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VEGEdge

YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

Volume 15 | Issue 05 | April 17, 2019

Photo: J. Reid, 2016

Cornell Cooperative Extension
Cornell Vegetable Program

# Creating NYS Adapted Tomatoes with Resistance to Multiple Fungal and Bacterial Diseases

*Martha A. Mutschler, Plant Breeding and Genetics Section, SIPS, Cornell University; Margaret McGrath, Plant Pathology and Plant-Microbe Biology Section, SIPS, Cornell University*

One of the myriad challenges for tomato production in NYS is control of common fungal, oomycete, and bacterial diseases. Control of these diseases by routine application of fungicides contributes to the cost of production. Loss of marketable crop or crop quality can reduce sales and sales price. So reliable disease control, at minimal cost, is important for economic sustainability of tomato production.

The Cornell tomato breeding/genetics program has taken a multiple disease approach to reducing the need for fungicide sprays. Because there are several foliar diseases impacting tomato production, having a hybrid with resistance to one disease will reduce the need for fungicides with targeted activity for it, but not the need to apply broad-spectrum protectant fungicides and targeted fungicides for other diseases. Since late blight, early blight, and Septoria leaf spot are the most important fungal and oomycete diseases in NYS, we needed to breed for resistance to ALL THREE of these diseases to create lines and hybrids that could be grown conventionally with substantially reduced levels of fungicides, and also used in organic production with much less use of copper sprays.

The Cornell program is not a seed company; it does not create and market hybrids. When improved lines with useful new traits, in NYS adapted backgrounds, are developed, they are released to interested seed companies, which use them either as parents

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**VegEdge** newsletter is exclusively for enrollees in the Cornell Vegetable Program, a Cornell Cooperative Extension partnership between Cornell University and CCE Associations in 14 counties.

The newsletter is a service to our enrollees and is intended for educational purposes, strengthening the relationship between our enrollees, the Cornell Vegetable Program team, and Cornell University.

We're interested in your comments. Contact us at:
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**Help us serve you better by telling us what you think. Email us at *cce-cvp@cornell.edu* or write to us at Cornell Vegetable Program, 480 North Main Street, Canandaigua, NY 14424.**

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*The next issue of VegEdge newsletter will be produced May 1, 2019.*

Signs of spring in this Steuben County greenhouse. *Photo: Judson Reid, CVP*

to create new hybrids or as breeding lines to create new lines that also possess the new traits, and can be used as parent of hybrids.

Using the lines that have been released since 2010, a number of hybrids with combined resistances to the three main diseases are now being sold by several seed companies. In this article, we list the hybrids currently being sold, and also summarize new traits being added to lines in development, that should result in new hybrids in the not too distant future.

**Current Fresh Market Hybrids with Multiple Disease Resistance:** All of the hybrids developed to date using Cornell resistant lines, which are listed below, possess combined resistances to late blight and Septoria leaf spot, plus a strong tolerance to early blight that provides good protection of infection on stems and peduncles (the stems on fruit, which protects against internal infection of fruit) and lesser control of blighting of foliage. The hybrids also possess resistance to Verticillium and Fusarium wilts that is standard in modern tomato hybrids. The hybrids differ considerably in other traits, such as maturity and fruit size, which are unrelated to disease resistance.

**Iron Lady** (High Mowing Organic Seed) is the first of the resistant hybrids commercialized. This slicer type tomato hybrid was developed in cooperation with the tomato breeding program at NCSU, with Randy Gardner.

See: https://www.highmowingseeds.com/organic-non-gmo-iron-lady-f1-tomato-a.html

**Stellar** (Pan American Seeds). This slicer, which was the second hybrid released, is different from Iron Lady in fruit size and maturity, and has improved flavor.

See: https://www.panamseed.com/plant_info.aspx?phid=062000001010320

**BrandyWise** (Fruition Seed Company) is the result of crossing the popular Heirloom Brandywine with a Cornell line. Eating quality is much like Brandywine, but the fruit have greatly reduced cracking and catface. While not commercialized until 2018, this hybrid was a hit for flavor in repeated trials before 2018, and it has become a favorite tomato for the Cornell Freeville research farm crew/staff members.

See: http://www.fruitionseeds.com/Organic-Brandywise-Tomato-p/t42.htm

**Summer Sweetheart** (Fruition Seed Company, a relatively new NYS seed company) is a Campari type tomato that has superior flavor. It has an indeterminate vine, is earlier in maturity than the larger fruited hybrids, and is very productive.

See http://www.fruitionseeds.com/Organic-Summer-Sweetheart-Tomato-p/t43.htm)

**Best use of these disease resistant hybrids:** The early blight tolerance in these hybrids provides good protection on stems and peduncles; however, this tolerance provides only moderate control of blighting of foliage, so further control by applying fungicides could be needed. The Septoria leaf spot resistance is also strong in its suppression of lesion expansion, and fungal reproduction, but it does NOT prevent the initial lesion formation by this pathogen. Due to the mechanism underlying this resistance, the highest degree of disease control is obtained when the plants are separated from typical Septoria susceptible tomatoes. In our experiments, this separation can be a little as 15 to 20 feet upwind of the susceptible tomatoes. The late blight resistance is extremely strong.

**Plum Perfect** (High Mowing Organic Seed) is the most recent of the resistant hybrids to be commercialized with seed first available in 2019. The diseases for which it has resistance differs somewhat from the other hybrids: Verticillium, Fusarium (I1, I2 and I3 genes), late blight, root knot nematodes (Mi) bacterial speck (Pto), TSWV (Sw-5), as well as some early blight tolerance. This hybrid is extremely productive, with a heavy crop of large firm jointless fruit. Fruit have very good flavor and color, and can be used fresh chopped or cooked. It was developed in cooperation with the tomato breeding program at NCSU, with Randy Gardner.

See: https://www.highmowingseeds.com/organic-non-gmo-plum-perfect-f1-paste-tomato-a.html

**Coming Attractions:** Even as these hybrids were being commercialized, the Cornell program continued improving lines by adding additional resistances. We have transferred resistances to bacterial spot and to bacterial speck into our best late blight, early blight, and Septoria leaf spot resistance lines. Development of the resulting new lines was either completed in 2018 or will be completed by end of 2019. Bacterial diseases are notoriously difficult to manage with pesticides because the main one used, copper, is inherently not highly effective (contrasting with modern fungicides) and bacteria have proven adept at developing resistance, plus bacteria multiple rapidly. Consequently, having hybrids with bacterial disease resistance will not only enable growers to reduce their need to apply copper but will also improve their ability to manage these important diseases. As we transferred the bacterial disease resistance, we unexpectedly discovered an additional resistance for early blight that is particularly effective at suppressing symptoms on leaves. Transfer of this additional early blight resistance into the best Cornell lines will be completed in 2019. As all of the new lines are completed, they are released to seed companies for creation of hybrids with combined bacterial/fungal disease resistance, and/or with substantially better early blight control. Time to release of new hybrids depends on the seed companies involved.

**NOTE**: The work at Cornell was supported, in part, by grants funded by NYSCG program and by NYFVI, as well as a grant from USDA/NIFA. Lines are being evaluated on Long Island by M. T. McGrath in the Hudson Valley by T. Rusinek. Growers will have an opportunity to see and taste fruit from the new hybrids and experimental lines during a late summer Twilight meeting at LIHREC.

# And the Results are in…from Year 1. What do Biofungicides Add to Vegetable Disease Management? Part 3

**INTRODUCTION**

In 2018 we conducted field trials using biofungicides in cucurbit powdery mildew and snap bean white mold management programs. Hopefully you've read part 1 and part 2 of this biofungicide story. If not, now might be a good time.

One of our goals for this project was to understand what biofungicides might add to a cucurbit powdery mildew management program.

Part 1 *[see 12/1/18 VegEdge, pg 4. ed. AO]* will give you more details about the trial design. We wanted to know whether adding biofungicides would improve disease control, plant health, or yield. For cucurbit powdery mildew, we were adding one of three different biofungicides to a conventional chemical spray program. We also included a treatment that was all OMRI-listed (organic) products. For white mold on snap beans, we were curious about using an in-season biofungicide (Double Nickel, *Bacillus amyloliquefaciens* strain D747) in combination with a pre-season biofungicide (Contans, *Paraconiothyrium minitans* strain CON/M/91-08). In 2018, our white mold treatments were just Double Nickel and Cueva (an OMRI-listed copper). In 2019, we'll add the pre-season Contans treatment.

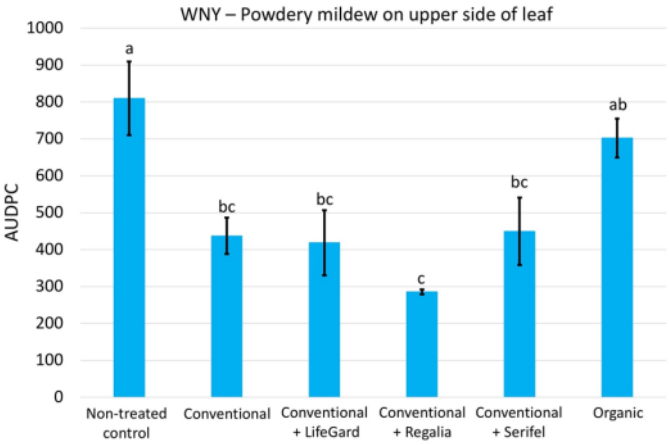
Part 2 *[see 2/4/19 VegEdge, pg 4. ed. AO]* explains more about the modes of action of the five biofungicides we are looking at. The post also includes practical information about how to use these biofungicides to maximize their efficacy – compatibility with other products, best way to store them, when to apply them, etc.

Now it's time to talk about what we learned from this first year (of a two-year project).

**THE BOTTOM LINE**

I don't want to keep you in suspense, so here's a quick summary of what we learned. Fortunately for the eastern NY grower who graciously allowed us to run the trial on his farm (but unfortunately for us), the snap bean field had very little white mold in 2018. Even the plots that were not sprayed with Double Nickel or Cueva had almost no disease. So we weren't surprised when there were no differences in disease, plant health, or yield among the white mold treatments. Results from Sarah Pethybridge's efficacy trials with OMRI-approved products for white mold are available online.

Cucurbit powdery mildew was a bit more severe than white mold (low pressure in eastern NY, moderate pressure in western NY and on Long Island), but we were not able to detect statistically significant benefits from adding biofungicides to a conventional spray program. Disease severity, plant health (as measured by NDVI), yield, and fruit quality (Brix) were the same whether you used a conventional spray program, or a conventional spray program plus a biofungicide. We didn't measure significant differences in yield among any of the treatments at any of the three sites.




Severity of powdery mildew on the upper sides of the leaves in the WNY trial. Here, disease severity is quantified using the area under the disease progress curve (AUDPC). This number summarizes disease severity from multiple dates, and the larger the number, the worse the disease. If two treatments share the same letter, the average disease in those treatments is not significantly different. The error bars give you an idea of how much variability there was in each treatment.

**NDVI RESULTS**

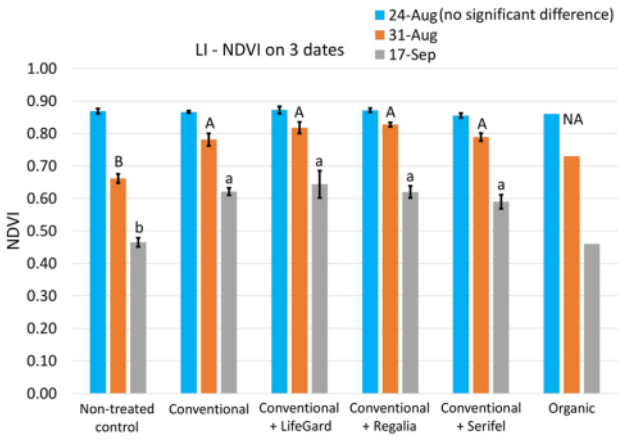
NDVI (normalized difference vegetation index) values did not detect cucurbit powdery mildew early *[see chart on next page]*. (Since there was so little white mold, we couldn't test NDVI for early detection.) There was some inconsistent correlation between NDVI readings and disease, yield, and Brix in winter squash. In WNY we used both a handheld GreenSeeker and a gator-mounted Crop Circle to measure NDVI. Both devices had similar results. Based on this first year of testing with these two devices, NDVI measurements were not useful as an early indicator of cucurbit powdery mildew.

In addition, NDVI measurements did not detect subtle differences in plant health among treatments. At only one of our three sites (Long Island) were there any significant differences in NDVI among treatments. This was only on the last two rating dates in the season, when powdery mildew was visibly more severe in the non-treated control than the conventional fungicide treatments.

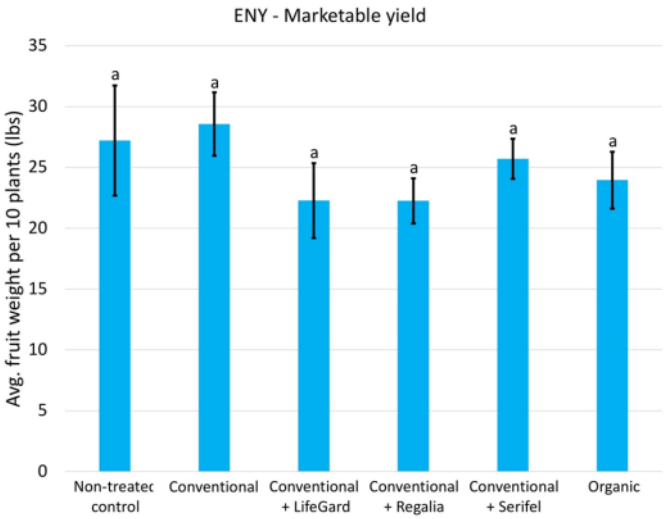
**SOME CAVEATS**

The non-treated control (received no powdery mildew fungicide) was often not significantly different from the conventional fungicide control (our best management program). We know that controlling powdery mildew on cucurbits is important, but if we don't detect a significant difference between the non-treated control and the treatment that

should have provided the best control, it is then hard to draw further conclusions from the data.

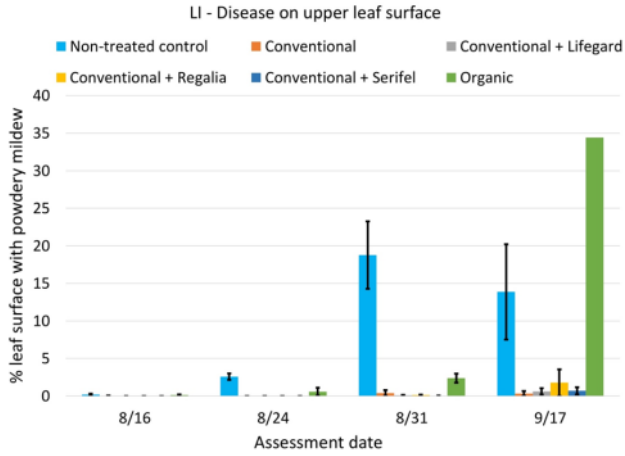



Normalized difference vegetation index (NDVI) measured on winter squash in the Long Island trial on three dates at the end of the season. NDVI values closer to 1 indicate more healthy, green foliage. If two treatments have the same a letter on the same date, the average NDVI readings on that date were not different between the two treatments. Data from August 31 are labeled with uppercase, while data from September 17 are labeled with lowercase letters. There were no differences among any treatments on August 24. The error bars give you an idea of how much variability there was in each treatment. We couldn't do statistics on the organic treatment because too many plants were killed by Phytophthora blight in the plots that received this treatment.




We didn't detect statistically significant differences in marketable yield among any of the treatments in any of the trials. Here are the data from ENY. Notice that all six bars are labeled with the letter "a". As with previous graphs, the error bars give you an idea of how much variability there was across the different plots in each treatment.

When disease pressure is low (as it was in Eastern NY), we would expect not to see many differences between treatments. Similarly, if the conventional fungicide program provided excellent disease control (as it did on Long Island), it would be hard to detect an improvement in control from adding a biofungicide. Another challenge we dealt with in the Long Island trial was Phytophthora blight. By the end of the season, we had lost two of the four plots receiving the organic treatment to this disease. This limited our ability to statistically analyze the biofungicide data. On Long Island, the organic spray program initially performed well – as seen on August 31 – comparable to the conventional treatments. But by the final assessment on September 17, the organic program was no longer as effective. This was not surprising since it was 10 days after the last application. Suffoil-X was the final organic product applied, and it has little residual activity.




Average severity of powdery mildew on the upper surface of leaves on the last four assessment dates in the 2018 Long Island trial. All of the treatments (except the non-treated control) suppressed powdery mildew well through August 31. Control in the organic treatment had declined by September 17, but this was 10 days after the last spray was applied.

In WNY, we had an epic aphid outbreak. An entomologist colleague identified them as probably melon aphids, and also that 2018 was generally a bad year for aphids. It's also possible that while trying to control cucumber beetles earlier in the season, we killed some aphid natural enemies, contributing to an aphid outbreak later in the season. I know cucumber beetles are tough, but if you can manage them without decimating your local natural enemies, you'll be doing yourself a favor!


The severe aphid outbreak in the western NY trial may have made it more difficult to detect differences among treatments. In late August, some of the leaves were covered with aphids (A), and many fruit were covered with honeydew (B). Getting a close look at the aphids is essential for correct identification (C).

*continued on page 6*

*continued from page 5 – And the Results are in...from Year 1. What do Biofungicides Add to Vegetable Disease Management? Part 3*

We deliberately used a very intensive spray program, starting our biofungicide applications early, and continuing to apply them as we added conventional fungicides later in the season. This was an expensive powdery mildew management program. But, in this first year of the project, we didn't want to be left wondering if a lack of differences was due to underapplication of the biofungicides.

If you want to see more of the data we collected from the cucurbit powdery mildew trial, you can find it in the Proceedings from the 2019 Empire State Producers Expo.

**WHAT DOES THIS ALL MEAN?**

First, this is only the first year of our project and one year of data. It's a start, but we'll hopefully learn more in a second year. Since we didn't measure a significant improvement in yield, we didn't see evidence that adding biofungicides to a full chemical spray program for powdery mildew justified the cost. The relative costs of the treatments we used are listed in the table below, and the approximate per acre costs of each product are in the Proceedings from the 2019 Empire State Producers Expo. Replacing a chemical spray or two with a biofungicide could be a more economical option. That's something we're planning to look at in 2019.

| | Treatment | | | | | |
|---|---|---|---|---|---|---|
| Date | Non-treated | Conventional | Conventional + LifeGard | Conventional + Regalia | Conventional + Serifel | Organic |
| 7/19/18 | - | | LifeGard | Regalia | Serifel | LifeGard |
| 7/27/18 | - | | LifeGard | Regalia | Serifel | LifeGard |
| 8/3/18 | - | Vivando | LifeGard + Vivando | Regalia + Vivando | Serifel + Vivando | MilStop |
| 8/10/18 | - | Quintec | LifeGard + Quintec | Regalia + Quintec | Serifel + Quintec | Serifel |
| 8/17/18 | - | Luna Experience | LifeGard + Luna | Regalia + Luna | Serifel + Luna | SuffoilX |
| 8/24/18 | - | Vivando | LifeGard + Vivando | Regalia + Vivando | Serifel + Vivando | MilStop |
| 8/31/18 | - | Quintec | LifeGard + Quintec | Regalia + Quintec | Serifel + Quintec | Serifel |
| 9/7/18 | - | Luna Experience | LifeGard + Luna | Regalia + Luna | Serifel + Luna | SuffoilX |
| Total cost (per A) | - | $228.28 | $343.32 | $536.28 | $696.28 | $257.76 |
| Cost increase vs. conventional (per A) | - | $ - | $115.04 | $308.00 | $468.00 | $29.48 |

Schedule and costs of sprays applied to the Long Island cucurbit powdery mildew trial. This schedule is representative of all three trials, but there were some variations among sites due to factors like weather and plant development. Costs per acre of each spray program were calculated from approximate product costs provided by a NY distributor or estimated from available prices found online. Prices may vary.

Based on results from this year, we can't yet recommend that you run out and buy a handheld NDVI sensor for early detection of cucurbit powdery mildew. We'll collect NDVI data again in 2019, and let you know what we learn. Although our results from the field trials were somewhat inconclusive in this first year, we're hopeful that the information we've compiled about how these biofungicides work and how to use them will be useful. If you're thinking of using Contans, Double Nickel, LifeGard, Regalia, or Serifel in 2019, first take a look at these fact sheets related to our white mold and powdery mildew trials. And if you have used biofungicides, we'd be interested in hearing about it; click here to send an e-mail.

Read more about biocontrol and how to use it at Biocontrol Bytes: https://blogs.cornell.edu/biocontrolbytes/.

*This post was written by Amara Dunn (NYS IPM), Elizabeth Buck (Cornell Vegetable Program), Meg McGrath and Sarah Pethybridge (both from Plant Pathology & Plant-Microbe Biology, School of Integrative Plant Science, Cornell University), Crystal Stewart (Eastern NY Commercial Horticulture Program, and Darcy Telenko (Department of Botany & Plant Pathology, Purdue University). Thank you to the New York Farm Viability Institute for funding.*

# Changes Coming for Paraquat (Gramoxone) Use

*Alice Wise and Andrew Senesac, CCE Suffolk; edited by Elizabeth Buck, CCE Cornell Vegetable Program*

In 2016-17, the EPA issued (then amended) a decision concerning risk mitigation measures deemed necessary for continued use of paraquat herbicide. The changes involve the following:

1. **Label changes to emphasize toxicity and supplemental warning materials**
2. **An online training requirement for all users**
   a. In-person training curriculum does not currently exist. Efforts to create one have begun. The EPA must approve the course before it can be taught. Therefore, it may be some time before we can offer trainings off-line.
   b. The training must be completed **BEFORE** using any paraquat bearing a label with a training requirement.
   c. All manufacturers must have the new labels in place by Nov. 14, 2019.
   d. Training will be **required every 3 years**.

*continued on next page*

3. **Closed system packaging will be required for all non-bulk (<120 gal) containers**
   a. This is a **safety upgrade** for those who must transport and handle paraquat
   b. Label changes may include specific instructions for using the new, closed system packaging. Follow those directions carefully, they are there for your protection.
   c. Sale of containers without the closed packaging system will be discontinued in September 2020.
4. **Only certified pesticide applicators will be allowed to apply paraquat**
5. **Older product can be used up in accordance with its labeled directions,** if those labels remain registered in NY.

For more information, visit: www.epa.gov/pesticide-worker-safety/paraquat-dichloride-training-certified-applicators, and www.epa.gov/ingredients-used-pesticide-products/paraquat-dichloride#action.

Sources: US EPA Feb. 6, 2018 Memorandum on Amendment to Paraquat Dichloride Human Health Mitigation Decision. March 8, 2019 Cornell Pesticide Program Update. Correspondence with Mike Helms, Cornell Pesticide Program.

# Chlorpyrifos (Lorsban) Update

*Dan Gilrein, CCE Suffolk; edited by Elizabeth Buck, CCE Cornell Vegetable Program*

**Status Update**
NY State Bill A2477/S2156A banning all use of the organophosphate insecticide chlorpyrifos has passed through the State Senate and Assembly. As of April 8, 2019, it has not yet been signed into law. If signed into law, all uses of chlorpyrifos will be prohibited after one year.

Nationally, the court order to ban chlorpyrifos use across the country is set for re-examination by the Ninth Circuit Court. Given the activity surrounding the status chlorpyrifos, growers should use the 2019 field season to investigate which alternatives work best on their farms.

**Cabbage Maggot**
Work to identify alternative crop protection options is continuing. Upstate, the restricted use pesticide Coragen (Group 28, applied at 5 fl oz/A) provides suppression. Cultural practices, particularly rotation and avoiding planting into decaying cover crops, can reduce pressure.

**Swede Midge**
Several products can be used in place of Lorsban, with little to no impact on your ability to rotate chemistry groups. Consider starting your treatment sequence with the acetamiprid (Group 4A, Assail 30SG) as it performs best when used preventatively. Spirotetramat (Group 23, Movento) is another non-restricted use option. Both imidicloprid (Group 4A, Admire Pro) and lambda-cyhalothrin (Group 3A, Warrior II w/Zeon Technology) have 2ee labels for swede midge and require a spray license.

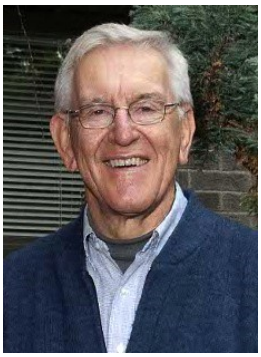
**Onion Maggot**
Pest resistance to Lorsban has led many growers to switch to other products. Spinosad (Group 5, FarMore) and cyromazine (Group 17, Trigard) seed treatments offer control.

**Cutworms in Sweet Corn**
Many management options exist, however there are none that replace Lorsban use prior to planting. At-planting and foliarly applied options are numerous.

# Memorial Tree Dedication for Joseph Sieczka

*Mark Bridgen, Professor and Director, Cornell University Long Island Horticultural Research & Extension Center*

Our colleague and friend, Joseph Sieczka, passed away on July 29, 2018, at the age of 79. Joe was a professor emeritus of horticulture at Cornell University who worked also worked as a Cooperative Extension agent in western NY and served as Coordinator at the Long Island Horticultural Research & Extension Center (LIHREC) in Riverhead from 1980-2001. In addition to his administrative responsibilities for the LIHREC, Joe was Long Island's potato and vegetable crops specialist. More information and a full obituary can be found at: http://news.cornell.edu/stories/2018/08/joseph-sieczka-potato-specialist-dies-79


Joseph Sieczka

A tree will be planted in memory of Joe at the Long Island Horticultural Research & Extension Center (LIHREC) at 3059 Sound Ave. in Riverhead, NY at 2 p.m. on Saturday, April 27. Friends of Joe Sieczka are cordially invited to attend this ceremony.

All 3 of Joe's children and their families will be attending and will host light refreshments at the LIHREC after the ceremony. You are cordially invited to attend this memorial and to visit with Joe's family.

Saturday, April 27, 2019
2:00 p.m.
Long Island Horticultural Research & Extension Center
3059 Sound Ave.
Riverhead, NY 11901

# First Look at the 2017 USDA Ag Census for Vegetables Grown in NY

*Steve Reiners, Cornell Horticulture/SIPS, Cornell University*

The 2017 Ag Census was finally released earlier this week and it's worth noting a few highlights. The total number of vegetable acres in New York is down by more than 11,000, with the biggest losses seen in potatoes (6,550), snap beans (4,026), sweet corn (3,216) and onions (1,352). Increases were seen in cabbage (1,331), peas (1,189), lima beans (565) and kale (469). The total number of farms growing vegetables was up by 77, which continues a trend we have seen in each census since 1997. One highlight appears to be much greater diversity across all farms as there was a significant increase in the number of farms growing particular crops. For example, beets, broccoli and garlic were grown on 257, 290 and 403 farms, respectively in 2012. Those same values are now 610, 535, and 824, respectively, in 2017. Most vegetables surveyed (46 of 53) saw at least a small increase in farms growing the crop.

The top five vegetable crops for New York in terms of acres in 2017 were sweet corn (25,370), snap beans (23,901), potatoes (15,315), cabbage (12,651) and green peas (8,880). The top five being grown on the most farms include tomato (1,534), sweet corn (1,281), snap beans (1,039), squash (1,003) and bell peppers (977). Garlic saw a large increase in farms growing the crop (up 421 farms to 824) yet only an increase of 86 acres.

**Table 1. Comparison of 2012 and 2017 USDA Ag Census for New York grown vegetables.**

| | 2017 | | 2012 | | Change since 2012 | |
|---|---|---|---|---|---|---|
| Crop | Farms | Acres | Farms | Acres | Farm Number | Acres |
| Total Vegetable and Potatoes | 3,544 | 124,859 | 3,467 | 135,997 | 77 | -11,138 |
| Artichokes | 9 | 3 | na | na | na | na |
| Asparagus | 290 | 498 | 167 | 321 | 123 | 177 |
| Beans | | | | | | |
| Lima | 24 | 972 | 20 | 407 | 4 | 565 |
| Snap | 1,039 | 23,901 | 1,230 | 27,927 | -191 | -4,026 |
| Beets | 610 | 3,176 | 257 | 3,372 | 353 | -196 |
| Broccoli | 535 | 634 | 290 | 562 | 245 | 72 |
| Brussels Sprouts | 263 | 148 | 118 | 75 | 145 | 73 |
| Cabbage | | | | | | |
| Head | 630 | 12,651 | 323 | 11,320 | 307 | 1,331 |
| Chinese | 260 | 298 | 49 | 142 | 211 | 156 |
| Mustard | 30 | 4 | 4 | na | 26 | na |
| Cantaloupes/ Muskmelons | 377 | 341 | 177 | 218 | 200 | 123 |
| Carrots | 552 | 1,608 | 190 | 1,516 | 362 | 92 |
| Cauliflower | 344 | 478 | 143 | 437 | 201 | 41 |
| Celery | 136 | 59 | 40 | 23 | 96 | 36 |
| Chicory | 58 | 26 | 3 | 3 | 55 | 23 |
| Collards | 142 | 100 | 53 | 129 | 89 | -29 |
| Cucumbers/Pickles | 945 | 1,359 | 469 | 1,717 | 476 | -358 |
| Daikon | 107 | 29 | na | na | na | na |
| Eggplant | 546 | 264 | 249 | 190 | 297 | 74 |
| Escarole/Endive | 110 | 62 | 20 | 75 | 90 | -13 |
| Garlic | 824 | 382 | 403 | 296 | 421 | 86 |
| Ginger | 34 | 7 | na | na | na | na |
| Ginseng | 8 | 22 | 8 | 39 | 0 | -17 |
| Honeydew melons | 76 | 34 | 11 | 6 | 65 | 28 |
| Horseradish | 60 | 24 | 15 | 11 | 45 | 13 |
| Kale | 489 | 573 | 140 | 104 | 349 | 469 |
| Lettuce | | | | | | |
| Head | 293 | 160 | 94 | 62 | 199 | 98 |
| Leaf | 563 | 741 | 185 | 775 | 378 | -34 |
| Romaine | 253 | 283 | 55 | 236 | 198 | 47 |
| Mustard greens | 149 | 75 | 28 | 35 | 121 | 40 |
| Okra | 67 | 14 | 23 | 8 | 44 | 6 |
| Onions | | | | | | |
| Dry Bulb | 558 | 6,606 | 278 | 7,958 | 280 | -1,352 |
| Green | 342 | 106 | 74 | 77 | 268 | 29 |
| Parsley | 277 | 101 | 33 | 23 | 244 | 78 |
| Peas | | | | | | |
| Green | 422 | 8,880 | 173 | 7,691 | 249 | 1,189 |
| Sugar/Snow | 233 | 399 | 55 | na | 178 | na |
| Southern | 11 | 3 | na | na | na | na |
| Peppers | | | | | | |
| Bell | 977 | 907 | 1,161 | 1,194 | -184 | -287 |
| Other (non Bell) | 535 | 286 | 696 | 399 | -161 | -113 |
| Potato | 953 | 15,315 | 1,207 | 21,865 | -254 | -6,550 |
| Pumpkin | 1,234 | 5,592 | 1,562 | 6,273 | -328 | -681 |
| Radish | 371 | 479 | 74 | 198 | 297 | 281 |
| Rhubarb | 276 | 66 | 54 | 41 | 222 | 25 |
| Spinach | 350 | 590 | 90 | 479 | 260 | 111 |
| Squash | | | | | | |
| Summer | 1,003 | 888 | 496 | 1,179 | 507 | -291 |
| Winter | 1,015 | 4,553 | 619 | 4,120 | 396 | 433 |
| Sweet Corn | 1,281 | 25,370 | 1,446 | 28,586 | -165 | -3,216 |
| Sweet Potatoes | 129 | 57 | 46 | na | 83 | na |
| Tomato (field) | 1,534 | 1,961 | 1,707 | 3,005 | -173 | -1,044 |
| Turnips | | | | | | |
| Turnip greens | 83 | 39 | 12 | 86 | 71 | -47 |
| Turnip (roots) | 252 | 165 | 50 | 172 | 202 | -7 |
| Watercress | 19 | 4 | 2 | 9 | 17 | -5 |
| Watermelons | 327 | 194 | 120 | 118 | 207 | 76 |
| Other Veg | 509 | 2,667 | 437 | 2,029 | 72 | 638 |

# 2019 Cabbage, Dry Bean and Processing Vegetable Crops Grants Awarded

*Julie Kikkert, CCE Cornell Vegetable Program*

The following projects have been awarded by the respective industry funding programs for applied research and extension in 2019. Sincere thanks to the growers and processors who contributed to these funds and to those who served on the advisory committees/boards to review the project proposals.

**Cabbage Research and Development Fund**

| Researchers | Title | TOTAL |
|---|---|---|
| C. Smart | Relative susceptibility of commercial cabbage varieties to different New York isolates of the black rot pathogen. | $16,000 |
| C. Hoepting | Optimizing herbicide weed control and crop safety in transplanted cabbage. | $7,000 |
| | **TOTAL AWARDS** | $23,000 |

**Dry Bean Endowment**

| Researchers | Title | TOTAL |
|---|---|---|
| S. Reiners, J. Ballerstein | Comparison of new and standard dry bean varieties at NYSAES research farm. | $8,243 |
| P. Griffiths | Breeding, evaluation and development of dry bean varieties that are highly adapted to NYS growing environments and markets. | $12,000 |
| A. Hamlin | Cool School Food: Encouraging the use of dry beans in school lunches, and promoting the health aspects of dry bean consumption. | $2,000 |
| S. Pethybridge, J. Kikkert | Towards a durable management strategy for white mold in dry beans in New York (2019/20): The status of fungicide sensitivity within the *Sclerotinia sclerotiorum* population. | $8,000 |
| M. Zuefle | Determine the magnitude and distribution of Western bean cutworm, and the risk to dry beans, in the major production areas in New York. | $2,400 |
| | **TOTAL AWARDS** | $32,643 |

**The New York Vegetable Research Association and Council (Processing Vegetables)**

| Researchers | Title | TOTAL |
|---|---|---|
| B. Nault | Optimizing the performance of insecticides to manage corn earworm in conventional and organic sweet corn production systems. | $20,025 |
| S. Pethybridge, J. Kikkert | Evaluation of alternatives to Quadris for early season and root disease control of table beet in New York. | $25,000 |
| S. Pethybridge, J. Kikkert | Optimizing the fungicide recommendations for white mold control in processing baby lima bean in New York. | $17,000 |
| S. Pethybridge, J. Kikkert | Revisiting the fungicide sensitivity of *Sclerotinia sclerotiorum* populations causing white mold in snap bean in New York. | $17,000 |
| S. Reiners, J. Ballerstein | NYS processing snap bean, green pea and sweet corn variety evaluations. | $49,500 |
| | **TOTAL AWARDS** | $128,525 |

# GAPs Assistance Available for NYS Producers

*Cornell University*

USDA's Risk Management Agency (RMA) and Agricultural Marketing Service (AMS) have partnered in an effort to increase market access and reduce the risks fruit and vegetable producers face by helping them pay for buyer-required food safety certifications. Under the program, USDA will cover the costs of voluntary USDA Harmonized GAP and Harmonized GAP Plus+ audits. These audits verify that fruits and vegetables are produced, packed, handled and stored in the safest manner possible to minimize risks of food safety hazards.

For more information please visit:
https://www.usda.gov/media/press-releases/2018/12/04/usda-announces-37-million-financial-assistance-fruit-and-vegetable

https://www.ams.usda.gov/publications/content/rma-ams-harmonized-gap-assistance-qa

https://www.ams.usda.gov/services/auditing/gap-ghp/harmonized

Or reach out to the New York State contacts in your region:
West/Central Regions – Marty Farrell
Phone: 585-427-0200
marty.farrell@agriculture.ny.gov

For agricultural risk management and crop insurance resources visit: https://agriskmanagement.cornell.edu

*Cornell University delivers crop insurance education in New York State in partnership with the USDA, Risk Management Agency. This material is funded in partnership by USDA, Risk Management Agency, under award number RM18R-METS524C018*

# 2019-2020 Cornell Management Guide for Greenhouse and Herbaceous Ornamentals Now Available

The 2019-2020 Cornell Guide for the Integrated Management of Greenhouse Crops and Herbaceous Ornamentals contains management information for common insect, disease, and weed pests of annual and perennial ornamentals grown in greenhouses, nurseries, or landscapes. The Guide also discusses growth regulators for ornamentals, effective and safe pesticide use, basic integrated pest management (IPM) principles, and biological control organisms. Greenhouse and nursery growers, landscape maintenance staff, and others who grow or maintain ornamentals will benefit from this publication.

In addition to updated pesticide information, the Cornell Greenhouse Crops and Herbaceous Ornamentals Guide includes several user-focused features:

- Six pages of color insect, disease, and weed pest photos;
- A "Quick Find" index to help users find specific chapters quickly;
- Disease and insect pests organized by name followed by specific management strategies for that specific pest;
- Listing pesticide resistance management codes to aid in resistance management programs;
- Pesticide application rates; and
- Summary tables for pesticides cited in the book organized by trade name and by active ingredient.

The Cornell Guidelines are available as a print copy, online-only access, or a package that combines print and online access. The print edition of the 2019-2020 Cornell Greenhouse Crops and Herbaceous Ornamentals Guide costs $41 plus shipping. Online-only access is $41. A combination of print and online access costs $57.50 plus shipping costs for the printed book.


Cornell Guidelines can be obtained through your local Cornell Cooperative Extension office or from the Cornell Store at Cornell University. To order from the Cornell Store, call (844) 688-7620 or order online at https://www.cornellstore.com/books/cornell-cooperative-ext-pmep-guidelines.

# Aid for Farmers Impacted by Extreme Weather

*NYS Department of Agriculture and Markets, 3/26/19*

Governor Andrew M. Cuomo today announced available assistance for farmers impacted by extreme rainfall and wet weather conditions last summer. Last week, the federal government declared 12 counties across the state as natural disaster areas. With these designations, farmers in the impacted areas may be eligible for assistance, including emergency loans, from the United States Department of Agriculture Farm Service Agency.

"As extreme weather becomes the new normal, we must protect our farmers who all too often bear the brunt of these weather events with damaged crops and land," Governor Cuomo said. "In the wake of the excessive rainfall experienced in these counties last year, the declarations will ensure farmers have access to emergency funds they need to help get them back on their feet and recover from these devastating losses."

"Communities across the state have been impacted by extreme weather events including significant rainfall," said Lieutenant Governor Kathy Hochul. "The designation of 12 counties as natural disaster areas will provide our farmers with the resources they need to build back better and ensure continued success."

**March 2019 Declarations**

In response to the extreme weather experienced in the summer of 2018, the federal government last week declared **Allegany**, Broome, **Cattaraugus**, **Chautauqua**, Columbia, Dutchess, Putnam, Rensselaer, **Steuben**, Suffolk, Tioga and Westchester counties as secondary disaster counties. The determination of a disaster declaration is based on reporting of on-farm production loss to the FSA.

Farmers in the eligible counties have eight months from the date of the disaster declaration to apply for emergency loans. FSA considers each emergency loan application based on the extent of production losses on the farm, as well as the security and repayment ability of the operator. Local FSA offices can provide affected farmers with further information. Contact information for the offices can be found at https://www.fsa.usda.gov/state-offices/New-York/index#_blank or call the State Office in Syracuse at 315-477-6300 to find contact information for County FSA Service Offices.


*view all Cornell Vegetable Program upcoming events at CVP.CCE.CORNELL.EDU*

## Women in Ag Discussion Group Starting!

Did you know that **38% of NY farmers are women**? Unfortunately, most agricultural meetings tend not to reflect how many ladies are involved in farming. To address this year, CVP and CCE Erie are facilitating a **monthly women's discussion group**!

Each month **an established, innovative Farm-her will lead a tour** of her operation and **share her expertise**. **Guest speakers** and CVP staff, will act as **resource people for** developing solutions to **common production challenges**.

**Why join?**

1) Welcoming environment for peer-to-peer learning and networking
2) The latest research from CCE & Cornell experts
3) Get to see other farms
4) Free! Thanks to a generous grant from Farm Credit East's AgEnhancement program

**Six out of eight meetings include vegetable topics**. Each meeting will have snacks and time for general discussion group identified topics. This group is **open to anyone professionally farming, including employees**, and FFA/4-H youth age 16 & up who plan a career in horticulture.

**To register** for the group, call Cornell Cooperative Extension of Erie County at 716-652-5400.

The next meeting will be:
**Monday, May 6 | 6:30 – 8 pm**
**Groundworks Market Garden**
**1698 Genesee St, Buffalo, NY 14211**

**Hosts**: Mayda Pozantides (Groundworks Market Garden) & Allison DeHonney (Urban Fruits & Veggies)

**Commodity**: Urban Farming

**Business Topics**: Positive Public Relations and Navigating Municipal Ordinances

**Production Skill**: High Tunnels, Urban Soils, and Adapting Farming Techniques

View the full Women in Ag discussion group schedule on the Cornell Vegetable Program website at https://rvpadmin.cce.cornell.edu/pdf/event/pdf1177_pdf.pdf

Cornell Cooperative Extension
Cornell Vegetable Program

480 North Main Street
Canandaigua, NY 14424

# VEGEdge

YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

VEGEdge

YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

VegEdge is the award-winning newsletter produced by the Cornell Vegetable Program. It provides readers with information on upcoming meetings, pesticide updates, pest management strategies, cultural practices, marketing ideas and research results from Cornell and Cornell Cooperative Extension. VegEdge is produced every few weeks, with frequency increasing leading up to and during the growing season.

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Cornell Cooperative Extension
Cornell Vegetable Program

For more information about our program, email cce-cvp@cornell.edu or visit us at CVP.CCE.CORNELL.EDU