# VEGETABLE CROPS HOTLINE

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



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# Time to Renew

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

This is the final issue of the *Vegetable Crops Hotline (VCH)* for 2020. Subscribers who receive a paper copy in the mail need to renew. A renewal form is included with this issue. You can check the date on the right bottom corner of your *VCH* envelope to find what year your subscription lasts through. You can sign-up for Veggie Texts with the same form. More information about Veggie Texts can be found here.

Email subscribers will remain on the subscription list for VCH as long as the email address works. Email subscribers will need to send us an email or call us to sign-up for Veggie Texts. An Indiana Vegetable Grower Association (IVGA) membership form is included here too. IVGA membership no longer automatically includes the VCH subscription. You need to indicate you would like to subscribe the VCH on the membership form.

Thank you for your support of VCH. If you have any suggestions, ideas, comments, please do not hesitate to send me a note (guan40@purdue.edu or Southwest Purdue Agricultural Center, 4369 North Purdue Road, Vincennes, IN 47591). Thank you for helping us to improve the newsletter!

# Post-harvest Weed Management

(Jeanine Arana, jcordone@purdue.edu, (765) 588-7787), (Brandi Woolam, bwoolam@purdue.edu) & (Stephen Meyers, slmeyers@purdue.edu, (765) 496-6540)

The vegetable crops have all been harvested and it's time to just relax, right?

Maybe. However, the decisions you make this fall will influence your weed control next spring.

In all likelihood, you did not control EVERY weed during the growing season. Inevitably, there were weeds that escaped control. If so, these weeds have already produced viable seeds (Figure 1).

Winter annual weeds have begun to germinate and grow. However, not every winter annual weed is problematic. Control measures in the fall should focus primarily on those weeds that will be more difficult to control next spring- marestail, for example.

Here are some control measures for managing this year's weed seeds as well as emerging winter annual and perennial weeds.



Figure 1. Barnyard grass seeds shatter and fall to the ground in a harvested Indiana pumpkin field

**Flail mowing:** This is a minimalist approach- simply mowing the remaining crop residue and any existing weed plants.

**Pros:** Weed seeds are encouraged to fall to the soil surface. This makes it easier for them to be consumed by birds, mice, and

#### insects.

**Cons:** Mowing does little to control winter annual weeds and perennial weeds like dandelion, Canada thistle, and docks (Figure 2).



Figure 2. Low-growing perennial weeds like dandelion (left) and curly dock (right) will not be controlled by mowing alone.

**<u>Cultivation</u>**: While it is tempting to run a disc through a harvested field, it may not always be the best option.

**Pros:** Shallow cultivation can uproot newly emerging winter annual weeds as well as perennial weeds.

**Cons:** Shallow cultivation moves weed seeds from the soil surface to below the soil, but not deeply enough to prevent them from germinating and growing. In other words, shallow cultivation when weed seeds are on the soil surface amounts to planting weeds seeds in your field. While it can be beneficial for some perennial weeds, shallow cultivation can also spread some weeds like Canada thistle (Figure 3) and yellow nutsedge throughout a field and make them more difficult to manage in the long-term.



Figure 3. A Canada thistle rosette grows in a harvested field.

**Deep tillage:** Sometimes referred to as inversion tillage, the idea behind this practice is to deeply burry plant residue (and weed seeds) several inches below the soil surface.

**Pros:** As a rule, small weed seeds will only germinate and grow when they are an inch or less below the soil surface. Burying these seeds can prevent them from germinating and encourage them to decay. Deep tillage is also a beneficial integrated pest management practice for some plant pathogens.

**Cons:** It is possible that deeply buried seeds from a prior deep tillage event can be moved to the soil surface. For this reason, avoid using this tactic every year.

**Herbicides:** Broadcast applications of non-selective or selective herbicides are suited for management of existing weeds post-harvest. Because most of the problematic weeds this time of year are broadleaves, consider using selective herbicides. Products containing 2,4-D, for example, can be a good option. Choose the warmest fall days to apply herbicides, and be aware that they will be slower to act in the fall than in the warmer months of spring and summer.

**Pros:** Herbicides can be used to control susceptible weed biotypes, even in no-till production systems.

**Cons:** Some winter annual weeds, such as marestail, have herbicide-resistant biotypes. It is important to be aware of the herbicide-resistant weeds in your fields.

**Cover crops:** Fall-planted cover crops are intended to compete with winter annual and perennial weeds. In Indiana, some cover crops will persist through winter while others will not. In general, weed control from cover crops is related to the amount of biomass the cover crop produces. Accumulation of biomass is largely determined by planting date and termination date. Early planting allows cover crops more time to accumulate sufficient biomass to suppress weeds.

**Pros:** Cover crops can reduce weed growth and reproduction. Many have additional soil health benefits. Cover crops, such as cereal rye, can be roller-crimped and used as an organic mulch for the following summer's crop (Figure 4).

**Cons:** With the exception of cover crops that winter-kill, cover crops will need to terminated in the spring.

More information about cover crops can be found in the *Managing cover crops profitability* handbook

https://www.sare.org/wp-content/uploads/Managing-Cover-Crops-Profitably.pdf



Figure 4. A handheld seed spreader containing cereal rye and crimson clover.

#### Pulling it all together:

Consider combining the above practices to match the weeds in your fields.

For example, inversion tillage followed by cover crops has been documented to control weeds better than either practice used by itself.

In a no-till system, flail mowing and herbicides can be used together.

# Using Grafted Watermelon Plants in Indiana

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

This article addresses considerations of using grafted watermelon plants in Indiana.

#### **Choosing rootstocks**

Interspecific hybrid squash is the most widely used watermelon rootstock. Many cultivars of the hybrid squash rootstocks that have been developed by different companies, share similar genetic background and thus similar characteristics. All of them have outstanding resistance to Fusarium wilt, but, unfortunately, highly susceptible to root-knot nematode. A newly developed 'Carolina Strongback' rootstock from a wild watermelon, citron, has resistance to both Fusarium wilt and root-knot nematode, providing a much better option when both pathogens are present in one field.

Using grafted watermelon plants is increasingly being accepted if a field has a known history of Fusarium wilt and, perhaps, rootknot nematode. However, the disease history of a field is generally unknown in most cases. In the absence of diseases, do grafted plants have a higher yield than nongrafted plants? This is a question most growers would ask considering the cost of grafted plants is much higher than nongrafted watermelon transplants.

# Do grafted plants have higher yield without Fusarium wilt pressure?

Many factors play a role, thus there isn't a simple answer to this question. Environmental condition is one of them. We saw the most dramatic yield increase of using grafted plants in a field without Fusarium wilt pressure in 2019. 2019 season was marketed with high precipitation. In our research plot, soil (sandy loam) water contents ranged from 0.25 to 0.30 m<sup>3</sup>/m<sup>3</sup> in the entire vegetative growth and fruit development stages. Watermelon plants do not perform well under the wet condition, but it seems this was not the case for the grafted plants. Grafted plants increased yield by 60% compared to the yield of non-grafted plants. Comparing between the rootstocks, watermelons grafted onto squash interspecific hybrid had a slightly higher yield (not significant) compared to the 'Carolina Strongback' rootstock.

It has been observed in many cases that grafted plants delayed fruit set. But the vigorous and healthy vines and strong root systems can support a longer harvest, which could contribute to a higher overall yield (Figure 1). In the above experiment conducted in 2019, the plants were harvested for one and a half months, and the yield advantage of using grafted plants was more pronounced in later harvest events.



Figure 1. Vine vigor of non-grafted 'Fascination', and 'Fascination' grafted onto interspecific hybrid squash rootstock and 'Carolina Strongback' rootstock in the 2019 experiment.

In 2020, our results of the same experiment were opposite. Yield of non-grafted plants were higher than that of grafted plants regardless of rootstocks. An important reason is due to an influence of a combination of Phytophthora blight and late-season vine decline, which destructively ended the trial early. The takehome message from this story is that growers who use grafted plants should be very careful in controlling diseases and pests in order to support an extended crop season and longer harvest. If severe pest problems result in a short season, growing grafted plants may not have a positive effect on yield or may even have a negative effect. Another important consideration when growing grafted plants is fertilizer application. Using fertigation rather than applying fertilizers all preplant is more favorable for grafted plants as fertigation reduces the risk of plant nutrient deficiency toward the later part of the season.

# Can planting density be reduced to one third when growing grafted plants?

This recommendation was developed partially from an economic standpoint by comparing cost of using grafted plants to cost of using soil fumigation in controlling Fusarium wilt. It would be less expensive for using soil fumigation to control Fusarium wilt with the typical plant spacing (around 1800 plants/acre) and current prices of grafted plants and soil fumigation. Cost of the two disease-control practices is becoming comparable if plant number reduced to 1/3 or more.

Do experimental data support this statement? Across experiments conducted by several research groups including the ones conducted at SWPAC, we noticed the yield of grafted plants was generally maintained when plant number was reduced. But interestingly, if the non-grafted watermelon was included in the experiments, their yield normally was also maintained when plant number reduced. What these results tell us is that it might be safe to use fewer plants per acre. Growers may be reluctant to reduce the plant number because there are so many uncertainties that could cause plant loss after planting. However, when using grafted transplants that cost 3-5 times more than normal watermelon transplants, it makes sense to cut the plant number, and reducing the number to 1/3 is a reasonable choice.

# Do grafted watermelon plants better survive transplant shock?

A favorable feature of the grafted watermelon plants, especially

the ones grafted with hybrid squash rootstock, is a better tolerance to low temperatures comparing with normal watermelon plants. Because it is not unusual to have cold days after planting, this is a great feature for watermelon production in Indiana. To maximize the benefits of using grafted watermelon plants, we recommend planting grafted plants early, assuming last frost has passed. Grafted plants are more likely to survive soil temperatures in the lower 50 °F range than nongrafted plants. If soil temperatures remain below 70 °F for an extended period, grafted seedless watermelons grow faster than nongrafted ones.

#### How about the quality of fruit from grafted watermelons?

Last but not least, I want to address the question about grafting effects on fruit quality. There are many researches targeting different aspects of fruit quality such as size, appearance, sugar content, acidity, firmness, color, antioxidants, aroma volatiles, etc. I would like to highlight a few points here that I think growers should be aware of and take into consideration when growing grafted watermelon plants. Firstly, grafted plants may delay fruit set that results in delayed fruit ripeness, especially when hybrid squash rootstock was used. If fruits are harvested before it is fully ripe, many quality attributes are sacrificed regardless of whether the fruit is from grafted or non-grafted plants. When the price is high, there is always a temptation to start harvest as early as possible. There is nothing wrong with this approach, but additional caution should be applied when harvesting grafted plants. It is always a good idea to cut a few fruit open to fully evaluate the ripeness especially for fruit from the grafted plants. On the other hand, if multiple fields are ready to be harvested but the harvesting crew is limited, it is okay to harvest the grafted field the last. Studies have found fruit from grafted plants can stay longer in the field, which might be associated with a firmer flesh of these fruits. Grafting may also affect fruit size, studies have found fruit from grafted plants tend to be bigger compared to fruit from non-grafted plants. If the market has a strict requirement for 45-count-sized fruit, growers should avoid using varieties that tend to develop large fruit as the scion variety.

#### **Pesticide Names**

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

I recently had the opportunity to speak with a grower who was trying to describe what pesticides had been used in his operation. This experience made me realize how confusing it can be to pick out the proper pesticide name. This article will help to describe which pesticide name to use, using fungicide as examples.

There are actually three different pesticide names. Each pesticide has a trade name, a common name and a chemical name. The trade name is the name that is advertised—it is the name you would most likely use at the counter of your favorite retail outlet to ask for a pesticide. In figure 1 below, the trade name is **Initiate 720**<sup>®</sup>. The common name is the accepted name of the active ingredient of the pesticide—that is, the portion of the pesticide that will act on the pest(s) of interest. In figure 1 below,

the common name is **chlorothalonil**. Some common names can be found associated with more than one trade name. More about this later. Finally, the chemical name is the name in parentheses after the common name. In figure 1 below, the chemical name is **Tetrachloroisophthalonitrile.** The chemical name is used only by specialists in pesticide science.



Figure 1: In this pesticide label, the trade name is Initiate 720, the common name is chlorothalonil and the chemical name is Tetrachloroisophthalonitrile.

Knowing the trade name of a pesticide is important in working with retail outlets, in searching for products in guides such as the *Midwest Vegetable Production Guide* and in online search engines such as cdms.net.

Common names are important in part because some active ingredients are shared between Trade names. This is because once a product goes 'off patent' other manufacturers may be able to label the same active ingredient under a different trade name. For example, one active ingredient, chlorothalonil, may be purchased under several trade names, for example, Bravo, Echo, Equus, Initiate etc. The trade names that have been labeled after the initial product are sometimes referred to as generics. Note that the active ingredient may differ in percent and additional active ingredients may be added. The label must be checked in all cases to make sure that the crop and pest are included.

In most cases, when one looks up pest solutions in the *Midwest Vegetable Production Guide*, trade names will be given. For example, if you look up tomato as the crop and early blight as the pest, you will find several trade names of fungicides such as Cabrio EC.

The product Bravo<sup>®</sup> is also a possible fungicide to use on early blight. Since there are many generic products with the same active ingredient as Bravo<sup>®</sup>, instead of listing the trade name Bravo<sup>®</sup>, the common name of the active ingredient is listed, chlorothalonil. Therefore, you will be able to find the common chlorothalonil listed among the trade names as possible fungicides to use for early blight of tomato.

The existence of generic pesticides that have many trade names for one active ingredient makes it important that one knows the common names for at least some of the products one uses routinely.

### Survey of Watermelon Nutritional Status in Southern Indiana - Sulfur

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

Thanks to growers' collaboration and help from Superior Ag, we collected plant tissue samples from 12 watermelon fields at different crop growing stages in Southern Indiana in the 2020 season. In a previous article, we discussed results about magnesium and potassium. In this article, we will discuss another nutrient, Sulfur (S).

Sulfur deficiency has become an issue in corn production in Indiana. This is attributed to decreased emissions of S from coalfired power plants that has lead to the decreased deposition of S to soils. As S from the atmosphere is reduced, S from fertilizer application and microbial activity on soil organic matter is becoming increasingly important. As sandy soils in our area are generally low in organic matter, it is reasonable to expect the soils may be potentially low in S.

Is S deficiency a concern in watermelon production in southern Indiana? In the current survey, we noticed that S content in dry watermelon leaf samples ranged from 0.3 to 0.5%. This is within the adequate range based on recommendations from Bryson et al., Plant Analysis Handbook III. The current survey revealed good news about S in watermelon production, but it is important to understand the survey number is not large enough to cover the entire region, and the survey was only conducted in one year. We will continue the survey in the coming years and watch closely for the S levels.

Although we did not detect S deficiency in the watermelon samples this year, watermelon growers should aware that sulfur deficiency was reported on watermelons in Maryland. In watermelons, symptoms appear as a light green or light yellowing of newer leaves (Nitrogen deficiency has yellowing on older leaves first). Overall, plant growth and development are stunted. Soil pH and the presence of other nutrients have little influence on S absorption, thus S deficiency may show up at a wide range of pH levels. If you suspect the S deficiency is a concern in your watermelon field, please contact me at guan40@purdue.edu, and we will conduct a plant tissue test to confirm this.

#### **Resources:**

Camberato, J. et al., Yield response of corn to sulfur fertilizer research update. 2020. <

https://www.agry.purdue.edu/ext/corn/research/updates/CornRes pSulfur.pdf>

Burst, J. 2019. Sulfur deficiency in sweet corn and watermelons. 2019. < https://sites.udel.edu/weeklycropupdate/?p=13894>

# Southwest Indiana Melon and Vegetable Growers Winter Meeting

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

The Annual Fall/Winter Meeting of the Southwest Indiana Melon and Vegetable Growers is scheduled on Monday, November 30, 2020, 3:00 pm - 5:00 pm (EST). This meeting will be held online this year because of COVID-19 restrictions. Dr. Wenjing Guan and Dr. Dan Egel will discuss the results of the 2020 watermelon and cantaloupe variety trials conducted at the Southwest Purdue Agricultural Center. We will also discuss topics for the March 2021 meeting (format to be determined).

#### Please go to

https://purdue.ca1.qualtrics.com/jfe/form/SV 5bx2xau3Pb1kQfP to register for the meeting. After registering, you will receive a confirmation email prior to the meeting with log-in information to join the meeting. We highly recommend you register following the link above. Even if you cannot attend the meeting, please register, so that we can send you the link of the recorded meeting and instructions to access the variety trial report after the meeting. If you have any problems with registration, please call (812) 886-0198.

PURDUE UNIVERSITY. SOUTHWEST INDIANA **MELON & VEGETABLE GROWERS WINTER** TECHNICAL MEETING

Virtual Meeting November 30, 2020 3:00 pm - 5:00 pm (EST)



For more information please contact Dr. Guan at guan40@purdue.edu or 812-886-0198

Register at: https://purdue.ca1.gualtrics.com/jfe/form/SV\_5bx2xau3Pb1kQfP

After registering, you will receive a confirmation email prior to the meeting with log-in information.

### Coronavirus Food Assistance Program 2 for Specialty Crop Producers

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

USDA is implementing Coronavirus Food Assistance Program 2 for agricultural producers who continue to face market disruptions and associated costs because of COVID-19. Here is an expanded list of fruits and vegetables eligible for CFAP2. USDA will accept CFAP 2 applications from September 21, 2020 through December 11, 2020. More information about this program can be found at https://www.farmers.gov/cfap/specialty

# Are You Interested in Participating a Grafted Cucumber Study?

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

We will continue the on-farm evaluation of grafted cucumbers for early-season production in high tunnels. The same as last year,

we are going to supply grafted and normal cucumber plants for free. These plants were grown in a conventional greenhouse. We will use untreated rootstock seeds, but they are not certified organic. What we want is for you to grow the same number and variety of grafted and normal cucumber plants, and keep track of the yields. We will provide a stipend for your efforts in tracking the data. If you are interested in the project, please contact Wenjing Guan at guan40@purdue.edu or (812) 886-0198. If you are interested in grafting cucumbers on your own, here is an extension bulletin and a video explaining the process. This project is supported by North Central Region SARE program under project number LNC17- 390.



#### Specialty Crops Soil Health Podcast Episodes – Cover Crops on Market Farms, Microbes and Soil Health

(Liz Maynard, emaynard@purdue.edu, (219) 548-3674)

Episodes 10 and 12 about specialty crops are (or soon will be) available in the CCSI-HAT-Soil Health Podcast from Conservation Cropping Systems Initiative (CCSI) in partnership with Purdue University and Hoosier Ag Today (HAT).

#### **'Cover Crops in Smaller Scale Specialty Crop Production'**

features Dan Perkins from Perkins Good Earth Farm and Kevin Allison from Marion County SWCD in a conversation about using cover crops throughout the year on market farms and urban vegetable production.

In **'Soil Amendments, Soil Microbiome, and Soil Health on Vegetable Farms'** Dan Perkins joins Dr. Lori Hoagland from Purdue Horticulture to discuss how microbes in the soil contribute to healthy crops and how management practices can influence them.

And check out Episode 11 that highlights David Brandt's reflections on 50 years soil pursuing soil health. Brandt farms over 1000 acres in central Ohio, including some vegetable production.

Find the podcast at https://www.ccsin.org/podcast or https://www.hoosieragtoday.com/category/hat-soil-health-podcast /, or subscribe to it on Stitcher, Spotify, iTunes, or Google Play.

Episodes will continue to be posted in the coming months. Let us

know what soil health topics you'd like to hear about, and who you'd like to hear from.

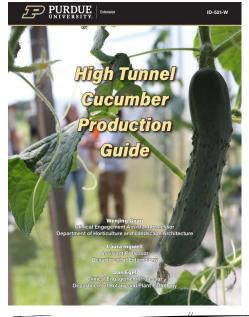
# High Tunnel Cucumber Production Guide

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

A new publication *High Tunnel Cucumber Production Guide* is available and can be downloaded at

https://extension.entm.purdue.edu/publications/ID-521/ID-521-W. pdf

This cucumber production guide provides resources and recommendations tailored to the distinctive growing environment of high tunnels. Recommendations are based on research efforts conducted in the Midwest U.S. and include cultivar selection, pruning and trellising systems, insect and mite pest management, disease management, plant physiological disorders, and grafting techniques that are tailored to cucumber production in high tunnels. This project is supported by North Central Region SARE program under project number LNC17- 390.



# Update from Purdue Horticulture Business

(Ariana Torres, torres2@purdue.edu)

A list of articles and publications are available at the Purdue Horticulture Business website. Articles range from weekly reports about prices of fruits and vegetables sold at farmers markets, the economic feasibility of plant growth regulators, the importance of relationships in the organic certified markets, and how to strategize your social media marketing.

To access the website, go to the following link: https://www.purdue.edu/hla/sites/hortbusiness/publications/exten sionpublications/

• Farmers market prices articles:

https://www.purdue.edu/hla/sites/hortbusiness/wp-content/ uploads/sites/10/2020/09/VeggiPrices.pdf

 Social media marketing; https://www.purdue.edu/hla/sites/hortbusiness/wp-content/ uploads/sites/10/2018/02/3.1.eGRO UseOfSocialMedia.pdf • Pricing your products:

https://www.purdue.edu/hla/sites/hortbusiness/wp-content/ uploads/sites/10/2018/02/3.1.-PIFF\_Prices.pdf

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# 2021 Vegetable Crops Hotline Subscription Form

The *Vegetable Crops Hotline* newsletter provides the commercial vegetable grower with timely information about disease, insect and weed pests, fertility practices, post-harvest problems, pesticide label changes, meetings and much more. Each year, the *Hotline* is published 12 times during the growing season (April - September) with additional issues in February, March and October.

In addition to the regularly scheduled issues of the *Hotline*, subscribers will be emailed articles published between issues about pressing matters. Growers may also use this form to sign-up for Veggie Texts. These texts, which will be of 160 characters or less, will deliver critical information to mobile phone numbers or email addresses.

# To subscribe, please fill in your name and address below, and send this form and a check for \$15.00 made payable to Purdue University to:

Vegetable Crops Hotline Subscription Southwest Purdue Ag Program 4369 North Purdue Road Vincennes, IN 47591

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If you would like to receive free email notification when a new issue of the <u>Vegetable Crops Hotline</u> is published online, please give us your email address or visit <u>lists.purdue.edu/mailman/listinfo/vch</u> to sign up: E-Mail address: \_\_\_\_\_\_

# Indiana Vegetable Growers Association Membership Renewal/Application

To renew or join, fill out the form below and send in with your check payable to IVGA. Memberships run January – December.			
Your contact information will be included in the membership directory and used for IVGA correspondence.			
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