CropHealth Advising & Research
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To	Date
ISA PRAIRIE CONFERENCE **Moose Jaw, SK**	**Tuesday October 24, 2017** ***10 pages from Mario Lanthier***

NORMAL ROOTS ON TREES

Based on current knowledge, a mature tree that is healthy and stable has fibrous roots growing laterally from a symmetrical root system.

Above left: A good quality root system is growing away from the stem, similar to the spokes on a bicycle wheel. There is genetic variability from plant genus to plant genus.
Right: As the roots grow out, the tree becomes stronger and develops a flare, the wider area at the base of the trunk where the first roots emerge from the trunk.

Above left: Natural graft unions occur between roots and between branches. The graft requires the vascular cambia of the two roots to be in direct contact.
Right: Natural grafting rarely occurs after the bark has formed. A root will not graft with the trunk unless both parts are very young.

IMPACT AFTER PLANTING

Plants with poor root systems are less likely to establish and grow normally after planting. These plants will show stress when the growing conditions are not optimum.


Above left: A pine tree showing decline many years after planting in a landscape.
Right: The tree was excavated and showed extensive circling roots.


Above left: An 8-year old pine plantation in a forest seed orchard.
Right: The dying tree was excavated and showed extensive circling roots.


Above left: An oak tree recently planted has a limited root system.
Right The tree will be unstable in severe wind storms.

CORRECTING FAULTY ROOTS AT PLANTING

Immediately before planting, trees can be visually examined and processed to improve root quality. Root defects should be removed at a point where new roots will grow laterally and away from the trunk. Trees usually do not self-correct defective roots.

Above: Shorten long roots and remove circling roots. Ensure all roots point outwards.

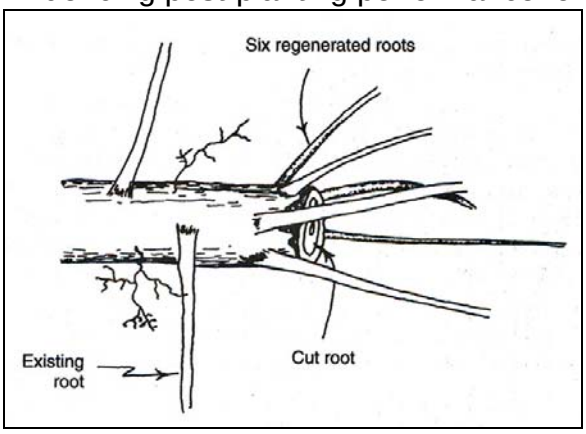
Above: Any hard tool can be used on container grown plants.
If the root system is still fibrous (white colour), roughing the outside layer is sufficient.

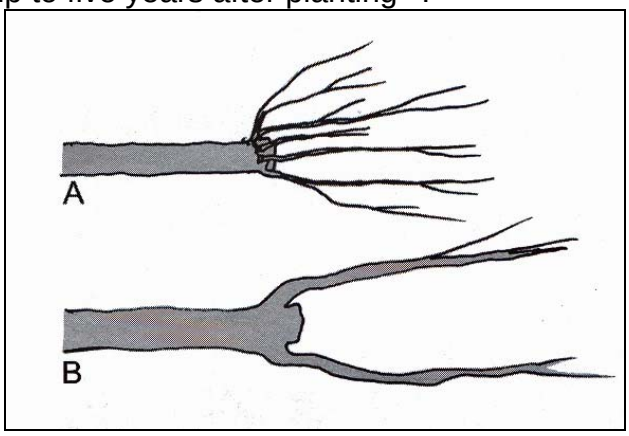
Above: If the roots are woody, roughing is not sufficient to remove circling roots.
Right: Use a pruning saw or a shovel to shave 1 to 2 cm on the outside and bottom.
Adequate water management is critical after this practice to avoid severe wilting.

ROOT DEVELOPMENT AFTER PRUNING

Straight, non-deflected roots result in well-anchored trees when planted into the landscape. Young trees tolerate removing up to 25% of the root system at planting, with few negative symptoms, provided the trees are watered properly [1].

Research with elms and maples concluded that pruning at planting improved the root systems by dramatically reducing the area of trunk circled with roots, without influencing post-planting performance for up to five years after planting [2].





When a root is severed, replacement roots are formed in the callus at the cut surface. Within one to two years, only one or two of the new roots will survive.
Left: From Ed Gilman, Univ of Florida, http://hort.ifas.ufl.edu/woody/root-growth-ends.shtml
Right: From "Up By Roots", James Urban, 2008.

Pruning tree roots ahead of planting has the following consequences:

- Advantages: larger amount of fine roots in the root ball, better survival at transplanting;
- Disadvantage: time consuming, triggers water stress for about 2 weeks.

The following are examples of published research on the topic.

1) Apple trees root pruned had less shoot growth, less new root growth and more water stress when compared to trees without root pruning for the first 15 days after treatment. The differences disappeared afterwards. There was no difference between treatments after 50 days. Poni, Tagliavini et al, 1992, Scientia Horticulturae.

2) Liners of hawthorns and red maples were root pruned before planting in nursery rows. Two years later, there was little effect on top growth whether root pruning had removed 25%, 50% or 75% of the original root ball. Harris, 1998, Journal of Environmental Horticulture.

3) Seedlings of Douglas-fir, Ponderosa pine and Western white pine were chemically root pruned during greenhouse production, then potted and grown for one season. There was no impact on height and calliper but total root number was increased. Wenny and Woollen, 1989, Western Journal of Applied Forestry.

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[1] Watson G.W. 1998. Tree growth after trenching and compensatory crown pruning. J Arboriculture. 24:47-53.
[2] Gilman E.F., M. Paz, C. Harchick. 2015. Nursery planting depth, mulch application , and root pruning at landscape planting affect tree health and anchorage. Arboriculture & Urban Forestry. 41(2):75-87.

ROOT DEFECT: CIRCLING ROOTS


Above: Circling roots are roots that are circling less than 30% of the trunk. Over time, a circling root will become a girdling root (circling over 30% of the trunk).

Circling roots should be cut to a smaller root growing away from the root ball.


Above: Circling roots are common on container-grown plants, where the roots are deflected by the wall and grow in a circular fashion.

Right: The container imprint is visible as a woody root circling around the trunk.


Above: Field grown nursery trees can also have circling roots.

The circling roots indicate the tree was grown in a container before being field planted.

ROOT DEFECT: STEM GIRDLING ROOTS

Stem girdling roots are roots that have the potential to compress the tree trunk (or another root) by circling more than 30% of the circumference. With time, the root is squeezing and compressing the sapwood of the trunk, preventing the flow of nutrients.

Root defects that most negatively impact tree health are those found at a distance within 30 to 60 cm of the trunk.

Above left: Circling roots over 30% of the trunk circumference. Right: Less than 30%.

Below: Girdling roots are sometimes seen on a tree dying a few years after planting. Left: Dead pine in the landscape. Right: Dead pine in a nursery.

FOR MORE INFORMATION

Extensive research was published in the past 30 years on tree roots, management of defects and impact after planting. The reader can visit these 2 sites.

1) Dr. Ed Gilman, University of Florida, website http://hort.ifas.ufl.edu/woody/
Information on root defects is found at http://hort.ifas.ufl.edu/woody/common-root-defects.shtml.
"Cue card" on root management at http://hort.ifas.ufl.edu/woody/documents/Rootcueonesheet.pdf.

2) Dr. Gary Watson, Morton Arboretum, webpage http://www.mortonarb.org/
See http://www.mortonarb.org/science-conservation/CTS/projects/arboriculture-tree-care

ROOT DEFECT: KINKED ROOTS


Kinked roots are tightly compacted or growing across the root ball. They cause damage by restricting growth. It is not always possible to remove this defect.

Kinked roots are considered a major root defect, along with circling roots.

ROOT DEFECT: ASCENDING ROOTS


Ascending roots are deflected and grow upwards, then turn when making contact with the air. They may grow outward or grow towards the trunk, becoming girdling root.

ROOT DEFECT: UNBALANCED ROOTS


An unbalanced root system lacks roots evenly around the root ball.
At full maturity, these trees may be unstable during severe wind storms.

ROOT DEFECT: DESCENDING ROOTS


Descending roots have the majority of roots growing downwards instead of growing horizontally away from the trunk. They will continue to descend after pruning.

Descending roots often start in propagation when using long, narrow containers.

ROOT DEFECT: J ROOTS


J roots grow in one direction. These roots often start at planting time, when the tree is pushed into the soil or pulled in one direction, displacing the roots to one side.

ROOT DEFECT: POT BOUND


Plants kept too long in a container develop a tight root system that may remain for years after planting. Container plants should be repotted at least every 2 years.

PREVENTING ROOT PROBLEMS IN THE LANDSCAPE

Avoid planting too deep

Planting too deep, or piling excess mulch on the surface, encourages adventitious roots (roots growing out from the stem tissue). These can become circling or girdling roots.

Manage circling roots on established trees

Where feasible, prune out any root that may become circling or stem girdling.
Where the root is already large, cut both ends where it is compressing the trunk.

Make space for roots

Planting a tree in a small square in a sidewalk is the same as growing in a container.
The roots will circle inside the box and trigger an early decline of the tree.
Make the tree planter as large as possible. Plant fewer trees but in larger spaces.

PREVENTING ROOT PROBLEMS AT THE NURSERY

Avoid problems during propagation

Many plants start their life in a container, either from a seed, a cutting or tissue culture.
Plants that remain too long in the container will develop circling roots close to the trunk.


Root pruning during production

Many nurseries conduct root pruning, either before planting or during production.
There is an extra cost to the practice but the resulting root system is better quality.


Good practices for container stock

Container-grown trees must be shifted regularly to prevent circling roots.
Some nurseries use containers with air pruning of root tips, which avoids circling roots.
However, these containers also develop circling roots when the trees remain too long.


2017 ISA Prairie Chapter Conference
Prairie Possibilities
October 23rd – October 24th , 2017
Heritage Inn Hotel & Convention Center Moose Jaw SK.

The International Society of Arboriculture (ISA) Prairie Chapter extends an invitation to you to attend the annual Chapter conference "Prairie Possibilities" at the **Heritage Inn Hotel & Convention Center Moose Jaw SK. October 23rd and 24th 2017.**

This major conference provides the opportunity to network with arborists, tree care companies, parks professionals, landscape architects, forest practitioners, tree nurseries/garden centre representatives and municipal parks employees from the three Prairie Provinces.

The conference will include a 20 booth "Trade Show" and "Outdoor Exhibit space" to allow companies and individuals in the arboriculture and tree service industry the opportunity to network and showcase their service and products to the approximately 150 conference delegates.

The two day conference hosts a variety of speakers on topics relevant to the urban forest issues we deal with across the prairies and will feature keynote speaker, **Mario Lanthier** of CropHealth Advising & Research from Kelowna, B.C. we are also featuring a major session that will bring us all up to date on the **10th Edition of the Guide for Plant Appraisal** presented by **Davey's, Dr. Len Burkhart**, who served on the committee to update the publication.

Please find attached an overview of the conference agenda and a registration form. Mail or email the completed form to the

ISA Prairie Chapter c/o Keith Anderson Executive Director

Box 757 North Battleford SK S9A 2Y9, or

e-mail: office@isaprairie.com.

Your support of this conference and major CEU opportunity is appreciated.
For more details contact the Prairie Chapter Office. **1-866-550-7464**

Thank you for supporting and participating in the 2017 ISA Prairie Chapter Conference and Trade Show.

See you in October.

ISA Prairie Chapter
Conference Planning Committee

Prairie Possibilities

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www.heritageinn.net

2017 ISA Prairie Chapter Conference
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Conference Program

Monday				Tuesday	
Time	Stream 1	Stream 2		Stream 1	Stream 2
7:30	Registration and Breakfast			Breakfast	
8:15 - 8:30	Greetings and Welcome			Announcements	
8:30	Mario Lanthier 50 years of Pest Management The past, present and future			Guide for Plant Appraisal 10th Edition Dr. Len Burkart Davey	
10:00					
10:00-10:30	Coffee			Coffee	
10:30 -11:30	Level 3 Tree Risk Assessment Field Demo Dwayne Neustaeter	Tree Protection Dr. Len Burkhart		Dendro Climatology Dr. David Sauchyn	Rebuilding Urban Soil, Anita Schill
11:30 -12:30		Elm Scale Bio Forest Jason Gasparetto		Launching Municipal Monitoring Programs Bioforest	Batgirl Returns Kristen Bondo
12:30 -1:30	Lunch			Lunch	
1:30 -2:30	Insects and Diseases What's new news Saskatchewan Environment			Mario Lanthier Root defects and advances in nursery practices	
2:30 - 3:00					
3:00 - 3:30	Coffee			Coffee	
3:30 - 4:30	Panel Discussion 4 reps - Municipal and Private discuss the future of Arboriculture on the Prairies			Ponderings and Possibilities Arboriculture around the World Dwayne Neustaeter	
4:30 - 5:00				Conference Wrap up - Head Home	