VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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In This Issue

Chateau Herbicide SW 24(c) label

(Dan Egel, egel@purdue.edu, (812) 886-0198)

Chateau SW® herbicide now has a 24(c) special local needs label for cucurbits. This product is produced by Valent, but the label is held by the Indiana Vegetable Growers Association (IVGA). To obtain a label, one must be a member of the IVGA, pay an annual $100 processing fee, read and understand the 'conditions for use' and have the appropriate forms signed and notarized. **One cannot use Chateau SW® without completing these forms and obtaining a label.** This process must be repeated every year.

Chateau® can only be used in row middles between raised plastic mulch beds that are 4 inches higher than the treated row middle. The mulched bed must be at least 24 inches wide. The application must be directed between rows with a shielded sprayer. Chateau® cannot be applied post-transplant. Do not apply more than 4 oz. of Chateau® per acre at a broadcast rate during a single application. A rainfall is required after application, but prior to transplant. Plant injury can result through misapplication. More important details are available on the label.

For more information about the 3rd party labeling process or a copy of the appropriate forms, contact Dan Egel. For more information about applications of Chateau®, contact Wenjing Guan.

Chateau Herbicide for Use in Melon Production

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198) & (Dan Egel, egel@purdue.edu, (812) 886-0198)

This article provides more detailed information about this herbicide.

How does Chateau® herbicide work

Chateau® is a group 14 mode-of-action herbicide. Compounds in this group are most active on broadleaf weeds. Before Chateau® became available, no other preemergence herbicide with the same mode of action was labeled for use in watermelons and cantaloupes. The active ingredient of Chateau® herbicide, flumioxazin, controls susceptible weeds by inhibiting propoporphyrinogen oxidase (PPO), an enzyme that controls chlorophyll synthesis. Because of chlorophyll production inhibition, a chain reaction occurs within the plant that causes cell membrane disruption.

Chateau® herbicide can assist in the postemergence control of emerged weeds. It is taken up by roots, stems, or leaves of young plants. It kills weeds through direct contact. There is usually little or no translocation of the herbicide within plants. Foliage necrosis can be observed after 4 to 6 hours of sunlight following the herbicide application. Susceptible plants die within one to two days.

When used as a preemergent herbicide, soil moisture is required to 'activate' the herbicide as germinating weeds can only take up Chateau® in a soil-water solution. Because of this, Chateau® label states that '*when adequate moisture is not received after a Chateau® herbicide application, weed control may be improved by irrigation with at least ¼ inch of water*'.

Research has shown that light is required for the activity of Chateau® herbicide. Because of this, if Chateau® is incorporated deeply in the soil, its effectiveness is greatly reduced. In the label, it states that '*if emerged weeds are controlled by cultivation, residual weed control will be reduced*'.

Other characteristics of Chateau® herbicide

The likelihood of leaching of chateau herbicide is relatively low since it has low solubility in water and nonionic charge in soil. The most common means of loss of Chateau® in the soil is due to degradation by soil microbes, while volatilization or photolysis of the product are minimal.

How to apply Chateau® herbicide in melon production

Chateau® can only be applied with a shielded sprayer in row middles between raised plastic mulch beds before transplant for melon production. More restrictions about the raised bed can be found in the 24(c) label. In addition, a rainfall or overhead irrigation after application but prior to transplanting is required, which helps to wash away chemicals that may contact the plastic mulch.

Watermelon injury due to inappropriately using Chateau® herbicide

The first symptom of watermelon seedlings exposed to Chateau® herbicide is usually a water-soaked appearance, an indication of membrane damage, followed by desiccation and necrosis of the affected tissue (Figure 1 and 2). The symptoms in the pictures were caused by spraying Chateau® herbicide over plastic mulch beds before transplanting. Rain occurred immediately after transplanting which contributed to some of the product being washed into the transplant holes, causing damage to the transplants. The injured plants were stunted (Figure 3). As a result, early watermelon yield was reduced. It is important to note that applying Chateau®over the plastic is against the label. The potential risk was clearly shown in our results.

Growers who chose to use Chateau® herbicide should clearly understand the risk of crop injury associated with using this herbicide, and strictly follow the labels to reduce the risk as much as possible.

Figure 1. Note the water-soaked area on the stem.

Figure 2. The water-soaked area became necrotic. The stem is brittle and easily broken.

Figure 3. Growth of the injured watermelon plant (left) was greatly inhibited compared to the control plant (right). Pictures were taken 18 days after transplanting.

Pollinator Health and Foliar Fungicide Use

(Dan Egel, egel@purdue.edu, (812) 886-0198) & (Laura Ingwell, lingwell@purdue.edu)

One can hardly glance at the news recently without noticing an item about the health of bees and other pollinators. We can all agree on the importance pollinators play in the health of our planet and the critical role honey bees and bumble bees play in agriculture. There is no doubt that populations of honey bees in particular have been in decline over the last several years. The multiple reasons for the decline are not as clear. This article will address the role that fungicides may play in bee health.

There are many possible reasons for the decline of bee populations. Pesticides have been implicated in bee declines. Most experts would agree pesticides may play a role in bee population declines. The type of pesticide that is most often implicated in bee declines are the insecticides. This makes sense: bees are insects. There is less known about the role that fungicides may play in bee health. Below I will discuss what is known about fungicides and bee health and what cucurbit growers may do to mitigate the role fungicides might play in bee declines.

In Table 1, select pesticides that may be used in cucurbit production are listed along with possible toxicity to honey bees. Precautions are listed for honey bees based on a table from the University of California. Each pesticide is ranked as either a I, II or III. The meaning of these designations is listed below.

I=Do not apply or allow to drift to plants that are flowering

II=Do not apply or allow to drift to plants that are flowering, except when the application is made between sunset and midnight if allowed by the pesticide label and regulations.

III=No bee precaution, except when required by the pesticide label or regulations.

Other precautions listed are: may be toxic to honey bee broods (young) and may be toxic to other bee species.

Note that most insecticides are rated as more toxic to honey bees than most fungicides. Insecticides are evenly split between I's and II's. Fungicides are split between II's and III's. All but two of the fungicides that are ranked II have interactions with insecticides that may cause health problems to bees. Below are listed examples of pesticides that may have toxicity to bees as

described in Table 1.

- Pristine® is listed as having possible toxicity to bees if applied with Lorsban® (chlorpyrifos). However, Lorsban® is not labeled for cucurbit production.
- Chlorothalonil maybe toxic to bees if applied with pyrethroid insecticides. These insecticides include Pounce® and Warrior®. Therefore, do not apply a chlorothalonil product (e.g., Bravo® Equus®, Echo®, Initiate®) with a pyrethroid product except between sunset and midnight.
- Fungicides in FRAC group 3, may increase toxicity of certain insecticides in the groups listed. See the mode of action column to find examples of fungicides in FRAC group 3. Examples of insecticides common to cucurbit production that may have increased bee toxicity when applied with FRAC group 3 fungicides include Admire®, Platinum® and Assail®.
- Copper products with the active ingredients copper hydroxide or copper oxychloride may be toxic to bees and have a II restriction presumably because of the innate toxicity of copper.

In addition to the synergistic effects described above, fungicides have been shown to be harmful on their own, especially chlorothalonil. For example, honey bees culture the pollen they collect and bring back to the hive, with help from a variety of microbes, and turn it into a substance called bee bread. The presence of fungicide residues in the hive decrease the nutritional quality of the bee bread and impair the ability of bees to absorb nutrients from their food source. Chlorothalonil has also been associated with reduced colony growth in the commercially available bumble bee, *Bombus impatiens*, and increases the prevalence of the parasites *Nosema ceranae* in honeybees and *N. bombi* in multiple species of bumble bees.

The effect of fungicides and bee health is still not well understood. The table and discussion presented here indicate that the fungicides are more likely to be toxic when applied in a mixture with certain insecticides. This information should help cucurbit growers avoid practices that may negatively impact bee health and choose active ingredients that may be less detrimental to these communities. Additional measures that may help to maintain bee health are listed below.

1. Read the label of each pesticide carefully before application. Some labels include specific information about bee safety.
2. Scout fields for insect pests and apply an insecticide only when the economic threshold has been reached.
3. Before making a fungicide application in response to a specific disease symptom, make certain of the identification of the disease, with an official diagnosis if necessary.
4. Use disease forecasting programs such as MELCAST when appropriate.

The health of pollinators, whether bumble bees and honey bees or native bees, is everyone's business. Although it is not always easy to know what to do to help bee health, this article will hopefully provide some answers.

Table 1: Possible toxicity of select fungicides and insecticides used in cucurbit production taken from the University of California < http://www2.ipm.ucanr.edu/beeprecaution/#>

Trade name	Common name	Pesticide type	Mode of action[z]	Rating[y]
Actigard	acibenzolar-s-methyl	fungicide	P01	III
Quadris	azoxystrobin	fungicide	11	III
Pristine[x, w]	boscalid/pyraclostrobin	fungicide	7/11	II
Bravo, Echo, Equus, Initiate[v, w, u]	chlorothalonil	fungicide	M5	II
Champ, Kocide	copper hydroxide	fungicide	M1	II
COC[u]	copper oxychloride	fungicide	M1	II
Multiple	copper sulfate	fungicide	M1	III
Torino	cyflufenamid	fungicide	U6	III
Inspire Super[u, t]	difenoconazole/cyprodinil	fungicide	3/9	II
Forum[u]	dimethomorph	fungicide	40	II
Luna Experience[t]	fluopyram/tebuconazole	fungicide	7/3	II
Luna Sensation	fluopyram/trifloxystrobin	fungicide	7/11	III
Dithane	mancozeb	fungicide	M3	III
Revus	mandipropamid	fungicide	40	III
Rally[t]	myclobutanil	fungicide	3	II
Fontelis	penthiopyrad	fungicide	7	III
Cabrio	pyraclostrobin	fungicide	11	III
Quintec	quinoxyfen	fungicide	13	III
Monsoon, Onset, Toledo, Vibe[t]	tebuconazole	fungicide	3	II
Procure[t]	triflumizole	fungicide	3	II
Agri-Mek[t]	abamectin	insecticide	6	I
Assail[s, u]	acetamiprid	insecticide	4a	II
Acramite[t]	bifenazate	insecticide	UN	
Admire, Provado[w, u, s]	imidacloprid	insecticide	4a	I
Oberon[w]	spiromesife	insecticide	23	II
Actara, Platinum[u, s]	thiamethoxam	insecticide	4a	I

[z]Mode of action is taken from the Fungicide Resistance Action Committee or the Insecticide Resistance Action Committee.

[y] Ranking of pesticides according to whether (I) the product should not be applied to flowers, (II) the product should not be applied to flowers except between sunset and midnight, or (III) no bee precaution except what is listed on label. More explanation is provided in text.

[x]Maybe more toxic if applied with an insecticide from IRAC group 1B

[w]Toxic to honey bee brood

[v]Maybe more toxic if applied with an insecticide from IRAC group 3A

[u]Toxic to other bee species

[t]Maybe more toxic if applied with an insecticide from IRAC group IRAC3A, IRAC4A, IRAC4D, IRAC15

[s]Maybe more toxic if applied with an insecticide from FRAC group 3

Tips for Submitting Samples to the Purdue Plant and Pest Diagnostic Lab (PPDL)

(Tom Creswell, creswell@purdue.edu)

Thinking of sending samples of your vegetables to the Plant and Pest Diagnostic Lab for diagnosis or insect ID? Here are some tips to help the samples arrive in the best possible condition for testing.

Fill out a sample submission form. Download at: https://ag.purdue.edu/btny/ppdl/Pages/physicalspecimens.aspx

If sending more than one kind of plant or problem be sure to label each bag specifically and fill out a separate form. The PPDL is closed on weekend so if you are sending samples make sure you send them early in the week so they are not in transit over a weekend. Express delivery (next day or second day) is preferred for samples that may not hold up well. You are also welcome to deliver samples to us on campus. See our website for location, parking and other information.

Information we need to make the most of your sample:

- Symptoms you are seeing (your main concerns)
- When did it start?
- How widespread is the problem?
- What varieties or types of plants are affected?
- Is there a pattern in the greenhouse/high tunnel/field?
- Recent pesticide applications: Dates, rates, combinations
- Any notes about recent growing conditions

Select sample material that is representative of the main problem. The sample should include a range of symptoms from early onset, to most severely affected plants.

Seedlings: Keep seedlings in the plug tray so media stays put and doesn't end up on the leaves. About half the tray is a good sample size. Place crumpled dry newspaper on top of seedlings then place inside a plastic bag with some vent holes for shipping. Alternatively, floating row cover fabric or other light fabric/mesh also makes a good cover to keep seedlings in place instead of the newspaper and plastic bag (Figure 1).

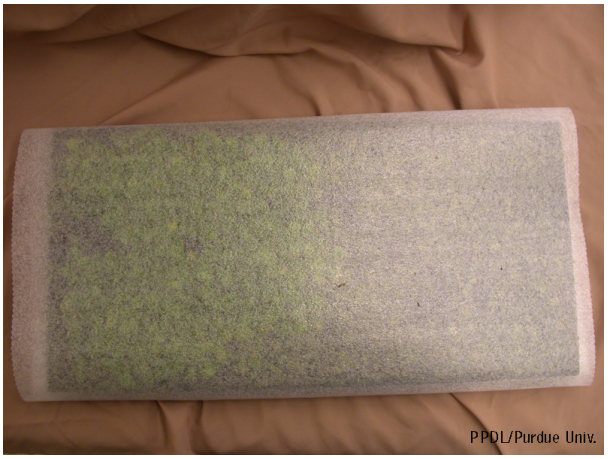

Figure 1. Seedling tray covered in light foam material for shipping.

Small plants in pots: Keep the plant in the pot and wrap the media surface with plastic wrap or foil to keep soil intact. About 6-8 plants would be ideal. Ship with ample padding in a sturdy box to prevent shifting during handling (Figure 2).

Figure. 2: Small pot covered with plastic wrap for shipping.

Larger plants in pots or from ground beds: Dig (don't pull) up a plant or several plants for submission. Leaving some soil around the roots, enclose the root system in a plastic bag and tie at the main stem to contain soil. Wrap the top of the plant in dry newspaper then enclose the entire plant in another plastic bag for shipping. Also collect additional leaves/stems/fruit from other affected plants in separate bags. (Figure 3)

Figure. 3: Tomato plant in high tunnel. Dig the entire plant if practical. Cover roots and soil with a plastic bag to keep soil off foliage.

Photos: Sending photos of a problem is always helpful to give us a better idea of the extent of a problem; (Figure 4 & 5) and may be a good way to let us help decide what kind of sample you will need. The same sample handling fee covers photos, a physical sample or both. Upload your photos and fill out our online form at: https://ag.purdue.edu/btny/ppdl/Pages/digitalimages.aspx You can also email photos to ppdl-samples@purdue.edu (15 MB size limit).

Figure 4. A broad view like this gives an idea of the extent and distribution of the problem.

Figure 5. A close-up view shows symptoms of leaf distortion to assist with diagnosis.

Questions? Visit our website:
https://ag.purdue.edu/btny/ppdl/Pages/default.aspx
or call Todd Abrahamson: (765) 494-7071

Use FoodLink to Increase Awareness and Sales of Fresh Produce

(Roy W Ballard, rballard@purdue.edu, (317) 462-1113)

Would you buy something if you didn't understand how it worked or what to do with it? Likely not...

Imagine a customer of yours who doesn't know how to select, prepare or store the fresh healthful produce that you are growing and offering for sale.

How likely is it that they will buy that product? Or buy it twice?

What are we doing at the point of sale to encourage that purchase?

Your produce may be cosmetically perfect and 100% healthful but is it able to communicate to the customer anything about its selection, use or how much their family will enjoy it if prepared properly?

Most every packaged, ready to eat, value added product in the grocery store is designed to convey these messages in a loud and clear format...Have you seen the breakfast cereal aisle in the grocery store lately? Those products are conveying an undeniable "BUY ME" message and they are directly competing for customer dollars with your silent but beautiful (and healthful) produce every day.

There is no single answer about how to step up to the competition... it is a variety of tools and techniques all implemented on a daily basis throughout the year... not the least of which is the trust that your customer has in you and your ongoing efforts tomotivate and educate them about good food! No one does it better than you!

One tool we have, now in its third year of use, to help supplement your efforts to educate your shopper/ buyer (wholesale or retail) is **Purdue Extension FoodLink**...

When used at the point of sale or in your marketing materials (for free) FoodLink can answer all of the questions below (and hundreds more) that you customers ask you on a daily basis...

- *How do I prepare asparagus?*
- *Do you have a recipe for apple crisp?*
- *How can I prepare one ear of sweet corn?*
- *How do I take the crystals out of my honey?*
- *What in the world do I do with Kohlrabi?*

FoodLink is a **FREE** tool that should help answer some of your customer questions!

Just cut and paste the QR codes into your marketing and promotional materials, or simply post the appropriate QR code card alongside of the product. Where ever the code is... the consumer can access basic information (including recipes) directly from their cell phone. The code can be attached to the

fruit itself…placed in your local advertising in the newspaper or blown up to billboard size…Some have even used QR codes as the design of a corn maze!!! Perhaps you want to be the first to incorporate food education into a Hoosier Corn Maze!!! Children would love to navigate via their smartphones… and they might learn something along the way! We can help!

If you are already using FoodLink in the farmers' market, a roadside stand, on your packaging materials or in the on farm market… then THANK YOU!…I would love to hear of your experiences and see pictures!

If not… and once again as the market season begins to build steam you find yourself answering a never ending array of customer questions about how to select, use, prepare, serve, and preserve our many Indiana grown specialty crops… fruits…vegetables…herbs and honey then my hope is that FoodLink will serve to save you time in this regard and hopefully increase consumer knowledge about the great crops that you are growing and selling…If they know more about them… my hope is that they will buy more!!!

Quick facts…

- FoodLink QR codes and informational PDFs (including recipes) are **FREE** and printable on demand
- Foodlink marketing resources… point of sale cards, banners, signage etc…are **FREE…**
- FoodLink provides quality information and recipes about 64 Indiana crops and honey…and the list is growing…
- Foodlink's use is limited only by your imagination to help market your crops.
- FoodLink will provide not only recipes for each crop but will link users directly to Pinterest for many additional popular uses.
- FoodLink is growing, changing and evolving and we welcome your suggestions… large or small about how to make it a better tool for you.

Remember… You <u>do not</u> need to understand how to use a QR code but MANY of your shoppers (and their children) will…That is the important thing!

Here is the link you need to take you to FoodLink www.purdue.edu/Foodlink.. once you are there… click enroll at the top header bar and take five minutes to enroll…we will send you a starter kit of relevant marketing materials… at ***NO COST***…

New in 2018 we have a dozen quick and easy recipes (3 for each season) both on video and as a full color booklet…That's right… those are FREE also…we will let FoodLink enrollees know how to order these.

Additionally… FoodLink enrollees will have their market identified on the online map to help folks find you….that's right… ***NO COST!***

See who else is using FoodLink at ***https://extension.purdue.edu/foodlink/about.php***

Please let me know if you need help enrolling or using FoodLink… I welcome your ideas and input…

Produce display with FoodLink

Here are examples of FoodLink OR cards. FoodLink QR_Veggie_Cards

Nematology Lab at Purdue will be Closing

Nematology lab at Purdue University will be closing at the end of June. The first of June is the last day the lab will accept samples.

A list of private and public nematology labs can be found here. Please contact these labs for their requirements for nematode sample submission.

Click here to view the listing for private and public nematology laboratories.

Entomologists Looking for Cucumber Beetles

(Laura Ingwell, lingwell@purdue.edu)

Entomologists are looking for growers willing to participate in research examining the detection and distribution of striped cucumber beetles. We would like to visit your fields on multiple occasions this year to count the number of cucumber beetles we encounter in your crop. If you grow slicing cucumbers in the field, and are interested in helping to improve our sampling recommendations for this pest, please contact Dr. Laura Ingwell at (765) 494-6167 or lingwell@purdue.edu

Upcoming Events

Southwest Purdue Ag Center High Tunnel Tour

Date: June 13, 2018 7:00-9:00 pm Eastern Time

Location: Southwest Purdue Agricultural Center, 4369 North Purdue Road, Vincennes, IN, 47591

The SWPAC high tunnel tour will be held on the evening of June 13, 2018.

Topics that will be discussed include: Grafting cucumbers for season extension; Seedless cucumber and summer squash variety evaluations in a high tunnel; Different pruning and trellising systems for growing cucumber, tomato and pepper in a high tunnel; Grafting tomatoes for improved yield; Cucumber beetle management; Annual plasticultural strawberry production with an innovative low tunnel system.

Registration will begin at 6:30 pm. The tour is free; to register please call (812) 886-0198. For more information please contact Wenjing Guan (guan40@purdue.edu). This event is sponsored by North-Central Sustainable Agriculture Research and Education.

2018 Indiana Hort Society Summer Field Day

Date: June 26

Location: Garwood

Orchard, LaPorte, IN

Please contact Lori Jolly-Brown at ljollybr@ purdue.edu for more information about the field day.

Webinar

Produce Safety for Broccoli Producers

UVM Agricultural Engineer Chris Callahan, Produce Safety Alliance Director Elizabeth Bihn, and their colleagues will present the webinar on Monday, May 14 at 2 p.m. The webinar will include an overview of food safety regulations (coverage thresholds and compliance dates, FSMA, Produce Safety Rule) and broccoli-specific considerations, plus an overview of educational materials being developed through the Eastern Broccoli Project.

Broccoli growers have particular sanitation challenges during cooling and icing, and all vegetable growers are looking for good water management and surface sanitation. Growers considering adding broccoli to their mix may need to make an investment in cooling equipment that meets recent sanitation requirements; this should be an excellent guide for making that investment effectively.

You can find more details about the webinar and a registration form on the Eastern Broccoli Project blog at this link: https://blogs.cornell.edu/easternbroccoliproject/2018/04/24/produce-safety-webinar-for-broccoli-producers/#.Wt991uJmF04.twitter.

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