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Are PGRs worth it? A sensitivity analysis using Paclobutrazol for shrub maintenance

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Labor is one of the largest expenses in the landscape services industry, and maintenance services, such as pruning, is 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, 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 second publication titled **Economics of Using Plant Growth Regulators in the Landscape**. 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.

This article discusses how hourly wages, application rate, shrub species, and area of coverage impact the cost and benefit of applying PGRs for shrub maintenance. The low availability of skilled employees coupled with a tight labor market for temporary employees is a threat to the quality and availability of landscape services, as well as the profitability of the industry, which are both issues that could be partially solved with the use of PGRs. As labor market availability decreases and hourly wages increase, the economic importance of PGRs is likely to increase.

PGRs can help landscape businesses save money, as long as the cost of application is lower than the costs of pruning untreated shrubs. Our results show that cost savings of PGR applications is strongly correlated with hourly wages. Applying PGRs to shrub maintenance resulted in cost savings for all shrub species when hourly wages were higher than \$21 per hour.

What are Plant Growth Regulators (PGRs)?

PGRs tend to reduce plant growth through the action of an active ingredient, such as paclobutrazol. Paclobutrazol suppresses plant growth by acting as a gibberellin biosynthesis inhibitor and blocking plant cell elongation. PGRs are widely accepted in the ornamental industry to help control plant height, shape, and

overall size. Researchers found that paclobutrazol applications can result in shorter and more compact shrubs. Foliar sprays of paclobutrazol have resulted in growth suppression for *Ligustrum japonicum*, *Ligustrum sinense*, *Loropetalum chinensis*, and *AbeliaXgrandiflora*. Other potential benefits of PGRs applications include reduced time required to prune trees and shrubs, reduced number of pruning events, and biowaste reduction.

Economic analyses

Data and methodology for this study is described in detail in the first article of the series, *A Partial Cost Analysis of Using Paclobutrazol for Shrub Maintenance*. Economic analyses were based on the U.S. average hourly wage for landscaping and groundskeeping workers at \$13.73 per hour (Bureau of Labor Statistics, 2018). Shrubs used in the analysis include Confederate jasmine, Asiatic jasmine, and Thorny eleagnus.



Figure 1. Confederate jasmine, Asiatic jasmine, and Thorny eleagnus in landscapes.

Sensitivity analysis is a tool used to help managers and decision-makers understand how macroeconomic shocks (industry or country) and microeconomic changes (business) can impact business success. In other words, a sensitivity analysis simulates shocks that businesses can face in order to indicate how uncertainty may impact them. For example, a sensitivity analysis can be used to investigate the effect of changes in inputs (e.g., hourly wages) on business outputs (e.g., costs). In our study, changes in hourly wages may be due to changes in labor supply and/or demand or local and federal laws that stipulate minimum wages for landscape workers.

A sensitivity analysis was conducted to compare the effect of

changes in hourly wages on the partial cost savings for each shrub experiment (see first article of series, HO-315-W). The sensitivity analysis was carried out using the range of hourly wages in the landscape industry for workers involved in trimming and pruning activities, which includes:

- The federal minimum hourly wage at \$7.25 per hour;
- The average hourly wage for landscaping and groundskeeping workers at \$13.73 per hour; and
- The 75th percentile hourly wage for tree trimmers and pruners at \$22.73 per hour.

Our findings

Results from our studies illustrate how, depending on the shrub species and location, pruning costs can be reduced by applying PGRs for shrub maintenance. Table 1 suggests that applying PGRs resulted in cost savings for all experiments when hourly wages were higher than \$21 per hour, a value close to the average hourly wage for shrub and tree pruners in the industry (\$19.47).

PGR applications could be useful for landscaping businesses aiming to reduce pruning and labor costs. As shown in Table 1, Asiatic jasmine (FL) experienced the highest cost savings as wages increased from \$7.25/hour to \$22.73/hour, saving up to \$1,800 a year. An explanation for the increase in cost savings may be that the labor demand for pruning maintenance can be greatly offset by reduced shrub growth due to PGR applications.

PGRs can be an economically feasible tool to decrease pruning labor, especially when hourly wages increase. Managers and owners of landscaping businesses should consider three specific variables when determining the economic impact of PGRs: 1) area of application, 2) rate of applications, and 3) hourly wages. Increasing wages and pruning demand are directly correlated with cost savings due to PGR applications.

Table 1. Effect of hourly wage on pruning cost savings from PGR use in shrubs

Shrub species	Hourly Wages (\$/Hour)																
	7.25	8	9	10	11	12	13	13.73	14	15	16	17	18	19	20	21	22.73
Confederate jasmine	-50	-47	-44	-41	-38	-34	-31	-29	-28	-25	-21	-18	-15	-12	-8	-5	0
Asiatic jasmine	333	406	502	598	695	791	887	958	984	1,080	1,176	1,273	1,369	1,465	1,561	1,658	1,824
Asiatic jasmine	0	1	3	7	11	16	20	23	24	28	32	37	41	45	49	53	60
Thorny eleagnus	-1	10	25	41	56	71	86	97	101	116	131	146	161	176	191	207	233

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