VEGETABLE CROPS HOTLINE

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

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In This Issue

Renew Vegetable Crops Hotline for 2018

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

Renew now! Vegetable Crops Hotline (VCH), is Purdue Extension's newsletter for people in the business of growing vegetables. We have fifteen issues throughout the 2018 growing season. The first two issues of the year are being sent to all who subscribed to VCH via US-mail in 2017 as well as new subscribers for 2018. To continue receiving future copies through US-mail, renew your *Hotline* subscription using the form attached to this issue. Your subscription year may be found on the bottom right of the envelope your copy of the hotline was mailed in. If your envelope says 2017, this will be your last issue unless you renew.

If you receive notification of a new issue through email, you will continue to receive notice of the newsletters being published. In addition, you will receive emails if there are articles or announcements that need your immediate attention. These articles will be posted under *Hot Topics* and be included in the next issue. All the previous articles published in VCH are available on the website, and you may find additional articles under *Veggie Extras*.

Frequently we include links to websites or publications available on-line. If you aren't able to access these resources, please contact us or a local Extension office to request a hard copy of the information.

We hope you enjoy the newsletter.

What You Need to Know about Cucumber Varieties for High Tunnel Production

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

Cucumbers are produced with very different production systems. The ideal cucumber variety for process pickling production is not the variety used for greenhouse production. Choosing the suitable variety for a specific production system then becomes important.

Where do you find recommended cucumber varieties for high tunnel production in seed catalogs? Some of the seed catalogs have a category called *Greenhouse* or *Protected culture*. Varieties listed in this category are recommend for greenhouse or high tunnel production. Other seeds catalogs may call this group *Parthenocarpic hybrid* or *European slicer*. Cucumbers listed under these names are also suitable for greenhouse or high tunnel production.

A few technical words (parthenocarpic, monoecious, gynoecious) occur frequently in the descriptions of high tunnel-grown cucumbers. Understanding their meaning is important in choosing the right varieties.

Parthenocarpic means that the plant can set fruit without pollination. Since pollinators are not required in this case, parthenocarpic is a desirable characteristic for cucumbers grown in protected cultural system. Cucumbers are harvested in immature stages where mature seeds have not developed yet. However, it is not uncommon to see immature seeds in field-grown slicer cucumbers. Consumers prefer cucumbers without seeds. Cucumbers produced by parthenocarpic plants are seedless, which is another reason that parthenocarpic cucumber plants are preferred for growing in greenhouse/high tunnel situations.

Monoecious and Gynoecious describe flower patterns of cucumber plants. Monoecious plants produce both male and female flowers in a single plant, while gynoecious plants produce primarily female flowers. Since female flowers are produced at every node of the gynoecious plant, gynoecious plant normally has a higher and earlier yield compared to monoecious plant (Figure 1).

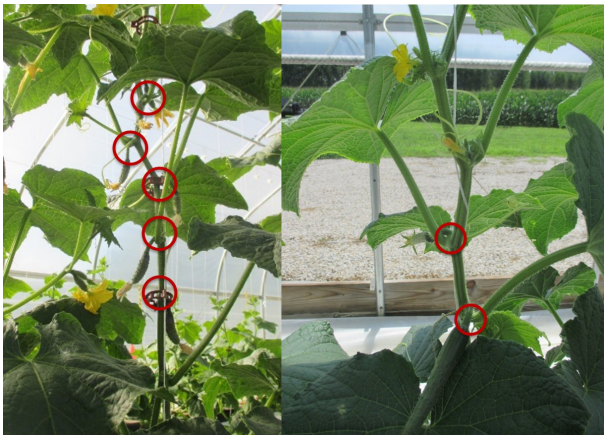

Figure 1. There is a cucumber fruit developing at the node marked with red cycles. The cucumber plant on the left is a gynoecious type plant, note it has cucumbers on every node. The cucumber plant on the right is a monoecious plant, note there are no cucumbers on the top two nodes.

Different types of fresh-consumed cucumbers. The most commonly grown type of cucumber is the American slicers. Although the majority of American slicers are grown in open-field. A few varieties are parthenocarpic and gynoecious that are well adapted for growing in greenhouse/high tunnel situation. When cucumber plants are trellised, they do not have a yellow belly that is often observed on field grown slicer cucumbers (Figure 2).

Figure 2. Well colored cucumbers on a trellised plant grown in a high tunnel. The cucumbers do not have yellow belly as shown on cucumbers at the left bottom of the picture.

European or English type cucumbers and Beit alpha cucumbers are originally bred for greenhouse production. The majority of the varieties in these types are parthenocarpic and gynoecious, they are more suitable to grow in a greenhouse than in an open-field. European type cucumbers are normally 14-16'' long, they are individually wrapped. Most Beit alpha cucumbers are about half of the size of European cucumbers. Beit alpha cucumbers can also be harvested smaller, and be sold as mini-cucumbers. Both European and Beit alpha cucumbers have thinner skins compared to American slicers. They do not need to be peeled which adds extra green color to the dish and it is preferred by consumers.

Both European type and Beit alpha type cucumbers sell at premiere price in the market. This is particularly true for European type cucumbers whose long shape makes it easy to be distinguished from slicer cucumbers.

Another group is called Asian or Japanese type cucumbers (Figure 3). They produce long, slender, thin-skinned cucumbers, similar to the European type cucumbers. Asian type cucumbers are not originally bred for greenhouse production that might explain why they are generally tougher and earlier to grow than European type cucumbers. Another advantage of the Asian type cucumber compared to European type cucumber is that they are less likely to produce misshaped fruit if they are pollinated, which could happen in semi-opened high tunnel situation. Some of the Asian type cucumbers are parthenocarpic that are well adapted to greenhouse/high tunnel production, however, the majority of this type of cucumber plants is monoecious producing both male and female flowers.

Figure 3. A Japanese type cucumber grown in a high tunnel.

Seed cost. Seed cost is one of the important considerations in choosing cucumber varieties grown in high tunnels. The price of parthenocarpic cucumber seeds varies dramatically among different types. The most expensive seed is the European type cucumbers, seed cost could be as high as $1 per seed. Seed price for Asian type cucumbers is the lowest, less than $0.1 per seed. Seed price might not be a big concern if one cucumber plant can continuously produce for three months or longer, but if the plants died from diseases after producing only for a few weeks, and then require replanting, seed cost would be an important consideration in the decision of choosing cucumber varieties for high tunnel production.

In summary, when choosing seedless cucumbers to be grown in high tunnels. Yield, fruit quality, consumer preference, and seed price should all be considered. Another important factor is disease resistance that we will discuss in the future articles.

Damping-off

(Janna Beckerman, jbeckerm@purdue.edu)

This is the time of year when growers begin planting seed—whether you are child planting a few seeds in Dixie cup for a school project, home tomato growers, or professional horticulturists. Unfortunately, one problem you may share in common is damping-off. Damping-off describes the death of seeds or seedlings and includes all of the following phenomena: Seeds that rot before they germinate, the newly emerging root (radicle) or shoot (cotyledons) of the seedling rots before emergence, or stems of seedlings (cotyledon) are attacked near the soil line, causing the young plants to collapse. Damping-off is caused by several fungi, including *Botrytis spp* and *Rhizoctonia solani*, and fungal-like organisms such as *Pythium spp.* and *Phytophthora spp.* These microbes are found in practically all soils and pose a large threat to plant propagation. Almost all species of plants can be infected, and these organisms also cause new cuttings to rot, as well.

Symptoms. In large flats or direct seeded gardens, damping-off commonly occurs in patches. Pre-emergent damping-off describes a seed rot (Figure 1), or the death of the seedlings before they emerge from the soil. Post-emergent damping-off affects newly developed seedlings that have emerged from the soil (Figure 2). Symptoms of post-emergent damping-off usually involve a dark stem rot near the soil surface that causes seedlings to collapse and rot. Usually, combinations of pre-emergent and post-emergent damping off occur together in plug trays (Figure 3).

Figure 1. Pre-emergent damping off is when seeds rot before they germinate.

Figure 2. Post-emergent damping off is when seedlings die due to root or crown rot.

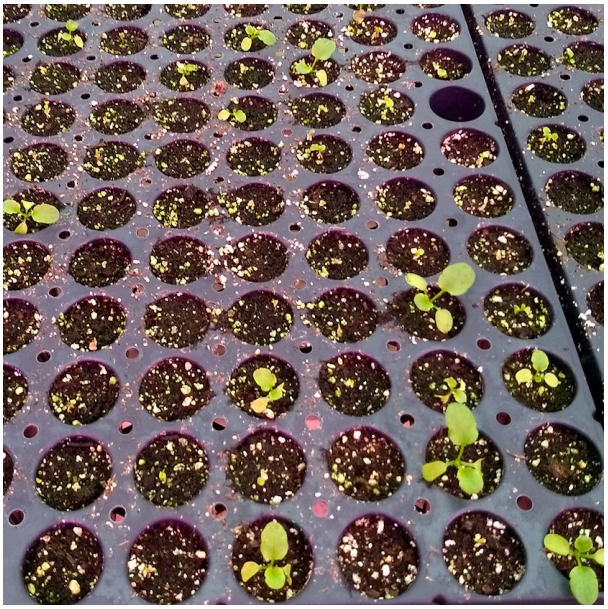

Figure 3. With damping off, multiple factors usually occur to cause seedling death, both before and after germination. These factors include improper watering, poor water quality, poor seed health (e.g., old seeds, improperly stored seed), or cool temperatures all impact seedling germination, emergence, and growth.

Management. In this case, disease prevention is a cornerstone of management. If planting in the garden, sow seeds when temperatures are favorable for rapid seedling growth. When starting seedlings indoors or in a greenhouse, this disease can be avoided if seeds and cuttings are planted in sterilized, soil-less seedling mix or other planting media, using only sterilized containers. A soil-less starting mix composed of a peat moss/vermiculite/sand mix is preferable for starting seeds. Use clean water on the seeds, not stored rainwater or pond water. Remove any pots or flats with damping-off immediately to prevent the spread of this problem.

As always, promote healthy plant growth–Vigorously growing seedlings are fairly resistant to infection. Follow planting instructions carefully—some seeds require light, a certain planting depth (or no depth!), soaking overnight, scarification (nicking the seed) and stratification (cold to induce germination). For plants that should not be covered, or require light for germination, plant seeds on soil, but cover with a light layer of sterile sand instead of soil. Provide good ventilation–moving air allows seedlings to dry and prevents the germination of *Botrytis*, or free water needed for *Pythium* or *Phytophthora* infection. Do not overwater, and follow instructions to thin seedlings appropriately. Yes—kill your darlings to the recommended spacing to allow them to grow big and strong, and not topple over because they are spindly and weak!

Finally, if you are faced with persistent problems, consider using fungicide-treated seeds, adding captan to seeds prior to planting, or using a product like Banrot G incorporated into your growing media, which controls most root rot pathogens. Follow labeled recommendations as rates change depending upon type of seeds being treated. Keep in mind that certain seedlings (e.g., conifer) may be adversely affected by captan.

This article was originally published on Landscape Report, Purdue University.

Lowering Soil pH in High Tunnels

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198) & *(Liz Maynard, emaynard@purdue.edu, (219) 548-3674)*

This article is my response to a grower's question about lowering soil pH in a high tunnel. The soil test indicated pH of the soil in his high tunnel was 7.7. The high pH could be partially caused by alkaline water (alkalinity 214 ppm) he used to use for irrigation. The grower has changed the water source, but high soil pH is still a concern.

'*I have soil sample from the high tunnels if I could have your input on them I would appreciate it. I am concerned with the pH, should I use sulfur to bring it down, if so, how much*?'

Following is my response to the grower's question. My response is mainly based on the publication '*Lowering Soil pH for Horticulture Crops*'. Purdue Extension HO-241-W.

We have a few choices to reduce soil pH. Adding elemental sulfur is one way to do it. If you want to reduce soil pH from 7.5 to 6.5, add 2 lbs elemental sulfur per 100 square feet. Note footnote of the following table, the amount changes based on soil type ('For sandy soils, reduce amount by 1/3; for clay soils, increase amount by 1/2').

Table 3. *Approximate amount of elemental sulfur needed to lower soil pH of a silt loam soil to a depth of 6 inches.*[1]

Present Soil pH	Desired Soil pH				
	6.5	6.0	5.5	5.0	4.5
	Pounds Elemental Sulfur per 100 Square Feet				
8.0	3.0	4.0	5.5	7.0	8.0
7.5	2.0	3.5	4.5	6.0	7.0
7.0	1.0	2.0	3.5	5.0	6.0
6.5	—	1.0	2.5	4.0	4.5
6.0	—	—	1.0	2.5	3.5

[1]For sandy soils, reduce amount by 1/3; for clay soils, increase amount by 1/2; if aluminum sulfate is used, multiply by 6.

This table is from *Lowering Soil pH for Horticulture Crops* (Purdue Extension HO-241-W)

The way elemental sulfur works is through a biological process: bacteria in the soil convert elemental sulfur to sulfuric acid, which reduces soil pH. Because microorganisms are involved, soil conditions such as temperature determine how effectively these tiny guys work, and the conversion process needs time.

Another way to reduce soil pH is through using acidifying nitrogen fertilizers. Since you need to add nitrogen anyway, it kills two birds with one stone. Nitrogen fertilizers containing urea or ammonium can reduce soil pH, but nitrogen fertilizers containing nitrate increase soil pH in the long term. You used potassium nitrate and calcium nitrate last year. They worked well, but it would not be a good idea to stick with it this year. Keep using them will continue to increase soil pH!!! The good news is that we have plenty of potassium and calcium in the soil, which we know tomatoes need.

This year, we should use more of an ammonium-based nitrogen source. You could apply some urea preplant, and inject 28% liquid nitrogen during the season. Ammonium sulfate can also be used preplant or through the drip depending on the forms. The effect of ammonium-based nitrogen fertilizers on reducing soil pH is relatively minor compared to elemental sulfur. 3.9 lbs of urea is equal to 1 lb of elemental sulfur in terms of reducing soil pH.

Table 2. *Acidifying effect of some common fertilizers and soil amendments.*

Material	Pounds of Pure $CaCO_3$ Needed to Neutralize Acidity in 100 Pounds of Soil[1]	Pounds of Material Equivalent in Acidifying Ability to 1 Pound of Sulfur
Elemental sulfur, S	312	1.0
Sulfur-coated urea (38-0-0)	118	2.6
Ammonium sulfate, $(NH_4)_2SO_4$ (21-0-0)	110	2.8
Urea, $(NH_2)_2CO$ (46-0-0)	81	3.9
Diammonium phosphate, $(NH_4)_2HPO_4$ (18-46-0)	70	4.5
Ammonium nitrate, NH_4NO_3 (34-0-0)	60	5.2
32% Liquid urea-ammonium nitrate (32-0-0)	55	5.7
Aluminum sulfate, $Al_2(SO_4)_3$	45	6.9
Ferric sulfate, $Fe(SO_4)_3 \cdot 9H_2O$	35	5.9
Peat[2]	30+	10.4 +
Pine bark mulch[2]	20+	15.6+
Compost[2]	0 to 10+	0 to 31.2+
Other animal manures[2]	0 to 10+	0 to 31.2+
Poultry litter[2]	0	0

[1] Values for pounds of $CaCO_3$ come from *Lowering Soil pH* (Alabama Cooperative Extension System publication S-04-08).
[2] Organic materials can be highly variable.

This table is from *Lowering Soil pH for Horticulture Crops* (Purdue Extension HO-241-W)

So if you decide to apply 30% the amount of nitrogen recommended from the soil test lab (105 lb/A) using urea applied preplant, the effect of the in reducing soil pH is similar to applying 0.04 lb elemental sulfur per 100 square feet.

Here is how I did the calculation:
105 x 0.3 = 31.5 lb/a N (apply 31.5 lb/a nitrogen preplant)
31.5 / 0.46 = 68 lb/a urea (68 lb/a urea supply the 30% required N)
68 / 3.9 = 17.4 lb/a elemental sulfur equivalent (the effect of urea to acidify soil is similar to apply 17.4 lb/a elemental sulfur)
One acre is 43560 square feet
17.4 / 435.6 =0.04 lb/100 square feet elemental sulfur equivalent

Remember, the recommendation is to apply 2 lbs elemental sulfur per 100 square feet. If the calculations make sense to you, you can work out a fertilizer plan for this season, and calculate the acidifying effects by using ammonium-based nitrogen fertilizers, and then decide whether or how much elemental sulfur you still want to add. Another thing you may consider is whether the material is applied only to the bed area or the entire area of the high tunnel.

Fungicide Schedules

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

The Midwest Vegetable Production Guide for Commercial Growers 2018 described above is a good way to keep up with what fungicides are recommended and their proper use. Last year, I developed a fungicide schedule to help growers schedule when fungicides are applied. These fungicide schedules seemed to be popular, so I have updated the fungicide schedules and made them available again. There are two fungicide schedules- one for cantaloupe and watermelons and a second for pumpkins. You can find the schedules at this URL: https://ag.purdue.edu/arge/swpap/Pages/SWPAPPresentationFiles.aspx. Or call (812) 886-0198.

Midwest Vegetable Production Guide for Commercial Growers

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

The *Midwest Vegetable Production Guide for Commercial Growers 2018* is available for sale as a hardcopy ($15) or free on-line. Actually, the *Vegetable Guide* has been available since last December. The guide may be purchased through the Education Store, at various extension meetings held around the state or from your Purdue University county educator. The website to either view or purchase the Guide, known in Indiana as the ID-56, is mwveguide.org. The *Midwest Vegetable Production Guide* is a collaboration of 8 states and 9 institutions.

Are you thinking that you already have a *Vegetable Guide* from a past year and wondering if it is worth getting a new one? The article below represents just some of the changes to this year's *Vegetable Guide.*

What's New in 2018?

New and Revised Sections

- For this year's guide, we created three new tables — Selected Information About Recommended Insecticides (page 54), Herbicides (page 69), and Fungicides (page 79). These tables include information about all pesticides recommended in this guide including their common names, trade names and formulations, signal words and restricted use status, mode of action information, greenhouse use status for fungicides and insecticides, and the leaching/run-off potential for herbicides.
- We removed the specific tables for greenhouse use and fungicide FRAC or mode of action and replaced them with the more comprehensive tables described above.
- We extensively revised the Plant-parasitic Nematode Management section.
- We modified the Pesticide Application Record form (page 38) to observe current regulations.
- We modified several variety recommendations, including the sweet potato section.

Disease Management

- In the Cucurbit Crops chapter, we expanded the seed treatment section.
- In the Cucurbit Crops chapter, we modified the recommended fungicides for downy mildew. • We added Velum Prime® for powdery mildew management (see the Cucurbit Crops chapter) and root-knot nematode (see Plant-parasitic Nematode Management).
- In the Fruiting Vegetables chapter, we added Regalia® for management of bacterial spot and speck.
- In the Cucurbits chapter, we added Elumin® for downy mildew and Phytophthora blight control. And in the Fruiting Vegetables chapter, we added Elumin® for Phytophthora blight control in eggplant and pepper.

Weed Management

- In the Asparagus chapter, we added Command 3ME® for preemergence use and Aim EC® for postemergence broadleaf control.
- In the Fruiting Vegetables chapter, we added League® for preemergence broadleaf control. Insect Management
- In the Dry Bulb and Green Bunching Onion, Garlic, and Leek chapter, we added Supresto® for thrips management.
- In the Cucurbit Crops and Fruiting Vegetables chapters, we added Kanemite 15SC® for mite management

Presentations from Winter Meetings Online

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

Slides from presentations at the 2018 Illiana Vegetable Growers Symposium and many of the fresh market vegetable sessions at the 2018 Indiana Hort Congress are available online. Visit https://ag.purdue.edu/hla/fruitveg/Pages/presentations.aspx.

Midwest Vegetable Trial Report for 2017

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

Reports of vegetable trials from 2017 are published online in the Midwest Vegetable Trial Report for 2017. There are reports of variety trials for green beans, cantaloupe/muskmelon, slicing and pickling cucumbers, ornamental corn, bell peppers in field and high tunnels russet potatoes, pumpkins, spinach in high tunnel, butternut squash in stripped-till rye, sweet corn, fresh market and saladette tomatoes, tomatoes in high tunnels, and watermelon. The trials were conducted in Illinois, Indiana, Kansas, Kentucky, Michigan, Ohio, and West Virginia. This and previous reports in the series are a good source of information on relative performance of vegetable varieties.

Sweet Corn Virus Survey

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

The USDA lab out of Wooster, Ohio is interested in surveying Indiana sweet corn for virus. They are especially interested in sweet corn near johnsongrass, but other fields are ok too. If you are interested, please let me know or contact Mark Jones, USDA Agronomist,mark.jones@ars.usda.gov, (330) 202-3555 ext. 2837.

Your participation would be pretty simple: one time when the corn is 15 to 30 inches tall you would collect ten leaf samples on a field transect and also a sample of any odd looking plants and mail them to the USDA lab for analysis. USDA would mail you a packet with sample bags and instructions and mailing materials.

If you are interested, but would rather have someone else collect the samples, I can check with a local county Extension educator to see if they would be interested in collecting the samples.

Thanks for considering this!

Upcoming Events

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

Food Safety Modernization Act Produce Safety Rule Training

A series of Food Safety Modernization Act produce safety rule training and registration information can be found on the website https://ag.purdue.edu/extension/safeproduce/Pages/FSMA-Training.aspx. The curriculum is designed to meet the needs of growers. Modules 1 through 6 align with sections outlined in the Food Safety Modernization Act (FSMA) Produce Safety Rule. Module 7 is focused on helping growers develop a written farm food safety plan. The farm food safety plan is not required by the FSMA Produce Safety Rule, it is included in the curriculum because growers expressed a need for a plan.

eOrganic Webinars

eOrganic provides a series of great webinars in organic farming practices and research. The upcoming webinars that might interest vegetable farmers include Conducting on-farm variety trials to manage risk for organic and specialty crop production (March 20 and April 11); Organic tomato foliar pathogen IPM webinar (March 21). Registration and more information about the webinar series are available at http://articles.extension.org/pages/25242/webinars-by-eorganic.

2018 Small Farms Winter Webinar Series of University of Illinois

University of Illinois Extension presents a weekly educational series for the small farm community. All the webinars are free and are recorded. Upcoming topics might interest vegetable growers include *Growing ginger, turmeric, and other unique crops* (March 22) and *Tips for modifying and building sprayers for specialty crops* (March 29).Information about registration and the list of topics can be found at https://web.extension.illinois.edu/registration/?registrationid=17593. Previous archived webinars are available at http://bit.ly/ILLocalFoodsYouTube.

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2018 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 off-season 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.

This year we will offer 3 subscription options: 1 year for $15 / 2 years for $25 / 3 years for $30

Yes, I would like to subscribe to the 2017 *Vegetable Crops Hotline*. Enclosed is a check made payable to **Purdue University.** (one year $15, two years $25 or three years $30)

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

******* (Please complete the following) *******

Name: _____

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Phone:_____(home) and/or_____(work)

____ **Yes, I would like to receive Veggie Texts.** Please provide your cell phone number and provider or an email address:

Cell Phone: _____

Carrier: (eg: Verizon, AT&T) _____

Email address: _____

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