

TREE GROWTH REGULATORS REDUCE LINE CLEARANCE TRIMMING TIME

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Abstract. Untreated silver maples (*Acer saccharinum*) and trees that were trunk injected with the tree growth regulator (TGR) paclobutrazol in northern Indiana were matched according to crown size, trim type, and number of overhead conductors. Trim time and total job site time for TGR-treated and untreated trees within four trimming regimes (single phase side trim or V-trim and three phase side trim or V-trim) were recorded for each tree. Trim time for TGR-treated trees side trimmed was not significantly reduced for either single phase or three phase lines. Trim time for V-trimmed TGR-treated trees was reduced significantly for both single phase and three phase lines (36% and 48%, respectively). Total job site time was not reduced significantly for TGR-treated trees either side trimmed or V-trimmed around single phase lines. However, total job site time for side trims and V-trims of TGR-treated trees was reduced significantly (25% and 58%, respectively) for trees associated with three phase lines.

Indiana Michigan Power (I&M) follows a "just in time" trimming policy. Work planners designate trees that need to be trimmed during the trimming cycle. Because each circuit is inspected annually and the only trees trimmed are those that require trimming during the current cycle, I&M can realize the maximum TGR cycle extension on those trees that hold beyond the expected cycle length. I&M's flexible lump sum unit price system compensates the contractor a fixed fee per tree using an average man hour/unit of work. This average is developed from the previous three years of circuit history. To integrate TGR trees into this system, I&M needed to develop a "multiplier" derived from the actual difference in trimming time of a TGR population versus a control population.

The purpose of this study was to determine to what extent the use of TGR reduced total job site time and trim time. Total job site time per tree should not vary unless one of the following vari-

able components changes:

Set-up Time. This is the actual time it takes at the job site to arrange signs, tools and equipment. This could change if the reduced trimming area causes less repositioning of a bucket truck to reach the entire crown.

Trim Time. Trim time is the actual time from the moment the trimmer makes the first cut until the last cut is completed.

Clean-up Time. This is the time to pick up and chip all limbs and debris, and adequately clean the work area. This could be reduced if the amount of biomass were reduced as a result of TGR treatment.

Methodology

Two matching populations of 52 treated and 52 untreated silver maples (*Acer saccharinum*) were selected from South Bend (treated) and Elkhart (untreated), Indiana. These towns are about 24 km (15 miles) apart. Treated trees were selected from a population that had been trunk injected with paclobutrazol at the appropriate labeled rate as an operational procedure. Twenty-nine of the TGR-treated test trees had been injected in September-October, 1989, and trimmed before the 1990 growing season; four full growing seasons before this study. Twenty-three of the TGR-treated test trees had been injected in July-August, 1991, and trimmed before the 1992 growing season; two full growing seasons before this study. Untreated control trees had been trimmed in late 1991 to early 1992; well before the 1992 growing season; two full growing seasons before this study. All trees in the TGR-treated and untreated control

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groups needed to be trimmed during 1994. Selection criteria required trees of good vigor and similar trimming technique, side trim or V-trim (drop crotch), as well as a similar number of conductors and other obstructions such as telephone and cable television lines. The trees had similar orientation to the conductors, i.e., under or adjacent to the conductors, and trees were of similar crown size. Crown size was determined using the same criteria used by the TGR injection crews: 1) very small, 2) slightly small, 3) average, 4) slightly large, and 5) very large crown. Tree heights also were matched as closely as possible. The study had eight treatments consisting of two trim types (side and V), two TGR treatments (treated and untreated), and two conductor types (single and three phase).

The time required for two portions of the trimming job were evaluated: 1) total job site time and 2) actual trim time. Job site time consisted of set-up, trimming, and clean-up for a two-person bucket crew. Job site time began when the crew exited the truck and terminated when all equipment was returned to the truck and the crew was ready to leave the job site. Trim time started when the crew made the first cut and ended when the last cut was complete. Job site and trim times were recorded by an I&M employee whose job duties were not related to the Right-of-Way Maintenance Depart-

ment of the South Bend Division. To help insure objectivity in record keeping, the intent of the study was not discussed with the timekeeper during the test. Job site time and trim time were evaluated in March, 1994.

The same two-person bucket crew conducted all trimming activities. The crew composition did not vary throughout the test period. No trees were trimmed during inclement weather. The crew usually alternated daily between treated and untreated trees to help negate any weather bias and to prevent the crew from forming a trimming pattern. The trimming crew also was unaware of the intent of the study during the test period. Total job site time and trim time, both in minutes, were subjected to a standard t-test to compare differences between the two tree populations

Results

Trim time. There were no significant differences in the times required to side trim TGR-treated and untreated trees adjacent to either single or three phase conductors (Table 1). However, there were significant differences in the times required to V-trim TGR-treated and untreated trees under both single and three phase conductors; 36% less for single phase and 48% less for three phase lines.

Total job site time. Total job site time was

Table 1. Trim time for TGR-treated and untreated silver maple trees separated by trim type and line phase.

Trim type	Single phase			Three phase		
	Untreated	TGR treated	Change	Untreated	TGR treated	Change
	(minute)	(minute)	(%)	(minute)	(minute)	(%)
Side Trim	3.4 (n = 21, 20)	4.6	+35 ns	3.7 (n = 14, 13)	3.8	+3 ns
V-Trim	6.6 (n = 11, 11)	4.2	- 36 *	11.3 (n = 6, 8)	5.9	- 48 **

ns = not significantly different at the 5% level

* = significantly different at the 5% level

** = significantly different at the 1% level

Table 2. Total job site time for TGR treated and untreated silver maple trees separated by trim type and line phase.

Trim type	Single Phase			Three Phase		
	Untreated	TGR treated	Change	Untreated	TGR treated	Change
	(minute)	(minute)	(%)	(minute)	(minute)	(%)
Side Trim	9.8 (n = 21, 20)	11.5	+17 ns	10.6 (n = 14, 13)	7.9	- 25 **
V-Trim	15.8 (n = 11, 11)	12.0	- 24 ns	25.8 (n = 6, 8)	10.8	- 58 **

ns = not significantly different at the 5% level

* = significantly different at the 5% level

** = significantly different at the 1% level

significantly less for TGR-treated trees under or adjacent to three phase lines regardless of whether trees were side trimmed (25%) or V-trimmed (58%) (Table 2). TGR treatment of trees under single phase lines did not significantly change total job site time regardless of trim type.

Discussion

Trim times. The influence of line phase on trim times for TGR-treated trees is a result of the regrowth pattern of TGR-treated trees and the difference in trimming requirements between single and three phase lines. The first sprouts to grow uncontrolled in a TGR-treated tree occur on the inner stems of the lower crown. The upper and outer portions of the crown may be controlled for several years after these first sprouts develop. This pattern of regrowth has been consistent with both soil-applied and trunk-injected TGR in the I&M South Bend Division. When drop crotch trimming for clearance of a three phase line (8 foot cross arm), the trim extends further into the depth of the crown, actually eliminating the inner stems, which normally are only trimmed for clearance of a single phase line. When drop crotch or side trimming directly adjacent to a single phase primary, the clearance begins around a single point in space in comparison to three phase trimming

beginning with an eight foot section of space. Drop crotch trims around the three phase required little or no trimming for side clearance. The bulk of the regrowth occurring under the conductors originated from the remains of the inner stems of the crown. Much less bucket repositioning is required to trim this portion of the crown. Its localized pattern tends to greatly increase the speed of the trim. Presumably, reduced biomass decreases clean-up time.

This study indicates a significant time savings to retrim TGR-treated trees that require drop crotch trimming under three phase conductors. The 58% reduction in job site time is substantial and is similar to the 59% reduction in trim and chip time reported by Redding et. al. (2), also for silver maple. However, the actual process of trimming a tree is, in most cases, not the largest portion of the total cost of trimming. Fixed costs associated with trimming (e.g., supervision, customer contacts prior to work, crew training, travel time, and equipment maintenance) normally account for the majority of the cost. Therefore, to calculate the true cost savings, the percent time saved must be multiplied by the known or estimated normal trimming time. Without accurate historical data the actual cost savings derived from the use of TGRs can be difficult to identify. For a modeled

work situation, job site time was estimated to be 21% of the costs and the remaining 79% were fixed costs (1). Therefore, the true savings is 58% of the 21% or a 12.2% savings for TGR-treated silver maple trees that are V-trimmed for three phase line clearance. For TGR treated trees adjacent to a three phase line that require side trimming, the actual savings is 25% of 21%, or 5.2%. The actual multiplier would be a weighted value according to the proportional distribution of the tree population. Using I&M's historical data to assess the actual savings, the cost savings is around 10%.

Literature Cited

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Zusammenfassung. In dieser Studie wurden unbehandelte und mit Baumwachstumsregulatoren behandelte Silberahorne (*A. saccharinum*) entsprechend ihrem Kronenhabitus und ihrer Schnittform (entweder seitlicher Rückschnitt oder V-förmiger Schnitt) miteinander verglichen. Für jeden einzelnen Baum wurde die gesamt benötigte Zeit für die Ausführung und die reine Schnittzeit gemessen. Bei beiden Schnittmethoden war der Gesamtzeitaufwand für behandelte Bäume wesentlich geringer. Für behandelte Bäume mit V-förmigem Schnitt war die gesamt benötigte Zeit um 58% reduziert und die Schnittzeit um 48%.