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HO-317-W

ECONOMICS OF USING PLANT GROWTH REGULATORS IN THE LANDSCAPE

PGRcalculator: An Economic Feasibility Tool for PGRs for Shrub Maintenance

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Plant Growth Regulators (PGRs) have been proposed as a management tool for reducing the labor needs in the Green Industry. PGRs tend to inhibit plant growth and produce more compact plants (Setia et al., 1995). Although PGRs are widely accepted in the ornamental plant production, their adoption among landscape maintenance companies is limited. The cost of PGR and lack of economic feasibility analyses are likely to undermine their adoption.

To address the lack of economic studies, this publication provides information on a financial calculator, PGRcalculator, developed by the Purdue Horticulture Business Extension program. PGRcalculator displays the economic impact of using PGRs (Paclobutrazol; Trimtect; Rainbow Treecare Scientific Advancements; Minnetonka, MN) for shrub maintenance, subject to product efficacy, wages, and application rate. The tool consists of three sections: Site Information, Calculations, and Analyses. Tool analyses include cost breakdown, labor costs, labor hours, and cost savings. Each section guides the user through an easy-to-follow process to help them understand the impact of using PGRs for shrub maintenance. In addition, the analyses use a sensitivity approach to help users understand how Trimtect PGR efficacy influences labor and maintenance costs. The tool is available at www.hort.purdue.edu/HortBusiness.

This publication uses PGRcalculator to illustrate the impact of PGRs on shrub maintenance and the direct effect on labor costs, labor hours, and cost savings. It is the third of three articles illustrating the economics of PGRs in the landscape industry. T**his publication provides a guide to using** PGRcalculator, **a financial tool developed to understand the economic benefits of PGRs**.

- The first publication in the series, HO-315-W, investigates the labor and dollar savings of applying PGRs in three shrubs located in three states.
- The second publication, HO-316-W, provides results from a sensitivity analysis to illustrate how hourly wages impact labor costs and dollar savings for these experiments.

Data Input

The tool consists of three sections: Site Information, Calculations, and Analyses. This study used Trimtect as the PGR applied to the site.

The Site Information section guides users through a series of questions to input key variables associated with calculating the impact of Trimtect (Table 1). Key variables include total area of PGR treatment, number of hours for each pruning event, number of pruning events per year, hourly wage paid to pruning workers, shrub specie, PGR application rate, and number of PGR applications per year. Table 1 illustrates the questions in the Site Information section and their description.

Table 1. Key variables of the economic feasibility analysis

Variable	Description
Total area	Area of the site the user wants to investigate the effect of PGRs
Time of pruning	Time of a single pruning event for a specific area (in hours)
Pruning events	Number of pruning events in a year
Hourly wage	Typical hourly wage for pruning workers
Shrub specie	Common name of the shrub specie
Application rate	Trimtect application rate in fluid ounces per gallon (fl. oz/gal)
RTU coverage	Area covered by 1 gallon of Trimtect solution (manufacturer suggests 1 gallon of RTU solution covers 300 square feet)
Number of applications	The number of Trimtect applications in a year

In our case study, we applied Trimtect to 1,000 square feet of Asiatic jasmine. Each pruning event took 10 hours, and the crew expects to perform 30 pruning events throughout the year. This case study uses an hourly wage of $13.70 and a Trimtect rate of 9.6 fl. oz. per gallon. The calculator sets by default the price of Trimtect at $165 per gallon, which can change depending on the manufacturer and retailer prices. According to manufacturer recommendations, a crew can expect to cover 300 square feet per gallon of RTU solution. Figure 1 illustrates the Site Information section in the spreadsheet. In the PGRcalculator, cells in blue indicate the user needs to input information into the calculator.

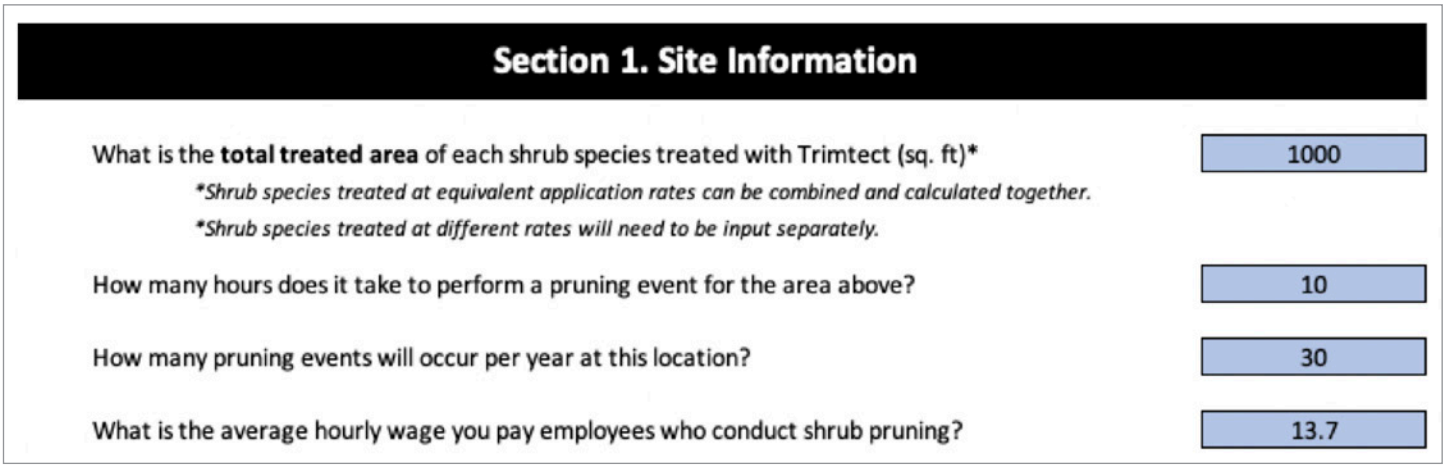

Figure 1. Input information, important user's variables

Tool Analyses

Section 2 provides the calculations obtained from inputting data into Section 1. The tool provides the following calculations: annual number of expected pruning events, annual number of expected pruning hours, coverage of Ready-To-Use (RTU) solution, and annual Trimtect volume. Cells in yellow indicate the spreadsheet generates information automatically. Figure 2 illustrates the calculations obtained from Section 2. For example, it is expected that 1,000 square feet of Asiatic jasmine will require 300 hours of pruning hours. Based on application rate and RTU coverage, it was estimated that this site will use 64 fl. oz. in a year.

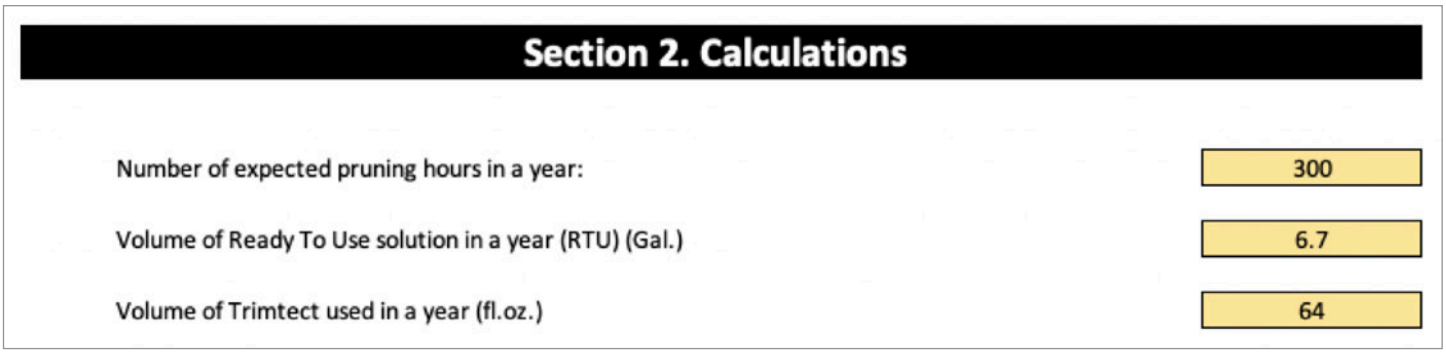

Figure 2. Calculations based on user's information

Lastly, Section 3 provides the economic analyses including cost breakdown (Figure 3), labor cost (Figure 4), labor hours (Figure 5), and cost savings (Figure 6). Cost breakdown analysis illustrates the two main costs in the tool: labor cost without PGR and cost of agrochemicals (Trimtect and surfactant). Cost of labor without Trimtect is the total pruning wages paid in a year to maintain the site if Trimtect was not applied. Alternatively, the second cost is the annual cost of Trimtect and surfactant needed to cover the site. The graph in Figure 3 illustrates the cost comparison of labor and agrochemicals. For our case study, the landscape services business would spend $4,119 on pruning wages in a year without Trimtect, while agrochemical costs would account for $82.61.

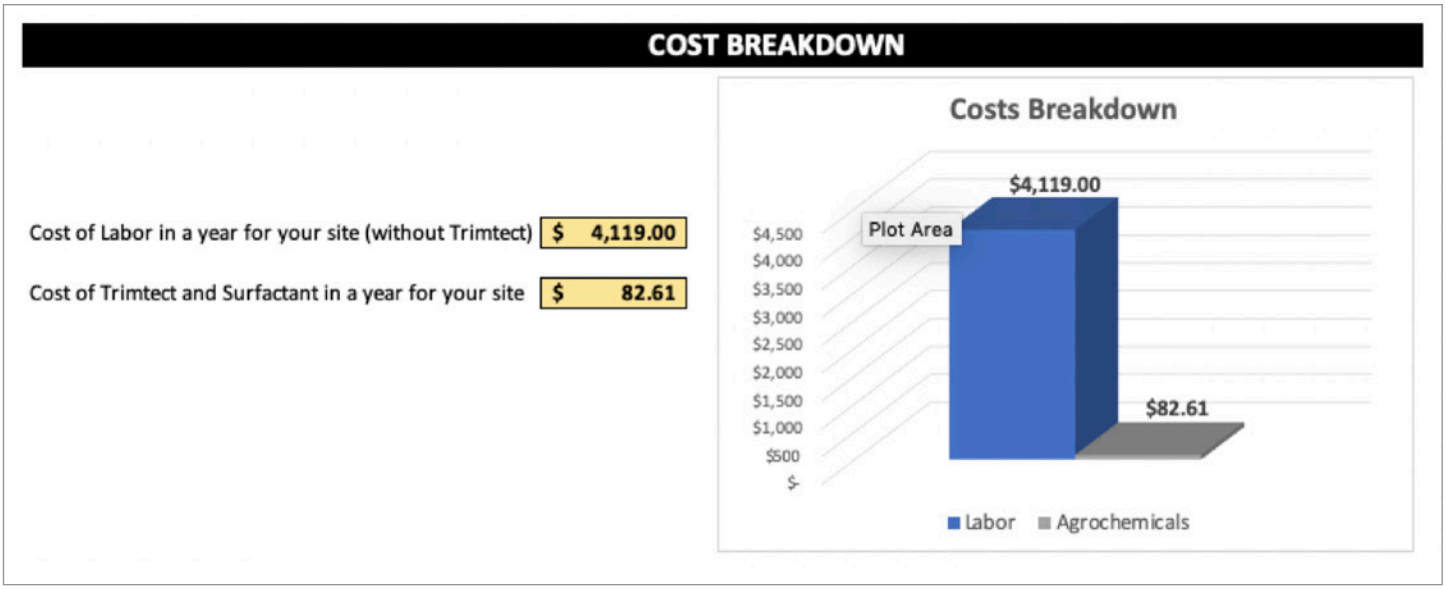

Figure 3. Costs Breakdown

Labor Costs analysis is illustrated in Figure 4. This analysis uses a sensitivity approach to display how labor costs can change as the efficacy of Trimtect changes. As reported in the two previous publications of this series (HO-315-W and HO-316-W), Trimtect can reduce the number of pruning events and time per pruning up to 90%, depending on species treated and location. Thus, we defined PGR efficacy by the percentage reduction of both pruning events and time per pruning event. To display the efficacy of Trimtect, Figure 4 illustrates how labor costs decrease as the number of pruning events reduce up to 90% (X-axis) and the time per pruning event decreases up to 90% (Y-axis). In other words, labor costs reduce as the efficacy of Trimtect increases.

Figure 4 illustrates that a 0% efficacy results in annual labor costs of $4,119, which were the costs incurred without Trimtect. On the other hand, a 50% reduction of both number of pruning events and time per pruning event decrease labor costs to $1,029.75. Furthermore, when efficacy of Trimtect results in 90% reduction of both number of pruning events and time per pruning event, labor costs are projected to decrease to $41.19.

LABOR COSTS

Percentage reduction in time per pruning event	Percentage reduction in number of pruning events										
	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	$ 4,119.00	$ 3,707.10	$ 3,295.20	$ 2,883.30	$ 2,471.40	$ 2,059.50	$ 1,647.60	$ 1,235.70	$ 823.80	$ 411.90	$ -
10%	$ 3,707.10	$ 3,336.39	$ 2,965.68	$ 2,594.97	$ 2,224.26	$ 1,853.55	$ 1,482.84	$ 1,112.13	$ 741.42	$ 370.71	$ -
20%	$ 3,295.20	$ 2,965.68	$ 2,636.16	$ 2,306.64	$ 1,977.12	$ 1,647.60	$ 1,318.08	$ 988.56	$ 659.04	$ 329.52	$ -
30%	$ 2,883.30	$ 2,594.97	$ 2,306.64	$ 2,018.31	$ 1,729.98	$ 1,441.65	$ 1,153.32	$ 864.99	$ 576.66	$ 288.33	$ -
40%	$ 2,471.40	$ 2,224.26	$ 1,977.12	$ 1,729.98	$ 1,482.84	$ 1,235.70	$ 988.56	$ 741.42	$ 494.28	$ 247.14	$ -
50%	$ 2,059.50	$ 1,853.55	$ 1,647.60	$ 1,441.65	$ 1,235.70	$ 1,029.75	$ 823.80	$ 617.85	$ 411.90	$ 205.95	$ -
60%	$ 1,647.60	$ 1,482.84	$ 1,318.08	$ 1,153.32	$ 988.56	$ 823.80	$ 659.04	$ 494.28	$ 329.52	$ 164.76	$ -
70%	$ 1,235.70	$ 1,112.13	$ 988.56	$ 864.99	$ 741.42	$ 617.85	$ 494.28	$ 370.71	$ 247.14	$ 123.57	$ -
80%	$ 823.80	$ 741.42	$ 659.04	$ 576.66	$ 494.28	$ 411.90	$ 329.52	$ 247.14	$ 164.76	$ 82.38	$ -
90%	$ 411.90	$ 370.71	$ 329.52	$ 288.33	$ 247.14	$ 205.95	$ 164.76	$ 123.57	$ 82.38	$ 41.19	$ -
100%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Figure 4. Impact of Trimtect on Labor Costs

The impact of Trimtect efficacy on labor hours is illustrated in Figure 5. Similar to Figure 4, labor hours can be impacted by the reduction of pruning events and time per pruning event. Following our case study, at 0% efficacy of Trimtect, the site will require 300 hours of pruning labor in a year. On the other hand, a 50% efficacy would decrease labor pruning hours to 75. Furthermore, when efficacy of Trimtect results in 90% reduction of both number of pruning events and time per pruning event, labor hours are projected to decrease to 3 in a year. The importance of reducing the number of labor hours lies in the reallocation of labor to other profitable activities.

LABOR HOURS

Percentage reduction in time per pruning event	Percentage reduction in number of pruning events										
	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	300	270	240	210	180	150	120	90	60	30	0
10%	270	243	216	189	162	135	108	81	54	27	0
20%	240	216	192	168	144	120	96	72	48	24	0
30%	210	189	168	147	126	105	84	63	42	21	0
40%	180	162	144	126	108	90	72	54	36	18	0
50%	150	135	120	105	90	75	60	45	30	15	0
60%	120	108	96	84	72	60	48	36	24	12	0
70%	90	81	72	63	54	45	36	27	18	9	0
80%	60	54	48	42	36	30	24	18	12	6	0
90%	30	27	24	21	18	15	12	9	6	3	0
100%	0	0	0	0	0	0	0	0	0	0	0

Figure 5. Impact of Trimtect on Labor Costs

Lastly, Figure 6 illustrates how Trimtect can impact cost savings. Figure 6 displays the dollar savings per year as the efficacy of Trimtect increases. Cost savings was calculated based on the reduction of labor costs and additional cost of agrochemicals (Trimtect and surfactant), and does not include other maintenance costs (e.g., fertilization, pesticide applications, etc.). To illustrate, at 0% efficacy, the business in our case study would incur $83 in additional expenses due to the agrochemical costs and zero reduction on labor costs. However, at 50% Trimtect efficacy, the business would save $3,007 due to the reduction of labor costs. Similarly, at 90% efficacy, a business can have cost savings up to $3,995 when compared to traditional shrub maintenance (no Trimtect).

COST SAVINGS

Time per pruning reduction	Number of pruning reduction: 0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	$ -83	$ 329	$ 741	$ 1,153	$ 1,565	$ 1,977	$ 2,389	$ 2,801	$ 3,213	$ 3,624	$ 4,036
10%	$ 329	$ 700	$ 1,071	$ 1,441	$ 1,812	$ 2,183	$ 2,554	$ 2,924	$ 3,295	$ 3,666	$ 4,036
20%	$ 741	$ 1,071	$ 1,400	$ 1,730	$ 2,059	$ 2,389	$ 2,718	$ 3,048	$ 3,377	$ 3,707	$ 4,036
30%	$ 1,153	$ 1,441	$ 1,730	$ 2,018	$ 2,306	$ 2,595	$ 2,883	$ 3,171	$ 3,460	$ 3,748	$ 4,036
40%	$ 1,565	$ 1,812	$ 2,059	$ 2,306	$ 2,554	$ 2,801	$ 3,048	$ 3,295	$ 3,542	$ 3,789	$ 4,036
50%	$ 1,977	$ 2,183	$ 2,389	$ 2,595	$ 2,801	$ 3,007	$ 3,213	$ 3,419	$ 3,624	$ 3,830	$ 4,036
60%	$ 2,389	$ 2,554	$ 2,718	$ 2,883	$ 3,048	$ 3,213	$ 3,377	$ 3,542	$ 3,707	$ 3,872	$ 4,036
70%	$ 2,801	$ 2,924	$ 3,048	$ 3,171	$ 3,295	$ 3,419	$ 3,542	$ 3,666	$ 3,789	$ 3,913	$ 4,036
80%	$ 3,213	$ 3,295	$ 3,377	$ 3,460	$ 3,542	$ 3,624	$ 3,707	$ 3,789	$ 3,872	$ 3,954	$ 4,036
90%	$ 3,624	$ 3,666	$ 3,707	$ 3,748	$ 3,789	$ 3,830	$ 3,872	$ 3,913	$ 3,954	$ 3,995	$ 4,036
100%	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036	$ 4,036

Figure 6. Impact of Trimtect on Cost Savings

Conclusions

This publication illustrates the economic impact of using Trimtect PGR as a management tool for shrubs in landscape services. Using a case study, this publication provides four analyses available through the PGRcalculator tool: cost breakdown, labor cost, labor hours, and cost savings.

Analyses show that PGRs can effectively reduce labor costs due to a reduction of pruning events and time per pruning. Our findings also show that depending on Trimtect efficacy, businesses can reduce the number of labor hours, which can directly impact labor reallocation to other tasks that offer higher return. A reduction of labor hours can also help businesses spread out pruning activities during high labor demand. The impact of Trimtect depends on the area of application, rate of application, and wages. Furthermore, additional benefits of PGRs may go further than time and cost savings. Benefits may also include savings on waste disposal and increased labor safety.

Distribution of the HortCalculator

The calculator will be hosted at https://www.purdue.edu/hla/sites/hortbusiness/

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References

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Also in this series

Available at https://www.edustore.purdue.edu

- HO-315-W, A Partial Cost Analysis of Using Paclobutrazol for Shrub Maintenance
- HO-316-W, A Sensitivity Analysis of Using Paclobutrazol for Shrub Maintenance