VEGETATION MANAGEMENT ALONG TRANSMISSION UTILITY LINES IN THE UNITED STATES AND CANADA

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Abstract. A survey investigating vegetation control methods along transmission rights-of-way was sent to 220 Utility Arborist Association companies. The survey contained questions regarding right-of-way characteristics, control methods used, total dollars spent on vegetation management, and priorities of the vegetation management program. The ROW area reported represented over 48% of all the investor-owned ROWs over 39 Kv in service throughout the United States. More than 75% of the respondents reported using herbicides on their rights-of-way. However, acres treated mechanically outnumbered those treated chemically by a margin of 2.7:1. Garlon 3A and Garlon 4 topped all herbicides, with a combined 220,574 projected gal (834,961 L) of the estimated 549,869 gal (2,081,474 L) of herbicide applied to transmission rights-of-way in 1995. It appears that quite low levels of active ingredients are being applied per acre. Basal, high-volume foliar, and low-volume foliar with a backpack or handgun applications accounted for approximately 75% of the acres of transmission ROWs treated with herbicides.

Key Words. Vegetation management; utility lines; herbicides; rights-of-way; utilities.

To deliver uninterrupted electricity to customers on a reliable basis, United States utility companies must control the vegetation growing in more than 7 million ac (2.8 million ha) of their rights-of-way (ROWs). A significant sector of the arboriculture industry is dedicated to the development and implementation of more efficient, longer lasting, and less expensive methods to control this vegetation. Two general methods of vegetation control presently are used to accomplish this task, namely, mechanical and herbicidal. Despite efforts devoted to developing these methods of control, little is known about the current status of their use by the utility industry.

To assess current practices, a two-part study was developed in the Michigan State University Department of Forestry—one part focusing on transmission rights-of-way (reported in this article) and the second focusing on distribution rights-of-way. The study was initiated following recommendations from the Vegetation Management Task Force in the Environmental Stewardship Strategy for Electric Utility Rights-of-Way. The primary purpose was to describe current vegetation control techniques used by utility companies, with a secondary objective of quantifying the active ingredient per acre applied for the herbicides reported. This data could assist in the assessment of possible secondary exposure (post-dilution) risks incurred by applicators and the environment. The Stewardship Strategy addresses these concerns by focusing on "minimizing the amount of active ingredient of a particular product (or products) applied per acre rather than reducing the total volume of products used" (VMTF 1996). Therefore, calculating active ingredient per acre applied could provide baseline data to determine whether a further reduction is required.

METHODS

A survey was developed that asked utility representatives to provide information on several 1995 characteristics of the transmission line rights-of-way for which their companies were responsible. The survey contained four categories of questions: right-of-way characteristics, control methods used, total cost of vegetation management, and priorities of vegetation management. The survey was piloted to several members of the Vegetation Management Task Force. Four rounds of pilot studies were done, from which suggestions regarding content and ease of completion were incorporated for the final version.

The study was a census of companies represented by the members of the Utility Arborist Association (UAA). A total of 220 UAA companies, consisting primarily of investor-owned utilities, were identified. These companies represented 49 U.S. states and four Canadian provinces.

The original survey and four callbacks were mailed to the Utility Arborist Association companies beginning in April 1996 and ending in September 1996. Each mailing contained a copy of the survey, a

letter explaining the background and significance of the study, and a business-reply envelope for returning the survey. A letter encouraging completion and prompt return of the survey from James Downey, then-president of the UAA, was included. Once received, the surveys were categorized by region, and data were entered into a computer data file. Owing to competition concerns in the industry, and to preserve promised anonymity, all information was treated as group data. Respondents were categorized into one of five geographical regions. The five regions were Canada, and the northeastern, north central, southern, and western United States.

Statistical Analysis and Calculations

Statistical procedures and data manipulations were performed with the Anderson Bell statistical program AbStat® using a Gateway 2000 version G6-180 computer. All data were coded and entered as variables.

Calculations of active ingredient per acre (AIA) were performed for all herbicides reported. Gallons (liters) of product applied, A, were multiplied by the suggested percent dilution rate, B, and then by the percentage of active ingredient (gal/ac or L/ha) contained in the product, C. The result was then divided by the acres (hectares) treated, D, to obtain the AIA (or active ingredient per hectare, AIH).

$$\text{Active ingredient per acre} = \frac{A \infty B \infty C}{D}$$

A second variable, termed the maximum recommended application rate, was calculated to compare the manufacturer label rates with those above. Herbicide labels give a range of dilution rates; therefore, the mean recommended dilution from the label, E, was calculated as percentage of product contained in the final herbicide solution. This number was then multiplied by the maximum number in the recommended range (gal/ac or L/ha) of the application rate given on the label, F. This calculated product amount per acre (or hectare) was then multiplied by the percentage of active ingredient contained in the product, C.

$$\text{Maximum recommended application rate} = E \infty F \infty C$$

All calculations were dependent on the information provided by the respondents. Incomplete information was regarded as missing.

RESULTS

Respondent Characteristics

A total of 81 utility companies, 37% of those solicited, representing 2,600,487 ac (1,052,383 ha) of transmission right-of-way, responded to the survey (Table 1). Four companies responsible for 777,414 ac (314,609 ha) of transmission ROW represent Canada. Twelve companies responsible for 211,876 ac (85,744 ha) of transmission ROW represent the northeastern United States. Twenty-two companies responsible for 627,518 ac (253,948 ha) of transmission ROW represent the north central United States. Twenty-nine companies responsible for 824,101 ac (333,503 ha) of transmission ROW represent the southern United States. Lastly, 14 companies responsible for 159,578 ac (64,579 ha) of transmission ROW represent the western United States (Table 1).

ROW Characteristics

Sixty-nine percent (1,794,336 ac or 726,144 ha) of the total reported transmission ROW acres require vegetation control (Table 2). Twenty-one percent (546,102 ac or 221,000 ha) of the ROW acres are used for agricultural or grazing purposes. Seven percent (182,034 ac or 73,667 ha) are open land (parking lots, yards, roads,

Table 1. Sample and responses to transmission vegetation management survey 1995, including acre (hectare) representation.

	No. of survey recipients	No. of surveys returned	Acres (hectares) reported	% of total
Canada	9	4	777,414 (314,609)	30
Northeastern U.S.	39	12	211,876 (85,744)	8
North central U.S.	59	22	627,518 (253,948)	24
Southern U.S.	70	29	824,101 (333,503)	32
Western U.S.	43	14	159,578 (64,579)	6
Total	220	81	2,600,487 (1,052,383)	100
% returned overall		37		

Table 2. Total reported transmission line right-of-way acres (hectares) with land type characteristic percentages.

	Vegetation control	Agriculture/ grazing	Open without control	Other	Total
Acres (hectares)	1,794,336 (726,144)	546,102 (221,000)	182,034 (73,667)	78,014 (31,571)	2,600,487 (1,052,383)
% of acres/ hectares	69	21	7	3	100

lakes) that require no management, and 3% (78,014 ac or 31,571 ha) represents other land use, such as submarine and subsurface cables, conductors designed with greater than 100 ft (30.5 m) clearance, or a combination of agricultural and open land not requiring management (Table 2).

Seventy-five percent of the responding companies reported that they used herbicides on transmission ROW acres that required vegetation control. Of those same companies, however, the vast majority (89%) reported that there were also areas of their ROWs for which mechanical control methods were used exclusively to control vegetation.

Herbicides Used

Garlon 3A was the most applied herbicide along transmission rights-of-way in 1995, with 162,880 gal (616,566 L). Garlon 4 was second, with 57,694 gal (218,395 L), while Accord was third, with 42,447 gal (160,679 L). The mixture of Accord and Arsenal followed, with 32,349 mixed gal (122,454 mixed L) applied. Arsenal applied alone was fifth, with 19,143 gal (72,464 L), and Krenite S completed the list of top six herbicides used, with 8,807 gal (33,338 L) applied. A total of 417,983 projected gal (1,582,233 L) of herbicides were applied in 1995 (Table 3).

Methods of Herbicide Application

Respondents were asked to report application methods from six commonly used practices in the vegetation control industry. The methods were basal, cut surface, high-volume foliar application with a hand gun (HVF), low-volume foliar application with a backpack or hand sprayer (LVF), aerial spraying (including herbicide side trim), and low-volume foliar broadcast (LVFB) such as fixed boom and/or radiarc.

The two general types of herbicide application techniques are selective and nonselective (Table 4). Selective techniques, such as basal and low-volume foliar methods, target only the undesirable vegetation, leaving behind herbaceous and low-growing woody plants to establish shrub-dominated communities resistant to tree seedling invasion (Niering and Goodwin 1974; Bramble et al. 1991). Cut-surface techniques can be either selective or nonselective, depending on the situation, because a mechanical cutting of brush is required. Nonselective techniques, such as high-volume foliar and aerial methods, are used to re-establish control of the right-of-way vegetation. These broad-sweeping techniques, used in areas containing over 2,000 stems per acre, generally kill all vegetation within a given ROW and create a “clean slate” where desirable vegetation can become established. In most cases, a period of intensive maintenance following nonselective techniques is required to achieve the desired results. If the maintenance is not performed, the ROW will revert to its original problem state.

Except in the case of aerial application, most nonselective techniques require the use of heavy equipment. Coupled with eradication of most vegetation, this technique actually produces soil conditions that can benefit the establishment of the undesirable vegetation. These effects, however, are not exclusive to nonselective herbicide techniques because they also exist following a mechanical clearing of brush (Luken et al. 1991).

Selective techniques can be used effectively only in areas where stem densities are low and tree size is small (DowElanco 1994; DuPont 1996). Typically. these are areas of the transmission ROW that are in transition to, or exist as, a stable, low-growing plant community. This situation exists as a result of previous maintenance or the climatic conditions of the area.

Table 3. Most common herbicides used by respondents along transmission rights-of-way: 1995.

Herbicide	Frequency reported	Projected gallons (liters) of sample population
Garlon 3A	10	162,880 (616,566)
Garlon 4	19	57,694 (218,395)
Accord	14	42,447 (160,679)
Accord/Arsenal	9	32,349 (122,454)
Arsenal	10	19,143 (72,464)
Krenite S	9	8,807 (33,338)
Other	56	94,663 (358,337)
Total		417,983 (1,582,233)

At least 53% of reported herbicide methods were selective (Table 4). Despite the disadvantages of nonselective treatments, high-volume foliar methods were the most common of all treatments, after basal. In fact, if one case of 36,523 ac (14,780 ha) treated with a basal method had been removed from the analysis, the most common application method would be high-volume foliar.

Mechanical Vegetation Control

Mechanical methods were divided into two categories, depending on the dimensions of measurement: treated ROW acreage and linear side trim of ROW. Treated acreage is represented by two methods: mowed acres and hand-treated acres. Mowed acres represent 82% (394,997 ac or 159,850 ha) of all mechanically treated ROW (Table 5). A considerable number of respondents in all regions neither mowed nor used hand equipment to treat transmission line ROWs.

The second type of mechanical control is a linear method known as a side trim. For purposes of this study, side trim methods were split into three categories: side trim with a bucket truck, side trim manual, and side trim with a helicopter. Side trim with a bucket truck was used on 50% of the reported side trim miles, but this method was not used by any of the Canadian respondents. A total of 16,767 mi (26,983 km) of transmission line ROWs were treated using a side trim method (Table 6).

Table 4. Herbicide application methods, and their selectivity, ranked by total acres (hectares) treated: 1995.

Method	Type	Acres (hectares)	% of total
Basal	Selective	50,363 (20,381)	28
High-volume foliar	Nonselective	42,128 (17,049)	24
Low-volume foliar with backpack or hand sprayer	Selective	40,231 (16,281)	23
Cut surface	Selective/non-selective	34,025 (13,769)	19
Aerial	Nonselective	7,357 (2,977)	4
Low-volume foliar broadcast	Selective	3,974 (1,608)	2
Total		178,078 (72,066)	100

When asked why mechanical methods were chosen over herbicide methods to control vegetation, the two most frequently given reasons by the respondents were public perception and cost.

Risk-Reduction Strategy

The second intent of the study was in direct response to the use of a risk-reduction strategy proposed in the Stewardship Strategy for Electric Utility Rights-of-Way. Minimizing the amount of active ingredient per acre applied, rather than the total volume of products used, was the primary focus. To assist in the analysis of risk, the average active ingredient per acre for each reported herbicide was calculated. Dilution rates of herbicides prior to application differ for each method used; therefore, the results for each application method are separated.

Table 5. Acres (hectares) of ROWs treated with mowing and hand equipment by region: 1995.

Region	Mowing	Hand equipment	Total	% of total
Canada	135,000 (54,633)	46,500 (18,818)	181,500 (73,451)	38
Northeastern U.S.	1,386 (561)	4,152 (1,680)	5,538 (2,241)	1
North central U.S.	6,202 (2,510)	11,004 (4,453)	17,206 (6,963)	4
Southern U.S.	249,253 (100,869)	22,505 (9,107)	271,758 (109,976)	56
Western U.S.	3,156 (1,277)	2,610 (1,056)	5,766 (2,333)	1
Total	394,997 (159,850)	86,771 (35,114)	481,768 (194,965)	100
% of total	82	18		

Table 6. Miles (km) of transmission ROWs controlled by side trim methods by region: 1995.

Region	Bucket truck	Manual	Heli-copter	Total	% of total
Canada	0	30 (48)	600 (966)	630 (1,014)	4
Northeastern U.S.	171 (275)	3,346 (5,385)	120 (193)	3,637 (5,853)	22
North central U.S.	1,414 (2,276)	2,110 (3,396)	167 (269)	3,691 (5,940)	22
Southern U.S.	6,385 (10,276)	1,196 (1,925)	535 (861)	8,116 (13,061)	48
Western U.S.	370 (595)	173 (278)	150 (241)	693 (1,115)	4
Total	8,340 (13,422)	6,855 (11,032)	1,572 (2,530)	16,767 (26,983)	100
% of total	50	41	9		

Table 7. Ratio comparisons of actual to recommended active ingredient per acre for all respondents.

	Method of application			
Herbicide	LVF* Actual:Rec.	HVF* Actual:Rec.	LVFB* Actual:Rec.	Aerial Actual:Rec.
Garlon 3A	4:1	1:93	1:109	—
Garlon 4	1:6	1:7	—	—
Accord	1:9	1:29	1:33	1:62
Arsenal	1:8	1:93	1:307	1:165
Krenite S	1:65	1:26	—	1:12
Escort	1:35	1:63	1:35	1:35
Tordon K	—	1:2	1:305	—

*LVF = Low-volume foliar with backpack or hand sprayer, HVF = high-volume foliar, LVFB = low-volume foliar broadcast.

Calculating the active ingredient per acre provides only half of the information required to evaluate whether reduction is necessary. Ratio comparisons of the active ingredient per acre for the most common herbicides with the maximum recommended application rates (gal/ac or L/ha) reveals if there is, indeed, a potential secondary exposure risk to humans and the environment (Table 7). Basal and cut-surface comparisons were excluded because the rates of application are based on a per-tree or per-stump basis and not per acre Herbicide mixtures were also excluded because the variability in mixture possibilities eliminates a standard from which comparison can be made.

It should be noted that a number of respondents failed to provide the information necessary to completely represent all reported herbicide applications using a specific method. Therefore, the ratios should be viewed as possible trends in application, and not an absolute for all areas.

Vegetation Management Budget

A total of US$81,636,098 was spent annually among all respondents for their vegetation management programs. Sixty-six percent of this amount was for mechanical control, while 34% was for herbicidal control. Canadian dollars were converted to U.S. currency with an 1995 exchange rate of $0.75 Canadian: $1 U.S. (Table 8).

Vegetation Control Priorities

The respondents were asked to rank eight factors in vegetation control in terms of priorities. They ranked them as follows (first being most important): providing safety and reliability of service, providing customer satisfaction, lengthening the vegetation control cycle, reducing liabilities, accentuating the aesthetics, creating wildlife habitat, minimizing herbicide use, and increasing biodiversity.

DISCUSSION AND CONCLUSIONS

A survey to describe the 1995 transmission ROW vegetation control programs was sent to 220 Utility Arborist Association member companies. The survey solicited information regarding right-of-way characteristics, control methods used, total dollars spent on vegetation management, and priorities of the vegetation management program. Data from the survey represented 37% of the sample universe, but based on data published in the Statistical Yearbook of Electric Utilities (1996), it represented over 48% of the investor-owned ROWs over 40 Kv in service throughout the United States (VMTF 1996). These statistics do not include Canadian data; therefore, all estimates of total ROW acres requiring vegetation control, acres treated mechanically and with herbicides, gallons of Garlon 3A and 4, and total gallons of herbicide applied nationally are listed in Table 9 and are relevant only to United States companies.

Extrapolations of the reported figures in this study to the entire United States were performed using a conversion factor of 2.537. This number is the ratio between the total acres of United States transmission ROWs reported in the study (1,153,574 ac or 467,197 ha) and the total investor-owned transmission ROWs over 40 Kv in service (2,927,132 ac

Table 8. Regional average annual budget allocations (U.S.$) for vegetation control 1990–1995.

Region	Herbicide dollars	% of total region dollars	Mechanical dollars	$ of total region dollars	Total dollars	% of dollars
Canada	2,405,625	34	4,625,625	66	7,031,250	13
Northeastern U.S.	7,395,490	57	5,431,510	43	12,827,000	17
North central U.S.	9,126,802	29	17,805,546	71	26,932,348	31
Southern U.S.	8,039,400	31	22,846,100	69	30,885,500	34
Western U.S.	381,920	10	3,578,080	90	3,960,000	5
Total (U.S.$)	27,349,237		54,286,861		81,636,098	
% of total dollars		34		66		100

Table 9. Estimated vegetation control for the United States (Canadian data not included).

Treatment	Data from sample	Estimated amount (column 2 ∞ 2.537)
Total acres (hectares) of transmission ROWs requiring vegetation control	1,166,767 (472,175)	2,960,088 (1,197,909)
Acres (hectares) treated mechanically	300,268 (121,515)	761,780 (308,282)
Acres (hectares) treated with herbicide	172,221 (69,696)	436,925 (176,818)
Gallons (liters) of Garlon 3A applied	130,304 (493,253)	330,581 (1,251,383)
Gallons (liters) of Garlon 4 applied	37,075 (140,344)	94,059 (356,052)
Total gallons (liters) of all herbicide applied in the U.S.	333,742 (1,263,347)	846,703 (3,205,111)

or 1,185,488 ha) published in the Statistical Yearbook of Electric Utilities (1996).

Vegetation Management

Acres treated mechanically outnumbered those treated chemically by a margin of 2.7:1. A total of 481,768 ac (194,965 ha) were treated mechanically (Table 5), with an additional 16,767 mi (26,983 km) of ROWs mechanically side trimmed (Table 6), while a total of 178,078 ac (72,066 ha) were treated with herbicides (Table 4).

Mechanical techniques (especially mowing) have been shown to cause a proliferation of undesirable vegetation via the phenomenon of stump sprouting. Increased stem density and decreased accessibility are the result, neither of which are conducive to herbicidal techniques. Therefore, continual mowing of areas creates a situation in which only mechanical techniques can be effectively employed.

The majority of respondents reported negative public perception about chemicals as the most common reason for the preference of mechanical control. This perception can be remedied through a two-step initiative. The first step is an educational program to explain utility company policies and the benefits of herbicide techniques. The Vegetation Management Task Force and the Edison Electric Institute, with the publication of the Environmental Stewardship Strategy for Electric Utility Rights-of-Way, have initiated this step. Utility companies can use the information provided to develop literature and programs to help ease any anxiety that residents may have regarding herbicide application.

The second step involves increasing the public's confidence in the safety and effectiveness of herbicide programs. That concern may be resolved partially by the results of this study. Results, however, are only as strong as the information received. The most startling finding of this study was the lack of knowledge some respondents had about their transmission ROW vegetation control programs, as demonstrated by occasional missing information in herbicidal and mechanical control categories.

Herbicides

The two most common herbicides in use, Garlon 3A and Garlon 4 (more than 169,000 gal or 639,733 L) pose little threat to human or environmental well being if application is done according to the label. In most cases, adverse effects from these herbicides would occur only with an extremely large exposure amount (2,000 to 2,500 mg/kg). The risk of these chemicals to humans is relatively low. Each herbicide is required to undergo U.S .Environmental Protection Agency analysis and approval to be registered for public use. The low toxicity of these herbicides results from the mode of action of the active ingredients. The majority of herbicides mentioned inhibit enzymes found only in plants; therefore, organisms without these enzymes are not adversely affected. Unless they are improperly applied and/or proper precautions are not taken, these herbicide formulations pose little threat to workers and those living adjacent to a ROW.

The environmental impacts of these chemicals are also small if proper application procedures are followed. Effects on the surrounding environment play just as important a role in herbicide classification as human risk from exposure. Examples are the Tordon herbicides, which are categorized as restricted because of the high soil motility of their active ingredient Picloram and the potential off-target effects that could occur, but not because of toxicity to humans. The widespread use of water-based herbicides such as Accord, Arsenal, Tordon 101M, and Krenite suggests that a shift from oil-based carriers is occurring. Use of water-based chemicals in conjunction with selective application methods allows the control of target species, while having little effect on the surrounding soil, which in turn, helps establish a low-growing plant community resistant to tree seedling invasion (Bramble 1991).

Risk-Reduction Analysis

To determine whether the reported application rates posed any risks to applicants and the public at large, comparisons of active ingredient per acre applied and the maximum recommended application rates were performed. The results were contrary to what was expected. The original concern was that the calculations would reveal over-application of herbicides on transmission rights-of-way. Instead, these herbicides were applied well below the maximum labeled rate. In some cases, these ratios were two orders of magnitude less. Only Garlon 3A applied using a low-volume foliar technique with a backpack or hand sprayer exceeded the recommended maximum active ingredient per acre (Table 7).

Depending on the effectiveness of the herbicide control program, these low ratios may be assessed in one of two ways. If the programs are effective with low ratios, then the acceptance of herbicide application as a viable vegetation management technique should be possible. Effective programs with low application rates reduce the pressure for herbicide reduction. A low potential risk may reduce the negative perception of herbicides currently held by the public. The fact that some herbicides are applied below the recommended maximum rates, with desired results, can help improve the current negative image of herbicides.

If the herbicide programs are ineffective, however, then the cost of herbicide control is altered. The higher cost of herbicide programs was a common reason some utility companies preferred mechanical methods. Low application rates may cause decline symptoms on the targets without full control. Poor control of target species requires reapplication, which adds to cost. Some utility companies pass these additional costs on to the contractor by implementing a 100% control policy. In most cases, these policies require a visual inspection of areas for missed targets. Individual plants that show symptoms of decline are not re-treated. Future problems arise when these targets recover from the application and become outage threats. These added costs are reflected in the next bid to treat new areas. Thus, ineffective herbicide programs result in target re-treatment, causing a double payment for the same target, which could explain the dissatisfaction of some industry members toward herbicide vegetation control.

Another possible, though not accepted, explanation for these low ratios is that the herbicide application information provided was unrepresentative. The motive for this type of response could be the possibility of company policy being revealed publicly. As the industry becomes more competitive, this could be perceived as giving other companies an advantage. Although the possibility of inaccurate information is recognized, the assumption is that professional integrity was used during completion of this survey.

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Résumé. Un questionnaire a été envoyé à 220 compagnies membres de l'Association des arboriculteurs de services publics (Utility Arborist Association) afin de déterminer quelles sont les méthodes de contrôle de végétation employées sur les emprises de lignes électriques. Le document contenait des questions relatives aux caractéristiques des emprises, aux méthodes de contrôle utilisées, aux montants totaux investis sur la gestion de la végétation et aux priorités du programme de gestion de la végétation. Les données sur les emprises qui ont été rapportées indiquaient que les emprises de lignes de plus de 39 kV accaparaient plus 48% des investissements à ce chapitre aux États-Unis. Plus de 75% des répondants ont indiqué faire usage d'herbicide sur leurs emprises. Néanmoins, les superficies traitées mécaniquement étaient plus grandes que celles traitées chimiquement, et ce dans une proportion de 2,7:1. Le Garlon 3A et le Garlon 4 étaient les herbicides les plus employés avec un volume combiné de 838181 litres par rapport au total de 2089502 litres d'herbicides utilisés dans les emprises électriques en 1995. Il est apparu que des quantités plutôt faibles d'ingrédients actifs ont été appliquées par unité de surface. Les applications d'herbicide par méthodes dites basale, à volume foliaire élevé ou à volume foliaire faible, et ce au moyen d'un réservoir dorsal ou d'un pistolet à main, ont été employées dans 75% des cas d'emprises traitées aux herbicides.

Zusammenfassung. An 220 Baumpflegefirmen, die mit der Pflege von Korridoren unter Überlandleitungen beauftragt sind, wurden Fragebögen verschickt, die die Methoden zur Vegetationskontrolle erfassen sollen. Der Fragebogen enthielt Fragen zum Durchfahrtrecht, angewendeten Kontrollmethoden, Bruttosumme der Investition im Vegetationsmanagement und die Prioritäten des Vegetationsmanagementprogramms. Die gemeldete Fläche des Durchfahrtsrecht entsprach bei mehr als 39 aktiven Kv in den Vreinigten Staaten über 48 % von der im Eigentum des Investors stehenden Durchfahrtsrechts. Über 75 % der Einsendungen berichteten von Herbizideinsatz auf ihren Korridoren. Dennoch war die mechanisch behandelte Fläche größer als die chemisch behandelte mit einem Rand von 2,7:1. Garlon 3A und Garlon 4 überragten in der Anwendung mit kombinierten 838.181 l bei den schätzungsweise im Jahr 1995 aufgewendeten Herbiziben von 2.089.502 l.Es scheint, daß recht geringe Dosen von aktiven Inhaltstoffen auf der Fläch ausgebracht wurden. Applikationen mit der Rücken- oder Handspritze überwogen mit 75 % von der insgesamt behandelten Fläche.

Resumen. Un estudio sobre los métodos de control de la vegetación a lo largo del derecho de vía, fue enviado a 220 compañías de la Utility Arborist Association. El cuestionario tenía preguntas con relación a las características del derecho de vía, los métodos de control utilizados, el total de dólares gastados en estudios de manejo de la vegetación, así como las prioridades en los programas de manejo. El área de ROW (derecho de vía) reportada representó arriba del 48% de toda la de 39 Kv en servicio a través de los Estados Unidos. Arriba del 75% de los que respondieron reportaron usar herbicidas sobre los derechos de vía. Sin embargo, las áreas tratadas mecánicamente fueron mayores que las tratadas químicamente por un margen de 27:1. Garlon 3A y Garlon 4 toparon todos los herbicidas con una combinación de 220,574 galones (838,181 l) del estimado 549,869 galones (2,089,502 l) de herbicidas aplicados a los derechos de vía de transmisión en 1995. Parece que están siendo aplicados muy bajos niveles de ingrediente activo por unidad de área. Aplicaciones basales y de alto y bajo volumen foliar, con mochila de aspersión o aplicaciones con pistola, respondieron por aproximadamente el 75% de los acres de transmisión ROW tratados con herbicidas.