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Bagworms May Still Threaten both Deciduous and Evergreen Trees and Shrubs

(Cliff Sadof, csadof@purdue.edu)

Once common only in Indianapolis the southern part of our state, bagworm caterpillars are defoliating trees and shrubs throughout Indiana. Cold temperatures that kept these pests in check north of Indianapolis are becoming less frequent due to the warming effects of urban development. Although typically associated with evergreen trees and shrubs, like junipers and spruce, they are becoming increasingly common on common deciduous trees including maples, oak, elm and honeylocust. In the last few weeks before they become adults, large bagworms can cause significant amounts of damage.

After they become adults in August it is too late to kill them with insecticides because they have stopped feeding. If you have a bagworm problem you have to check the bags to be sure they are feeding before you go to the effort of spraying them with insecticides.



Fig. 1 Bagworms that have tied themselves to twigs can no longer be killed by applications of foliar insecticides because they have stopped feeding.



Fig. 2 Bagworms feed on leaf tissue between the veins of maple trees and cover themselves with bits of leaves.



Fig. 3 Even oak leaves can be consumed by bagworm caterpillars.

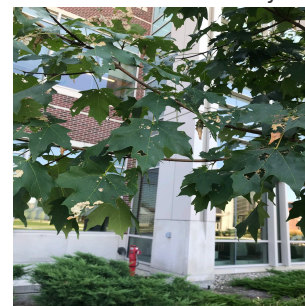


Fig. 4 Deciduous trees planted near bagworm-infested juniper are likely to get attacked by bagworms.

Bagworm life cycle

Bagworms are flightless moths who spend the winter as eggs laid by their mother in silken cases covered with dried leaves. Eggs hatch into caterpillars from mid-May to Early June. Caterpillars will crawl to tree tops and blow up to 30 feet to nearby plants. As caterpillars feed they cover themselves with leaves to protect themselves from birds. Caterpillars feed through mid August before they become adults. . Wingless adult females remain in their bags allowing winged males to fly to them to mate. After mating the females will lay eggs in the silken sack where bagworms spend the winter.

Late Season Management of Bagworms

If most of the caterpillars are still feeding you can control the problem with a foliar spray of an insecticide. Spinosad (Fertilome Borer and Bagworm killer, Captain Jack's Deadbug) are still very effective at killing caterpillars who eat treated foliage. If most of the bagworms have stopped feeding, then you are better off waiting until next May or June to kill the young caterpillars with insecticide. If there are only a few bags on the tree, and you can reach them, then you can pick them off.

Use the [Purdue Tree Doctor](#) app to get a diagnosis and a recommendation for bagworms and other pests.

Beyond Roundup: Alternatives to consider adding to your weed management plan (Update)

(Kyle Daniel, daniel38@purdue.edu)

What is your go-to postemergence herbicide? If you answered Roundup (glyphosate is the active ingredient in Roundup), you would be in the majority for landscape and nursery professionals. Though glyphosate works very well on most weed species, there are times when other products may be more effective or offer a less phytotoxic (damage to ornamental plants) alternative (Fig.1). We should also keep in the back of our minds to continue rotating herbicides to prevent herbicide resistant weeds.



Utilizing several different modes of action in the nursery and landscape can aide in reducing resistant weeds, as well as being more effective on certain weed species.

Roundup has been a household name for over 20 years. It's most likely the only herbicide that the general public can name. For several years, the most widely used herbicide in the world has

been glyphosate (many trade names). There is a reason for the popularity of this herbicide. Some of the positive attributes include non-selective/broad spectrum (kills many types of plants), systemic activity (travels in the vascular system, both xylem and phloem), low mammalian toxicity (relatively safe for humans), limited soil activity, non-volatile, low environmental impact, and the efficacy of the product (how well it kills weeds). With these attributes, it's not hard to wonder why this product has become a mainstay in the industry.

National media outlets are reporting that there are growing concerns regarding the potential link between glyphosate-containing products and increased risk of cancer. Jury verdicts in California have been covered in great detail by the media, thus elevating the dialogue of the cancer risk with consumers. Purdue Weed Scientists are trained and tasked with studying weed biology, weed competition, various methods of controlling weeds with herbicide and non-chemical tools, and herbicide resistance in weeds. They are also responsible for developing weed control best management plans for a number of crops grown in Indiana and the Midwest. They are not trained to be cancer scientists and thus do not conduct research on the potential risk of cancer. We rely on toxicologists to conduct the appropriate research regarding the toxicology of any pesticide to mammals and amphibians and use their expertise to develop recommendations on the risks associated with various pesticides. To that end, toxicologists affiliated with the National Cancer Institute conducted a review of the literature and found no link between glyphosate and increased risk of cancer. This is the most recent and most prestigious research paper available on the topic. The journal article can be found here:

<https://academic.oup.com/jnci/article/110/5/509/4590280>. A scientific organization wrote an article about this subject in March that discusses the glyphosate-cancer topic in much detail: https://geneticliteracyproject.org/2019/03/26/infographic-global-regulatory-and-health-research-agencies-on-whether-glyphosate-causes-cancer/?mc_cid=41a15fec7f&mc_eid=3dd2ec99f7.

With that in mind, what is going to be your answer when your client request that you stop using glyphosate on their property? Do you have a backup plan? These questions are the reality going forward and some landscape companies are having to devise a new plan that doesn't use glyphosate on some properties.

Before discussing alternatives to glyphosate, always remember to utilize preemergence herbicides (fall and spring) as your primary method of weed control in nurseries and landscapes. Relying on preemergence herbicides will reduce labor, reduce the chances of phytotoxicity to ornamentals, and reduce total herbicide usage. Postemergence herbicides should be relied upon only when necessary to control weeds that have escaped your preemergence program.

Considering alternatives to glyphosate will require a knowledge of what ornamental plants are on the property, as well as what are the dominant weeds. There is no herbicide that will completely 'replace' glyphosate due to the attributes mentioned above. Careful planning by developing a property-wide herbicide plan will

assist in determining the optimum solution for reducing the use of glyphosate.

When you are trying to control grassy weeds in ornamentals, there are several options that are very safe on most ornamental plants. The grass specific herbicides, such as fluazifop (Fusilade/Ornamec), clethodim (Select, Envoy), sethoxydim (Poast, Vantage, Grass Getter), and fenoxaprop (Acclaim), can control many grass weeds effectively with little phytotoxicity to most ornamental plantings (Fig.2). These herbicides will only kill grass, so they can be sprayed over the top of many broadleaf ornamentals, as well as plants such as liriopse and iris, since these are not grasses (Fig.3). Always check the label to ensure the ornamentals are labelled for over the top or directed sprays. More information about controlling grasses in non-grassy ornamental plants can be found here:

<https://www.purduelandscapereport.org/article/killing-grasses-in-grasses-how-to-control-grasses-in-non-grassy-ornamental-plants/>



Figure 2. Grass specific herbicides can be utilized over the top on many ornamental plantings in nurseries and landscape to reduce the chance of phytotoxicity on ornamentals.

Contact herbicides are an option and are most effective on annual weeds, especially while small. Since contact herbicides are not translocated throughout the plant, coverage of the weed needs to be sufficient enough to kill. Most large or mature plants tend to outgrow contact herbicide applications. There are some contact herbicides labelled in nurseries and landscape, including Scythe (pelargonic acid), Reward (diquat), and Finale (glufosinate). These products are broad-spectrum, so damage can occur if applied on ornamental plantings. Basagran (sodium salt of bentazon) is a contact that is effective on nutsedge, as well as many broadleaf weeds.



Figure 3. Grassy weeds can be controlled with grass specific herbicides in liriopse.

There is some confusion in the industry that glufosinate (Finale and other trade names) is a 'replacement' for glyphosate. Though their names are very similar, they are very different

herbicides. As mentioned above, glyphosate is translocated throughout the plant, but glufosinate is a contact herbicide that does not translocate. Though glufosinate could be a replacement for glyphosate in some instances (i.e. small annual weeds), just remember that it will not have the same efficacy as a translocated herbicide on larger or more mature weeds.

Being that glyphosate is a translocated postemergence herbicide that is non-selective, there are a few 'true' alternative herbicides that can be used as a substitute. This is where the knowledge of your ornamental plants and types of weeds are very important. Some alternative postemergence herbicides that translocate include, Lontrel (clpyralid) Dismiss (sulfentrazone) and Sedgehammer (halosulfuron-methyl). These products each control hard to control weeds, such as thistle (Lontrel) and nutsedge (Sedgehammer) (Fig.4). These products have some over-the-top use of certain ornamental plantings, but can cause severe damage on certain ornamental plants. The label must be followed carefully when using these products around ornamental plantings due to the potential of severe phytotoxicity or death.

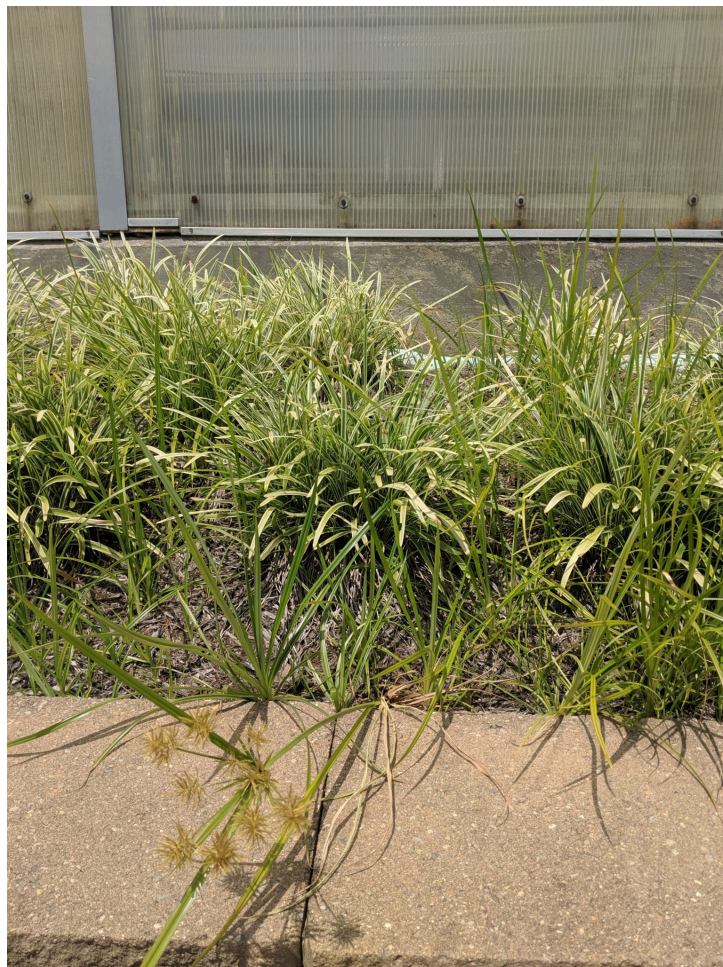


Figure 4. Some weed species, such as nutsedge, are better controlled with herbicides other than glyphosate.

Glyphosate is a product that is effective in many applications for your weed program, but there are alternatives. As described previously, no singular herbicide will totally replace glyphosate due to many positive attributes. Considering incorporating some of these alternatives will aide in the reduction of resistant weed

populations, can be safer around ornamentals, more effective on some weed species, and make your clients more comfortable in having another option available.

To review herbicide modes of action, visit:

<https://www.extension.purdue.edu/extmedia/WS/WS-23-W.html>

There are 82 products available on CDMS containing glyphosate, with almost 1,400 total herbicide labels, that can be found at <http://www.cdms.net/Label-Database/Advanced-Search#Result-products>.

Remember to always check labels prior to making any herbicide application.

Reference in this publication to any specific commercial product, process, or service, or the use of any trade, firm, or corporation name is for general informational purposes only and does not constitute an endorsement, recommendation, or certification of any kind by Purdue University. Individuals using such products assume responsibility for their use in accordance with current directions of the manufacturer. Always refer to the label prior to making any pesticide application.

Feast or Famine: Landscape plants are struggling due to precipitation extremes

(Kyle Daniel, daniel38@purdue.edu)

It seems like yesterday that we were worried if Mother Nature's faucet would ever stop (some of you still have that thought in some parts of the state). Now, in many parts of the state, soil moisture is all but gone after a few heat waves passed through the Midwest, with many plants that are without irrigation are starting to show severe drought symptoms. Some areas have been lucky enough to receive timely rains over the last month, but a few miles down the road may not have received a drop. Too much and too little has seemingly become the norm around the Midwest over the last few years. These extremes are placing many plants under stress that make them more susceptible to insect and disease problems.



Figure 1. Transplant shock on spruce due to excess soil moisture.

It was predicted several years ago that the Midwest will experience more rainfall throughout the year, but there will be fewer rain events. This means that heavy downpours and flooding are expected, while during the same year droughts could be experienced. So far, through the end of July, this is true throughout every corner of Indiana (Fig.2). This yearly scenario lays out potential challenges for many of our ornamental plants. You can find more information about the changes that are expected for the Midwest, which was developed by a large group of scientists here:

<https://nca2014.globalchange.gov/report/regions/midwest#intro-section-2>

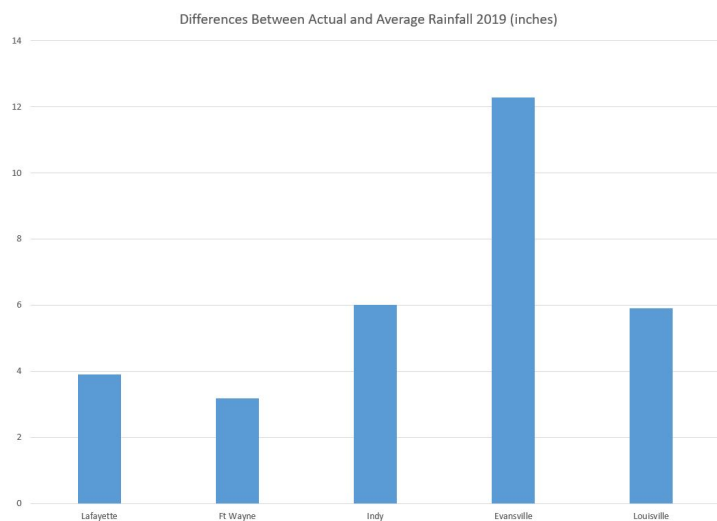


Figure 2. Precipitation from multiple locations is above normal in all locations.

For the last several years, the normal is now ‘abnormal’. Depending on the part of the state you are located, rainfall has either been above normal or extremely above normal. Five locations throughout the state were charted, as seen in the figures below.

With these changes that are occurring, what does this mean for selecting ornamental species going forward? What about for established plants in the landscape? These changes will require a proactive instead of a reactive mindset. Have plans in place that include landscape irrigation, drain tile to move water out of a landscape bed, grading work to move water away from landscape plants, amending soil to increase drainage, selecting plant species that can tolerate more stress, mulching at least three inches to conserve soil moisture, consider installation of rain gardens, and addressing any other site specific issue. Educating your clients of the importance in being proactive to mitigate the changing climate should be considered. When working grade and tile around mature trees, care must be taken to cause no, to very little, disturbance of the existing root system.

One group of ornamentals that can potentially succumb to the precipitation extremes in the Midwest are most of the evergreen species. White pine decline has been a common term for many years, but many of the evergreen species are experiencing decline other than the white pine. The combination of heavy clay soils and high summer temperatures cause extreme stress on these species. Most evergreens can’t tolerate too much or too little soil moisture, thus stress symptoms are often observed. Usually by the time symptoms appear on evergreen species, it’s very difficult to reverse the issue due to the ability to hold needles for long periods of time. Some species are well known to decline due to lack of excess soil moisture, also called ‘wet feet’, such as arborvitae. This species is very popular to homeowners due to the relative cheap price and fast growth rate, but will typically struggle in most years. Each year that above average rain occurs, more and more arborvitae are showing decline symptoms.

As the Green Industry faces numerous challenging issues, such as

lack of skilled labor, rising insurance premiums, new OSHA standards, increasing wages, and many others, weather is another key factor that should be considered going forward. A discussion with clients on proactively installing measures to limit moisture stress should be considered to develop a plan of action to prevent issues related to moisture stress.

There have been numerous articles and publications from our Purdue Green Industry Team discussing decline of various evergreen tree species (see below for links).

Top Arborvitae Aggravations:

<https://www.purduelandscapereport.org/article/top-arborvitae-aggravations/>

Stress Related Conifer Dieback:

<https://www.extension.purdue.edu/extmedia/ID/ID-477-W.pdf>

Blue Spruce Update

<https://www.purduelandscapereport.org/article/blue-spruce-update/>

White Pine Decline

<https://www.extension.purdue.edu/extmedia/BP/BP-34-W.pdf>

Drought? Don’t forget the Trees

<https://www.extension.purdue.edu/extmedia/FNR/FNR-483-W.pdf>

Why is My Tree Dying?

<https://www.extension.purdue.edu/extmedia/FNR/FNR-FAQ-11-W.pdf>

Right Tree-Right Place: White Pine and Salt Tolerance

<https://www.extension.purdue.edu/extmedia/FNR/FNR-FAQ-10-W.pdf>

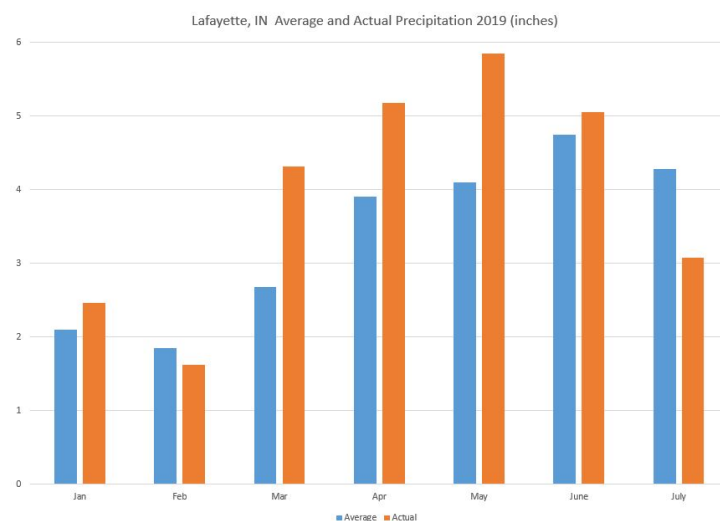


Figure 3. Lafayette, IN average vs. actual precipitation in 2019.

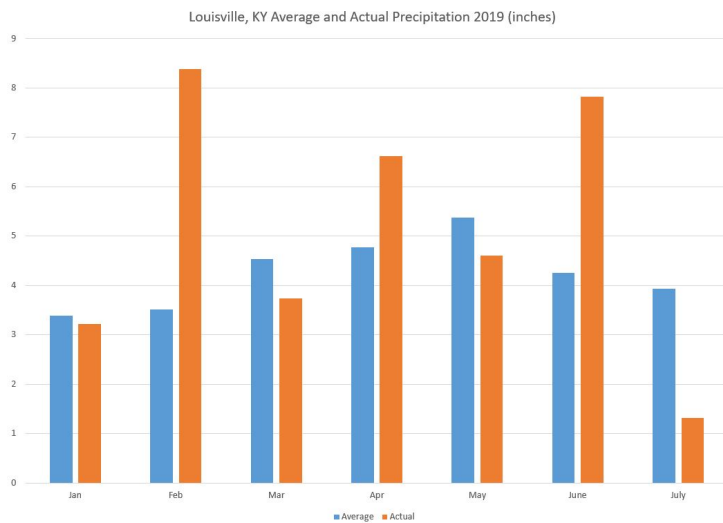


Figure 4. Louisville, KY average vs. actual precipitation in 2019.

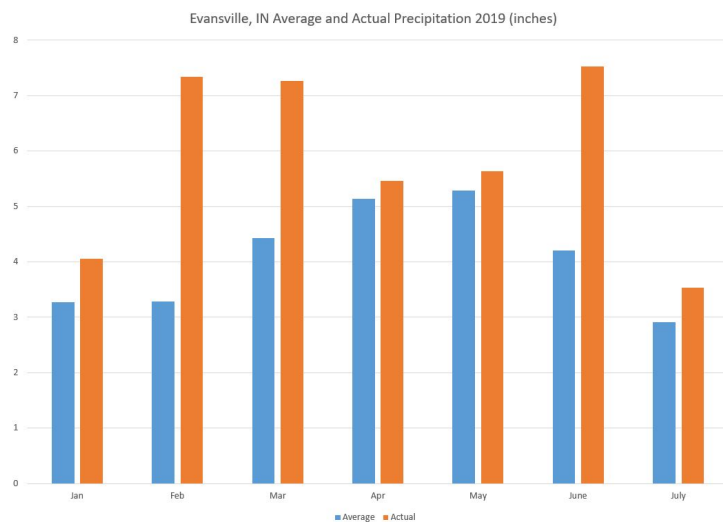


Figure 5. Evansville, IN average vs. actual precipitation in 2019.

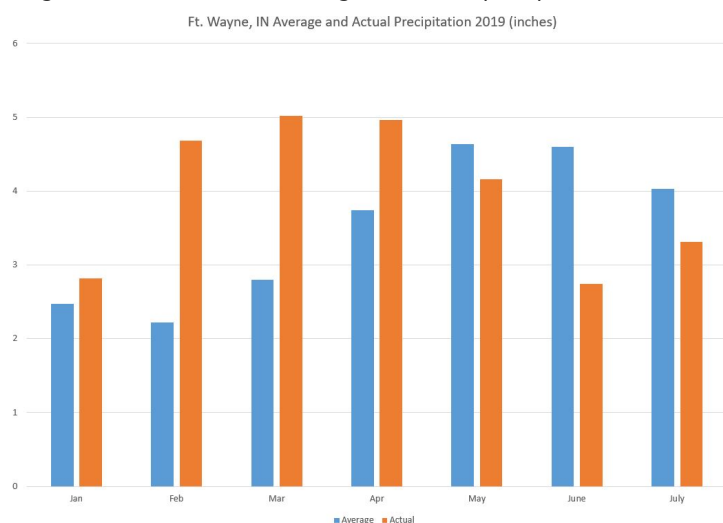


Figure 6. Fort Wayne, IN average vs. actual precipitation in 2019.

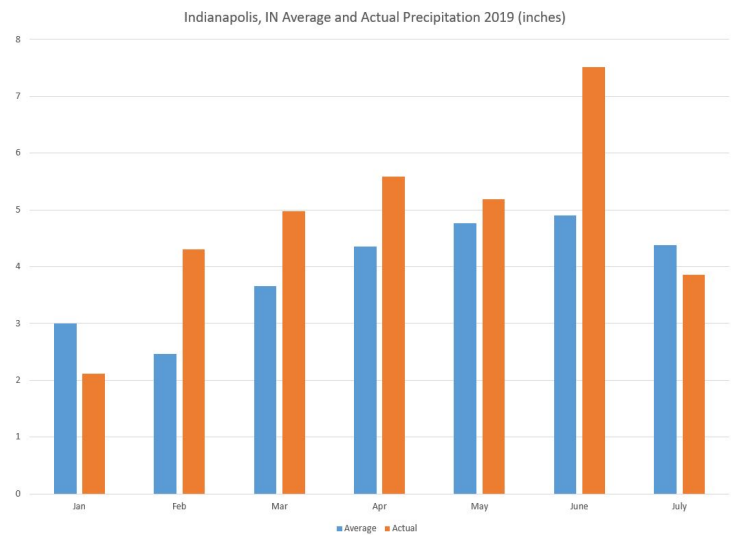


Figure 7. Indianapolis, IN average vs. actual precipitation in 2019.

*Data Source: cli-MATE tool from the Midwestern Regional Climate Center

Trichomes

(Gail E. Ruhl, ruhlga@purdue.edu)

Have you ever noticed the fuzzy growth (Fig1) on the underside of an oak or sycamore leaf and wondered what was wrong with the tree? Fuzzy mats of hairy growth on the underside of tree leaves (Fig 2) are often mistaken for a plant disease or insect problem. In actuality, the whitish-tan fuzzy growth is a part of the plant known as trichomes (Fig3). Wikipedia defines a trichome as a small hair or other outgrowth from the epidermis of a plant, typically unicellular and glandular. Trichomes may provide greater surface area, and create a sunlight- or wind-deflecting blanket. Thick mats of trichomes on leaves can actually help a plant control its temperature. A carpet of fuzz on a leaf's underside can reduce a plant's water loss through evaporation. When viewed with magnification, trichomes can be seen to come in many forms including straight, branched, star-shaped, and tufted.



Figure 1



Figure 2



Figure 3

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