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THE PURDUE LANDSCAPE REPORT

In This Issue

Orange ‘Koosh’ Galls on Eastern Red Cedar

(Gail Ruhl, ruhlg@purdue.edu)

Three different rust fungi cause gall-like protrusions on eastern red cedar (*Juniperus virginiana*) trees.

Figure 1

Figure 2

Figure 3

Figure 4

The bright orange gelatinous galls with tendril-like protrusions (Fig 1) resembling ‘koosh balls’ are caused by *Gymnosporangium juniperi-virginianae*. This fungal disease is known as Cedar Apple Rust. The galls develop on the cedar tree (Fig 2) and ‘sprout’ fungal spore-bearing tendrils during rainy periods in the spring (Fig 3 and 4). Spores from these galls infect apples and crabapples.

Figure 5

Figure 6

The smaller, less conspicuous branch galls, with horn-like protrusions shown in Figures 5 and 6, are known as Hawthorn Rust and are caused by the fungus *Gymnosporangium globosum*. The fungus alternates between Juniperus spp. hosts; and hawthorn, crabapple, and apple in addition to several other

rosaceous hosts.


Figure 7


Figure 8


Figure 9


Figure 10

Gelatinous swellings on the cedar branches (Figs 7, 8, 9 and 10) are signs of yet another type of rust disease known as Quince Rust, caused by *Gymnosporangium clavipes*. This disease alternates between Juniperus and various rosaceae plants. Hawthorn (Fig 11) is one of the most notable alternate hosts of this Quince Rust on Cedar. Rust galls girdle hawthorn branches (Fig12) and cause dieback.


Figure 11


Figure 12

As noted above, these rust fungi require two separate hosts to complete their life cycle and thus the spores produced from the cedar galls are dispersed by wind-blown rain to infect succulent parts of various angiosperm hosts. During midsummer, spores are produced from infected angiosperm hosts and these spores are then blown back to their Juniperus hosts, completing the life cycle of this rust fungus.

The cedar-apple rust and hawthorn galls that form on eastern red cedar are unsightly, however usually cause little harm to the tree. During dry weather, galls can be pruned out and destroyed. The spindle shaped stem swellings of quince rust may eventually girdle branches and cause some minor branch dieback. As per the publication below, management recommendations include the use of resistant varieties and preventive fungicide applications where these rusts are a perennial problem on high value susceptible plants.

Cedar Apple and Related Rusts on Landscape Plants
https://www.extension.purdue.edu/extmedia/bp/bp-137-w.pdf

Growing Degree Days... another tool for plant health care

(Lindsey Purcell, lapurcel@purdue.edu)

When’s the best time to apply insecticides for control of bagworms? When should I expect an outbreak of scale insects on my shade trees? When is the best time to control mites? These are common questions which can be perplexing for landscapers, gardeners and plant health care professionals. Understanding plant and pest development can help provide the most effective and timely approaches to managing pests. Timing is everything and using this simple tool can ease the pain of diagnostics. Growing degree-days (GGD), while not perfect, is a more reliable method of predicting plant and insect development rather than using a calendar. Scouting for an insect may begin too early or

too late if using the calendar, resulting in wasted time and missed damage on trees and shrubs.

Figure 1. Calico scale

Pests and plants are dependent on temperature to develop. They can develop and emerge earlier in warmer years than cooler temperature years. Plants also develop and bloom earlier with those “early spring’ years. Monitoring plant phenology such as bloom times can be used as a biological calendar to track degree-day accumulation and predict pest activity.

Phenology is the study of naturally recurring events in plant and insect life cycles such as bud expansion and bloom times or when scale crawlers appear on plants. Also, how seasonal variations in weather, especially temperatures, affect the timing of those events. GDD is a tool in phenology measuring heat accumulation to estimated growth stages of plants and life stages of insects. Simply stated, GDD are calculated by taking the average of the daily maximum and minimum temperatures compared to a base temperature of 50 degrees.

Calculating GDD can be a challenge and there are at least a couple of ways to determine this temperature-based function. However, there are some tools available which calculates this information for us and agricultural organizations which measure heat accumulation to provide the information necessary to make scouting and applications more effective. Also, tracking GDD is tedious and time consuming. However, phenological events can be used effectively for scheduling applications. Regardless of the time of year, bloom sequence is typically consistent with pest emergence.

Now, lets put this to work. First, it is necessary to find a reliable source for finding GDD for the target area. There are several websites available for obtaining this data which includes:

GreenCast

http://www.greencastonline.com/growing-degree-days/home

GDD Tracker

http://www.gddtracker.net

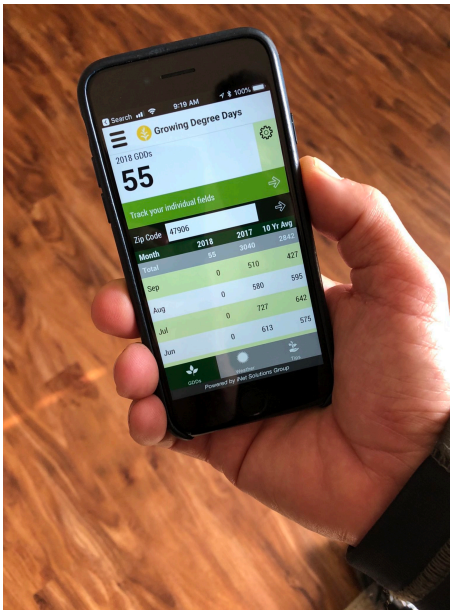


Figure 2. GDD app for smartphones

ISU Mesonet

https://mesonet.agron.iastate.edu/GIS/apps/coop/gsplot.phtml?network=INCLIMATE&var=gdd50&year=2018&smonth=1&sday=1&emonth=12&eday=26

Of course, there is an “app” for that! There are various smartphone applications which can provide GDD instantly and accurately on both platforms. Examples include Growing Degree Days, iNet Solutions Group or GDU Calculator, Ag PhD

Now, once the GDD has been determined, pest stage of development and plant phenology can be employed to determine pest appearance and vulnerability for best pesticide applications. GDD coupled with using indicator plants from the phenology charts can be a useful decision-making guide for applications.

Some examples include:

Pest name	Plant event	GDD’s	Vulnerable stage	Avg. Date
Bagworm	Catalpa full bloom	600-900	Larvae	Late May-Early June
Emerald Ash Borer	Black Locust full bloom	780-1040	Adult	Early May to late July
Eastern Tent Caterpillar	Forsythia first bloom	90-350	Larvae	Early April- Mid May
Japanese Beetle	Littleleaf Linden full bloom	950-2000	Adult	Early June- late July

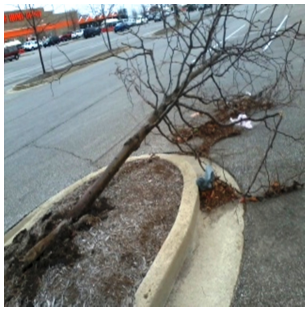
These examples are for northern Indiana and may vary with your area, however, there is a close correspondence with phenological events. For improved accuracy in your region, local charts can be made with only one year of observations and record keeping.

Timing is everything and using GDD’s and phenological events is one of the best strategies for scouting; knowing when to expect the emergence of pests in your landscape and for timing pesticide treatments to help ensure effectiveness. This tool can help take the guesswork out of your IPM strategy and create more effective plant health programs.

Purdue Landscape Report En Espanol: Lo barato sale caro: Profundidad de siembra adecuada = éxito a largo plazo

(Kyle Daniel, daniel38@purdue.edu)

Translated by: Dania Rivera, Ornamental Horticulture Extension Specialist, University of Puerto Rico



Arbol plantado profundo

"El mejor momento para sembrar un árbol es veinte años atrás. El segundo mejor momento es ahora" Anónimo

Si vas a hacer algo, hazlo correctamente la primera vez. Esto es cierto para muchos aspectos de la vida, pero, cuando se refiere a la siembra de plantas, esto suena especialmente cierto. ¿Cuánto tú crees que es la expectativa de vida promedio de un árbol en una localización urbana: 40, 50, 60 años? ¿Qué tal diez años? La expectativa de vida promedio de un árbol urbano se estima desde siete (Moll, 1989) hasta no más de 20 años (Roman y Scatena, 2011). Lo que complica el problema es que un árbol maximiza sus beneficios ambientales solo después de los 30 años (USDA-FS). Cuando nos gusta hablar de todos los beneficios ambientales que un árbol agrega a una comunidad, uno debe darse cuenta de que pasarán muchos años hasta que se hagan realidad estos beneficios. Las últimas tres oraciones deben llamar la atención a todos en la industria y querer implementar las mejores prácticas de manejo para la instalación de plantas, especialmente árboles.

Hay muchas razones que contribuyen a una alta tasa de mortalidad para los árboles urbanos, que incluyen: toxicidad a la sal, falta de humedad, compactación, contaminación, suelo pobre y así como muchos otros. Con todos estos posibles factores de estrés, otros factores, que nosotros como instaladores podemos controlar, son la profundidad de siembra y la arquitectura de raíz. Esto suena como un concepto rudimentario, pero la siembra demasiado profunda ocurre con demasiada frecuencia en muchos jardines (Fig. 1). Muchos propietarios, gerentes y jefes de personal pueden dar por hecho que todos en su organización conocen la profundidad correcta para sembrar, pero ese no es siempre el caso. Un árbol plantado demasiado profundo puede enrollar o deformar las raíces (Seiler et al., 1990), tener raíces creciendo hacia la superficie del suelo (Carvell y Kulow, 1964), tener raíces adventicias del tallo, sufrir de falta de oxígeno y se descubrió que las nueces pecanas (Carya illinoinensis) sembradas profundamente tenían más probabilidades de caerse al suelo con vientos fuertes (Sparks, 2005) (Fig. 2). La siembra por encima del nivel adecuado puede causar deterioros debido al daño por resistencia al frío, ya que las raíces son mucho menos resistentes al frío que las partes de la planta que se encuentran sobre la tierra. Se han realizado estudios que indican resultados positivos de la siembra profunda, pero la mayoría son ensayos son a corto plazo (Lyons et al., 1983), por lo que no se tiene en cuenta la supervivencia a largo plazo de las plantas.

Arbol plantado demasiado profundo.

Soplado sobre un árbol debido a que fue plantado demasiado profundo.

El cuello de la raíz, es la porción basal del tronco que se hincha antes de las primeras raíces o raíces de refuerzo (Fig. 3). El cuello de la raíz es la zona de transición donde el sistema vascular cambia entre el tallo y las raíces. El haz vascular en las raíces se encuentra en el centro, mientras que las porciones superiores de la planta contienen el sistema vascular distalmente desde el centro. Esto explica por qué las raíces pueden rodear el tallo, pero no pueden injertarse con él. Las raíces deformadas y adventicias pueden rodear el tallo, por lo que es importante corregir la arquitectura de la raíz, mientras que también se siembra en la profundidad adecuada. Esto se puede arreglar mediante poda de raíz.

Como industria, debemos pensar a largo plazo, con respecto a la siembra. Muchas veces, la siembra se realiza muy rápido, sin tener en cuenta el futuro de la planta. Cuando se piensa en la profundidad de siembra, siempre se debe considerar el acolchonado (mulch), ya que los volcanes de acolchonado son tan perjudiciales como el suelo alrededor del tallo (Fig. 4).

Deberíamos educar no solo a los propietarios, gerentes y jefes de personal, sino también a los empleados que realizan la siembra.

Un volcán mulch puede causar consecuencias similares a la plantación demasiado profunda

La bengala de la raíz del árbol debe estar por encima del grado.

Consejos para la siembra a la profundidad adecuada:

- Separa tiempo para educar a tus empleados
- Haz el hoyo solo hasta la profundidad necesaria
- Poda raíces deformes antes de sembrar en el hoyo
- Se debe remover el exceso de suelo de la planta que se encuentre a 1 a 2 pulgadas encima de la primera raíz superficial
- Compacte el suelo alrededor de la bola de raíces para limitar la sedimentación

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Spotlight on Weeds: Henbit (Lamium amplexicaule)

(Aaron Patton), (Leslie Beck) & *(Kyle Daniel, daniel38@purdue.edu)*

Figure 1. Henbit in a landscape bed.

Biology:

Henbit (*Lamium amplexicaule*) is a common winter annual broadleaf weed found throughout the United States. It can often be mistaken for another closely related winter annual broadleaf, purple deadnettle. Both can be observed by their showy pink to purple flowers which are primarily produced in April, but can appear from March to November in Indiana.

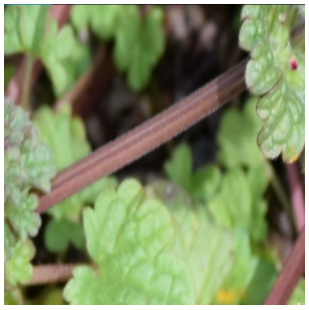

Figure 2. Square stems on henbit indicate that it is in the mint family

Identification:

Henbit is a winter annual, meaning that it germinates in the fall, survives the winter as a vegetative plant which eventually flowers, develops seed, and dies as temperatures increase in late spring to early summer. As a member of the mint family, henbit has a characteristic four-sided (square) stem which can be sparsely hairy and greenish to purplish in color. All henbit leaves are hairy. Upper leaves are deeply lobed and encircle the main stem at the base (no leaf stem). In contrast, purple deadnettle leaves are more triangular, less deeply lobed, and are more reddish in color than henbit. Henbit flowers are small, pinkish-purple with darker coloring on the lower petal, arranged in whorls, and are tubular in shape.

Figure 3. Henbit flower.

Cultural Control:

Mulching landscape beds at a depth of three inches can reduce germination of many weeds, including henbit. The air space between the chips create an environment not conducive to germination. Preventing weeds in the lawn will aide in reducing the weed seed bank in the landscape beds. In nurseries, cultivation is an effective treatment for reducing henbit populations.

Biological Control:

There are some organic postemergence herbicides available to control henbit. For example, pelargonic acid (Scythe) and acetic acid (5% or greater solutions) may be used to manage weeds. Other products such as Eugenol, which contain medium-length fatty acids and clove oil, have shown also some promise as an effective weed control tool.

Chemical Control:

Preemergence:

Preemergence herbicides are the recommended method for controlling henbit in nurseries and landscapes. Preemergence herbicides will reduce risks of phytotoxicity, reduce the total amount of herbicides applied, and reduce labor inputs. The herbicide must be applied PRIOR to germination for control. A fall application of preemergence herbicide is necessary to control henbit. See table 1 for preemergence herbicides that are labeled on ornamentals for controlling henbit.

Postemergence:

Postemergence herbicides may be used when escapes occur with the preemergence application. Glyphosate works well on henbit, but be cautious when applying around the ornamental plants in the nursery or landscape. See Table 2 for labeled postemergence herbicides that are effective on henbit.

References:

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Editor: Kyle Daniel | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West Lafayette, IN 47907