NDSU Extension Service
North Dakota State University

TREE TALK

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Welcome to Tree Talk

By Joe Zeleznik, Forester, NDSU Extension Service

Welcome to the first issue of Tree Talk, a monthly electronic newsletter discussing the growth, development, maintenance and health of trees and forests. There are many professionals in North Dakota who work with trees and forests in some capacity, including Extension Service agents, tree planters and planners, such as local Soil Conservation Districts and NRCS personnel, city foresters and practicing arborists. Currently, there is no common method of providing outreach to this diverse audience. Tree Talk attempts to bridge this gap by:

- Bringing together educators and practitioners in the fields of both arboriculture and forestry
- Presenting up-to-date tree information to professionals who work with trees and forests
- Providing timely reminders regarding insect and disease treatments
- Offering a convenient outlet for disseminating current research results in forestry and arboriculture.

Tree Talk is divided into five sections:

- Lead article (general tree-care or forestry topic)
- Insect of the month
- Disease of the month
- Tree species of the month
- "Small talk" (short communications on specific, timely topics)

The lead article may occasionally be switched from the general tree care topic to a timely discussion of additional insect or disease problems. Tree Talk is coordinated by the NDSU Extension Service forester. One of the goals of this newsletter is to provide greater visibility to the various forestry and tree care experts found throughout the state. Articles will come from a diverse group, such as NDSU researchers, N.D. Forest Service foresters, county Extension agents, city foresters and others.

We hope you find the information provided in Tree Talk interesting, useful and fun.

"Out of the shadows of legend
I begin a little to understand
the marvel of trees."
- J.R.R. Tolkien in The Two Towers

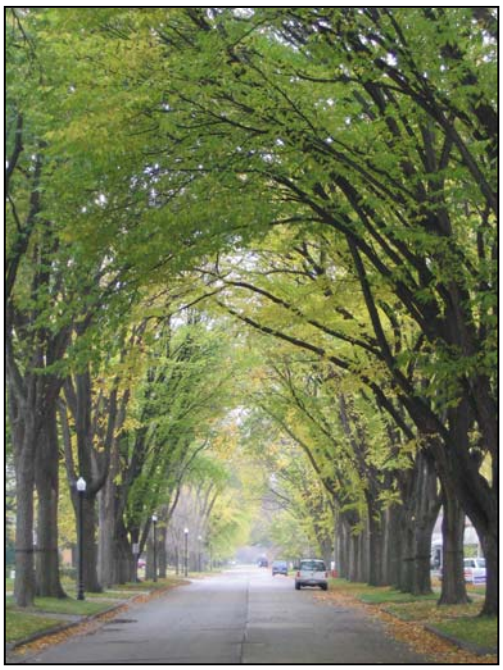
Planting for Success:

Problems, Pitfalls and Proper Procedures

By Scott Liudahl, Fargo City Forester

Think of the tree you just purchased as a lifetime investment. How well a tree and investment grows depends on the type, location, proper planting and follow-up care.

More than 80 percent of the inspection calls to our office that are related to tree decline, especially in the newer parts of town, can be attributed to mower/weed whip damage or a tree planted too deep. The first one is easy to fix if it's not too late. Either stop the damage or start over. The second one can be easily avoided at planting time. **When dealing with compacted clay and poorly or slowly drained soils, the proper planting depth is CRITICAL**.



The ideal time to plant trees is in the fall after leafdrop or early spring before bud-break. Weather conditions are cool, which allows plants to establish roots in their new location before spring rains and summer heat stimulate new top growth. Trees that are properly cared for in the nursery or garden center and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In either situation, proper handling during planting is essential to ensure a healthy future. *Before planting a tree, be sure you have had all underground utilities located prior to digging. Call ND One Call at* ***(800) 795-0555.***

Whether the tree to be planted is balled and burlapped (B & B), containerized or bare-rooted, it is important to understand that the tree's root system may have been reduced by 90 to 95% of its original size during transplanting. As a result of the trauma caused by the digging process, trees will commonly exhibit transplant shock. Transplant shock is indicated by slow growth and reduced vigor following transplanting. A rough estimate is that for each inch of ground-line caliper (diameter), a tree will experience one year of transplant shock as it becomes acclimated to the new site. Proper site preparation before and during planting, coupled with good follow-up care will reduce the amount of time the plant experiences transplant shock and will allow the tree to quickly establish itself. As the saying goes, "It's better to put a $100 tree in a $200 hole than to put a $200 tree in a $100 hole."

Our survival success rate over the last four-plus years is at 95 percent or better on new tree planting projects. A large majority are bare root trees. Bare root trees are the most cost effective, but can also be a huge problem if not handled or planted properly. LEARN TO PROPERLY PLANT BARE ROOT TREES. Many of our containerized and B&B plantings are in newer areas of the city where the soils and conditions are challenging. When excavated (in the name of science of course), the root systems -- after two growing seasons -- had spread 18 to 24 inches beyond the original planting hole. Wow! And the initial hole was only eight inches deep!

Follow these simple steps to help ensure a successful tree planting:

1) **Dig a wide, shallow hole.** The diameter of the hole needs to be at least three times the diameter of the root ball. The sides of the hole should be loosened and roughed up to allow for root penetration. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil, hastening establishment.

2) **Don't plant too deep.** The first major root should be even with, or slightly above, the existing grade outside of the planting hole. This point is called the root flare where the top of one tree was

grafted onto the rootstock of another. There will be a swelling near the base of the tree. This is called the graft union. DO NOT mistake this for the root flare. Keep looking. For B & B or containerized trees, the first main root is often buried under several inches of soil in the container or root ball. Gently pull the soil away from the top of the ball until you find this root. A chaining pin, ice pick, or coat hanger can be used to probe a bit to help locate this root. Make sure the ball rests on a firm base to avoid settling. Call me crazy, but the hole may end up being only 6 inches deep. However, it still should be 60 inches wide.

3) **Completely remove all containers and cut circling roots.** Remove all baskets and containers. Make cuts along the side and bottom of the container to easily slide the tree out of the container once it is in the hole. Cut the bottom rung of the wire basket off BEFORE putting the tree in the hole and then remove the rest after it is in the final location. Peel back and cut out as much of the burlap as possible and remove all twine/string. A recent article by Bonnie Appleton and Scharlene Floyd (Journal of Arboriculture, July 2004) indicated that the flare roots may grow into the wire and cause partial girdling and restricted vascular flow. In some cases, the wire showed little signs of any deterioration over time. I have seen fully intact wire baskets after being in the ground for 20 years. It is not a pretty sight. There also is a common misperception that the burlap will quickly break down. Experience shows that burlap can remain in the ground for years without decomposing. If the ball is dry or crumbles when the basket or burlap is removed, reject that tree. Start over with a quality tree.

It is especially important to make vertical cuts several inches into the ball to cut circling roots on containerized trees. Learn to properly plant bare root trees to spot early problems. Girdling and circling roots kill trees. Be aggressive with this step since this is the best opportunity to deal with girdling roots and preventing future problems. Stem girdling roots have been a main focus of Dr. Gary Johnson at the University of Minnesota. In one study, he noted that 73 percent of linden species failed completely in storms. They broke where the stem girdling roots had compressed the stem. For more information about stem-girdling roots, see the University of Minnesota Extension publication, "A practitioner's guide to stem girdling roots of trees."

4) **Loosen and break up existing soils for backfill when possible.** Don't be so easy on the tree that it gets really comfortable with its small planting hole. Tree roots will do better in the long run if they can be encouraged to get used to their new home and not some cushy, feel good, multi-soil type, full-of-fluff site. A research brief by Dr. Ed Gilman (Journal of Arboriculture, September 2004) indicates that there is no apparent benefit to adding amendments at planting time. He tested several amendments in that study, including two water-absorbing gels and several organic preparations, including compost. Too many amendments – compost, peat moss, etc. – leaves the potential for a future problem. Water the soil to allow for natural settling, then continue to backfill.

5) **Mulch.** Mulch has many benefits. Add 2 to 3 inches of woodchip mulch over the entire planting

area. Continue to replenish the mulch and make the area wider as the tree matures. Avoid direct contact between the mulch and the base of the tree. Mulch will help keep that nasty lawnmower and weed whip away. Other benefits include keeping the soil cool and moist and adding more organic matter to the soil over time. Caution – too much mulch may cause moisture and oxygen problems.

6) **Water.** A new tree likely will require a slow, thorough soaking once a week, by hose or Mother Nature. One inch per week is typical. According to John Ball, professor of forestry and horticulture at South Dakota State University, an inch caliper tree can use up to 3 gallons of water per day. A 2-inch tree uses 6 gallons. Don't over water. This could easily happen if drainage is poor or the mulch is too thick.

7) **Stake loosely** with a strap or two if necessary. The tree needs to move around a bit to stimulate root growth and develop proper taper. The taper and the roots together provide windfirmness to the tree. The stem should be gently cradled, not strangled, about 2 to 3 feet above the ground. Although a variety of products can be used for staking, never place wire directly against the tree trunk. Some professionals have even questioned the use of a piece of wire placed through a length of garden hose as a staking material. A properly planted tree only needs to be staked for one season (maybe two).

8) **Pruning and fertilizing.** Don't do them yet – maybe later in life. Pruning removes leaves that create sugars during photosynthesis. These sugars are critical to proper growth and recovery during the first few years after planting. Wait at least two years before beginning to prune. Small, structural pruning in the first five to 10 years of life will help a tree develop into a strong specimen. Fertilizing – remember when I stated earlier not to make the tree TOO happy in its new home? Enough said about this.

(M)id (W)est (W)inter (S)urvival --
MULCH, WATER, WIDE, SHALLOW
After completing these simple steps, further routine care and favorable weather conditions will help ensure that a new tree will grow and thrive.

Trees are a valuable asset to any landscape. Trees provide a long-lasting source of beauty and enjoyment for people of all ages. When questions arise about the care of your tree, be sure to consult your local ISA Certified Arborist, tree care or garden center professional for assistance.

References:
Bonnie Appleton and Scharlene Floyd. Journal of Arboriculture, Volume 30: Number 4, July 2004. Wire Baskets: Current Products and Their Handling at Planting

Ed Gilman. Journal of Arboriculture, Volume 30: Number 5, September 2004. Effects of Amendments, Soil Additives, and Irrigation on Tree Survival and Growth

Gary Johnson, Jim Hermann, Ken Holman and Don Mueller. MN Shade Tree Advocate, Vol. 2, No. 1, Winter 1999. Storms over Minnesota: Seven months of severe weather and catastrophic tree damage.

International Society of Arboriculture, www.treesaregood.org, New Tree Planting

Elm Bark Beetles

By Justin Knott, N.D. Department of Agriculture

There are two species of bark beetles known in North Dakota that feed on elm trees, the native elm bark beetle, *Hylurgopinus rufipes,* and the European elm bark beetle, *Scolytus multistriatus*. These beetles cause little direct damage to healthy trees, but are able to spread the fungus that causes Dutch Elm Disease (DED). Bark beetles are small brown beetles approximately 1/10 to 1/8 inch long. The larvae are small white grubs that feed under the bark.

Native elm bark beetle, *Hylurgopinus rufipes*

Native elm bark beetles are the most important vectors of DED in North Dakota.

Photo source: Gerald Fauske, North Dakota State University

Larvae and adults overwinter in the bark of elm trees, with the adults staying in tunnels near the base of elm trees. Adults emerge in May and fly to healthy trees were they feed in the bark of small branches and stems. Later, the adults fly to suitable breeding sites, such as dead and dying trees, broken limbs or cut logs that are at least 2 inches in diameter. Female beetles excavate a tunnel for laying eggs (egg gallery) perpendicular to the wood grain; the larval galleries run with the wood grain.

Photo source: John A. Williams, USDA Forest Service, www.forestryimages.org

Because these beetles prefer larger limbs, a large portion of the tree crown may become infected with DED very quickly.

European elm bark beetle, *Scolytus multistriatus*

European elm bark beetles play a smaller role in transmitting the DED fungus in North Dakota.

Photo source: Gerald J. Lenhard, www.forestryimages.org

This is likely caused by cold North Dakota winters which limit beetle populations. Larvae overwinter under the bark of the elm trees. Pupation occurs in the spring, adults emerge and move on to healthy trees, where they feed in the crotches of twigs. Beetles then move on to seek breeding sites in dead, dying or injured elm trees or elm firewood. Eggs galleries are constructed parallel to the wood grain.

Photo source: Beat Forster, Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), www.forestryimages.org

After hatching, larvae feed, develop, and create tunnels at right angles to the egg gallery.

Banded elm bark beetle, *Scolytus schevyrewi*

Affectionately referred to as the two-toned Chevy beetle, this non-native beetle was first identified in Colorado in 2001, though specimens have since been identified that were collected in 1994.

Photo source: Jose Negron, USDA Forest Service

The beetle has not been observed in North Dakota, but it has been found in Montana, South Dakota and Minnesota, as well as states on both coasts. The life history of this insect is thought to be similar to that of the European elm bark beetle. The larval galleries meander more than the other two elm bark beetle species.

Photo source: Jose Negron, USDA Forest Service

Laboratory studies in Colorado have show that this new species picks up and carries spores of the DED fungus. It is still unknown if this beetle currently is, or will become, an important vector of DED in North Dakota. Information on the natural geographic range of *S. schevyrewi* suggests that it tolerates cold winters much better than does *S. multistriatus*. We may see more serious outbreaks of DED here in the north should *S. schevyrewi* become established. Also, it appears that banded elm bark beetles are highly attracted to stressed elm trees, even more than European elm bark beetles.

Bark beetles as vectors of Dutch elm disease

When DED fungus is present in the breeding sites of elm bark beetles, the sticky spores which are produced adhere to adult beetles. Adult beetles moving to healthy trees may deposit spores. Inoculation can occur if the spores settle on vascular tissues. Infections caused by native elm bark beetles feeding on healthy trees initially express symptoms on branches 2 to 6 inches in diameter in the upper crown. If the pathogen is vectored into the tree by European elm bark beetles, symptoms will initially occur on smaller branches high in the crown. If infections caused by European elm bark beetles are caught early enough, pruning and fungicide injections may save the tree.

Management

The most effective method of controlling elm bark beetles is sanitation. Eliminate habitat suitable for beetle development, especially trees with DED. Allowing a tree with DED to remain standing provides a source for bark beetles armed with spores of the DED fungus. It is suspected that BEBB may be attracted to trees that are only beginning to be stressed by the disease, instead

of those that are clearly dying. If it is found that this species is a vector of DED, prompt removal of infected trees will become even more critical. Keep in mind that logs that are cut down and piled for firewood will still harbor beetles. When temperatures are above freezing, wood should be stripped of bark or immediately burned.

Dutch Elm Disease – Ever-present and back in full force …

By Joe Zeleznik

Dutch Elm Disease (DED) was found in North Dakota in 1969 in Mandan. From there it spread and now is found in rural and urban areas in most parts of the state. Most communities fight DED and minimize its effects by sanitation – prompt removal of infected trees. Without sanitation, cities can lose up to 20 percent of their elm trees in one year – and more than 90 percent within 10 years. Cities with active sanitation programs generally report elm losses of less than 2 percent per year.

Many cities across North Dakota report that the removal of DED-infected elm trees increased in 2004. Several cities in Minnesota have also reported major increases in DED. There are many reasons why this has occurred, including inadequate levels of sanitation, more stressed trees due to summer drought, higher beetle populations because of mild winters and a lack of disposal of infected wood.

Biology of the disease

There actually are two different species of fungus that cause DED, *Ophiostoma ulmi* (formerly *Ceratocystis ulmi*) and *O. novo-ulmi*. The *O. novo-ulmi* appears to be the more aggressive strain. Trees that are resistant to *O. ulmi* may not be resistant to *O. novo-ulmi*. American elm cultivars that are resistant to DED will be featured in a future edition of Tree Talk. Also, see the New York Times article from April 7, 2005 regarding the loss of the original 'Princeton' elm. Both fungi are similar enough in their growth and development that they are managed in the same way. DED fungi enter elm trees by being vectored in by bark beetles that are feeding in the tree or through root grafts, one tree to the next.

There are two known insect vectors for DED fungi, the native elm bark beetle (*Hylurgopinus rufipes*) and the European elm bark beetle (*Scolytus multistriatus*). These beetles carry spores from the DED fungi from infected trees or firewood and transfer them into uninfected trees during feeding. European elm bark beetles tend to feed in the crotches of small twigs, high up in the crown. Native elm bark beetles feed in larger branches (2-4" diameter) further down. A third insect, the banded elm bark beetle (BEBB, *S. schevyrewi*), feeds in elm trees in a manner similar to the other two beetles. Collaborative work by the U.S. Forest Service, Colorado State University and Iowa State University showed that BEBB is also capable of carrying spores from *O. novo-ulmi*. It is still unclear if the feeding habits of BEBB will allow it to vector the fungus into elm trees. Banded elm bark beetles have not been found in North Dakota. See the article "Elm Bark Beetles" (page 6) for more information about the biology and management of elm bark beetles.

Spores that are vectored into the trees germinate and the fungus then moves both upward and down through the xylem vessels. This movement is by active growth of fungal hyphae within the vessels and by passive spread of spores. Vessels are the major water conducting elements of the tree. Fungal growth blocks the vessels and the leaves and branches above the point of infection die back. In a sense, this dieback can be thought of as an intense, localized drought. Other internal symptoms include the death of xylem parenchyma cells and browning of infected sapwood vessels, following the grain in narrow streaks (Figure 1). How quickly the fungus grows depends on the diameter of the xylem vessels (larger vessels = faster growth rate). American elm is more susceptible than other elm species to DED because of its larger diameter vessels. Depending on the vessel diameter of an individual tree, it may take one to three years for the disease to spread from the initial point of infection down into the roots of the tree.

Figure 1. Brown streaks in the sapwood of a DED-infected American elm. Note that DED has only spread slightly into the smaller branch on top.

Once the fungus reaches the roots, it will spread very quickly because the vessels are even larger in diameter in the roots than in the stems. Where roots of the same species grow together, it is possible for root grafts to form, allowing the trees to share water, carbohydrates, nutrients and even some diseases. The DED fungus quickly spreads through root grafts and can move from one tree to the next, quickly destroying a whole line of mature trees.

Several other diseases also cause dying leaves and general dieback. These include Verticillium wilt, Botryodiplodia canker and wetwood. Verticillium wilt can result in sapwood streaking, but this fungus only grows upward in a tree, not downward. There is no control for Verticillium wilt. Botryodiplodia canker causes the leaves on affected limbs to turn bright yellow in mid-to-late summer and shed prematurely. Botryodiplodia canker affects Siberian elms more than it does American elms. Wetwood is a disease caused by bacteria and is associated with "slime flux" that may be present. In severe cases, this disease may cause branches to die back. Laboratory isolation and testing is needed to confirm that DED has caused the tree to decline or die.

Management

Given DED biology and dispersal methods, there are three approaches to minimizing its spread: (1) destroy beetles indirectly through habitat elimination or directly with insecticides; (2) eliminate root grafts; (3) use fungicidal injections preventatively, before trees are infected. All three approaches have been used, but the key to long-term success is habitat elimination.

Sanitation – prompt removal of infected elm trees – is the most important part of any DED management program. Without it, dead and dying elms continue to provide habitat to the bark beetles and the fungus still can travel through root grafts. Many towns and cities have ordinances requiring the prompt removal of infected elm trees. These ordinances only are as good as their enforcement. Allowing some infected trees to remain will continue the cycle of the disease. What is considered "prompt" removal varies from place to place. In Fargo and Bismarck for example, trees must be removed within 10 days of initial homeowner notice. The city of Grand Forks, using a local contractor to remove DED-infected elms, requires trees to be removed within 15 days of initial contractor notice.

Trees that are cut during the growing season must be burned, debarked or chipped immediately. Burning is the only method that will immediately kill the fungus; it can remain viable in debarked or chipped wood for a while. All three methods destroy beetle habitat and DED apparently does not pass from infected chips or de-barked logs without the beetle vector. Trees that are cut during the winter don't need these treatments immediately, but must be treated by winter's end. Most cities with DED ordinances have restrictions on keeping elm firewood – with the bark still on – past a certain date (around March 1). Elm firewood provides overwintering habitat for beetles and the fungus also can remain alive beneath the bark. American elm firewood can be identified by the alternating brown and white layers within the bark and sometimes by its thin layer of light-colored sapwood surrounding many years of darker-colored heartwood (Figure 2).

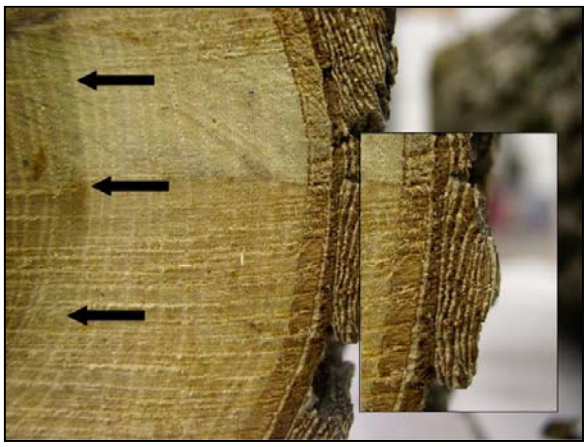


Figure 2. Elm firewood with dark heartwood (arrows, left) and brown-and-white layered bark (inset). Although this tree was removed because it was infected with DED, the disease had not yet spread into this section of the stem, and it doesn't have the brown streaking in the sapwood.

Adult native elm bark beetles overwinter in the thick bark at the base of large trees. Some municipalities have used insecticide sprays to help control the beetles during the late summer and fall or even early spring. Permethrin (Astro and others) can be used for this purpose. Chlorpyrifos (Dursban and others) was available, but this insecticide is no longer approved for use in the U.S. Because beetles can move long distances, insecticide sprays on individual trees only provides limited protection against the spread of DED. As stated above, sanitation is the most important part of an effective DED management program.

The longer an infected tree is allowed to remain standing, the more likely it is that the DED fungus will get into the roots and spread through root grafts. That's another reason why prompt removal of infected trees is so important. Where trees remain in place longer, root grafts must be broken to ensure that DED does not spread from one tree to another. Mechanical disruption of root grafts is often done by digging a trench between infected and healthy trees, using a ditch digger or a vibrating plow. Because most roots are near the surface, trenching to a depth of 24 to 30 inches usually is sufficient to disrupt most root grafts. Trenching to 48 inches may be necessary if the roots extend deeper into the soil. **At all times, extreme caution must be observed to not contact buried power cables or gas lines. Anyone digging in North Dakota must call ND One Call at (800) 795-0555 before digging.** For more information on ND One Call, go to www.ndonecall.com.

Certain fungicides can provide protection against DED. Thiabendazole (Arbotect) and propiconazole (Alamo and others) have been used successfully as treatments for the prevention of DED. These fungicides must be injected into the trees. The work is usually done by trained professional arborists. The chemicals are injected into the flare roots around the entire tree and are taken up through the xylem stream, spreading throughout the crown. These fungicides remain active in the tree for up to three years. Continued injection may cause a large number of wounds in the tree. While otherwise healthy trees can withstand this treatment, stressed trees may not and the injections could cause more harm than good. Use injections sparingly.

In certain situations, the spread of the fungus within an infected tree may be stopped by fungicidal injections. This usually happens when the initial infection occurred from the European elm bark beetle (higher in the crown) and the infection is detected immediately, when less than 5 percent of the crown has died back. When these conditions are met, the branches should be immediately pruned back at least 10 feet lower than where the symptoms occur. The trees then can be injected with an appropriate fungicide. Because most DED infections in North Dakota are caused by the native elm bark beetles, much more than 5 percent of the crown has died back by the time symptoms are first noticed. Therefore, therapeutic injection of elms in North Dakota is unlikely to be successful and is not recommended.

Conclusion

Although Dutch Elm Disease is found throughout North Dakota and can have devastating consequences on a city's population of elm trees, the disease is manageable and its effects can be minimized. The most effective control programs require a commitment from all citizens. Prompt sanitation of infected trees is needed. Without this dedication, DED will spread more quickly and a

community will lose a highly valuable resource long before it should.

Dutch Elm Disease in Steele

By Craig Kleven
NDSU Extension Service (Kidder County)
and member of the Steele Tree Committee

Dutch Elm Disease (DED) has plagued many cities and towns over the years causing devastation to the communities in terms of tree loss, financial burdens, and an increase in volunteer hours and educational programming.

DED in Steele and the county is not new, but the last few years the problem magnified to a level where property owners were becoming concerned about the number of elm trees that were dying. There was an increase in larger, older trees dying. A majority of the trees were not removed, which enhanced the spread of the disease. After several concerned residents went to the Steele city council, the council decided to form the Steele Tree Committee in the spring of 2004 to address the issue since it had grown to such a large scale. At the time of tree committee development, Steele already had a city ordinance on DED. The ordinance contained a tree committee provision, but there was not a person or group serving in this capacity to address the problem of DED and take hold of implementing corrective and preventive measures. The ordinance requires property owners to remove and pay for removal of DED trees and requires property owners to remove and dispose of DED trees within five days of a confirmed laboratory analysis. However, the ordinance was not being carried out and enforced.

With the recent outbreak, the committee had a large task at hand. A lady that recently had moved back to the community took the lead role on the committee. She was working on grants offered through the North Dakota Forest Service for Steele to replace trees that were lost from wind storms in the late 1990s and replace trees on the main boulevard before its 125th celebration in 2006. The effort was made much easier with a central person to lead the effort. After the grant was approved, the committee began meeting in the spring of 2004 to work on finalizing the trees to be planted. In addition to the grants, the committee focused on the DED epidemic. The major concentrations of DED trees in Steele were located in the two oldest sections of town, which also contained the most elm trees. However, DED was present throughout the town. The largest number of trees beginning to wilt and die came during the summer of 2004. The increase was due to the passage of DED through tree roots and is believed to have originated from elm trees that had been taken down in rural areas and piled for several years before being destroyed, creating a possible habitat for the elm bark beetle. This is a theory and was not proven to be the leading cause.

In late 2002 and 2003, symptoms of DED started showing up in Steele. Some trees were immediately removed but some were not. Some were assumed not to have DED because it was thought the trees had fewer leaves because of the cool springs and dry summers. Property owners did not want to remove the large trees because of cost and simply did not want to deal with the removal of a favorite tree. The city ordinance should have been enforced right away to have the trees removed. This would have slowed down or prevented the spread of the disease and save money. Unfortunately, this did not occur in 2002 or 2003. Another major factor to the spread of DED was that many people don't understand the devastation of the disease or how it spreads. Lessons well learned by all parties involved.

In the fall of 2004, the Steele city council told the Tree Committee to make a large effort to remove the trees and they would be supportive of the plan to carry out this mission. The committee marked more than 100 DED infected and hazardous trees on private and city property on Sept. 24, 2004. The marking consumed an entire day. A map of the city was used to record the marked trees so that letters could be sent to property owners letting them know they had trees to be removed and the steps that would follow. The DED and hazardous trees were identified with a spray painted red X.

Since the number of trees to be removed was large and included some very large trees, the committee solicited bids from five tree service companies to remove all the marked trees by Nov. 30, 2004. This was done to speed up the removal process because the infestation had grown to such a large magnitude and also to hopefully reduce the costs to the property owners if one tree service company could set up shop in Steele for a couple of weeks. This ensured that the trees would be removed and made it easier to monitor the removal process. Property owners had the opportunity to take the trees down or hire a different company. The process was very time consuming because several letters and post cards were sent to property owners to officially identify the trees the company would be responsible to remove. However, it was beneficial to ensure the effort was a successful. All stumps were ground or removed and the trees were placed in the city's tree dumping grounds to be burned during the winter by city maintenance employees.

The process went fairly well. There were people that were upset that the city was requiring private property homeowners to remove trees, but attitudes changed after they learned about how harmful DED was to the remaining elm trees. The financial burden for some was a real issue, as the bids for the city ranged from more than $15,000 (a local tree service) to more than $25,000 (a tree service over 50 miles away). The local tree service company was chosen. The local credit union and bank offered a one-year interest-free loan for people removing their trees as part of the city-wide effort. People could spread the cost of the tree removal over 12 months, which helped reduce the immediate burden. The community-wide effort was key to the success of the project.

There still are elm trees left in Steele. During the summer of 2005, the tree committee will take an aggressive approach to marking DED trees and enforcing the ordinance to slow the spread. The committee plans to mark the initial round of trees by June 1. The remaining elm trees appear to be in good shape, but time will tell. As mentioned earlier, new trees are being planted throughout the town as an effort to replace trees lost in a wind storm, which destroyed many trees during the late 1990s. More than 200 10-foot-tall trees will be planted in the spring of 2005 to replace the trees lost from the wind storms on the main boulevard. Trees also will be planted around the high school baseball diamond. Some of the tree species that will be planted include pine, evergreens, ash, linden, lilac and oak.

The spread of DED is controllable in small towns, if the city council and community leaders have a vested interest in supporting the cause. Most small towns have a city ordinance on DED, which just needs someone to take hold of and educate the community about DED and its harmful effects.

Quercus macrocarpa

Bur Oak: A Rugged, Neglected Tree for the Northern Plains

By Dale E. Herman

Although exceedingly winter hardy (Zone 2) and adaptable, native in at least 29 states and five Canadian provinces and the longest-lived tree species in the Northern Plains, Bur Oak (*Quercus macrocarpa)* is a vastly underused tree. It is the only oak species native in North and South Dakota, although three species come close to the eastern borders, including Swamp White Oak (*Q. bicolor*), Northern Red Oak (*Q. rubra*) and particularly, Northern Pin Oak (*Q. ellipsoidalis*).

The largest bur oak in North Dakota are 11½ to more than 12 feet in trunk circumference, over 85 feet tall and more than 60 feet in branch spread. It adapts well to many soil types, thriving in calcareous, well-drained, almost droughty soil. However, ultimate tree size varies markedly with site conditions. For example, in extremely dry, hilly sites, as opposed to moist bottomlands, it grows very slowly and may never produce a medium to large tree. Under such conditions, it sometimes has been called "scrub oak." Few trees have been bored for annual ring counts, but the very oldest are

apparently between 450 – to 500-plus years of age in the Dakotas.

Although bur oak is native across North Dakota, it is particularly evident in such areas as the Pembina River Hills, Sully's Hill National Game Preserve south of Devils Lake, the Killdeer Mountains, the Cross Ranch Nature Preserve in Oliver County, the Sheyenne National Grasslands in Richland and Ransom Counties and in the Turtle Mountain State Forest.

Bur oak is noted for its bold, massive, rugged branching structure, particularly noticeable in the winter.

Trees increasingly become more stately and picturesque with age. The grey-brown bark gradually becomes rather deeply ridged and furrowed. Twigs and branches on some trees, but not all, develop distinctly dare, corky ridges, which adds to its rustic qualities in winter. The alternate leaves are leathery, smooth, dark green and semi-glossy above, but covered with grayish-white soft hairs beneath. Leaves usually have five to nine pairs of rounded lobes.

Several of the lobes just past the mid-point of the four to 10 inch long leaves are much enlarged and irregular in shape. Several lower leaf sinuses cut deeply toward the midrib. The deciduous leaves slowly turn from yellow to rustic brown in the fall. Leaf drop occurs gradually for three to four weeks, rather than quickly, as occurs with some tree species.

The staminate (male) flowers are borne in slender, hanging, yellow-green catkins and the pistillate (female) flowers in separate reddish hairy catkins. These flowers are produced on current year's growth in mid-to-late May as the leaves are unfolding. The ¾ to 1½ inch fruits mature in one growing season, with the acorn covered one-half to three-fourths of its length by a coarsely-fringed cup, which accounts for the name "mossycup oak" that often appears in references.

As a young tree, bur oak grows somewhat pyramidal to variably oval in shape, becoming rounded to informally spreading with age. Its longevity, large size and impressive stature make it a valuable shade, park or even specimen tree, where space permits. It is not usually recommended for planting on typical narrow boulevards due to its spreading branches and acorn drop on roads and sidewalks. It is well-adapted for use in natural landscape settings.

Bur oak suffers a reputation of being tap-rooted, difficult to transplant and slow growing, which deters people from planting it. Yes, it is tap-rooted but field nursery techniques of root-pruning and use of open-bottomed containers to induce air pruning

on benches can solve much of this problem. Bare-root trees should be spring planted. Plants dug and containerized for four to 12 months are not difficult to transplant. If held longer in containers, attention to possible circling roots must be recognized and corrected upon transplanting. If proper attention is given to ball size, moving larger caliper bur oak with mechanical tree spades is highly successful. Growth rate of newly-transplanted bur oak is admittedly slow for three to five years, but once established, growth accelerates. In North Dakota State University trials, the 10-year growth rate of established bur oak trees surpassed the growth rates of such trees as red maple, sugar maple, Kentucky coffeetree, amur corktree, Ohio buckeye, American hop-hornbeam (ironwood), junipers and hawthorns. The growth rate nearly paralleled those of certain species of ash, pine, spruce and linden. Trees in this trial were not fertilized or watered and grew in competition with sod. Mulching newly transplanted trees is strongly advised and tends to enhance establishment and growth rates. However, bur oak competes well with grass for nutrients and water, and also is adaptive to stressful urban conditions.

Bur oak is seed propagated, a low maintenance tree and requires little care or pruning once established. Due to the difficulty of vegetative propagation, there are virtually no cultivars available in the nursery trade, even though selections with superior landscape traits have been noted.

Bur oak is host to several insect-induced galls, but these are normally of little threat to the survival, vigor or health of the tree. In the 1990s, damage due to localized outbreaks of the two-lined chestnut borer (*Agrilus bilineatus*) caused some concern in North Dakota. Injury from this insect possibly intensifies following several years of drought stress. Bur oak is quite resistant to the oak wilt fungus (*Ceratocystis fagacearum*) and no problem has been found in North Dakota.

Bur oak has not been used extensively in field shelterbelts and farmstead windbreaks. This is largely due to questionable transplant success and slow rate of growth. Deer browsing also is a problem on young transplants.

Bur oak wood is used for dimension lumber, veneer, firewood and fence posts. Native Americans used the acorns for food after leaching away tannins and astringent properties, and medicinally, to treat dysentery and as an antiseptic and astringent.

Bur oak is a favorite wildlife species. Warblers and blue jays search its bark and branches for insects. In the winter, chickadees and nuthatches visit it regularly. Other birds nest in its branches. Its acorns are a favorite food for a variety of wildlife, such as deer, turkeys, wood ducks and all species of squirrels.

In the Dakotas, it is often said that "poplars typify the Northern Plains." This is basically true, and the cottonwood (*Populus deltoides*) is our largest tree. However, maybe we should change our future goal orientation, "Bur oak will also typify the Northern Plains." Although this species has some propagation, transplant and growth challenges to overcome, it has an enviable record of adaptability, rugged strength, ease of maintenance and longevity with which few other trees can compete. If we honestly look ahead to future generations, the bur oak must be recognized as the true patriarch of Northern Plains trees. Many bur oak trees can be planted in the Northern Plains before we need to worry about monoculture considerations.

Small Talk – April 2005

Frost damage

Spring came early this year, with warm temperatures coming to many parts of the state in early April. However, by the middle and end of the month, temperatures returned to near normal. This includes some nights with lows in the mid-20s. With many trees already having expanding leaves and shoots, some frost damage occured.

Frost damage can kill entire leaves and flowers or only parts of each. Dead tissue will turn brown or black. If the entire leaf or flower is dead, it will fall off. If part of the leaf is dead, then just the leaf margin will turn brown/black or the leaf may end up with a crinkled margin. Sometimes, whole shoots

are damaged by freezing temperatures and may turn black and die back. Frost damage does not normally kill trees, although it can destroy a fruit crop if it kills the blossoms. I have heard some people say that the cold temperatures we received in late April may have ruined the apple crop this year. Time will tell for sure.
-*JDZ*

Arbor Day

Arbor Day was originally established in 1872 by Nebraska newspaperman J. Sterling Morton as a celebration of tree planting. Morton was a pioneer originally from Detroit, and he missed his trees. It was estimated that more than one million trees were planted in Nebraska on the first Arbor Day.
Since then, Arbor Day has been celebrated in all fifty states and in many countries around the world. The actual date of the celebration varies from state to state, as the best time for tree planting varies. In North Dakota, Arbor Day is officially celebrated during the first Friday in May, although many communities celebrate at different times throughout the month. Celebrate Arbor Day by planting a tree. If properly planted, it will provide years of shade, protection and beauty and will be a lasting reminder for future generations.
-*JDZ*