Compensatory Pruning: To Prune or Not to Prune at Planting

By Richard Hauer, Ph.D., Assistant Professor of Urban Forestry at the University of Wisconsin – Stevens Point.

Should tree canopies be pruned at planting? Thirty years ago you would have likely heard yes. Now you will likely get a mix of yes and no responses. Conventional wisdom says tree canopies should be pruned at planting to compensate for root loss. Tree root systems are reduced in size to facilitate transplanting bare root, balled and burlaped, and tree spade-moved trees, altering the natural root to crown balance. Removing branches at planting to compensate for root loss just seemed logical.

Compensatory pruning is the removal of branches to offset the loss of roots during any period of the tree’s life. Reestablishing the natural balance of root to crown conventionally meant removing one-third of the canopy. It was thought that transplant survival should increase, canopy dieback should decrease and trees would be healthier because of compensatory pruning. As reasonable as this practice seemed, a scientific base to support it never existed. In fact, a mounting body of evidence over the last twenty years finds that compensatory pruning does not benefit newly transplanted trees.

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To understand why compensatory pruning is not beneficial, let’s travel back over 20 years to a tree nursery in Oklahoma. A research team lead by Dr. Carl Whitcomb was conducting a weed control study. As part of the research plan, tree canopies were pruned back at transplanting – since this was the standard practice any respectable arborist and horticulturist would do. However, Mother Nature intervened! A rainy spring season prevented compensatory pruning in 40% of the trees. By the time the nursery fields dried and workers could resume work, the trees had started their spring flush of growth. It was decided not to prune the remaining unpruned trees. During the first growing season a fortuitous finding occurred: pruned trees grew slower and had greater mortality. This certainly flew in the face of conventional wisdom that trees pruned to compensate for root loss should do better. Perhaps the observations were merely due to species differences. Trees within each species were treated equally; three species had all trees pruned and two species had no trees pruned.

Follow-up experiments were conducted to confirm if the earlier findings were merely due to species differences or if compensatory pruning was truly not beneficial. In a total of 11 different species, subsets of trees were either not pruned or pruned to remove 15%, 30% or 45% of the canopy. Each treatment was replicated 12 times and tree responses were evaluated for two years. Again, compensatory pruning was found to be not beneficial. Since then three additional studies in other locations (Colorado and England) by different research teams produced similar results.

The findings in England are interesting in that they suggested pruning to compensate for root loss was not the critical question; rather, soil moisture was more important. When pruned or unpruned treatments were grown in a droughted condition they both grew very little. But when water was not a limiting factor, pruned trees had less root growth, fewer leaves and smaller leaves. Trees not pruned at planting that received ample water had more leaf tissue to photosynthesize and a greater ability to produce plant-growth regulators to influence root growth.

But if compensatory pruning is not the answer, what can be done to decrease canopy dieback, increase transplant survival and foster tree health? Water! It’s as simple as that. But how much? A conventional tree-watering guide suggests 1 to 1.5 inches of water every seven to ten days is appropriate. But apparently this common watering guideline is not any more research-based than the compensatory pruning assumption.

Research within the last ten years from the Morton Arboretum and the University of Florida at Gainesville suggests more frequent watering is optimal. Newly transplanted trees benefit from daily watering for the first one to two weeks, applying approximately 1 to 2 gallons per caliper inch per watering. For the next two or three months, water trees every two to three days and then weekly until established. Remember, newly transplanted trees are absorbing water from a diminished rooting area (i.e., apply water to the root ball). Roots must generate and grow into surrounding soils before a larger soil volume can be tapped for moisture. Trees in Wisconsin will become established with-in one to one-and-a-half years for each caliper inch of stem. Thus, it takes two to three years before a two-inch caliper tree is fully-established.

If you cannot adequately meet the water requirements of newly transplanted trees, planting smaller trees is recommended. For example, one- and two-inch caliper trees have less root loss and recover faster than trees two inches to three inches in stem caliper. Mulching trees to a two- to three-inch depth is recommended as it helps to conserve the precious water.

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To prune or not to prune at planting – that is the question! Removing branches to compensate for root loss (i.e., compensatory pruning) is not beneficial – that is the answer. At least five independent research studies have reached this conclusion. The fact is young adolescent trees require nurturing to survive and become prosperous adult trees. The simple act of watering every couple of days with 1 to 2 gallons of water per stem caliper inch is one of the best things you can do for newly-planted trees. Selecting structurally sound and healthy plants is also a must. Whitcomb said it best 20 years ago: “Top pruning and other practices are unlikely to help an unthrifty plant and a thrifty plant doesn’t need it.”

Approaches to Managing Garlic Mustard in Wisconsin

By Mark Renz, Extension Weed Scientist, University of Wisconsin-Madison

As the snow melts, populations of garlic mustard will begin to emerge and grow. A key trait of this plant is its ability to be one of the first to resume growth in the spring as well as the last to go dormant in the fall. This is a major advantage of this invasive non-native plant, and is likely one of the main reasons it is rapidly spreading and dominating woodland areas, especially urban forests and parks. Infestations can displace native plants and also reduce the mycorrhizal associations with a range of native plants, particularly hardwood trees. This reduction in recruitment of hardwood trees could have a large impact on many of our forests causing large-scale shifts in tree species. While it has not been studied, it appears that garlic mustard can spread by several means, including animals, water, and human activities.

**How do I Identify Garlic Mustard?**

Garlic mustard is a biennial plant that germinates in the spring and develops basal leaves (rosette) which grow all summer. This plant then over-winters as a rosette and the following spring-summer will flower, produce seed, then die. Individuals should be familiar with the seedling, rosette, and adult plants as they can each look unique and all require management. Garlic mustard seedlings are typically the first plants to germinate in the spring and have two oblong small cotyledons (see picture 1). Rosette plants consist of several green rosette leaves (typically 3-4) that are two to 4 inches in height, round with scallop-edges. Second year plants produce an inflorescence 1-4 ft tall consisting of white flower from May-June. Few forest plants reach this height and often this alone will distinguish garlic mustard from other plants. Leaves and stems also can have a distinctive smell of onion or garlic when the leaves are crushed.

**How do I Manage Garlic Mustard?**

Garlic mustard has been shown to be sensitive to several management methods if they are applied correctly. Before conducting management consider the size of the population you wish to control, the desired plants present, and the desired result of management as this can aid in the decision of the appropriate management method(s). Also consider developing a multi-year management plan, as the seed can remain dormant in the soil for 2-5 years, requiring management for several years. When developing management plans also remember that the key to long-term management is the prevention of seed production, and some management techniques that may not give the desired short-term result will still be effective at preventing seed production. Due to the ability for the seed to spread long distances, any management plan should attempt to manage all populations nearby. Below I will summarize information on several management approaches.

**Mechanical Control:** Garlic mustard can be effectively controlled by hand-pulling or cutting plants at the soil surface. This is recommended to be conducted at or before the onset of flowering. If pods are present make sure and remove plants from the area once they are pulled or cut. Some plants may resprout from either of these techniques, and may require an additional visit for management. Hand-pulling or hand-cutting are recommended in sensitive areas, where desirable plants are present that one does not wish to harm. Realize that pulling often results in soil disturbance and often promotes the establishment of more garlic mustard or other undesirable plants.

**Burning:** Burning can be an effective strategy at managing seedling garlic mustard. The spring timing is recommended as seedlings have just germinated and are most susceptible to fire. Older plants often can survive fires, and while injured, regrow and will require additional management. Because most woodland fires are patchy, flame torches may be useful in areas not burned in entirety. Burning is most effective when integrated with other management activities for garlic mustard.

**Herbicides:** Several herbicides applied at various timings and methods are effective at controlling garlic mustard. The selection of the appropriate herbicide is based on the size of infestation, access to the equipment, and the presence of desirable plants. The ideal time to treat garlic mustard would be the spring as seedling plants have emerged and 2nd year plants are also present and applications can effectively eliminate two generations of plants. Most applications, however, occur in the fall as herbicides used are typically sensitive to desirable plants as well. Late fall applications after a frost is an excellent timing as most desirable species have gone dormant minimizing injury.

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Planting Trees This Spring?
Follow Proper Tree Planting Techniques

Many stem girding root problems can be avoided by planting trees at the right depth.

Every tree should have a root collar. The first 15 minutes of proper planting plays a crucial role in determining the longevity of a tree. Many stem girdling root problems can be avoided by planting trees at the right depth.

If you are a commercial landscaper in Brown County, call Brown County UW-Extension at 920-391-4611 to set up an onsite tree planting demonstration to train your employees.

Trees play a vital role in our ecosystem, beautify the land, and shelter a variety of wildlife. We need trees in our communities. And we need your help by planting trees correctly, so future generations can reap their benefits and enjoy a greater quality of life.

Brown County UW-Extension has released a new brochure on proper tree planting which is available in both English and Spanish. To order a copy, call Linda at 920-391-4653. Or you can download the bulletin online for free at www.browncountyextension.org/horticulture