



PREPARING SITES FOR WOODY PLANTS

FOREST STEWARDSHIP MANAGEMENT NOTE #10

INTRODUCTION

Site preparation is often necessary for the successful establishment and growth of woody plants whether they are timber trees or wildlife shrubs and whether they are planted as seeds or seedlings or naturally regenerated. It may be necessary to remove trees, brush, and slash (woody debris) from the site to facilitate planting operations, to allow natural regeneration to emerge, and to reduce the risk of wildfire. In many cases, herbaceous plants, especially grasses, and undesirable woody regeneration compete strongly with planted species for water, nutrients, and light, so suppression of these plants is frequently needed.

The purpose of this Note is to familiarize landowners with site preparation options, the conditions under which these options are appropriate, and associated stewardship considerations. Sources of further information are listed.

GENERAL CONSIDERATIONS

The best site preparation strategy depends on existing vegetation, amount and size of debris present, soil type, slope, site quality, and other site-specific conditions. In many cases the best strategy will be a combination of methods. Landowners should consult local foresters and/or tree planters to determine the best approach for a given site; be sure to discuss the reasoning behind recommendations and any stewardship concerns.

Advance planning is essential for achieving good results and minimizing negative impacts. In most cases, except furrowing, site preparation should occur in the year before planting to allow time for air pockets and herbicides to dissipate and for damaging soil movements to subside.

MECHANICAL SITE PREPARATION

Mechanical site preparation is done with implements that are either pushed or pulled through the area with tractors, caterpillars, or skidders. Pulled implements include discs, furrowers, scarifiers, and roller choppers. Pushed implements include straight, toothed, V-shaped, and shearing dozer blades.

Advantages of mechanical methods include removal of debris, reduction of wildfire risk, and improvement of seedbed conditions. Disadvantages include soil disturbance and associated erosion, soil compaction, soil rutting, unsuitability on steep slopes or wet soils, and high cost.

1. **DISCING** - Heavy discs can be used to chop up shallow roots, weeds, and slash (woody debris). Discing alone works well on light soils where the amount of slash is small. Where the soil is heavy and/or the slash is thick, discing should follow grubbing or shearing (see below). Discing leaves the site cleaner than other methods and may reduce the need for herbicides. This method also has the advantage of mixing topsoil nutrients deeper into the soil where tree roots will be but discing large amounts of debris into the soil can cause seedling roots to dry out.
2. **FURROWING** - Plows, disc trenchers, and "scalpers" attached to tree planting machines can be used to create trenches about 15 inches wide in which seedlings can be readily planted. The furrow should be deep enough to remove competing vegetation (about 2 inches) but not greater than 4-6 inches deep. Furrows tend to collect water and provide seedlings with more moisture than other methods. However, furrowing should not be done on heavy soils or high-water tables as seedlings may drown. Furrowing can be done with relatively small equipment in open fields, but heavy equipment is needed where the soil contains large roots. Disc trenchers skip over rocks and stumps. A drawback of furrowing is that the trench and adjacent hump of soil persist for many years creating rough ground and an unnatural appearance.

3. PATCH AND ROW SCARIFYING - Patch scarifying is accomplished with an implement that uses a revolving base with extending prongs to grind away brush, slash, and ground litter from small areas where trees will be planted. This method works well on sandy or gravelly soils and can also be used where other methods are unsuitable due to rocky soil or susceptibility to erosion; it does not work well in heavy soils, swamps, or where the slash is heavy.
4. ROLLER CHOPPING - A roller chopper is a large drum with blades sticking out that chop up brush, slash, and shallow roots. Like grubbing, roller chopping is most effective if done in summer. It is not well suited for rocky terrain or debris larger than 5 inches.
5. GRUBBING - Grubbing, or raking, is done with large crawler tractors equipped with flat, V-shaped, or toothed ("rock rake" or "brush rake") blades. Trees, small stumps, and brush are rooted out and pushed along with debris into piles or windrows where they can be burned. Some soil ends up mixed with the debris making it difficult to burn. Piles are usually easier to burn than windrows. Grubbing is best done between July and September when nutrients are in the above-ground parts of the plants and roots are weakest. A drawback of grubbing is the large amount of top soil disturbance.
6. SHEARING - Shearing is much like grubbing, but a "KG" blade that is sharp at the base is used to cut trees, stumps, and brush off at the ground. This method is most effective when the ground is frozen and the vegetation is brittle. Shearing is advantageous where many small trees must be removed, but it is not well suited for rocky terrain. Because proper shearing causes little topsoil disturbance, burning piles or windrows is easier. However, shearing does not remove roots, so hardwood sprouting is abundant and herbicide treatment is often also required.

7. STEWARDSHIP CONSIDERATIONS FOR MECHANICAL METHODS (#3):

- Use methods that will cause the least disturbance to the soil and still allow successful regeneration.
- Leave undisturbed buffer strips along wetlands and water bodies. Buffers should be 50 feet or more wide on flat ground and 100 feet or more wide on steep ground.
- To minimize erosion, orient equipment movements along the contours, to the degree operator safety permits. An exception is roller chopping, in which erosion is minimized by going up and down slopes.
- Avoid operations when saturated soil may cause rutting and erosion. Remove impediments to beneficial soil drainage.
- Avoid dumping residue in water, wetlands, or flood plains.
- Locate piles and windrows to minimize blockage of drainage patterns.
- Minimize incorporation of soil into piles and windrows by raking lightly or when soil is frozen.
- Avoid operations on organic soils except when frozen.
- Limit discing to slopes of less than 10% if soil is erodible.
- Use patch or scarification where risk of erosion is high.

Although mechanical site preparation may be necessary to remove debris much competing vegetation often survives. The roots of woody plants may survive and they often produce vigorous sprouts that outgrow planted seedling. Also, mechanical treatments may stir up seeds and otherwise create good conditions for the growth of brush and weeds, especially on moist, fertile sites. If conservation of biodiversity is an objective (FSMN #37), the natural regeneration that follows mechanical treatment may be desirable, up to a point. However, if the objective is to maximize timber production, herbicides provide an alternative, or supplemental, means of controlling competition.

CHEMICAL SITE PREPARATION

Whereas mechanical methods may serve several functions, chemical treatment is generally for the sole purpose of controlling competing vegetation. However, herbicides are more flexible than mechanical methods in that they can be used to control competing vegetation at all stages in the regeneration process, including before existing stands are harvested and after new trees are planted. Herbicides can also be used where heavy equipment cannot. Application may be by broadcast (including aerial application) or spot/band treatment

(ground application). The advantages of chemical site preparation include flexibility of timing, suitability on steep slopes, effectiveness of controlling competition, and cost-effectiveness. Disadvantages include water quality considerations, sensitivity to weather, regulatory requirements, and lack of debris removal.

Specifications for the chemical site preparation (time of year, type of herbicide, etc.) should be determined by an experienced tree planting contractor or other professional with appropriate licensing for herbicide application. However, landowners should verify that the herbicides selected are approved for use on forest lands and for the species that are to be treated and that proper safety practices are employed (#1,2,3,7,9).

PRESCRIBED BURNING FOR SITE PREPARATION

Although controlled burning can be a useful method of site preparation it is seldom used in the Great Lake States because of infrequent suitable burning weather. Professional assistance and proper permits are essential. Advantages of prescribed burning include reduction of wildfire risk, improvement of seedbed conditions, encouragement of fire adapted species, reduction of debris, and low cost. Disadvantages include weather constraints, safety risks, resprouting of hardwoods, and possible soil erosion and loss of organic matter.

GENERAL STEWARDSHIP CONSIDERATIONS

The purpose of site preparation is to ensure that the desired species become established and grow well, not to eliminate all other plants. Growth rates of planted trees will not be seriously lowered by moderate amounts of competition and may be improved in some cases. The wildlife habitat and visual quality of plantations is often dramatically improved by even small inclusions of different tree species.

REFERENCES

FSMN #'s refer to other Forest Stewardship Management Notes in this series.

- #1 Lantagne, D.O., et al. 1990. Forest herbicides for weed control in the Great Lake States. Mich. State U. Extension Bulletin E-2219.
- #2 Lantagne, D.O., et al. 1990. Effective herbicide use in Christmas tree plantations. Mich. State U. Extension Bulletin E-251.
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- #6 Minnesota Department of Natural Resources. Undated. Methods of site preparation (NA-02032-01).
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- #9 Stone, D. 199_. When is it safe to use modern herbicides in sandy soil? North Central News (North Central Forest Experiment Station, St. Paul, MN).
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CITATION: Burnett, Christopher D. 1994. Preparing sites for woody plantings. Michigan Forest Stewardship Management Note #10. Michigan Department of Natural Resources, Forest Management Division.

ACKNOWLEDGEMENTS: This project was supported, in part, by a grant from the Michigan Department of Natural Resources and the USDA Forest Service.