COST EFFECTIVENESS OF UTILITY RIGHTS-OF-WAY VEGETATION MANAGEMENT TREATMENTS: II. FIRST MAINTENANCE CYCLE

by Lawrence P. Abrahamson, Christopher A. Nowak, Edward F. Neuhauser, Curtis G. Foreback, H. Dale Freed, Scott B. Shaheen and Craig H. Stevens

Various management schemes involving herbicides have been successfully used to achieve ROW management goals during the first maintenance cycle following an initial clearing phase of electric utility ROW vegetation management. Two herbicide mixtures were used to determine which application mode (selective or nonselective) and method (basal or stem-foliar) is most cost effective in accomplishing vegetation management objectives during the second phase of ROW vegetation management — first-maintenance cycle. This study is a follow-up to an initial clearing research study (1).

Materials and Methods

Study area description. Studies took place on Niagara Mohawk Power Corporation's Volney-Marcy 345 kV transmission right-of-way in Oneida County, New York. The study area has been described in detail in the previous study on initial clearing of this ROW (1).

Experimental design and treatments. A randomized complete block design was used to test maintenance (four treatments, three replications, two blocks) treatment effects on ROW vegetation. Treatments were applied on initial clearing study plots which ranged in size from 0.4 to 2.1 ac (1). Treatments were blocked across a contiguous 15 mile section of ROW between abandoned agricultural land and woodland areas. A prestudy inventory of vegetation was conducted in 1982. The ROW was cleared and treated in spring 1983 using selective and nonselective mechanical and herbicide application modes (1). A post treatment evaluation was conducted in fall of 1983, followed in the summer of 1984 by the First Maintenance Cycle treatments. A post treatment vegetation survey was completed in the fall of 1987 to evaluate the first maintenance cycle treatments.

The four study treatments were composed of two basal and two stem-foliar herbicide treatments applied selectively and nonselectively:

Selective basal. Basal treatment of selected undesirable woody vegetation with a herbicide formulation consisting of 2 gal of triclopyr at 4.0 lb active ingredient (a.i.)/gal (3,5,6-trichloro-2-pyridyloxyacetic acid) (Garlon™ 4) and 98 gal oil; it was targeted at the lower 1 to 2 ft of individual stems, saturating the base of the stem and all exposed roots to the point of rundown and puddling around the root collar zone.

Nonselective basal. Basal Treatment of nonselected woody vegetation with a herbicide formulation consisting of 2 gal of triclopyr at 4.0 lb a.i./gal and 98 gal oil; it was targeted at the lower 1 to 2 ft of individual stems as in selective basal.

Selective stem-foliar. Stem-foliar treatment of selected woody vegetation with a herbicide formulation consisting of a mixture of 1.5 qt of triclopyr at 4 lb a.i./gal plus 2.4-D at 2 lb a.i./gal (4-Amino-3,5,6-trichloropicolinic acid and 2,4-Dichlorophenoxyacetic acid) (Amdon™ 101), 1 qt
of surfactant (Surfem™) and 99 gal water, applied
to leaves, branches and stems to a point of wet-
ness.

**Nonselective stem-foliar.** Stem-foliar treat-
ment of all woody vegetation with a herbicide
formulation consisting of a mixture of 1.5 qt of
triclopyr at 4 lb a.i./gal, 2 qts of a formulation of
picloram at 0.5 lb a.i./gal plus 2,4-D at 2 lb a.i./gal,
1 qt of surfactant and 99 gal water, applied to
leaves, branches and stems to a point of wetness
as in selective stem-foliar.

**Data collection and analysis.** Treatment costs
were based on current year (1984) contractor
billing rates for labor, equipment and herbicide
mix for our small study plots. Although the actual
costs per treatment may be higher than if done on
larger operational plots, the cost ratios between
treatments would not change.

Plant community development was periodically
monitored since 1983 by surveying total species
density (sprout or seedling) and number of stems
> 6 ft height on systematically located strip transects
covering 7% of the treatment plot area. Plants
were classified as undesirable or desirable. De-
sirable are any vegetation, including trees and
shrubs, that attain maximum heights of < 20 ft.
Undesirable are any vegetation, mainly trees,
that attain maximum heights > 20 ft. Percent her-
baceous cover was tallied separately using point
samples (4 ft² quadrats) located at 10 ft intervals
down the center of each strip transect.

Analysis of variance and covariance were used
to test treatment effects on undesirable and de-
sirable plant density, percent of undesirable stumps
that sprouted, number of stems > 6 ft height,
herbaceous cover and treatment costs. Means

Table 1. Mean desirable and undesirable stem density change and treatment cost in response to first
maintenance cycle treatments, one growing season pre- and three growing seasons post treatment.¹

<table>
<thead>
<tr>
<th>Comparison group</th>
<th>Sample size (n)</th>
<th>1983 Desired</th>
<th>1983 Undesired</th>
<th>1987 Desired</th>
<th>1987 Undesired</th>
<th># stems &gt;6 ft Desired</th>
<th># stems &gt;6 ft Undesired</th>
<th>Percent herb cover</th>
<th>Treatment cost dollars/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonselective basal</td>
<td>6</td>
<td>2610a</td>
<td>17570a</td>
<td>2150a</td>
<td>1620a</td>
<td>10a</td>
<td>120a</td>
<td>110a</td>
<td>550ab</td>
</tr>
<tr>
<td>Nonselective stem-foliar</td>
<td>6</td>
<td>2230a</td>
<td>13820a</td>
<td>2460a</td>
<td>1880a</td>
<td>10a</td>
<td>100a</td>
<td>130a</td>
<td>420b</td>
</tr>
<tr>
<td>Selective basal</td>
<td>6</td>
<td>3250a</td>
<td>24010a</td>
<td>2470a</td>
<td>2420a</td>
<td>180a</td>
<td>270a</td>
<td>110a</td>
<td>690a</td>
</tr>
<tr>
<td>Selective stem-foliar</td>
<td>6(5)</td>
<td>1950a</td>
<td>7130a</td>
<td>2630a</td>
<td>2980a</td>
<td>230a</td>
<td>130a</td>
<td>110a</td>
<td>330b</td>
</tr>
</tbody>
</table>

Effects were tested using analysis of variance or covariance with a randomized block design model (_=0.10). Means
within a column, within a comparison group, followed by the same letter are not statistically different (_=0.10;
Duncan’s Multiple Range Test).

¹ Numbers in parentheses are sample size for percent herbaceous cover, it is lower because one plot was not measured.
were separated using Duncan's Multiple Range Test.

Interpretation of cost effectiveness for the first maintenance cycle treatments was based on both vegetation control (1983 vegetation pre treatment survey vs. 1987 vegetation post treatment survey) and treatment cost (1984). A treatment that would decrease undesirables, increase desirables and maintain relatively low costs was determined as most cost effective.

**Results**

*First Cycle Maintenance.* There were no differences between desirable and undesirable stems among selective and nonselective basal and stem-foliar treatments 1-year pre- (1983) and 3 years posttreatment (1987) (Table 1). The number of stems > 6 ft height 3 years post treatment was not different among treatments (Table 1). Total herbaceous cover did not differ among treatments 3 years posttreatment, all plots had over 100% cover (Table 1). Treatment costs were different among treatments; basal costs were nearly twice that of stem-foliar (Table 1).

**Conclusion**

Given equal reduction of undesirables and promotion of desirables, cost effectiveness of the first maintenance cycle can be based on treatment costs alone. Basal treatment cost was nearly double that of stem-foliar; therefore, stem-foliar treatments using either a selective or nonselective mode is most cost effective.

**Literature Cited**