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-pyridyl-oxyacetic 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, 2 qts of a formulation of picloram at 0.5 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

L.P. Abrahamson is Senior Research Associate, and C.A. Nowak is Principal Research Support Specialist and Doctoral candidate, Faculty of Forestry, State University of New York, College of Environmental Science and Forestry, 1 Forestry Drive, Syracuse, New York 13210; E.F. Neuhauser, C.G. Foreback, H.D. Freed and S.B. Shaheen are Research Specialist, Senior Environmental Analyst, Director System Forestry and Assustabt Analyst, Niagara Mohawk Power Corporation, 300 Erie Boulevard West, Syracuse, New York 13202; and C.H. Stevens is Environmental Manager, Tree Preservation Co., Inc., 566 North State Road, Briarcliff Manor, New York 10510.

of surfactant (Surfel™) and 99 gal water, applied to leaves, branches and stems to a point of wetness.

Nonselective stem-foliar. Stem-foliar treatment 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. Desirables are any vegetation, including trees and shrubs, that attain maximum heights of < 20 ft. Undesirables are any vegetation, mainly trees, that attain maxium heights > 20 ft. Percent herbaceous cover was tallied separately using point samples (4 ft^2 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 desirable 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]

Comparison group	Sample size (n)1	Stem Density 1983 Desired	1983 Undesired	1987 Desired	1987 Undesired	# stems >6 ft Desired	# stems >6 ft Undesired	Percent herb cover	Treatment cost
		stems/ac							dollars/ac
Nonselective basal	6	2610a	17570a	2150a	1620a	10a	120a	110a	550ab
Nonselective stem-foliar	6	2230a	13820a	2460a	1880a	10a	100a	130a	420b
Selective basal	6	3250a	24010a	2470a	2420a	180a	270a	110a	690a
Selective stem-foliar	6(5)	1950a	7130a	2630a	2980a	230a	130a	110a	330b

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

1. Abrahamson, L.P., C.A. Nowak, E.F. Neuhauser, C.G. Foreback, H.D. Freed, S.B. Shaheen and C.H. Stevens. 1991 Cost effectiveness of utility rights-of-way vegetation management treatments: I. Initial clearing, J. Arbor. (this issue).

Faculty of Forestry
State University of New York
College of Environmental Science and Forestry
1 Forestry Drive
Syracuse, New York 13210