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Costs of applying plant growth regulators (PGRs) for shrub maintenance

By: Ariana Torres Bravo, torres2@purdue.edu

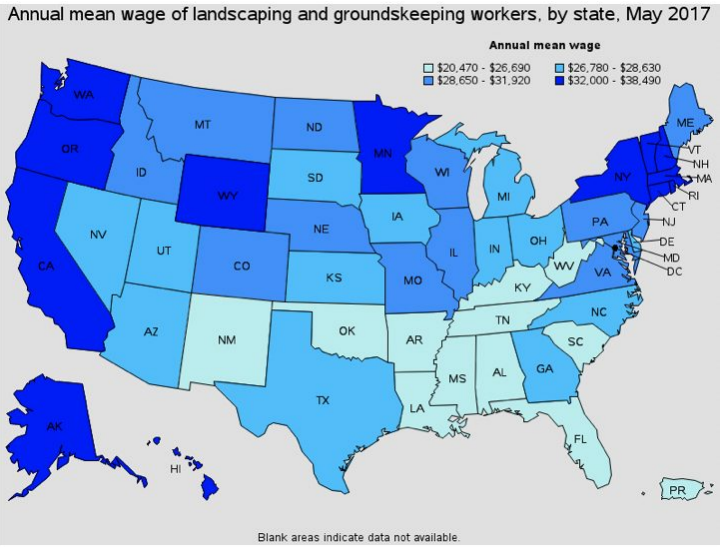
Labor is one of the largest expenses in the landscape services industry, and maintenance services, such as pruning, are one of the most labor-intensive tasks. While plant growth regulators (PGRs) can be a cost-effective tool to control growth in shrubs and reduce labor expenses, a lack of information on the economic feasibility of PGRs has limited their adoption.

Using a partial cost analysis approach, Dr. Ariana Torres and master student Enrique Velasco published a series of three articles illustrating the economics of applying PGRs in the landscape industry. This article summarizes the first publication titled **A Partial Cost Analysis of Using Paclobutrazol for Shrub Maintenance.** This and other articles of the series ***Economics of Using Plant Growth Regulators in the Landscape*** can be downloaded at www.hort.purdue.edu/hortbusiness.

Our results show that PGR applications can be an economically feasible tool to effectively reduce the frequency of pruning landscape shrubs. By reducing the necessary pruning labor, managers can reduce the number of employees sent to a job visit, reallocate labor, and increase business profitability overall.

Shrub Pruning in the Landscape Industry

Shrub pruning is the purposeful removal of plant parts and is considered one of the most important cultural practices in landscape management. Due to the complexity of proper techniques and safety issues, pruning labor is among the highest paid occupations in the landscape industry. Landscape and groundskeeping workers can receive an average hourly wage of $13.73 (Bureau of Labor Statistics, 2018), which can vary depending on the location. Figure 1 illustrates the 2019 annual mean wages for landscaping and groundskeeping workers in the U.S.



Historically, landscape businesses tend to be more dependent on labor than other segments of the green industry. In order to decrease costs, business owners and managers of landscape businesses are constantly looking for ways to improve the quality and speed of manual labor. One of the strategies has been the implementation of PGRs to their maintenance toolkit. PGRs reduce plant growth through the action of an active ingredient, such as paclobutrazol, which suppresses plant growth by acting as gibberellin biosynthesis inhibitor and blocking plant cell elongation.

Our experiment

Data for this analysis comes from four experiments conducted between April and May 2016 in Florida, Texas, and Indiana. Account managers of landscape maintenance companies collected data on three shrub species: Confederate jasmine (*Trachelospermum jasminoides*), Asiatic jasmine (*Trachelospermum asiaticum*), and Thorny eleagnus (*Elaeagnus pungens*). Data collected included number and time of pruning

events and agrochemical (PGR and surfactant) applications. PGR (Paclobutrazol; Trimtect; Rainbow Treecare Scientific Advancements; Minnetonka, MN) and surfactant (Glycerin, diethylene glycol and alkyl polyglucoside; Audible 90; Exacto Inc.; Sharon, WI) rates followed product manufacturer recommendations (6.4 to 9.6 fl. oz/gal for PGR and 2ml/gal for surfactant).

Table 1 illustrates the data collected as well as the length of each experiment. We computed the percent reduction of the number of pruning events and hours per pruning for control and treated shrubs. For example, Table 1 shows treated Confederate jasmine (FL) received 67% fewer pruning events and 70% fewer hours per pruning event when compared to the control group. We can see similar results in Confederate jasmine (FL) that reduced the number of pruning events by 67%.

Table 1. Effect of Trimtect PGR treatment on number and timing of pruning cycles.

			Pre-treatment		Control		Treatment			
Shrub	State	Weeks experiment	Number cycles	Hours per cycle	Number cycles	Hours per cycle	Number cycles	Hours per cycle	Reduction number cycles (%)	Reduction hours per cycle (%)
Confederate jasmine	FL	6	1	1	3	1	1	0.3	67	70
Asiatic jasmine	FL	12	1	10	8	10	1	10	88	0
Asiatic jasmine	TX	6	1	3.75	6	3.75	1	3.75	83	0
Thorny eleagnus	IN	12	1	9	1	9	1	1	0	89

Economic Analyses

A partial cost analysis helped us investigate the change in labor costs due to PGR applications for shrub maintenance. Later, cost savings from the use of PGRs was also calculated by comparing costs of treated (with PGRs) versus untreated (control) shrubs. We standardized values to dollars per 500 ft^2 per year ($/500 ft2/year). For example, the cost of pruning was standardized to dollars spent in pruning an area of 500 ft^2.

Findings

Three out of four experiments resulted in cost savings after applying PGR. Treating Asiatic jasmine (FL and TX) and Thorny eleagnus (IN) with paclobutrazol resulted in cost savings of $956.95, $23.14, and $96.28 per 500 ft^2 per year, respectively. The amount of cost savings is mainly due to high demand of pruning hours in each species, which was offset by suppressed growth after PGR applications (Table 2). Alternatively, applying PGRs to control growth of Confederate jasmine (FL) resulted in a negative economic impact. This negative impact is likely the result of two main factors: 1) a high rate of PGR application (9.6 fl. oz/gal), which resulted in “curved leaves” as reported by account managers; and 2) a low demand of pruning hours for Confederate jasmine in Florida.

Table 2. Partial cost analysis for each shrub species in the control and treatment groups.

		Control		Treatment					
Shrub species	State	Cost of pruning	Partial net cost	Cost of pruning labor	Cost of application labor	Cost of PGR	Cost of surfactant	Partial net cost	Cost Savings
Confederate jasmine	FL	$50.46	$50.46	$5.05	$1.01	$72.77	$0.10	$78.92	-$28.46
Asiatic jasmine	FL	$1,516.57	$1,516.57	$189.57	$5.06	$364.51	$0.49	$559.62	$956.95
Asiatic jasmine	TX	$71.69	$71.69	$11.95	$2.07	$34.46	$0.07	$48.55	$23.14
Thorny eleagnus	IN	$234.21	$234.32	$26.02	$1.52	$110.24	$0.15	$137.93	$96.28

Findings from this study show that, depending on the shrub species, PGRs can reduce the labor needs in landscape maintenance due to a reduction of pruning events and pruning time of each event. For example, applying PGRs can reduce the number of pruning events by up to 83% (Asiatic jasmine, TX) and hours per pruning cycle by up to 89% (Thorny eleagnus, IN).