

Forest Science Becomes Forest Practice

Reviewing practical science to help forest owners sustainably manage their woodlands

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Controlling beech sprouting through limited use application of herbicides.

Article Reviewed:

Kochenderfer, JD, Kochenderfer, JN, and Miller, GW. 2006. Controlling beech root and stump sprouts using the cut-stump treatment. *Northern Journal of Applied Forestry*. 23(3):155 – 165.

Issue and Background:

Landowners are often tempted to cut mature beech (*Fagus grandifolia*) for firewood or during forest improvement to provide additional growing space for more valuable species. However, cutting beech typically results in the prolific development of root sprouts. The density of sprouts from the roots can sometimes exceed 10,000 stems per acre, forming a “beech thicket”. Death of mature stems, by cutting or disease, causes a redistribution of hormones that activate new growing tissue on roots that form into shoots. Overly abundant seedling and sapling beech can produce enough shade to effectively inhibit the reproduction of other hardwood species, reduce forest diversity, and limit owner access for other objectives. In areas with mature beech and a landowner objective to reduce the abundance of beech, what cost effective tools exist to control all beech size classes?

Review of Kochenderfer et al. 2006:

The herbicide chemical glyphosate (originally marketed as Roundup™) has been successfully applied to freshly girdled stems to kill above ground stems. Other types of herbicides are

applied via a basal application which chemically girdles the tree. Because glyphosate translocates to actively growing tissue, applications to girdled stems would typically move up the tree, but not into the root system. While girdle, basal and ground-mist herbicide treatments are effective, Kochenderfer et al (2006) investigated the potential of cut-stump treatments to distribute the herbicide more fully into the root system and gain additional control beyond the treated stem. The authors note that cut-stump treatments of beech are “target-specific, applicable to small ownerships, and easy to apply. It entails applying herbicide to the cambium layer of freshly cut stumps.”

The research conducted by Kochenderfer et al. (2006) assessed the use of cut stump treatment with a 53.8% active ingredient (ai) glyphosate solution¹ applied within one hour of cutting the tree. The authors investigated the spread of the herbicide into the root system and death of adjacent trees based on the size of the treated stump. One-third acre plots in each of two study areas in West Virginia were designated for treatment (cut plus herbicide) or no treatment (cut without herbicide). All beech stems in the plots that were greater than 6” dbh (diameter breast height) were cut, and all cut stumps within the treatment plots were treated with the herbicide solution. Glyphosate was applied to the stump within one hour of cutting at a target rate of 0.12 fl. oz (3.5 ml) per inch of stump diameter. The actual application rate was closer to 4.2 ml per inch of stump diameter. The authors used the equivalent of 1.0 to 1.6 gallons of herbicide per acre to treat approximately 80 stumps per acre. All cutting and treatment was done during September.

As a result of the treatment, the



The glyphosate should be applied to the outer two inches of the freshly cut stump to focus the effects on the active plant tissue. The tissue towards the center of the stump is less conductive and does not as effectively transfer the chemical to the root system.



Pete Smalldige (left) (you'll need to crop the part of a person in the actual left) explaining beech stump study plot to Master Forest Owner Regional Coordinators at June 8 coordinators meeting at Arnot Forest. Four of the 13 coordinators are shown here (from left to right): Mike Birmingham, Dick Patton, Keith Hedgecock, and Jerry Michael.

authors found significant mortality of uncut beech seedlings and saplings within the treated plots. Because trees greater than 6" dbh were cut, the herbicide activity was directed into the smaller sprouts resulting in high levels of beech mortality. The treated plots had mortality of more than 90% of the equivalent of 6000 to 9000 beech stems per acre in the two study areas. The cut but untreated control plots had approximately 2% mortality of beech and attributed mortality to damage caused by the felled stems.

In another aspect of the study the authors investigated the dose-distance mortality response of beech to determine how far away from a cut stump seedlings and saplings were controlled. The distance away from treated stems that untreated beech stems died depended on the diameter of the treated stumps. Treated 5" diameter stumps controlled more than 50% of all beech stems within 10 feet of the stump. Treated 10" diameter stumps controlled more than 50% of all beech stems within 15 feet of the stump. Treated

17" diameter stumps controlled more than 50% of all beech stems within 25 feet of the stump. As an approximate guide based on a calculation of data presented by the authors, at least 50% of uncut beech stems were controlled at a distance equal to 20 times the stump diameter treated, although somewhat further for trees between 5" and 10" dbh. For example, treatment of a 7" dbh beech would be expected to achieve 50% mortality of beech stems within 140" (11.6') of the stump. In all situations, mortality was almost 100% near the stump and decreased further from the stump.

The cost estimate for treatment varied with treatment intensity. The basal area of treated beech stems at the two study sites ranged from approximately 40 to 80 sq. ft of basal area per acre. Cost, including labor and chemical, ranged from approximately \$1.00 to \$0.75/sq ft of basal area treated. The cost of chemical represented 85% of the treatment cost. This was the equivalent of approximately \$45 to \$60

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The methods described by Kochenderfer et al. (2006) have potential for use by many NY forest owners. Most glyphosate-based herbicides are not restricted in New York, meaning that people can purchase them through many local farm and garden stores. Cut stump treatments of beech provide a means to kill numerous beech stems with treatment of a small percentage of stems. Treatment costs, in conjunction with fuel wood harvesting, are highly favorable when compared to other herbicide and mechanical treatments. A reasonable approach for applying this research by NY forest owners would include:

1. Evaluate ownership objectives to assess the desired role of beech.
2. Inventory to identify areas needing control of beech, focusing perhaps on areas with diseased rather than healthy mature beech.
3. Read the herbicide label and assemble equipment to comply with provisions of the label.
4. Review safe chain saw use protocols and inspect personal protective equipment. Take safety course if appropriate.
5. Cut the largest beech stems, especially those with beech bark disease, and treat the outer 2" of stump diameter (Figure 1) with the herbicide solution comprised of a concentrated active ingredient of glyphosate. Large diameter beech left uncut may act as a sink of the herbicide and reduce the mortality of smaller sprouts. Apply treatment to the stump within one hour of cutting and after brushing away sawdust. Treatment should be applied from mid summer to late fall for best effect. Treatments during all times of the year except March and April showed reasonably good control in the southern Appalachian study sites. Dates for NY treatments would likely be best from late June through late fall. Frozen wood in New York would likely limit treatment effects.

¹ The authors used Glypro, which is a restricted-use herbicide in NY and only available to certified herbicide applicators. Most owners can obtain glyphosate based products with an active ingredient concentration of 40 to 48% in their local garden or hardware store. Always read and follow the label specifications.

Forest Science (continued)

per acre, and represented a relatively small proportion of the fuel wood value of the cut stems. Thus, selling the beech as firewood, those cut for treatment, would have more than covered the costs of treatment. These costs are significantly less than other types of herbicidal control of beech.

If you have any questions about the possible use of this forest management activity, please contact your local office of Cornell University Cooperative Extension, NYS Department of Environmental Conservation, or a forester who is a certified pesticide applicator.

Science Disclaimer: Scientific research is typically applied in a single area under a limited set of environmental conditions. Researchers, and the interpretation of that research, attempt to describe how different conditions might affect the application of results. The results interpreted here should be applied with due diligence by forest owners, incorporating their specific conditions into the practices described. If any questions exist, seek assistance from professionals before proceeding.

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