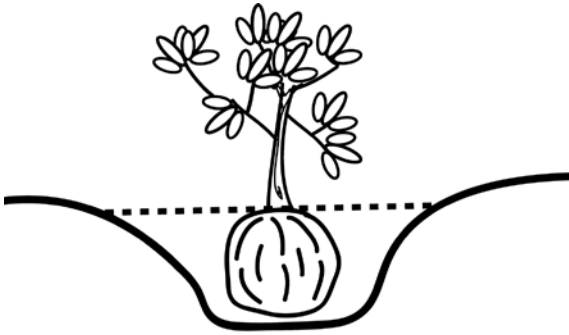


FOREST ENHANCEMENT
PROGRAM

TREE CARE



Planting
and maintaining
your trees



Forest Enhancement Program

Since 1995, Manitoba Hydro Forest Enhancement Program has funded hundreds of community tree planting projects in the province. These trees educate, beautify, and provide erosion control, shade and windbreaks throughout Manitoba.

The Forest Enhancement Program helps people set involved in their communities, creating beautiful and useful green spaces for future generations.

If your group or community could benefit from some added trees next summer, apply to the Forest Enhancement Program.

Go to hydro.mb.ca/community/forest_enhancement/ for more information.

Note:

To be eligible for funding, projects must be located on land that is accessible to the public and open to public use. Projects located on private property are not eligible.

Acknowledgments

The *Tree Care Guide* was researched and developed by Jody Rutledge on behalf of the Manitoba Hydro Forest Enhancement Program.

Richard Westwood Ph.D.
U of W, Centre for Forest Interdisciplinary Research (CFIR)

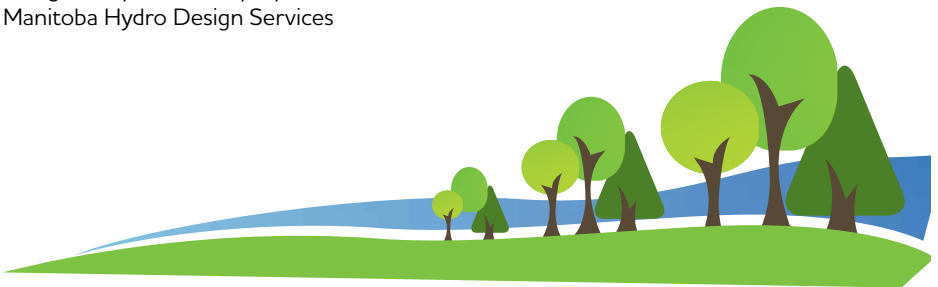
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Coalition to Save the Elms

Illustrated by Michelle Beaudry and Phil Johnston

Design and production preparation:
Manitoba Hydro Design Services



Planting and maintenance checklist

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Celebrating trees

Canadians have a cultural link with the outdoors. One need only look to our currency to see this ongoing national love affair with the natural environment. Trees are integral to this vision of Canada, and tree planting is an act of faith in the future and an ecological investment to be enjoyed for generations.

Proper planning, planting and maintenance are key for growing flourishing trees. You must give careful thought to the purpose of the planting, location of the planting, tree selection and how the trees will be cared for once they are in the ground.

This booklet is a step-by-step checklist of fundamentals to help you with your tree planting project. When looking for information specific to your endeavour, it's always a good idea to contact the professionals at your local nursery and a professional arborist. You may also obtain valuable information from:

- Manitoba Conservation Districts Association
- Manitoba Habitat Heritage Corporation
- Manitoba Forestry Association
- Manitoba Conservation and Climate – Forestry
- Trees Winnipeg
- International Society of Arboriculture

Following the steps in this booklet will help give your planting project an excellent chance of success for years to come.

Preparing a planting plan

The planting plan will identify what tree species to plant, where to plant and how trees will be maintained.

Tree-planting objectives

For aesthetics or community revitalization, consider trees that provide:

- Shade
- Interesting foliage and colour
- Showy blossoms and fruit

For windbreaks and screens, consider:

- The purpose and placement of the tree
- Trees that are well suited to your climate and soil conditions
- A mix of both coniferous and deciduous species if space permits

Tree species that grow quickly — an average of 1.5 metres a year — may be weak and prone to breakage from high winds.

For shade, consider trees that have:

- A long life span
- Known sturdiness and disease resistance
- Large or spreading crowns or a crown shape that suits your needs



Full crowned



Pyramidal



Spreading



Multi-stemmed



Weeping



Vase-shaped



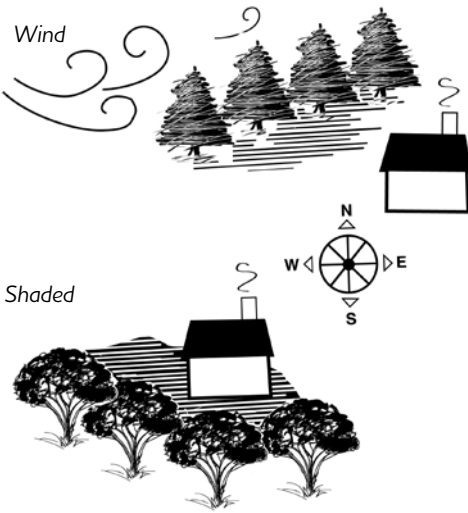
Columnar

For education, decide on a theme that integrates:

- Site characteristics
- Tree life cycle
- Planting method
- Short and long-term maintenance needs

For energy conservation, consider trees that provide wind protection and shade. Your trees should:

- Have long life spans
- Be hardy for the local setting
- Have tall, spreading crowns



Well-positioned trees can reduce energy costs by shading buildings and park spaces in the summer and diverting prevailing winds in the winter.

Evergreens planted on the northwest side of a building create windbreaks that can shield a home against wind and snow, reducing heating costs as much as 30%. Deciduous trees provide shade during the summer and permit sun to shine through in the winter. Tree shade can reduce air conditioning costs in residential and commercial buildings by 15 to 50%.

— *Tree Canada Foundation 2001.*

Considering local soil and climate conditions

Soil

Trees need soil with adequate nutrient levels, organic matter and good drainage.

- Select trees that are suitable for the soil found at the site.
- Seek advice from your local nursery and arborist.

Local climate

Be aware of the following when selecting tree species:

- Annual rainfall (is the planting site normally wet or dry?)
- Wind exposure (will the trees be sheltered from prevailing winds?)
- Amount of direct and indirect sunlight (will seedlings or young trees be shaded?)

Drainage

- Good drainage is important for almost all landscape trees.
- Monitor the planting site for drainage patterns.
- Avoid planting in low areas.

Selecting tree species

The following trees have good survival rates:

Silver maple	Basswood/Lindens	Manitoba maple
Blackhills spruce	Amur maple	Paper birch
White spruce*	Bur oak	Siberian larch/Tamarack
Colorado spruce	Willows	Showy mountain ash
Poplars	Cherries	Aspens
Apples/Crabapples		

* Manitoba's provincial tree

The following species also perform well in Manitoba:

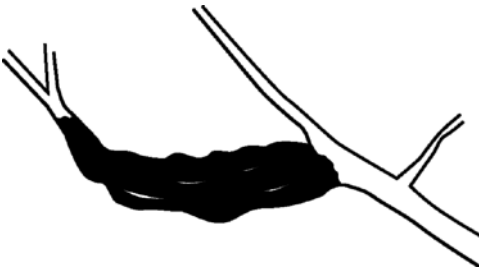
Fruit trees

- | | Height |
|-----------------------|--|
| • Canadian Plum* | 9 metres |
| • Native Chokecherry* | 5 to 7 metres (<i>not all chokecherry varieties qualify</i>) |
| • Pincherry* | 16 metres |
| • Buffalo Berry | 6 metres |
| • Sea-Buckthorn | 5 metres |

Lilacs

- | | Height |
|-----------------------------|---------------|
| • Golden Eclipse Tree Lilac | 6 metres |
| • Ivory Silk Tree Lilac | 6 metres |

Most other varieties of tall-growing lilacs have a mature height of 3 metres.



Black knot is a fatal disease that attacks plum and cherry species. Shubert chokecherry seems to be particularly susceptible to infection and may infect other trees. Black knot must be attacked quickly before it spreads by careful pruning and immediate removal and disposal of all cut branches. Do not leave pruned branches on site to avoid spreading infection. Black knot is difficult to control with pruning if many trees are infected.

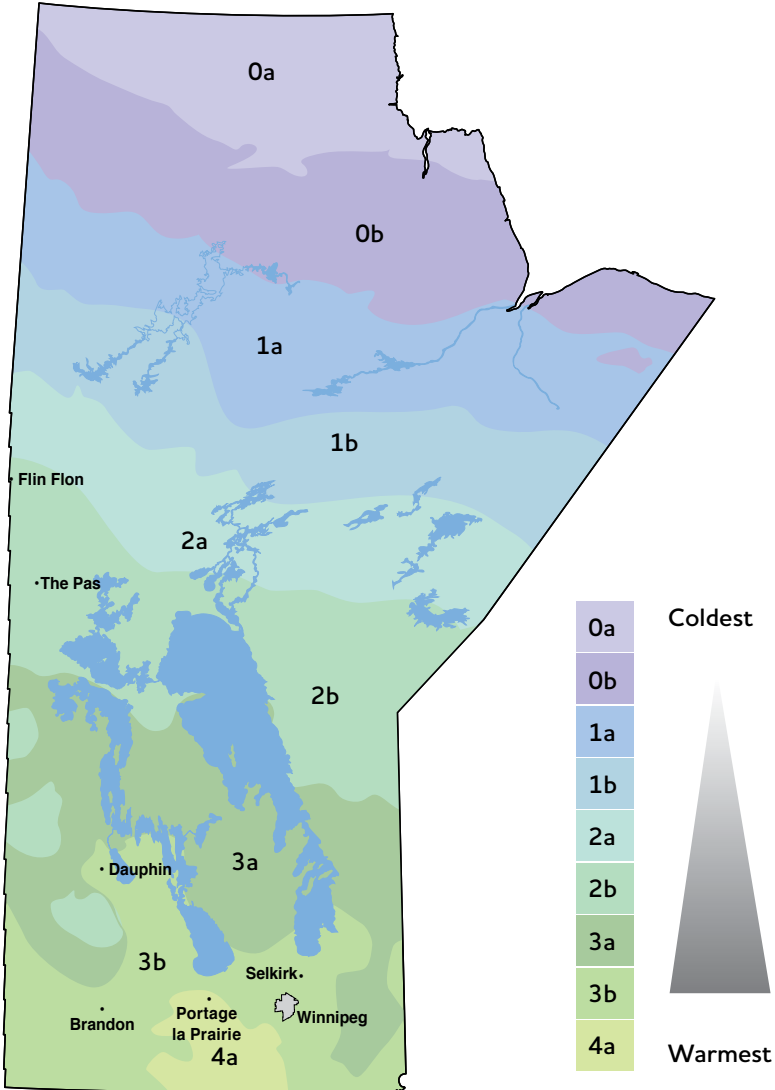


*Susceptible to black knot.

There are certain plant characteristics to consider when selecting trees. Consult your local nursery.

Manitoba's hardiness zones

Based on climate conditions, indicating where plant and tree species are most likely to survive and thrive.



- **Hardiness:** Select species that are hardy for your region.
- **Species diversity:** Be sure to include two or more species in your planting. If possible, plant no more than 10% of any one tree species and no more than 20% of any one type or genus of tree (i.e. maple, poplar, etc)
- **Tree size & aesthetics:** Select species based on their suitability as both a seedling and a mature tree.
- **Growth rate:** A fast growing tree species may be weaker than a slow growing tree species and may be at a greater risk to damage in extreme weather events.
- **Salt tolerance:** Consider salt tolerance of a tree species when planting on boulevards or near moderate to high-speed traffic routes. Silver maple, Russian olive, poplar, willow, lilac, American elm, and Japanese elm are some species that demonstrate better salt tolerance than others.
- **Drought tolerance:** Species native to an area of low annual moisture are well suited to local growing conditions.
- **Maintenance:** Select a species knowing the amount and type of care required.

Conifers require more water than deciduous trees for two to five years **after** planting!

Choosing stock type and size

Select the stock type and size of tree based on:

- Planting site: Sites with a lot of foot traffic or young children may require larger size tree stock.
- Capability of the people planting the trees.
- Availability of equipment (tree spade, backhoe, shovels).
- Survival rate (bare root, potted, balled in burlap).

Common stock types

Bare root – This stock type is commonly sold in early spring while plants are still dormant and with peat moss covering the roots. Avoid damage to the root ball by careful handling and planting soon after purchase. The peat moss and roots should be kept moist, covered and out of sunlight before planting. Cuts or tears to the roots increase its vulnerability to infection and disease. Drying out of this stock type can occur easily and should only be planted in early spring when soil moisture levels are higher.



Potted – These trees are sold in plastic or peat pots (ranging from 1-gallon to 25-gallon sizes). This container grown stock offers better protection against transplant shock and drying of roots during transport and storage. This stock type can be planted at any time during the growing season; however, spring and fall are preferred for Forest Enhancement Program projects. This stock type should be kept shaded, cool and watered if being stored for one or more days (remove pots prior to planting!)



Balled in burlap (B&B) – Trees are sold with burlap secured with twine or wire surrounding the root ball. All burlap, twine and wire should be removed prior to planting. If the stock will be stored for one or more days it should be kept shaded, cool and watered. Be sure to handle this stock by lifting the soil ball. Never move a B&B tree by lifting at the stem.



Field grown (tree spade) – This is typically very large stock and will require a professional to lift, transport and plant. Vulnerability to transplant shock and root ball damage is low. If this type of stock is to be stored for more than a day or two the root ball must be burlap wrapped, kept moist and shaded.



Click Before You Dig

Contact Click Before You Dig when planning your project. This service coordinates line location for multiple utilities. They will visit the site to mark any service lines or pipes present. Planting directly over these service lines and pipes must be avoided to ensure that future problems do not result.



Trees should not be planted under or within five metres of overhead power lines. If this is unavoidable, plant shrubs or low growing trees in these areas.

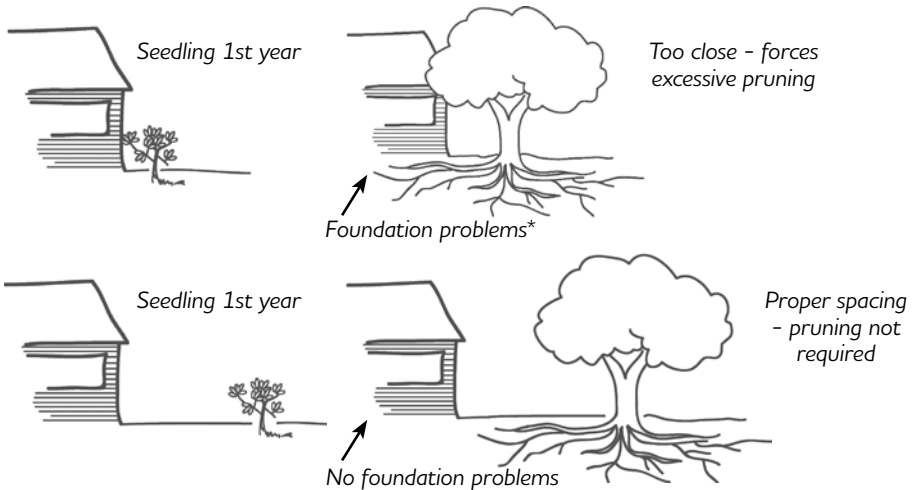
If you plan to excavate or dig into the ground for any reason deeper than 15 cm, complete a line locate online at clickbeforeyoudigmb.com or call 1-800-940-3447 for help with your request.

Deciding when to plant

- We suggest planting trees in spring before bud break or in fall when the trees are dormant and less likely to suffer transplant shock.
- Trees should not be planted after mid-October.
- Water stress and risk of transplant shock will increase during periods of high temperatures and low precipitation. Plant at times when these conditions can be avoided.

Determining tree spacing

- Allow for adequate tree growth above and below ground when planning the location and relative position of the trees.
- Consider the size of the tree and the spread of its crown and roots at maturity when planting near buildings or other permanent site structures.



Tree spacing guidelines:

- Trees in urban soils should be planted no less than 4 metres apart.
- Trees in undisturbed soils should be at least 2.5 metres apart.
- Trees should be planted at least 2.5 metres away from sidewalks and walkways.
- Trees should be planted at least 4 metres away from buildings.

*Trees planted too close to a structure can cause excessive pruning and tree roots will penetrate cracked foundations and any other cracked or fractured underground structures.

Arranging for purchasing, transportation and storage

Obtaining price quotations

Several quotations should be collected for cost comparison from local nurseries or suppliers and should include:

- Cost of tree stock.
- Freight charges.
- Any additional materials: topsoil, mulch and peat moss.

Compare cost and overall stock quality to find the best supplier. Remember, cheaper is not always better! To ensure you get high quality stock, inspect and select the trees prior to purchase.

Inspecting stock quality

Good quality tree stock will show:

- **Normal growth form:** At least half of all foliage should be found on the lower two thirds of the tree.
- **Tapered stem:** The stem should taper slightly from bottom to top. Severe taper or reverse taper trees should be avoided.
- **Correct pruning:** Branches and twigs should not be torn or show other signs of damage. Do not purchase trees that show oozing or “bleeding” cuts.
- **Green foliage:** No discoloration, spots or insect feeding should be seen. Foliage should not be wilting or drooping.
- **Leaf buds:** Abundant bud set should be seen on trees purchased in fall or spring. Actively growing branch tips should be present on stock purchased in mid to late summer.
- **One main stem:** Trees should have one main stem and no pruning scars at the base of the tree. Be careful not to confuse this with graft faces. A trunk flare should be evident at the base of the stem to indicate that the main roots are at a proper depth in the container or root ball.
- **Healthy bark:** Bark should be free of mechanical or insect damage. Check for abrasions caused by guards, wires or stakes.
- **Healthy root growth:** Root ball should show abundant fibrous root growth. Roots should not be circling the pot and should not be kinked or cut. Main lateral roots should be located close to the surface of the soil.
- **Quality guarantee:** Nurseries will often guarantee their stock quality for at least one year from time of purchase. Trees should be replaced with like or similar species of the same size and quality.

Planning transportation and storage

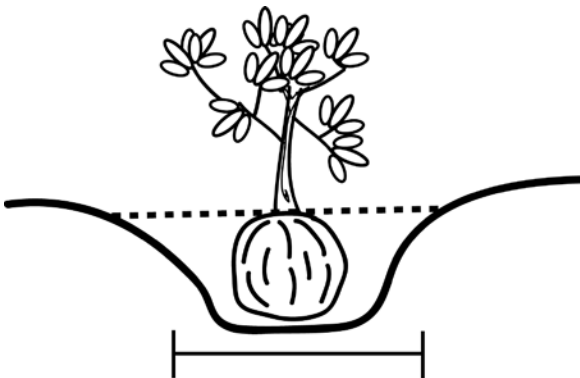
- Always minimize time between purchase and planting.
- During transport, keep trees covered and moist.
- Avoid moving trees during extreme temperatures.
- Once trees are on site they should be inspected for damage that may have occurred during shipping. The soil or peat moss that covers the roots should be moist.
- If trees must be stored, they should be covered, watered and shaded. Assign a project member to take care of the trees.

Knowing how to plant

Preparing the planting hole

- Dig the hole to allow just enough space for the root ball and backfill - generally no more than two times wider than the root ball.
- Planting depth is correct when the root flare is JUST BELOW the soil surface. The root flare is the point at which the tree stem divides into the root system. Locate the tree's root flare by carefully removing soil around the base.
- Plant trees so root flare is slightly above ground level to allow the root flare to settle at or just below the soil surface.

Prepare the planting holes before the stock arrives; it's a great way to minimize storage time for trees.



No more than two times wider than the root ball

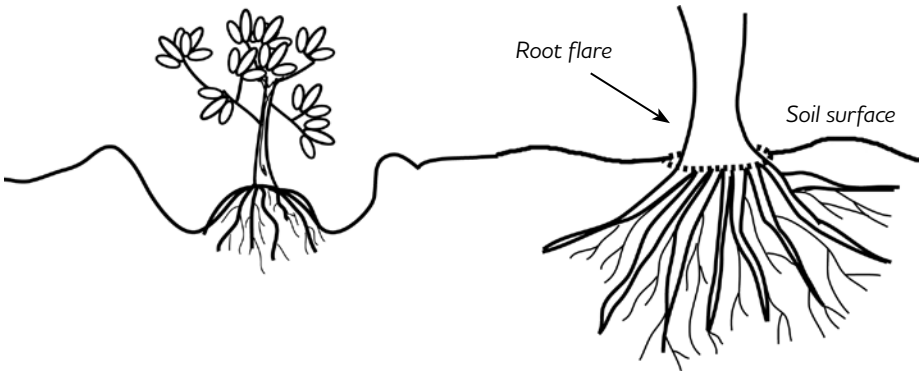
Installation techniques

- Remove any containers, burlap, twine and wire from the root ball. Soil around roots should be left intact and roots should not be kinked or broken.
- Prune any damaged or diseased roots with a sharp, steril, knife or pruning secateurs.
- Be sure to have quality backfill on site for planting the trees. It should be composed of no less than 5% organic matter and no more than 27% clay. If the backfill from the hole is good quality, it is recommended to use that soil for backfill.

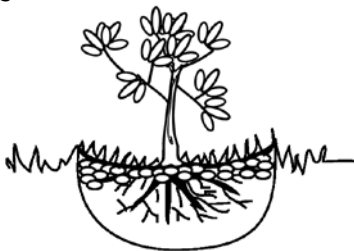
Planting method varies with stock type.

For bare root stock:

- Build a small mound of soil in the centre of the hole. Let roots drape naturally over this mound making sure they are not kinked.



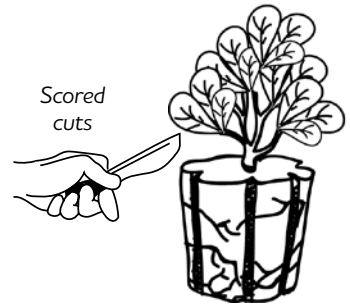
- Backfill about three-quarters of the hole and gently tamp the soil to remove any air pockets. Water to promote good contact between the roots and soil. Finish filling the hole and tamp slightly. Water thoroughly.
- The finished planting hole should be flat and level with grade and surrounded by a soil embankment. This is required for all stock types. During heavy rainfall, monitor the embankment and open to reduce flooding.



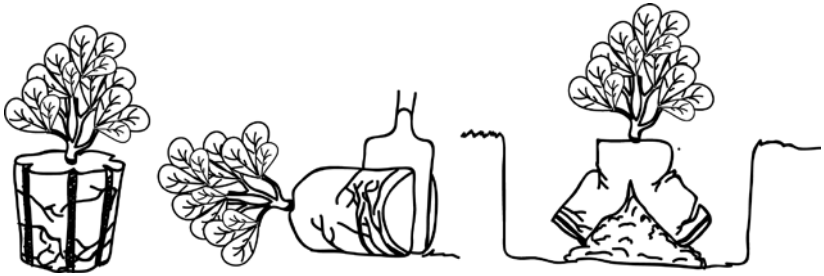
Highly compacted soil decreases the roots' ability to exchange oxygen and carbon dioxide. Backfill should be slightly tamped to remove any air pockets. **DO NOT STOMP** on the soil!

For potted stock:

- Remove containers by tapping the sides and bottom.
- Do not force the plant out of the pot. You may need to cut the sides of the pot to remove the plant.
- Score the root ball by making vertical cuts down the root ball.



Butterflying is an acceptable alternative:



Butterfly cut

- Plant trees slightly above ground level to allow the root flare to settle so the root flare is just below the soil surface. Backfill two-thirds of the hole with soil. Tamp and water. Fill the remaining hole level to grade and make a low embankment around the edges of the planting hole. Tamp and water.

For balled in burlap stock:

- Remove wire, twine and fabric prior to planting.
- The hole should be just deep enough that the root flare is at or just below ground level.
- Position the tree in the centre of the hole and backfill around the bottom third of the root ball. Firmly press this soil around the base. Water gently.
- Fill the hole level with grade and create a low embankment around the edge of the planting hole.
- Tamp and water thoroughly.

Once the tree is planted, remove all nametags and flag tape. If identification is necessary, place a nameplate on a soil stake.

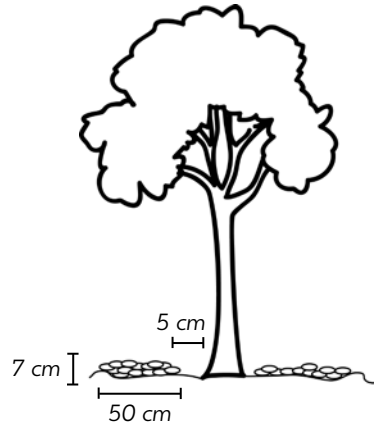
Many trees do not survive because they are planted too deep. Proper planting depth is critical! The root flare should be just below the soil surface. Monitor the depth throughout the planting process by using a string line drawn across the planting hole.

Applying mulch

Mulch

- keeps the soil moist by decreasing evaporation,
- decreases competition from weeds,
- creates a buffer between the tree and weed trimmers or mowers,
- increases the effectiveness and longevity of fertilizer applications,
- moderates soil temperature.

Mulch types include bark chips, wood chips, flax shives, sawdust, hay, straw and even old newspapers.



How to apply a layer of mulch:

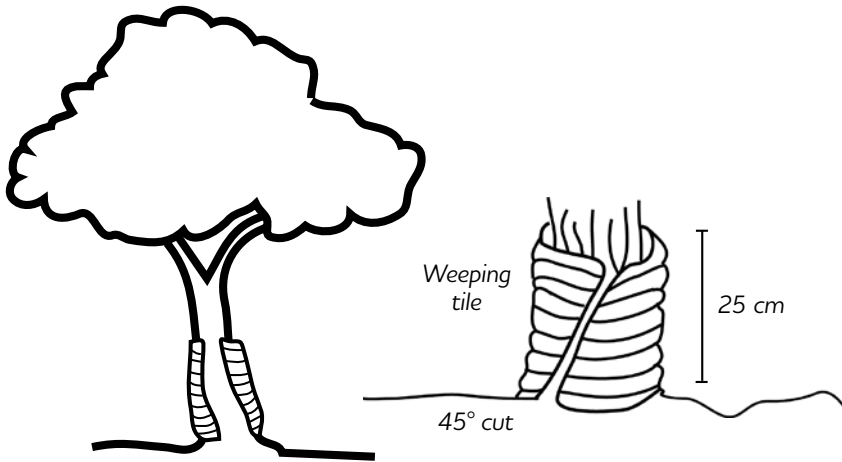
- Do not cover the area immediately surrounding the stem, measure out 5 cm and begin there.
- Spread the mulch around the tree to a distance of approximately 50 cm from the stem.
- The mulch layer should be approximately 7 cm deep. A thicker mulch layer is not necessary.
- Reapply as needed.

Providing protection

Tree guards protect the stem against damage. Materials used for tree guards include:

- Weeping tile
- Plastic tubing
- Plastic lattice
- Trees will often be sold with flexible white plastic coils already present. These are satisfactory for the first year but should be replaced with a different stem guard as the tree grows.
- Tree guards should be at least 25 cm tall. Cut the weeping tile down one side at a 45° angle and fit it around the tree base.

Many trees will die or be damaged by tree guards left on for too long. Remember to check the tree protection regularly to ensure it is not damaging the trees.



Weeping tile or corrugated plastic tubing is an inexpensive and effective material that can be used to protect tree stems for many years.

Preparing a maintenance plan

Watering

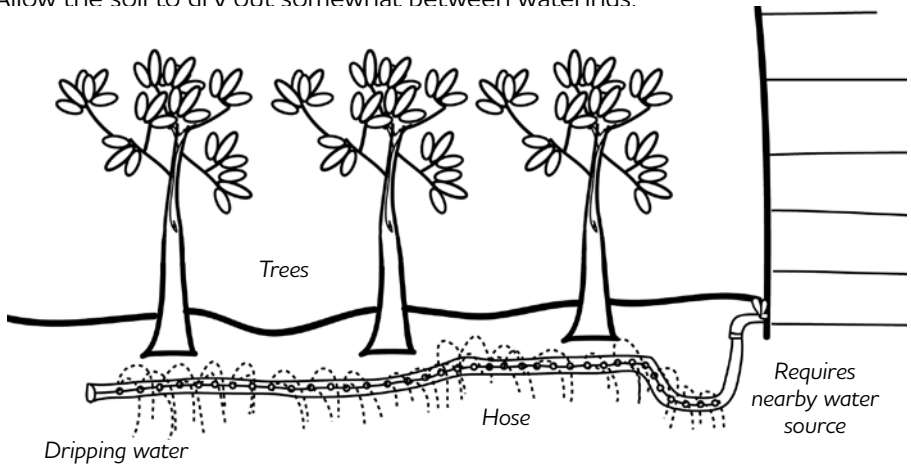
Adequate watering may be the single most important factor affecting the survival of transplanted trees. A drought-stressed tree is more likely to succumb to other threats including transplant shock, pests or disease.

Tips:

- Water the tree regularly for the first two years after planting. Some trees may need watering for three or four years to become established.
- Water the trees based on precipitation, soil type, and soil moisture. Average frequency is once per week. Increase frequency during dry periods and decrease during wet periods.
- Conifers may require more water than deciduous trees.
- Irrigation is not adequate or may be excessive if the trees have wilted foliage or show slow, stunted growth.
- Ideally, trees should be watered in the early morning.
- Watering should taper off a few weeks before the first frost.

Focus watering on the area of the root ball in the earlier establishment phase and progressively move the watering more to the outer edges of the planting hole over time. Do not water close to the main stem of the tree.

Allow the soil to dry out somewhat between waterings.



Watering methods:

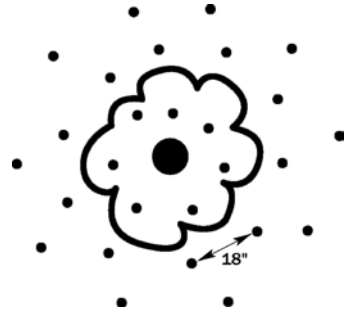
- Slow-drip irrigation: This method is most effective at producing a tree with a healthy and expansive root system. Each week, let water trickle for a few hours to ensure deep soil saturation.

- Hose or water truck: Trees should be thoroughly soaked once a week to ensure water is delivered deep into the soil.

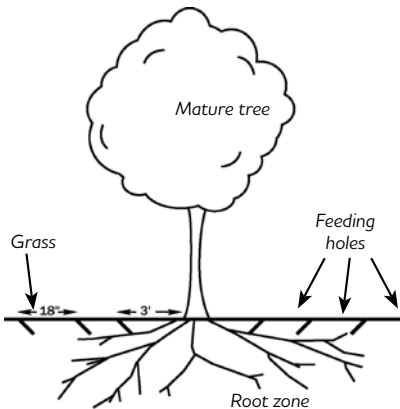
Fertilizing

Fertilizers are not a cure for an unhealthy tree but can enhance growth that is already occurring. Fertilizers should be used with care. Don't hesitate to consult your nursery or the supplier.

- It is not necessary to add fertilizer at time of planting.
- Fertilizing is part of good long-term maintenance and may be applied every one to two years, depending on soil conditions.
- First fertilizer application may be at the beginning of the second growing season. Be sure to follow the manufacturer's recommendations for application method and rate.
- Check with the nursery to determine local soil conditions and pick the appropriate fertilizer.



Aerial view showing placement of fertilizing holes around new or mature trees



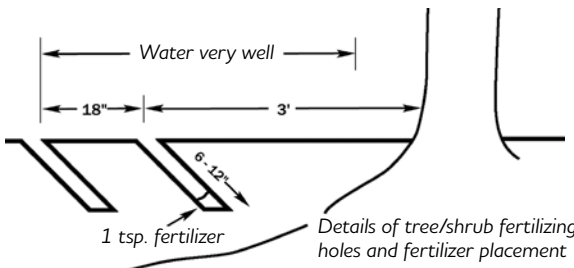
Examples of fertilizers to use are:

20:20:20

16:20:0

11:48:0

Others are good as long as they do not contain weed controlling herbicides.



Details of tree/shrub fertilizing holes and fertilizer placement

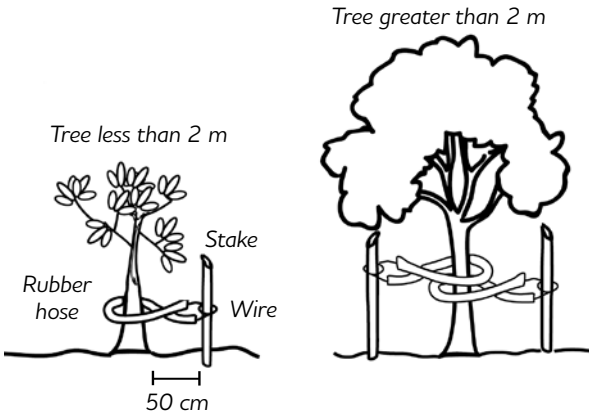
Staking

There are two reasons to stake your trees:

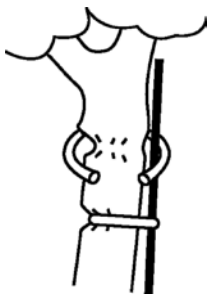
- Protective staking is used in high-traffic areas. They protect against mower or weed trimmer damage and will divert foot traffic away from the tree base.
- Support staking is used to prevent excessive movement of the tree as it establishes. These attachments between the tree and the stakes should not be rigid but rather allow for some movement of the stem.

How to stake a tree for support:

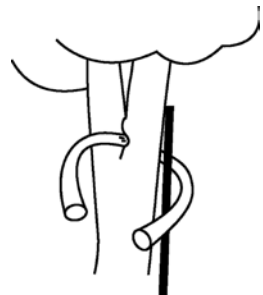
- Trees smaller than two metres will require one stake and larger trees will require two or more.
- Stakes should be 2 metres long and secured 50 cm into the ground.
- Stakes should be placed in solid ground outside the planting hole.
- Using a 9 to 12 gauge wire strung through rubber hose, loop it around the tree and back to the stake making two loops.
- The tie should be about a quarter of the way up the stem.



Support stakes should remain on the tree for only one growing season. Test stability by moving the trunk back and forth. Remove the stakes if the soil around the roots does not move. If the tree needs to be staked for another season, growth requirements are not being met.

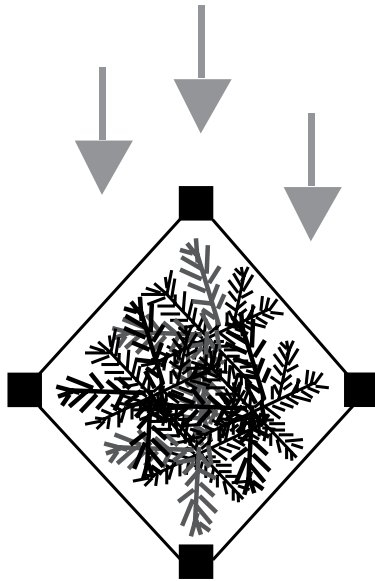


Stakes are a common source of damage to the tree trunk and should be checked frequently for fit and stability.



Winter protection

- Trees need adequate water before winter.
- Decrease frequency of watering in fall to correspond to lower temperatures.
- Water before ground freezes.
- Burlap can be used to protect evergreens from winter drying. The fabric should be attached to wooden stakes and placed so that the burlap does not make contact with the foliage.



Conifers can become dried out from both wind and snow. Complete wrapping will help avoid having young trees dry out during winter, reducing winter-kill.

Pruning

Correct pruning is essential to the health and form of your trees. Pruning should only be done after mid-October and before the end of April. No heavy pruning should be done before the second growing season.

Tips on pruning:

- After planting, prune only dead or torn branches.
- Sterilize tools between pruning trees to prevent spread of infection or disease.
Use a 1:1 solution of water to chlorine bleach or denatured alcohol.
- Tree paint or other solvents used to “seal” or cover the cut are unnecessary and not recommended.
- Remove competing root or stem sprouts as they appear over time as the tree grows.

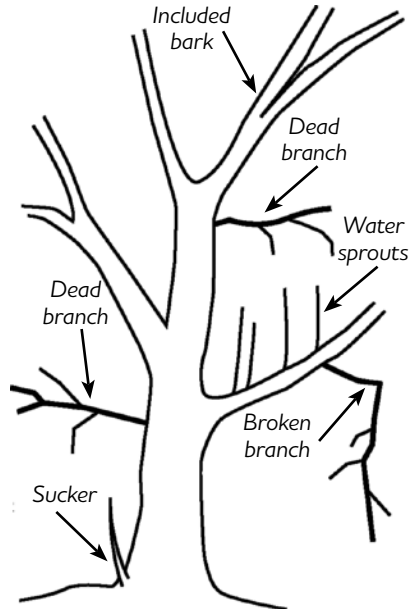
Remember a simple pruning rule:

Never remove more than one-quarter to one-third of the crown that is living.

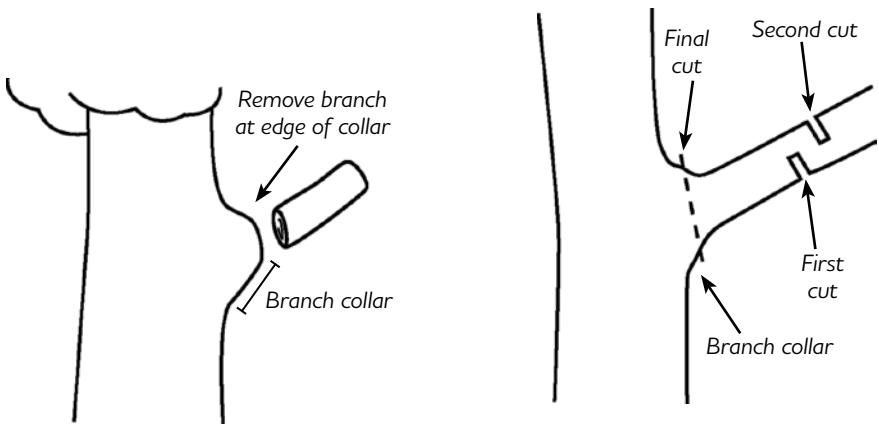
General tree and shrub pruning guidelines

Correct pruning is essential to keep shrubs and trees healthy and safe in an urban environment. General pruning can be done by anyone who is knowledgeable and willing to invest time in caring for their trees and shrubs. To assist you with proper pruning techniques, please follow the guidelines set out here.

- Proper equipment is a must! Use a pair of good quality bypass pruners or pruning saw, depending on the size of branch to be removed.
- It is recommended that pruning tools be sterilized in a 1:1 solution of water and bleach or denatured alcohol (gas line antifreeze works well) between each cut. This will minimize the spreading of disease.
- Pruning paint or similar products to seal a wound are not recommended.
- Heavy pruning or removal of large limbs should be done when the plant is dormant, either before the leaf buds swell in spring or after the leaves have dropped in fall.

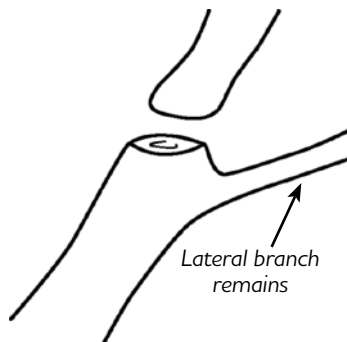


- Some plants like lilacs and fruit trees flower on old wood. Minor pruning on these plants can be done once they have finished flowering. This will ensure they flower the following year.
- Minor pruning on conifers should be done after the buds have broken. The general rule with conifers is to prune the new growth tips in mid-June around Father's Day.
- Any diseased, broken, dead or structurally unsound branches should be removed immediately.
- Remove any competing suckers or stem sprouts as they appear.



When removing a branch, the final cut should be made just outside the branch collar.

Large limbs should be removed using the three cut method to reduce damage to the main stem.

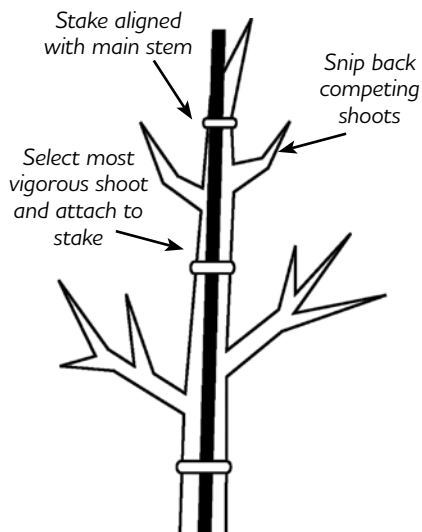


To reduce the length of a branch, the cut should be made at a lateral branch large enough to have apical dominance at least one-third the diameter of the branch from which it is growing.

- How a tree responds to pruning will vary depending on its species and age. Generally, fast growing species and younger trees will respond the quickest.
- Trees should be pruned when young so they can grow into the desired shape.
- Old trees should only be pruned to remove dead, damaged, or diseased branches, or pruned to preserve structural integrity.

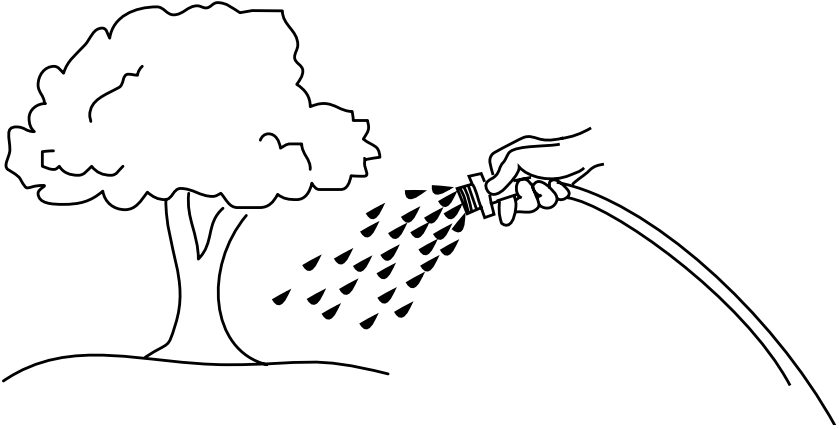
Broken Leaders on Conifers

When establishing a new leader on a conifer, select the largest, most vigorous shoot and attach it to a small stake aligned with the trunk. If there are only two shoots, the smaller one should be removed. If there are more than two shoots, the smaller ones should be clipped back, so they do not compete with the new leader. The support should be removed in the next growing season.



Long-term maintenance

- Water trees regularly for at least two years after planting (some may require three to four years).



- Remove support stakes after the first growing season and if necessary after two years. Protective staking can remain indefinitely but should be checked frequently and adjusted to fit the growing tree.



Internet resources

Manitoba Hydro Landscaping

hydro.mb.ca/safety/landscaping/

City of Winnipeg Urban Forestry Branch

winnipeg.ca

Trees Winnipeg (The Coalition to Save the Elms)

treeswinnipeg.org

International Society of Arboriculture

isa-arbor.com/

Trees Are Good

treesaregood.org

Tree Canada Foundation

treecanada.ca

University of Florida Landscape Plants

hort.ifas.ufl.edu/woody/pruning/

Resources

Brazell, Margaret. 1992. *Growing Trees on the Great Plains*. Fulcrum Publishing, Colorado.

Coalition to Save the Elms, Manitoba Inc. 1995. *Tree Owners Manual: Trees for All*.

Harris, Richard W., James R. Clark and Nelda P. Matheny. 1999. *Arboriculture – Integrated Management of Landscape Trees, Shrubs and Vines*. Third Edition. Prentice Hall, Upper Saddle River, New Jersey.

Miller, Robert W. 1998. *Urban Forestry – Planning and Managing Urban Greenspaces*. Second Edition. Prentice Hall, Upper Saddle River, New Jersey.

Moll, Gary and Stanley Young. 1992. *Growing Greener Cities A Tree Planting Handbook*. Living Planet Press, California.

Pirone, P. P. 1972. *Tree Maintenance*. Fourth Edition. Oxford University Press, New York.

Shigo, Alex L. 1991. *Modern Arboriculture – A Systems Approach to the Care of Trees and Their Associates*. Shigo and Trees Associates, New Hampshire.

Watson, Gary W. and E. B. Himelick. 1997. *Principles and Practice of Planting Trees and Shrubs*. International Society of Arboriculture, United Graphics Inc., Mattoon, Illinois.

Westwood, A. Richard, J.L. Fehr and H. Thompkins. 2001. *CFIR Report to the Manitoba Hydro Forest Enhancement Program – An Evaluation of Selected Tree Planting Projects in Manitoba 1996–1998*. Manitoba Hydro, Winnipeg, Manitoba.



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Available in accessible formats upon request.

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