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THE PURDUE LANDSCAPE REPORT

In This Issue

Purdue Landscape Report: Virtual Live

(Kyle Daniel, daniel38@purdue.edu)

Please join us Wednesday (October 21st) for our bi-weekly, live educational series. The event will take place at 12:00 pm (Eastern) on Zoom at **https://purdue-edu.zoom.us/j/96190839031** or on Facebook Live at **https://www.facebook.com/PurdueLandscapeReport/**.

The following speakers and topics will include:

Why should I have my trees inspected?-Lindsey Purcell

Selecting Quality Plants-Kyle Daniel

Saving Money with PGR’s-Arian Torres

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

(Ariana Torres Bravo, torres2@purdue.edu)

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

	Hourly Wages ($/Hour)																
Shrub species	**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

The Cold Never Bothered Ticks Anyway (well, kinda)

(Elizabeth Barnes, barne175@purdue.edu)

As the fall weather starts you might be tempted to put away your bugspray along with your shorts and flipflops but hold up! You still might need it. Some ticks may still be active well into the fall and even in the winter. These tiny animals are more than just a nuisance. They often carry a range of serious diseases that can have lifelong impacts on people, pets, and livestock.

When are ticks active?

Many people assume that ticks go dormant once the weather starts to get colder. However, this is only partially true. Ticks, like most arthropods, do slow down once the temperature drops. However, many species of ticks will become active if the weather warms up again even if it's only for a short period of time. A standard rule of thumb is that if the ground isn't frozen and the temperature is above freezing, you should be worried about ticks.

Where are you most at risk for ticks?

Different ticks prefer different types of environments but are commonly found in wooded areas, leaf litter, tall grass, bushes, and woodpiles. They are less common in cut grass but are occasionally still found there.

What can you do to prevent ticks?

The old saying that an ounce of prevention is worth a pound of cure holds true with ticks. Many of the diseases that ticks can vector are still poorly understood and currently don't have cures. It's much better to take a few simple steps to avoid the risk of a tick bite than it is to deal with the consequences of one. Here are a few tips to prevent bites:

- Treat your clothes with a tick repellent like permethrin (ALWAYS read the label and follow the directions before using)
- Put on bugspray before you go outside
- Tuck in your shirt to limit tick access to your body

- Do a visual inspection of yourself and your clothes at the end of the day
- Use tape or a lint roller on your clothes after going outside to pick up any ticks you may have missed

These are just a few of the many ways you can prevent ticks bites. For more information, check out the resource list below!

What if I'm bitten by a tick?

There are a few steps you can take to prepare in case you are bitten by a tick. First, familiarize yourself with the types of ticks in your area and the symptoms of the diseases they carry. This is especially important if you work or recreate outside on a regular basis. Information on tick distribution is constantly being updated so we suggest checking the CDC website on ticks which also has tips on when to seek medical attention. Second, learn how to safely remove ticks and make sure you have removal tools on hand. Again, we defer to the CDC on the best ways to remove ticks safely.

Resources

- https://tickencounter.org/ticksmart/tips
- https://www.cdc.gov/ticks/geographic_distribution.html
- https://tickinsiders.org/
- A recent webinar on ticks

Cover image by Mohammed El Damir, Bugwood.org

A New Certification Course Offering from Purdue Pesticide Program

(Kyle Daniel, daniel38@purdue.edu)

A New Certification Course Offering from Purdue Pesticide Program

This new course helps prepare those working toward their Category 3a Ornamental Pest Management pesticide certification exam. It will also be useful to new employees or veterans of the industry by providing practical information about caring for plants in the landscape. Taught by leading experts in the field, the course provides up-to-date information on plant care, managing landscape pests, application equipment, and solving pesticide math problems. The course contains over eight hours of instructive videos that will apply directly to your work and to passing the certification examination.

The course lets you move through the material at your own pace using the Purdue University's online learning system. For $110, you receive 90 days of access to the online materials and a copy of the Category 3a Ornamental Pest Management Training manual.

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PPP.Purdue.edu/elearning

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"Life starts all over again when it gets crisp in the fall." —F. Scott Fitzgerald

(Janna Beckerman, jbeckerm@purdue.edu)

As the 2020 gardening year draws to a close, now is the time to ensure a successful gardening season next year, for you or your customers! Sanitation is a cornerstone of integrated pest management and is essential for good plant health management. Throughout the year, we have been plagued with both unusually wet and unusually dry weather sometimes within weeks of each other. This weather incited normally minor disease problems to epidemic levels, encouraged the development of new disease problems and made for a difficult year to garden, particularly for first time gardeners. However, now is not the time to give up!

Good sanitation, in the form of removing diseased plant material this fall will help minimize or even prevent disease problems next spring. Many disease-causing organisms can survive the winter in infected plant debris. Cutting back infected plants, disposing diseased plants (by burning or the garbage—do not compost!), or tilling under crop debris can also help prevent over-wintering of plant disease causing organisms.

Evaluate and Investigate

Figure 1. Failure to divide perennials can result in crown rots.

Before you begin your sanitation program, bring out a notebook to take records of what did and did not work, what will need dividing in the spring, and what needs to be moved to a different site. Remember to accurately identify which pests you have and what crops they attack!

For numerous perennials, failure to divide is a leading cause of crown (Fig. 1). If you haven't started a pest management, customer yard, or gardening log, consider doing so. Make notes about problems and research potential solutions over the winter.

Evaluate which varieties did well and which you should consider replacing. Did your rose defoliate in July? Look for the many disease resistant roses or investigate what fungicides or insecticides you may wish to purchase if you or your customer wants to keep the problem child. The rose blackspot bulletin can help you with both. Was powdery mildew a problem for your bee-balm? Consider moving it to a sunnier location in the spring (with better air flow) or remove it and replace it with a powdery mildew resistant variety, like 'Jacob Cline', or many of the new, petite and disease resistant bee balms.

Get Down and Dirty

After you've filled up several pages of notes, its time to put the notebook down, and put on the heavy gloves. Clean up leaves and crop residues from all gardens. As soon as crops are harvested, pull up and dispose of all plant material, including roots. After a hard freeze, remove and compost all disease-free, but frost-blackened, tender annuals , from African daisy to zinnia, and everything in between.

A common question asked by gardeners is whether diseased plants can be safely composted. The answer is NO! Do not compost diseased plants! In Indiana (and most of the Midwest), compost rarely reaches the temperatures required to kill most plant pathogens. Be sure to discard the material properly, by bagging it or by burning it if this is permitted.

Did you have really bad leaf spots on certain perennials? After your perennials have died back, the leafy material can be removed. Carefully cut the tissue with shears or scissors and dispose of the infected leaves. Consider applying a chlorothalonil-based fungicide next year if leaf spots were particularly severe. Some diseases may require multiple applications for adequate control. There are many common leaf diseases that good sanitation practices will help control, such as leaf spot of iris or botrytis of peony, to name a few. Cut back late flowering perennials like asters and chrysanthemums to a few inches. Did your peonies develop spots? Pull out the shears! Peonies can be cut to the ground, but be sure to remove all the infected foliage so it doesn't reinfect the new growth next year. Don't forget the mulch, or a row cover to protect against freezing and thawing.

Figure 2. This year, many clematis across the state were infected with Ascochyta blight.

Clematis, "Queen of the Vines" commonly gets dethroned by a variety of fungal diseases, the most common and most serious of which is Ascochyta blight (Fig. 2). Remove infected vines and dispose of them. For some varieties, you may lose flowers, particularly if they flower on old wood (not commonly grown in the Midwest, but at least you were warned). Mulch heavily with several inches of both soil and mulch—Because this disease commonly attacks at the soil line, by preserving the crown through deep planting or mulching, you can regenerate your clematis after infection—even severe infection, although the plant may take several years to recover. In the spring, consider preventative applications of a chlorothalonil based fungicide to minimize the likelihood of reinfection. If powdery mildew is also a problem, be sure to add a FRAC 3 fungicide, like Eagle/Systhane, Torque, Tourney, or Banner Maxx.

Clematis isn't the only plant to benefit from mulching: Add mulch to your perennials to create a protective layer that insulates plant roots from the freeze-thaw damage. Mulch also conserves moisture and improves soil structure. Straw, hay and compost are all excellent mulch materials. Leaves and grass clippings are less effective as mulch material because neither holds much air space for insulation, but the price is hard to beat! (Remember in the coming spring to remove the mulch layer promptly, to prevent crown rots from occurring.)

Colorado Purple Spruce Syndrome

Conserving moisture isn't enough, though. The dry to drought-like conditions are setting trees and shrubs up for failure come spring. Be sure to thoroughly water all plants as we head into winter. Spruce, pine and other conifers especially can become desiccated by the harsh winter winds if a fall drought should develop. When symptoms develop in the spring (purple Colorado blue spruce, reddish brown white pines and red pines), nothing can be done to "cure" the problem. While watering the bigger plants, don't forget sheltered perennials, such as those under the eaves, or under the trees. Plants that become too dry in fall are less likely to survive the winter. And you won't know this until the late spring when they fail to return!

Install simple windbreaks, or cover (Fig. 3) the entire tree, or cover the trunk of vulnerable, thin bark trees with plastic "tree guards." to protect them from drying winter winds. Anything that encourages snow accumulation will help provide excellent protection against low temperature or wind desiccation (Fig. 4). Questions regarding the use of anti-transpirants and evergreens need to be put to rest: Anti-transpirants are tools that help plants endure stressful, short-term periods, like transplant shock. Only the most hardcore lover of snow and ice could define an Indiana winter as "short term." For this reason, anti-transpirants are not a replacement for proper fall watering or proper plant selection.

Figure 3 Many trees are better able to survive the winter (despite the embarrassment) when wrapped to protect them from winter burn.

Figure 4 Snow provides ideal winter protection—protection ended at the snow line.

No Shears Here

If there weren't enough chores in the yard this time of year, there is one you should not be doing: Pruning fruit trees. In climates such as ours, pruning should be done in spring just as the buds begin to swell. Freezing injury and dieback can occur to fruit trees if they are pruned in fall or early winter. Even though you can't prune, you can remove fallen fruits, or hanging "mummies" (dessicated, infected fruit that often serves as an inoculum source for next years infection). Don't forget to protect trees with mouse-vole/rabbit/deer guards. Wrap tree trunks with hardware cloth (¼ inch openings) up to the expected snow-line to provide the necessary protection. Be sure to remove this protection in the late spring to protect the crown of the tree as it continues to grow.

After the Bulbs of Summer Have Gone

Okay, that's not what Don Henley sang, but you get the idea. Don't forget to lift and harvest tender bulbs and corms (cannas, caladiums, gladiolas, dahlias and tuberous begonias) for next year. Lift after a good frost blackens their tops. Carefully dig bulbs/corms and place the bulbs in a well-ventilated location to dry for a two- to three- week period. This will prevent storage rot from destroying your bulbs. Stems can be cut off with a sharp knife or scissors (except for begonias—keep reading!) near but not at the point where they emerge from the bulb. Allow begonia stems to dry until they are brittle enough to break off from the bulbs or cut off the stems about 1 inch above the tubers. Place the tubers in a cool, dry area to cure for 2 to 3 weeks. After curing, store tubers between layers of peat moss or vermiculite. Store bulbs in a cool, dark place, that does not drop below 40 degrees F. Consider dusting the bulbs with a preventative fungicide, like captan or, Bordeaux or another copper to prevent storage rot. Consider pouring yourself a fine Bordeaux wine to toast yourself and all the work that you've accomplished!

Lawns

Don't forget to rake and compost fallen leaves. Leaf litter left on lawn provides an infection court for snow mold. Be sure to sneak that last mowing in, too, as long grass provides an excellent place for snow mold, too. Finally, fall is a great time to reduce weed levels—besides, you want your fertilizer to go to the plants you love. And unfortunately for me, no one wins prizes for growing the biggest dandelions!

All photos by Janna Beckerman.

Selecting High Quality Plants

(Kyle Daniel, daniel38@purdue.edu)

After you have decided on the best species and cultivar (right plant, right place!) for a location, it's time to inspect the plants from the nursery or garden center. What should you be looking for when inspecting trees prior to transplanting into the landscape? Here are a few:

Figure 1. Crossing branches can lead to tree failure.

- Look for structural defects (Fig. 1).
- Ensure root growth is sufficient in the pot or burlap.
- Inspect plants for signs and/or symptoms of insects, disease, and abiotic stress (Figs. 2 and 3).
- Ensure root growth is sufficient.
- Inspect plants for yearly growth.

Figure 2. Selecting plants that have pests can lead to an infestation into your client's landscape.

Figure 3. Selecting plants that have pests can lead to an infestation into your client's landscape.

Structural defects, especially in trees, can cause future problems as the plant increases in size, leading to failure. This can include multiple leaders, crossing stems, or trunk defects.

Root growth should adequately fill out the pot or be located to the outer edge of the burlap. In addition, roots should not be pot-bound.

Signs or symptoms of disease or insects should be inspected thoroughly. By accepting plants that are infected, you could be introducing pests into your client's landscape.

By inspecting a plant's internode length, you can determine the amount of growth over the preceding years. If a plant has short internode length over the last year or so, you can determine if that plant has been under stress or performed poorly over the past growing season(s).

Why should you concern yourself with the quality of the stock that you select? Here are a few reasons:

- Ensure longevity of the plant (especially important for trees).
- Reduced symptoms of transplant shock.
- Reduced chance for plant failure.
- More rapid transplant success.
- Happier clients!

When planting a new plant, one of the main concerns is to reduce transplant shock. The primary reason that plants experience transplant shock is due to a lack of water. Smaller plant material will be able to withstand a recovery from transplant shock than larger material. By insuring a reliable irrigation/water source, you can ensure less transplant shock. It's important to educate your clients on the proper amount of water because some homeowners will apply too much water, which can cause many problems as well.

The American Nursery Stock Standard, via AmericanHort, was updated in 2014. This is a guide that is very useful at determining the best practices for selecting plants.

Resources:

- American Nursery Stock Standard, Z-60.1
  - https://www.americanhort.org/page/standards
- Tree Planting Part One: Choosing a Tree
  - https://mdc.itap.purdue.edu/item.asp?Item_Number=FNR-538-WV
- Tree Installation: Process and Practices
  - https://www.extension.purdue.edu/extmedia/FNR/FNR-433-W.pdf

If you have any questions about plant material, please email me at daniel38@purdue.edu to discuss.

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