

OAK REGENERATION PRACTICES: SITE PREPARATION FOR NATURAL OAK REGENERATION

Jack Wilkerson, MS Student, Tennessee State University

Wayne K. Clatterbuck, Professor, Silviculture and Forest Management, School of Natural Resources, University of Tennessee

INTRODUCTION

Regeneration of desired species following a harvest is a key component of forest sustainability. Often undesirable trees, those of small diameter or larger non-commercial trees with little economic value after a harvest, if left, will ultimately compose the next forest. Site preparation is a silvicultural practice that removes these unwanted trees, as well as grasses and weeds, to encourage the regeneration of desirable species such as oaks. Site preparation can be performed before, during, or after a harvest or regeneration event.

Site preparation is commonly considered when planting trees and should equally be considered before and after a harvest to establish and promote natural regeneration. A stand inventory and regeneration survey should be conducted several years before a timber harvest to determine if desirable regeneration is present in sufficient size classes and numbers or if site preparation is necessary to establish and develop natural regeneration. Oaks, being advanced growth dependent, should be present in the stand before the harvest is conducted. The development of small, advance reproduction of oak to a larger size involves site preparation to control competing or undesirable species using herbicide, fire, or mechanical methods.

CONTROL OF UNDESIRABLE VEGETATION INCLUDING INVASIVE SPECIES

Several site preparation techniques are available to remove or deaden stems of unwanted species. Aboveground control methods of undesirable species include cutting, girdling, frilling, or burning. Mechanical methods that scalp or scrape the soil, removing the organic matter or the use of heavy equipment that compacts the soil are not recommended. These aboveground methods will not control sprouting from roots or stumps. Most all hardwoods sprout. Application of herbicide to the plant and translocation of the herbicide to the roots will prevent resprouting of undesirable vegetation and kill the roots and thus the plant.

HERBICIDE APPLICATION METHODS

Herbicide is usually applied on a stem-to-stem basis, not broadcasted, using equipment such as a backpack sprayer or squeeze/spray bottle. Common herbicide treatment types include foliar sprays, basal bark application, cut-stump sprays, as well as tree injections. The type of herbicide application depends on the size of the targeted stem as suggested in the accompanying table.

Table 1. Herbicide application method that is most appropriate for the target stem being controlled.

Application Method	Effective Size of Target Stems
Basal bark applications	Less than 3 inches in diameter
Cut stump spray	All sizes



When using a backpack sprayer, use Personal Protective Equipment (PPE) for safely applying herbicide. Photo Credit: Wayne K. Clatterbuck

BASAL BARK APPLICATIONS

When trees to be controlled reach a height of six feet or greater, foliar sprays are no longer feasible for safe application. Oil-based herbicides to penetrate the bark are applied as a basal spray on the lower one to two feet of the stem, encircling the entire stem. Basal herbicide sprays are recommended for many thin-bark, midstory species such as maples that are greater than six feet tall but less than three inches in diameter at breast height (DBH).

CUT-STUMP SPRAYS

Cut-stump treatments are particularly useful with larger stems and stumps that sprout. Herbicide should be directly applied within an hour of a fresh cut so that the stump can absorb the herbicide before it begins to seal its wounds. The outer 1 to 2 inches of the stump rings (live tissue) should be sprayed. If application occurs more than an hour following a cut, apply herbicide around the entire circumference of the stump surface and outer bark to ensure herbicide effectiveness.



A thin stream of herbicide is applied encircling this small red maple stem as a basal bark treatment.

Photo Credit: Wayne K. Clatterbuck

TREE INJECTION

For trees greater than three inches in diameter, hack and squirt treatments can be conducted. Downward hacks with a hatchet are made one inch apart on the stem and herbicide is applied with a squirt bottle to each hack. Follow herbicide label instructions. Continuous frills (girdling) rather than spaced notches are used on more difficult to kill species such as beech.

USE OF HERBICIDES

Glyphosate, triclopyr, and imazapyr are herbicides that are frequently used to control undesirable hardwood stems. Glyphosate and triclopyr (water-based amine and oil-based ester formulations) are preferred because they have little soil activity. Other herbicides may be equally effective and should be considered as options for use. These three herbicides are readily available at supply stores under various tradenames. Make sure to follow the label instructions for applying each herbicide. Personal Protective Equipment (PPE) should be worn by applicators.

Glyphosate - Herbicide has no soil activity and will not injure desirable plants via root uptake; rapidly deactivated and biodegradable in the soil by micro-organisms; broad spectrum, non-selective herbicide that is absorbed by plant leaves; and is a systemic herbicide that is translocated within the plant. Glyphosate has low health and environmental risks. For more information about possible threats associated with glyphosate, refer to [UT Extension publication W 827 Frequently Asked Questions: Glyphosate](#).

Triclopyr - Systemic herbicide is in two formulations, water-based amine (foliage, hack, and squirt) and oil-based ester (basal spray); does not kill grasses or sedges; interferes with normal expansion and division of plant cells resulting in distorted growth such as cupped leaves, twisted stems, and plugged vascular tissues; and is not translocated in the soil.

Imazapyr - Herbicide does move in the soil; should be used for stem injections without dripping chemical on the ground; inhibits amino acid protein synthesis; and has a delayed response after application.

This fact sheet focuses on site preparation to control grasses, weeds, and woody plants that may interfere with regeneration of oaks. Herbicides to control woody plants differ with their mode of action and application compared to herbicides that control annuals and some grasses. Most annuals should be controlled before they seed to create the generation for the next year. Contact your local Extension office or university for herbicide recommendations.

FURTHER READING

Clatterbuck, W.K., Armel, G.R. 2010. Site preparation for natural regeneration of hardwoods. Extension Publication PB1799. Knoxville, TN: University of Tennessee Extension, Institute of Agriculture. 12 p. (<https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/PB1799.pdf>)



UTIA.TENNESSEE.EDU

Real. Life. Solutions.™