where trees are removed from the watershed, water runs from the land much faster into the creeks and rivers. The impact of snowdrifts on roads during winter is very well understood in rural Alberta. As is the cost related to snow removal. Very few pay attention to what happens during the spring snow meltdown, when huge amounts of water rush into ditches that are full of hard-packed snow, with mini ‘ice/snow dams’. As a result, high volumes of water are diverted from these ‘dams’ to areas where they damage roads, culverts, and bridges. The long-term consequences of field windbreak removal to farmers, local municipalities, and provincial infrastructure budgets are never properly assessed. Millions of dollars are spent every spring/summer, to fix local culverts, roads, and bridges due to snowmelt and flooding directly attributed to windbreak clearing on the fields. Many decision-makers and professionals that treed areas reduce snowdrifts, slow spring melt, reduce water flow, reduce wind, and stabilize riverbanks.



RECOMMENDATIONS

To avoid costly rural road repairs and damages caused by spring run-off, there are several recommendations:

- Encourage farmers and landowners not to clear field windbreaks without a strong understanding of their importance and the impact they have on rural roads and infrastructure.
- Establish new field windbreaks in high risk areas for snowdrifts, to reduce possible spring flood damage to roads, culverts, and bridges.
- Establish tree planting program incentives for farmers and landowners who wish to plant field windbreaks.
- Rural planners and public works departments need to identify the areas of highest risk for snowdrifts that will accumulate in the ditch and create ‘ice/snow dams’, and develop appropriate actions to reduce the risk of field floods.

It is time to assess the impact of removing field windbreaks and to calculate the resulting ‘true cost’ of infrastructure repairs to rural municipalities.



Road wash-outs due to field flooding
Notice there are no trees in the area



Road wash-out due to field flooding



Ditch ‘Ice/Snow Dam’
creating flooding on fields and the road



Brown water from road wash-out

HAIL DAMAGE ON TREES & SHRUBS

“Do not fertilize trees after July 15, as it could be too late and detrimental to trees.”

Summer brings large and violent storms full of water and ice, creating hail. Large and small hailstones can lead to devastating damage to trees and shrubs. Hailstones can strip the tree of fine foliage, snap twigs, tear tender tissues, and, together with the wind, it can break large branches or topple trees. During these storms, strong winds can strip a tree of its bark, break small and large twigs, and completely defoliate trees.

Hail damage strips away the leaves that make energy for a tree or shrub. The hail damage to trees occurs on the upper side of branches and on the side of the trunk facing the storm, leaving noticeable scars on branches and trunks. Depending on the overall health of trees, it may take some time for them to recover. The hailstone damage increases the vulnerability of the tree to decay, causing fungi and insect activity. Depending on the level of damage by hailstones, many healthy and resilient trees and shrubs can still recover. The roots are the most important part of trees and they have likely received no damage from the hailstones. Roots are like engines in trees and a healthy tree's roots store much of its energy reserves, thus helping hail-damaged trees to recover above ground.

A healthy hail-damaged tree that has lost less than 20% of its foliage is likely to respond as though it received light pruning. When a tree has lost 50% or more of its foliage because of hail, the response can be more challenging, though most

likely a healthy tree will survive. However, many interior limbs, accustomed to being shaded, are now exposed to much higher levels of sunlight. If a tree has lost more than 50% of its branches, it will have a very hard time recovering but its survival will depend on the species, health, age, and care it is receiving.

In rare cases, hail can strip trees of virtually all their foliage. Your first reaction may be to remove the tree and start over. However, that may be the wrong approach. Many dormant buds can sprout in the weeks after a severe hail storm. Unless the tree was very unhealthy to begin with, or it had other significant problems, the best action is to wait a few weeks to see if the tree will recover.



WHAT CAN BE DONE?

If trees and shrubs are severely damaged, there are a few options, including proper tree pruning, watering trees, and putting wood mulch around the base of the tree after completing pruning, to protect roots during winter.

Do not fertilize trees after July 15, as it could be too late and therefore detrimental to trees. Trees usually start shutting down and preparing for winter by the end of August to the beginning of September, therefore tree roots may promote tree growth instead of preparing for winter. Early frost may kill and damage trees.

There are several important considerations to keep in mind when pruning hailstone damaged trees:



SAFETY:

Inspect your tree for any power line contact. Look around the trees and carefully inspect them from a safe distance. If there

is power line contact, stay away from the trees and call the power company.

- If you have heavy, broken branches, or large trees, call a certified arborist to deal with them. Broken and/or heavy hanging branches can fall in a slight wind or the cold, and you can be easily injured.
- Do not try to use a ladder to cut branches. Conditions may be very slippery and you can be easily injured.
- Do proper pruning that includes three-way cuts of larger branches to remove the heavyweight of the branch.
- Small branches, less than 2in in diameter, can be removed with one cut.
- Putting wound paint or dressing on the cut will have no effect.
- Do not leave any stubs when pruning.
- Make cuts with sharp tools.

TREE PRUNING

“ For any large pruning, please contact a professional, certified Arborist. ”

The following information is for beginners doing pruning in their yards. For any large pruning, please contact a professional, certified, Arborist.



WHY PRUNE TREES?

- To remove the '3Ds - Dead, Diseased, or storm Damaged' branches.
- To thin the crown to permit new growth and better air circulation.
- To reduce the height of a tree or to remove obstructing lower branches.
- To shape a tree for design purposes.
- To reduce potential fire hazards.
- To encourage flowering, to promote fruit production.
- To address safety issues for people or property.



WHEN TO PRUNE?

- Coniferous trees, like spruce or pine, can be pruned any time of year. For most trees the best time is from March to mid-April, or during the winter.
- Birch and maple - prune only during the growing season (June and July) as leaves must be fully developed.
- Elm trees - do not prune from April 1 - October 1.
- Hardwood trees, like aspen or ash, and shrubs without showy flowers, prune in the dormant season.

To easily visualize the structure of the tree, maximize wound closure in the growing season, after pruning, to reduce the chance of transmitting disease and to discourage excessive sap flow from wounds.



HOW MUCH TO PRUNE?

- Every time you prune a tree, it stresses the tree and increase vulnerability.
- Pruning increases the opportunity for insects and diseases to invade trees.
- Generally speaking, prune no more than 25% of living branches.
- The amount of live tissue that should be removed depends on the tree size, species, and ages, as well as the pruning objectives.



BASIC PRINCIPLES OF PRUNING:

- Visualize the shape of the plant at maturity, what the tree will look like after pruning.
- Remove dead, damaged, and diseased wood.
- Select the key branches or main stems that you want to keep.
- Remove weak crotches, crossed branches, suckers, and watersprouts (new branches growing near the bottom of the tree).
- Cut back to branch collar to leave the smallest wound possible.
- Remember, that more is not always better, you can always prune next year.



PRUNING TECHNIQUES

Cleaning is the removal of dead, dying, diseased, crowded, weakly attached, and low-vigor branches from the crown of a tree.

Crown Thinning is the selective removal of branches to increase light penetration and air movement through the crown (the branches and leaves extending from the trunk or main stems). Thinning opens the foliage of a tree, reduces weight on heavy limbs, and helps retain the tree's natural shape.

Raising removes the lower branches from a tree to provide clearance for buildings, vehicles, pedestrians, and vistas.

Reduction reduces the size of a tree, often for clearance of utility lines.



PRUNING TOOLS

- Keep pruning equipment (shears, loppers, saws etc.) sharp and clean
- You get what you pay for; cheaper tools are usually lower quality.
- Before you cut, dip your pruner for a few seconds in bleach.
- After pruning, put the tools under running water for 10 minutes and thoroughly dry them.
- Dry tools after clean up, don't let them rust.
- Clean up tools after you finish your work.
- Buy only the tools that you really need - pruners, rounding saw, loppers, shears, secateurs.



PRUNING SHRUBS

- Shrubs that bloom before June 20, should be pruned immediately after the bloom period.
- Shrubs that bloom after June 20, should be pruned in the dormant season, or just before growth in spring.
- Not all shrubs need to be pruned, not every year, and not severely.
- Many flowering trees and shrubs (e.g. crabapple, hawthorn, pin cherry, chokecherry etc.) are susceptible to fire blight and black knot fungus, and pruning can spread these diseases.



PRUNING ROSES

- In the wild, roses produce strong new shoots from near the base of the plant, each season.
- Prune during the winter (March/April), just before the season starts.
- Deadhead during the summer, prune back to a five leaflet leaf.
- Cut above an outward pointing bud to encourage an open centre.
- Cut back into healthy wood.
- Cut any diseased or damaged branches.
- Remove all thin, weak canes, that are smaller in diameter than a pencil.



SAFETY IN PRUNING

- Get pruning safety training, available at many Arborists.
- Have an emergency plan in place, in case an accident occurs.
- Wear eye protection at all times.
- Wear a hard hat and steel toed boots.
- Wear leather, or other appropriate, gloves.
- Do not use axes or hatchets, use proper pruning equipment.
- If you use power tools, please follow the safety procedures.
- Beginners should not climb trees.
- Before trimming a tree, inspect the area to identify possible hazards, such as the presence of power lines or broken or cracked limbs after a severe storm, and take appropriate actions to prevent injuries or accidents.
- Do not prune under power lines.
- Do not use dead branches for support.
- Do not leave partially sawn limbs on trees.

1. Pruning is difficult! Pruning is not complicated, but it is hard work.
2. Plants will die if they are pruned at the wrong time of year is not necessarily true.
3. All pruning must be done during the winter, with a few exceptions which you can prune year-round.
4. Removing and pruning trees is a crime against nature isn't true.
5. Most trees need pruning isn't true, unless there is a valid reason to prune a tree.
6. Hedge shears are all you need to prune shrubs isn't true, shrubs require more than hedge shears, they require proper pruning.
7. Anybody with a pick-up truck, chainsaw, and pruners is an expert isn't true, use people with knowledge and expertise in this area.
8. All cuts must be treated with paint isn't true.

FALL TREE PLANTING

“ Fall is a good time to plant larger caliper trees on your property. ”

Fall is a good time to plant larger caliper trees on your property. The caliper of a tree refers to the diameter measurement of the tree's trunk, generally taken from at least 6in above the ground. Large caliper trees are 10cm in stem diameter and are measured 30cm above ground level. Generally, in Alberta in early spring, the soil is dry and there is little humidity in the air. During fall tree planting, moisture is higher in the soil due to summer and fall rain, with higher humidity. With higher moisture and a large root ball, it gives the root system a better chance to get established and growing earlier in spring. Caliper trees are prone to transplanting shocks and it requires proper planting techniques.

There are several steps to consider before planting large caliper trees on your property:

- Tree Species Selection - Tree species diversity is crucial for the health and well-being of your property. A variety of trees and shrub species can be found in Alberta that theoretically should not be grown here due to our harsh climate conditions. Many introduced ornamental trees and shrubs are doing just fine in our cities and towns. Introduced ornamental trees and shrubs provide great beauty and diversity alongside our native tree and shrub species. There are several tools available online where you can set certain requirements to choose appropriate trees and shrubs for your property. Try to be creative but also visit your city or town parks, an arboretum, or tree nursery to see what trees and shrubs are growing in nearby surroundings. You would

be very surprised to see that a variety of oaks, maples, ashes, lindens, pines, spruce, douglas and balsam fir, or Ohio buckeye, are growing in your location. The variety of very handy trees and shrubs is an even bigger choice. Check with your local parks manager, horticulturalist, or arborist if they know about more of the tree you have chosen in the area.

- Planting Site - This is a very important step for successful and long-lasting trees on your property. Use 'the right tree in the right spot' thinking.
- Planting Stock - Keep in mind that these trees and shrubs are much bigger than small seedlings that you may plant in the spring. Usually, late in the season many trees and shrubs are on sale at local tree nurseries or various retail stores. There come in containers or baskets and burlaps. Container stock is a typical black container that comes in various sizes. A thorough inspection is necessary before buying them. Pay attention to any broken branches, weak branch crotches, signs of insects or disease, and irregular shapes. The most important check is for signs of a bound root system. If you see the roots already coming out of the container, the root system is most likely bound, and can create problems in the future health of your trees. If you see the roots are excessively bound or the trees are damaged, simply don't buy them. Balled and burlap trees are usually larger caliper trees, that are dug up, balled in a wire basket, and wrapped in jute burlap. Inspect the overall health of the tree before buying it.

- Planting - This is where most people kill their trees before giving them a chance to grow. Proper planting is the most crucial part of your process. If you bought plastic container stock, very carefully remove the soil by either shaking, soaking, or washing it with a hose, to reveal the root system. By doing this you will be able to see potential circling, hooking, or girdling problems with roots. You may need to do proper pruning or remove the roots that girdle the trees. Plant trees so that roots are just below the surface. Dig a hole that is as deep as the roots, but twice as wide. The wide hole will make it easier for the new lateral roots to grow into the surrounding soil. For a basket and burlap tree, properly fit it into the hole, then remove the burlap and cut the wire on top, before filling the hole with soil.
- Staking - Small trees in protected areas don't require staking. In an area exposed to high wind and tall, leggy trees, will require staking. Don't forget that after a few years you will need to remove the stakes.
- Mulch - Mulching provides a few key functions. It prevents weeds, protects the roots from extreme heat, and keeps moisture around trees. Create a donut-shaped wood chip cover around your tree to keep water inside. Putting wood chips next to the trunk attracts rodents, insects, and potential diseases. Mulch also protects tree roots from winter freezing, and reduces the possibility of root damage and tree mortality.
- Watering - After planting the tree, please make sure that you provide enough water before freezing. The amount of water depends on the soil and the tree species requirement for water. Water right after planting, and three days after that. Don't let your tree get dry. If you can easily

push a 6in screwdriver into the soil, there is enough water. Drip irrigation is a long-term solution for watering your trees. Turf irrigation may not be optimal.

- Fertilization - Fertilization during fall planting is not recommended, or necessary, unless there is a nutrient deficiency in heavy clay soils. Fertilize trees and shrubs in heavy clay soil after leaves drop.



Burlap & Basket (B&B) Trees require additional equipment and care



Variety of sizes for potted trees and shrubs

FALL TREE WATERING

“The main reason for watering in fall, before winter, is that water acts as an insulator to the soil and, most importantly, to the roots of trees.”

As trees are preparing for winter, deep watering may help their well-being during the coil Winter months, as well as at the beginning of the following spring. The majority of Alberta is dry, with very little moisture, during September and October, with many trees experiencing water deficiency during these months. The main reason for watering in the fall, before winter, is that water acts as an insulator to the soil and, most importantly, to the roots of trees. Cold air around the root system will greatly damage or kill roots, causing branch dieback or the eventual death of the tree.

Having frozen water in the soil makes soils warmer than the surrounding cold air. Roots without water around them will be susceptible to cold, dry air damage. Cold air in the soil will draw water from roots and create icicles in the live root cells. Icicles in root cells damage or kill fine roots causing significant stress to trees. Newly planted trees are more prone to winter kill injuries than mature trees. Be aware that during the winter months, the coniferous trees may lose water through their needles faster than their roots can absorb it, which will turn needles brown in the spring. This process is called Winter browning in coniferous trees. To avoid dead branches or entire trees being killed, providing a sufficient water supply in the fall is crucial for tree survival during the harsh winter months.



WATER AND SOIL TESTING FOR SODIUM

Before you do any watering, you must be aware of the sodium levels in the water and soil. If you have high sodium levels in the water, you are setting up your trees to be killed in the long run. Any water and soil-testing laboratory can measure sodium levels in water and soil. Most labs will measure Calcium, Iron, Magnesium, and many others, as well as Total Dissolved Solids (TDS) or Electrical Conductivity (EC).

The first step is measuring the salinity or sodium levels in the soil. Salinity in the soil is measured as Electrical Conductivity of extract (ECe) in deciSiemens per metre (dS/m). Most trees will grow in soils with an ECe of up to 4, but beyond that level their growth is restricted. With soil with an ECe between 8-16 dS/m, only saline tolerant species will grow, and their growth may be only satisfactory.

The second step is to measure sodium levels in the water. As you add water with high sodium level, you will see an overall increase in salinity in the soil, year after year. Most plants (flowers, vegetables, and crops) do not perform well when more than 100ppm of sodium is in the water.

According to Alberta Health, most of the Chloride concentration for drinking water is less than 250mg/L, or 250ppm.

Trees affected by salt will have a stunted appearance and reduced growth, and many will also succumb due to a higher dose of soil in the soil or on the trees themselves.



TIMING

When to water in the fall is hard to determine, as the weather in Alberta is unpredictable, but you must learn your local

weather situation and act accordingly. For hardwood species, you must wait until leaves fall off, and just before first soil freezing. For coniferous species, timing is the same as for hardwood species. Most of the trees will 'shut down' in the early weeks of October, just before the soil freeze. If you wait and the ground freezes, the frozen soil will act as a barrier and water will not seep down in the soil to the root zones. Always water early in the day, so the plants have time to absorb it before the temperature drops at night.



WHERE TO WATER

Most people make a very common mistake and water trees right next to the trunk. Trees should be watered past what an Arborist calls the 'drip line', an imaginary line extending from the outermost branch tips straight down to the ground. Most of the roots are spread beyond the drip line and usually are equal in length to the height of the tree.



HOW MUCH TO WATER

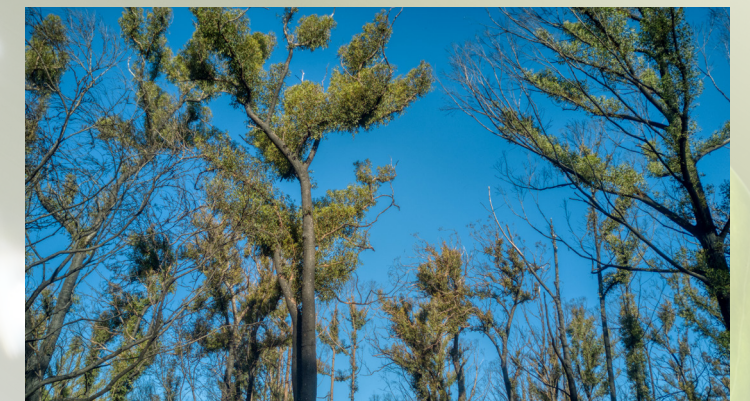
As a rule of thumb, for every inch at the tree breast height diameter equals 10 gallons of water. Watering should be slow and deep (6-12in). There are several ways to water trees by using a deep-root fork or needle (up to 8in into the soil), using a soaker hose, or sprinklers. Avoid water spraying on needles or foliage. If you use sprinklers avoid water hitting the tree trunk.



MULCHING

Besides water, you can also add mulch to your trees before freezing. Mulch also protects tree roots from Winter freezing and reduces the possibility of root damage and tree mortality.

Mulching provides several other functions, such as preventing weeds, protecting roots from extreme heat, and keeping moisture around trees for longer. Create a donut-shaped wood chip cover around your tree to keep water inside. Putting wood chips next to the trunk attracts rodents, insects, and potentially diseases.



Epicormic shoots and top branches dead due to winter root damage

PREPARING TREES & SHRUBS FOR WINTER

“ *Mulching is the most important protection you can do.* ”

Harsh winter climates in Alberta can create many forms of damage to trees and shrubs. Some of the most common damage occurs due to cold temperatures and dry air, winter sun, wildfire damage, salt, deep freeze, heavy snow, and ice. There are a few things you can do to help reduce potential damage.



COLD WINTER DAMAGE AND PREVENTION

Cold winter damage can happen due to the trees' inability to survive cold weather, lack of snow in some parts of Alberta, extreme cold and dry winds, and heavy snow and ice in late fall or early spring. There are a few things you can do to avoid cold Winter damage:

- Choose hardy trees and shrubs that can withstand cold temperatures. Alberta belongs to Canada Cold Hardiness Zones 1, 2, and 3, and partly Zone 4. Choosing trees and shrubs that are hardy enough for our climate is the first step to protect them from cold Winters.
- Snow is an excellent insulator for trees and shrubs.
- Plant trees and shrubs in protected areas, such as near buildings or an already established tree shelter, to avoid direct exposure to strong winds.
- Proper pruning will reduce the number of branch breaks during heavy snow or ice.



ROOT INJURIES AND PROTECTION

Root injuries due to cold, are one of the most impactful damages that trees and shrubs can sustain. Roots do not become dormant at the same time as branches, buds, or trunks and stems. Several studies show that roots remain mostly inactive. Roots can, and do, function and grow during winter months, whenever soil temperatures are favourable, even if the air above ground is brutally cold. The freezing, heaving, and cracking of winter soils physically damages roots, particularly the fine feeder roots in the uppermost, organic layers. The root damage can also trigger a range of effects, such as reducing a trees' ability to take up water and nutrients, particularly during a spring bud break, and supporting stem and branch growth in summer. Severe root damage from winter, will greatly contribute to whole or partial tree mortality.

To protect roots is the most important thing you can do for trees and shrubs. Here are several recommendations:

- Provide deep watering just before freezing, young or old trees. Frozen water is an excellent insulator and will reduce frost penetration to the root zone. Moist soil holds more energy than dry soil. Once the soil is dry it is easier for the frost to penetrate deep, and dry out roots. The freeze will take moisture from roots and create crystal icicles in the roots, which will create physical damage to the root system. The best way to water is slowly, with a soaker hose at approximately the rate of 10 gallons (around 40l) per inch of tree diameter. Tree diameter is measured at breast height.

- Good, deep, early snowfall will keep soil from freezing, even if the air temperature is brutally cold.
- If snowfall happens after the soil is already frozen, deep snow will protect roots from January or March early thaws, when the temperature fluctuates.
- Mulching is the most important root protection you can do. Mulching provides a few key functions: it prevents weeds, protects roots from extreme heat, and keeps moisture around trees. Create a donut-shaped wood chip cover around your tree to keep water in. Applying 2-4in (5-10cm) of wood mulch will greatly reduce soil freeze. A layer of 3-4in of wood chip mulch will prevent heaving by maintaining more constant soil temperatures.
- For newly planted trees, check if there is a crack in the soil due to planting or dry fall. Fill these cracks with soil to prevent cold air from entering the soil. Mulching would also prevent this as well.
- If you have sandy soil you should fertilize in the spring or the fall, on heavy clay soil, after the leaves have dropped.
- Leave leaves. Instead of disposing of fall leaves keep leaves on the ground, mulch, or blend them into a soil to retain nutrients. Be very aware if you have leaf disease, e.g. leaf spots, bronze leaf disease etc. You have to rake leaves to avoid future problems with diseases.



WILDLIFE DAMAGE AND PREVENTION

As winter is very harsh for many wildlife species, they usually look for food on young and recently planted trees. Several wildlife species will cause damage to your young trees. Mice, voles, rabbits, deer, and moose will griddle and eat the bark, twigs, branches, and buds by feeding on them. They can create severe damage, like total or partial destruction of trees and shrubs. There are

a few things you can do, such as erecting physical barriers, to prevent damages.

- Use mesh wire (1/4in in size) to protect trunk bark from mice, rabbits, voles, and, to some extent, deer and moose. Deer and moose will strip bark, either by eating it or using their antlers.
- Use plastic tree guards for small animals.
- Properly install mesh wires or plastic tree guards, with no gaps between the bottom of the mesh cylinder and the ground, where animals could crawl under the fencing.
- Build a large fence for deer or moose. Use some repellent as well.



SALT DAMAGE AND PREVENTION

Various salt (chlorides) are used to prevent ice from forming on the road in Alberta. Among them, sodium chloride is one of the most damaging agents to trees and shrubs, as some studies show. There are several things you may be able to do:

- Avoid, or reduce, the amount of salt used for de-icing
- Plant salt-tolerant trees and shrubs in the area with the high use of salt.
- Use other alternative de-icing material such as sand or small gravel.
- You may put some trees under burlap to prevent salt spraying particles on the trees.
- Move trees and shrubs further away to avoid salt damage.



PRUNING

After leaves drop in September and October, you may be considering pruning dead, diseased, and damaged (3Ds) branches. Any infested branches should be disposed of or burned. Perform proper 3-way cut pruning techniques and do not damage the branch collar during this process. Otherwise, avoid pruning this time of year, as this may create additional stress on the trees.

WINTER DAMAGE TO EVERGREEN TREES

“ Use the ‘right tree in the right spot’ thinking ”

Springtime needle discolouration on previously healthy evergreens is often the result of some form of winter injury.

There are many reasons why evergreen trees and shrubs turn brown and change colour or lose needles. Many environmental conditions, such as winter desiccation, salt, frost, drought, flood, soil deficiency, and many other environmental factors, are sometimes the cause of needle and leaf discolouration, and not necessarily insects or diseases.

The key to correctly diagnosing evergreen browning is a careful tree or shrub examination. You may start with branches, as colour change of the foliage may be the most obvious symptom. Following branch examination, the next things to check are the roots and the trunk, as they may give clues as to the exact cause of the problem. If the tree is too large, use binoculars to perform a careful inspection of the tree crown, to see if there is any physical damage by porcupines, birds, or hail. The next examination should be performed on the ground, to look for any roots and trunk damage and also possible soil compaction, salt, and chemical damage, as this may be necessary to find the possible reason for the discolouration. Winter damage and its severity can look different depending on the tree species. Cedar leaf scales fade from green to light tan or red-brown, while needle tips of spruce and pine trees turn brown. Winter damage may occur on different parts of trees and affect just a few branches, at the tree top,

on one side, or even the entire tree. The tree could lose most of its needles and die.

It is very important to keep in mind that many trees and shrubs, even after losing many needles, may survive winter damage and recover after a few growing seasons. The best way to find out if a branch is dead or alive is by following a simple method; if tree branches are still bending the green will flush out and new needles will grow back, while if the tree branch snaps they are dead, and no new growth will occur.

Winter hardiness, as well as plant variety, soil drainage, location, and environmental conditions, are some factors to consider for tree selection, in regards to Winter damages on trees and shrubs.

WINTER INJURIES CAN INCLUDE:
Winter Dessication is caused when the water leaves the tree needles faster than it is taken up. During Winter, coniferous needles still lose a miniscule amount of moisture in the air. Meanwhile, the root system freezes in the soil and cuts off the water supply to the tree. Water loss is greater on windy days and mild sunny days. The heat from the sun increases the temperature of the air, causing the stomata to open and lose that water. This injury can damage, or be deadly, to many species of coniferous trees.

Sunscald happens when Winter temperature fluctuations cause injury by damaging the bark of hardwood trees. It rarely kills the tree, but the damaged bark then becomes an entry point for insects and disease. Young trees with thin bark can suffer from sunscald, but many types of fruit trees as well as ash, oak, birch, and willow, are also affected.

Cold Temperature Damage happens when high fluctuations in temperatures during the winter months cause damage, and not a prolonged winter. In Alberta, we experience temperature shifts from -40°C to 10°C relatively quickly. Generally, dry soil are more likely to damage roots than soils that contain a good moisture supply. Root injury may be worse during winters with little snowfall. Winter root damage may not be noticed until the following summer, when the plants suddenly turn brown and die.



Winter damage to white spruce and cedar



TIPS TO MINIMIZE WINTER INJURIES

- Water evergreens in the fall. Adequate fall watering is the most beneficial for the tree. Slow water flow around the trees' drip line for several hours will provide enough water for those roots to survive winter and early spring.
- Water in early spring, once the ground thaws.
- Use mulching to keep moisture around trees. Wood chips, or other mulch, (5-12cm thick) will keep moisture in the root zone for longer.
- Use hardy plant varieties recommended for the specific horticultural zones of the province.
- Do not plant trees and shrubs around buildings or other reflective structures.
- Consider fertilizing trees following harsh Winter conditions, but stop using nitrogen, or any other fertilizers, after June.
- Do not wrap evergreens with burlap or plastic. Warm and sunny winter days will increase the internal temperature. This high temperature may damage warmed tissue when severe cold follows. Plants wrapped this way may also break dormancy.

TREE SALT-TOLERANT

“ *Planting trees along roads and driveways requires additional consideration due to potential salt damages.* ”

Planting trees along roads and driveways requires additional consideration due to potential salt damages and injuries, that will occur during their lifetime. Trees affected by salt will have a stunted appearance and reduced growth, many will also succumb due to higher doses of salt in the soil or on the trees themselves. It is very important to plan and plant trees that are best suited to handle high amounts of salt in the soil. You must understand the biology, growth, and site requirements for each species planted along roads or driveways. It is crucial to plant more salt-tolerant species along roads and driveways, as they will protect less salt-tolerant species from salt damages. Less winter-hardy plants are more susceptible to salt injuries. When planting trees along very busy roads, start with salt-tolerant shrubs as the first line of defense, followed by salt-tolerant trees, and, lastly, the trees that are least salt-tolerant. A little foresight will save you a lot of headaches down the road and will allow you to have long-lasting shelterbelts and trees around your property. It is important to keep in mind that all species of plants, shrubs, and trees are affected by salt. Some can tolerate greater salt levels than others, but it will still affect them. There are no tree or shrub species that are suitable for high and extremely high salinated soils, or in areas where annual road de-icing or dust control will accumulate a high level of salt in the soil. Some tree and shrub

species that are suited to high salt content in the soil can be very invasive, and it is crucial to check with local authorities if you are allowed to plant some of these species on your property. Trees and shrubs are rated for salt tolerance as high, medium, and low.

HIGH SALT TOLERANCE:

- Silver Buffalo Berry
- Sea Buckthorn
- Russian Olive
- Rocky Mountain Juniper
- Austrian Pine

MEDIUM SALT TOLERANCE:

- Spreading Juniper
- Snowberry
- Villosa Lilac
- Hawthorn
- Chokecherry
- Mountain Ash
- Ponderosa Pine
- Green Ash
- Manitoba Maple
- Siberian Elms
- Laurel Leaf Willow
- some Apples

LOW SALT TOLERANCE:

- Raspberry
- Rose
- Dogwood
- Winged Euonymus
- Spirea
- Colorado Blue Spruce
- Douglas Fir
- Balsam Fir
- Cottonwood
- Aspen
- Birch
- Little-leaved Linden
- Larch



Junction of Highway 49 and Highway 725, RR 1, Spirit River, Alberta, Canada, T0H 3G0

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Monday to Friday 8:15 AM to 4:30 PM



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