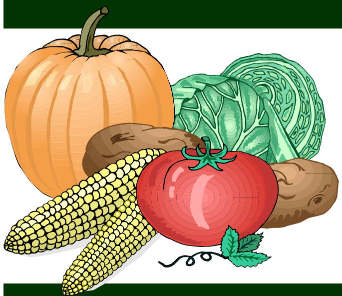

Veg Edge

Your Trusted Source for Research-Based Knowledge

Cornell University
Cooperative Extension
Regional Vegetable Programs

May 2012 **Volume 8, Issue 5**

2012 Pesticide Update

Christy Hoepting and Katie Klotzbach, CCE Cornell Vegetable Program

Changes in pesticide registrations occur constantly and human errors are possible. Read the label before applying any pesticide. No endorsement of products or companies is made or implied. Other pesticide updates that we missed are welcome. Information was last updated on March 27, 2012. Updates after this date will be posted in Veg Edge Weekly.

Note: We only included the chemical and biological materials/uses that pertain to vegetables. Several labels include uses in fruit and field crops as well.

New Registrations (i.e. new EPA No.s)

- **ARMEZON herbicide**: (EPA No. 7969-262, a.i. topramezone, BASF). For post-emergence weed (broadleaf and some grasses) control in all types of field corn, popcorn, and sweet corn.
- **CABRIO PLUS fungicide**: (EPA No. 7969-321, a.i. metiram and pyraclostrobin, BASF). For disease control of black dot, early blight and late blight, and suppression of white mold, and plant health in potato.
- **MASTERCOP fungicide/bactericide**: (EPA No. 55272-18-66222, a.i. copper sulfate pentahydrate, MANA Crop Protection). For broad range of bacterial and fungal disease control or suppression in most vegetable crops.
- **PFR-97 20% WDG microbial insecticide**: (EPA No. 70051-19, a.i. *Isaria fumosorosea* Apopka Strain 97, Certis). Soil and foliar uses for control of insect and mite pests, such as white flies, thrips, aphids, leaf miners, weevils, wireworms, symphylans, Lepidoptera caterpillars, Coleoptera grubs, and spider mites in sweet corn, leafy vegetables, melons and other cucurbits, potatoes, beans and herbs. Also for use in greenhouse for transplant production of these crops. For organic production. Do not mix with fungicides other than copper based.
- **SHARPEN X herbicide**: (EPA No. 7969-278, a.i. saflufenacil, BASF). Labeled on vegetable legumes (dry beans and peas) as a desiccant. Supplemental label also available for weed control in peas.
- **STRATEGO YLD fungicide:** (EPA No. 264-1093, a.i. prothioconazole and trifloxystrobin, Bayer CropScience). For control of leaf diseases and plant health in sweet corn.

Spraying onions.
Photo: Carol MacNeil, CCE Cornell Vegetable Program

2 EE's (add new pest or rate to crop already existing on label)

- **ACTARA insecticide** (EPA no. 100-938, a.i. thiamethoxam, Syngenta). For use on leafy vegetables (including brassica and non-brassica), and cucurbits to control brown marmorated stink bug. Actara is a restricted-use pesticide in NYS and is not for sale/use on Long Island.

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Veg Edge is a shared publication of two Cornell Cooperative Extension teams, the **Cornell Vegetable Program**, serving 12 counties in Western & Central NY, and the **Capital District Vegetable & Small Fruit Program**, serving 11 counties in the Capital Region of NY

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- **CORAGEN insect control**: (EPA No. 352-729, a.i. chlorantraniliprole, DuPont). For use as a transplant water treatment in cabbage for control of cabbage maggot.
- **ENTRUST** (EPA No. 62719-282, a.i. *Bacillus thuringiensis aizawi*, Dow AgroSciences) and **AGREE WG** (EPA No. 70051-47, a.i. spinosad, Cirtis) for use on summer and winter squash, pumpkins, gourds, cucumbers, and melons against the unlabeled pest squash vine borer.

Label Expansions (i.e. new crops added to the label)

- **AGRI-MEK 0.15 EC miticide/insecticide:** (EPA No. 100-898, a.i. abamectin, Syngenta Crop Protection). Added dry beans to control *Liriomyza* leafminers and spider mites, chives and spider mites to the herb section, and dry bulb group (including onions, garlic and chives) to control *Liriomyza* leafminers and thrips.
- **AGRI-MEK SC miticide/insecticide:** (EPA No. 100-1351, a.i. abamectin, Syngenta Crop Protection). Added dry beans to control *Liriomyza* leafminers and spider mites, chives and spider mites to the herb section, and dry bulb group (including onions, garlic and chives) to control *Liriomyza* leafminers and thrips.
- **BELT insecticide:** (EPA No. 264-1025, a.i. flubendiamide, Bayer CropScience). For control of Lepidoptera caterpillars in cucurbits, sweet corn, leafy vegetables (except Brassicas), fruiting vegetables, legume vegetables (except soybean).
- **DUAL II MAGNUM herbicide:** (EPA No. 100-818, a.i. s-metolachlor, Syngenta Crop Protection). Label now includes beans, peas, lentils, pumpkins, rhubarb, and tomatoes.
- **PROWL H2O herbicide:** (EPA No. 241-418, a.i. pendimethalin, BASF). Label now includes asparagus.
- **DUAL MAGNUM herbicide:** (EPA No. 100-816, a.i. s-metolachlor, Syngenta). Added crops to the 24 (c) Supplemental Label including: Broccoli (direct seeded and transplanted), cantaloupe, muskmelon, watermelon, summer squash, cucumber, winter squash, garlic, and leafy brassica greens. Includes a fall preplant application for nutsedge control in dry bulb onions. Also includes a reduced PHI for tomatoes from 90 days to 60 days. Note that the use of Dual Magnum under Special Local Needs labeling requires users to sign a waiver which releases Syngenta Crop Protection, Inc. from all liability and indemnification by the user and/or grower for failure to perform and crop injury, crop yield reduction, and/or crop loss from use of the product in accordance with the SLN labeling.

Supplemental Labels

- **ADMIRE PRO systemic protectant**: (EPA No. 264-827, a.i. imidacloprid, Bayer CropScience). Admire Pro Insecticide is now approved in NY for foliar use as well as soil applied uses. For foliar control of aphids, leafhoppers and beetles in potato, fruiting vegetables, herbs, brassica (cole) leafy vegetables, leafy green vegetables, legume vegetables, and root, tuberous and corm vegetables.
- **BELT SC insecticide:** (EPA No. 264-1025, a.i. flubendiamide, Bayer CropScience). For control of Lepidoptera caterpillars in cucurbit vegetables, fruiting vegetables (except cucurbits), and leafy vegetables (except brassica vegetables).
- **MOVENTO insecticide:** (EPA No. 264-1050, a.i. spirotetramat, Bayer CropScience). For use on legume vegetables, crop group 6 (except soybean, dry) including: edible podded and succulent shelled pea and bean, and dried shelled pea and bean for the control of aphids and whiteflies.
- **OPTILL herbicide**: (EPA No. 7969-280, a.i. saflufenacil and imazethapyr, BASF). For broad spectrum weed control in English (garden, green) peas in New York.
- **SHARPEN X herbicide**: (EPA No. 7969-278, a.i. saflufenacil, BASF). For preplant incorporated or preemergence applications in English (garden, green) and sugar snap (edible-podded) peas in New York for broadleaf control of black nightshade, common lambsquarters, redroot pigweed and velvetleaf.
- **SYNAPSE insecticide:** (EPA No. 264-1026, a.i. flubendiamide, Bayer CropScience). For control of Lepidoptera caterpillars in brassica (cole) leafy vegetables and turnip greens.

Section 18s (i.e. Emergency registrations)

- **MOVENTO insecticide**: (EPA No. 264-1050, a.i. spirotetramat, Bayer CropScience). To control onion thrips on dry bulb onions during the 2012 growing season in New York State. Expires September 15, 2012.

Special Local Needs (24C)

- **VYDATE L insecticide/nematicide:** (EPA No. 352-372, a.i. oxamyl, DuPont Crop Protection). For use on garlic and bulb onions for control of root knot, stubby root, stem and bulb nematodes including garlic bloat nematode.
- **NORTRON SC herbicide:** (EPA No. 264-613, a.i. ethofumesate, Bayer CropScience) and **UPBEET herbicide** (EPA No. 352-569, Dupont). For use on garden beets for control of broadleaf weeds before they emerge.
- **UPBEET herbicide** (EPA No. 352-569, Dupont). For use on garden beets for post-emergence control of broadleaf weeds.

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Discontinued Products

- **DI-SYSTON 8 Insecticide**: (EPA No. 264-734, a.i. disulfoton, Bayer CropScience). Registered crops (except lettuce): Distributors, retailers and growers can sell and use Di-Syston 8 on registered crops (except lettuce) until December 31, 2013, after which time Di-Syston 8 tolerances on registered crops (except lettuce) will be cancelled. Distributors, retailers and growers can sell and use Di-Syston 8 on lettuce until December 31, 2014, after which time Di-Syston 8 tolerances on lettuce will be cancelled. Any uses of Di-Syston 8 after the listed dates are illegal.
- **MONITOR insecticide:** (EPA No. 264-729, a.i. methamidophos, Bayer CropScience). Distributors, retailers and growers can sell and use Monitor on registered crops until December 31, 2013, after which time, Monitor tolerances will be cancelled. Any uses of Monitor after December 31, 2013 are illegal.
- **PROVADO 1.6 insecticide**: (EPA No. 264-763, a.i. imidacloprid, Bayer CropScience). Will be replaced by ADMIRE PRO. There is still some Provado in the channels of trade and that label is still legal. However now ADMIRE PRO with the foliar uses on the label can be shipped into NY and used accordingly.
- **SYNAPSE WG insecticide:** (EPA No. 264-1026, a.i. flubendiamide, Bayer CropScience). Will be replaced by BELT. Product may be used until it is gone.
- **THIONEX 3EC & 50W Insecticide** (EPA No. 66222-63(EC), 66222-62(W), a.i. endosulfan, MANA Crop Protection). For broad-spectrum insect control. MANA was able to sell endosulfan until December 31, 2010. Distributors/retailers were able to sell existing endosulfan inventories with the labeled uses until May 5, 2011. Growers and other end users may use endosulfan on the following labeled crops until the **stop use date of July 31, 2012:** Broccoli, Brussels sprouts, cabbage, carrots, cauliflowers, celery, collard greens, cucumbers, dry beans, dry peas, eggplant, kale, kohlrabi, lettuce, mustard greens, summer melons, summer squash, sweet potato and turnip. **Crops/Uses with a stop use date of July 31, 2015:** peppers, potatoes, pumpkins, sweet corn, tomato, and winter squash. **Crop Uses with a stop date of July 31, 2016:** vegetable crops grown for seed.

How to look up labels for pesticides labeled in New York

Go to the NYS Pesticide Product, Ingredient, and Manufacturer System (PIMS) website: http://magritte.psur.cornell.edu/pims/

To look up **currently registered labels**, click on "NYS PIMS Current Products". For primary and supplemental labels, you may search by product name, active ingredient or EPA number. From the product search results, click on the arrow under the "details" column of the material in which you are interested. From the resulting "supplemental information" page, click on the "NYS labels/docs" button. This will give you a list of primary and supplemental labels. Click on the most recent (by date) label to view the actual label as a pdf file. Often, but not always, **Section 24C Special Local Needs** and **2(ee)** labels will be available via this search.

If you want to check if a **pesticide has been deregistered**, click on "NYS PIMS Archived products" from the main search menu.

To look up **Section 18 Emergency** labels, from the main search menu, click on "Special/Pending registrations". Click the link "New York State Emergency Exemptions (FIFRA Section 18s) for the current year". From the list, click on the label to view it as a pdf. ■

2012 Cabbage Research Grants Awarded

Julie Kikkert, CCE Cornell Vegetable Program

The New York State Cabbage Research and Development Board has awarded a total of $32,019 towards four research projects at Cornell University. The funds for these grants are contributed by the growers and processors. The following projects were awarded for 2012:

Researchers	Title	Total Funding
Bellinder	Evaluating New Herbicides for Potential Registration in Transplanted Cabbage	$ 5,619
Dillard, Strauss, Scheufele	Fungicides - Which Will Control Alternaria Leaf Spot?	$ 5,700
Shelton, Fail	Determining Factors Responsible for Thrips Resistance in Cabbage	$ 10,000
Smart, Lange	Efficacy of Conventional and Biorational Pesticides Against Black Rot, 2012	$ 10,700
	Total Funded	**$ 32,019** ■

Kabocha/Buttercup Squash Cultivar Evaluation

E. Sánchez, M. Orzolek, T. Elkner, T. Butzler, S. Bogash, L. Stivers and E. Oesterling, Penn State Extension, The Vegetable & Small Fruit Gazette, 4/12

In 2010-11 we evaluated kabocha and buttercup types of squash cultivars in a conventional system in three locations across the state: in central PA at the Russell E. Larson Research and Education Center in Rock Springs, in eastern PA at the Southeast Research and Extension Center in Landisville, and in western PA at Beinlich Farms in 2010 and Harvest Valley Farms in 2011.

The cultivars evaluated along with the company from which seed were acquired are listed (right). The standard 'Sunshine' was grown for comparison.

Cultivar	Seed Company	Type of Winter Squash	Yr Evaluated
Sun Spot	Rupp Seeds Inc	Buttercup	2010
Space Station	Rupp Seeds Inc	Kabocha	2010-11
Thunder	Rupp Seeds Inc	Buttercup	2010-11
Sweet Mama	Seedway, LLC	Kabocha	2010-11
T-133	Seedway, LLC	Kabocha	2011
Red Kuri	Johnny's Selected Seeds	Mini red hubbard*	2010-11
Sunshine	Johnny's Selected Seeds	Kabocha	2010-11
Cha-cha	Johnny's Selected Seeds	Kabocha	2010
Bon Bon	Johnny's Selected Seeds	Buttercup	2010-11
Speckled Pup (PMT)	neseed.com	Kabocha	2010
Geisha	neseed.com	Kabocha	2011

*included in the evaluation because it is similar in size to the other cultivars evaluated

At all locations cultivars were grown in a plasticulture system using raised beds, drip irrigation and black plastic. Three foot in-row spacing and 8 foot center-to-center rows were used. At the central Pennsylvania site 4-week-old transplants were planted on 6/17/10 and 3-week-old transplants were planted on 6/14/11. Direct seeding was used in the western and southeastern sites.

Fruit were harvested when all plants of an individual cultivar reached maturity. Fruit was categorized as marketable or unmarketable, counted and weighed. Yield data was analyzed using analysis of variance.

RESULTS AND RECOMMENDATIONS BY LOCATION

Rock Springs, PA - In 2010, 'Sweet Lightening' and 'Sun Spot' produced a larger number of marketable fruit than 'Sunshine'. The number of fruit per plant produced by the remaining cultivars was not different than 'Sunshine'. In 2011, no differences in number of fruit per plant were observed.

In 2010, fruit weight per plant from 'Bon Bon' and 'Cha-cha' was lower than 'Sunshine'. Fruit weight from the remaining cultivars was not different from 'Sunshine'. In 2011, 'Geisha' had higher and 'Space Station' lower fruit weight per plant than 'Sunshine'. In 2010, individual fruit from 'Space Station', 'Sun Spot' and 'Sweet Lightening' weighed less than from 'Sunshine'. Individual fruit weight from the remaining cultivars was not different than 'Sunshine'. In 2011, individual fruit from 'Geisha', 'Sweet Mama' and 'Red Kuri' weighed more and from 'Space Station' weighed less than 'Sunshine'. The remaining cultivars were not different from 'Sunshine'.

Very few fruit were unmarketable. In 2010, 'Bon Bon' and 'Cha-cha' produced a larger number of unmarketable fruit than 'Sunshine'. The number of unmarketable fruit produced by the remaining cultivars was not different than 'Sunshine'. 'Bon Bon', 'Cha-cha', 'Thunder', 'Space Station' and 'Sweet Mama' produced higher unmarketable fruit weight per plant than 'Sunshine'. Fruit weight per plant was not different than 'Sunshine' for the remaining cultivars. In 2011, no differences were observed for unmarketable yield.

<u>'Red Kuri', 'Sweet Mama' and 'Thunder' are recommended</u>. In terms of number and weight of fruit per plant they performed equally or better than 'Sunshine'.

Landisville, PA - In 2010, 'Sweet Lightening', 'Sun Spot' and 'Bon Bon' produced a larger number of marketable fruit than 'Sunshine'. The number of fruit produced by the remaining cultivars was not different than 'Sunshine'. In 2011, 'Sun Spot' produced a higher and 'Thunder' and 'Space Station' a lower number of marketable fruit than 'Sunshine'. The number of fruit produced by the remaining cultivars was not different than 'Sunshine'.

In 2010, fruit weight per plant from 'Sweet Lightening' was lower than 'Sunshine'. Fruit weight per plant from the remaining cultivars was not different than from 'Sunshine'. In 2011, marketable fruit weight was higher from 'Bob Bon' and lower from 'Space Station' and 'Thunder' than 'Sunshine'. Fruit weight per plant from the remaining cultivars was not different than 'Sunshine'.

In 2010, 'Thunder', 'Bon Bon', 'Sun Spot', 'Cha-Cha' and 'Sweet Lightening' produced a lower individual fruit weight than 'Sunshine'. The remaining cultivar produced an individual fruit weight not different than 'Sunshine'. In 2011, 'Red Kuri' and 'Sun Spot' produced a lower individual fruit weight than 'Sunshine'. Individual fruit weight of the remaining cultivars was not different than 'Sunshine'.

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In 2010, differences in unmarketable yields in terms of fruit number per plant were not detected. All cultivars did not produce a different unmarketable fruit weight per plant than 'Sunshine'. In 2011, differences in unmarketable yield were not detected.

<u>'Sun Spot', 'Bon Bon', 'Red Kuri' and 'Sweet Mama' are recommended</u> as they performed equally or better than 'Sunshine' in terms of number and weight of fruit per plant. When markets demand a smaller individual fruit, 'Sun Spot' is recommended.

Valencia, PA – 2011 only –Only two replications of 'Sunshine' plants were harvestable; therefor it was not used as a standard. Differences were not detected in marketable or unmarketable yields in terms of number or weight of fruit per plant. 'Sweet Mama' produced a higher individual fruit weight than 'Bon Bon' followed by 'Sun Spot'. 'Thunder' and 'Space Station' produced intermediate individual fruit weight.

STATEWIDE RECOMMENDATIONS

The cultivars evaluated were beautiful and largely unique from each other. It is difficult to make recommendations because ornamental value and flavor may be a larger consideration in selecting these types. However, 'Red Kuri', 'Sweet Mama' and 'Sun Spot' are recommended based on their equal or higher yield than 'Sunshine'. ■

Cucumber Grafting Update

Judson Reid and Kathryn Klotzbach, Cornell Vegetable Program

Introduction - Grafting is the combination of two distinct plants into one. Well known among fruit growers, this technique is less common among vegetables in the US, however it is widely used in Asia. Here in North America greenhouse tomatoes are the most common grafted vegetable crop. The combination of a vigorous rootstock with a desirable scion (top portion) increases yields while retaining the attributes of the tomato fruit. Often used to manage root zone diseases, grafting can also increase cold hardiness. With this goal the Cornell Vegetable Program continues to research grafting of greenhouse cucumbers for cool soil production.

Materials and Methods - In 2011 Syngenta Seed provided us with Strongtosa variety rootstock which we grafted to Diva cucumbers. Diva was seeded in a heated greenhouse on March 2 and Strongtosa on March 7. We like to soak our rootstock in water for a day before seeding to improve germination.

On March 14 we grafted using the '1-cotyledon method'. This entails making a sharp cut on the rootstock stem leaving only a single cotyledon. The scion is then cut below its cotyledons and affixed to the rootstock with a clip. Grafted plants were placed in a healing chamber at 72° Fahrenheit with 100% relative humidity. As plants healed, humidity was decreased and light levels increased gradually, over 14 days.

Our final survival rate was 36 %. Most of this loss was caused by scions not healing onto the rootstock, or the adventitious growth of rootstock shoots in direct competition with the healed graft. Some grafts were mechanically damaged by greenhouse workers.

We transplanted these plants on April 1 into a cooperating high tunnel in Yates County. Cucumbers were harvested from May 19 to July 2. The weight and number of marketable fruit was recorded at each harvest date. Mean yield (pounds) per plant, mean fruit per plant and mean fruit weight were calculated (table 1).

Table 1. Mean yield and fruit per plant and mean fruit weight.

	Mean Yield per Plant (lbs)	Mean Fruit # per Plant	Mean Fruit Weight
Grafted	6.4	18.39	.68
Non-Grafted	6.2	18.24	.65

2012 Grafted cukes on misting table.
Photo: Judson Reid, CCE Cornell Vegetable Program

Results and Discussion - In this trial differences in yield between grafted and ungrafted Diva were not noteworthy, with the exception of earliness. Harvest of grafted cucumbers began on May 19, six days prior to the first ripe fruit on the non-grafted plants. Our earlier harvest may be attributed to cold hardiness of the Strongtosa rootstock. Overall, number of fruit per treatment was the same. However, grafted plants produced slightly larger fruit that non-grafted plants, resulting in a higher overall yield (chart 2).

Current Work - With a low survival rate in 2011, we took several steps to improve our healing techniques in 2012. The first step was to improve the stem diameter match between rootstock and scions. To this end we seeded the scions on three consecutive days on three separate occasions, each with increasing time relative to the rootstock. Next, we healed grafts in a misting chamber (often used for unrooted cuttings). With variable mist settings, we could gradually acclimate the plants to lower relative humidity without ever eliminating full greenhouse light. Survival rates in these trials have increased with some our best looking grafts going into a replicated trial the last week of March. Our success this year is correlated to complete removal of rootstock cotyledon buds.

Conclusions - Grafting of greenhouse cucumbers for high tunnel production is still in research phase, although we have demonstrated several steps towards commercialization:

- Earlier yields in cold soils.
- Improved stem diameter match with multiple scion seeding dates.
- Increased graft survival rate.

Our vision is to combine grafting for cold tolerance with high tunnels to increase the local cucumber season by over 4 weeks, creating more market opportunities for New York vegetable farmers. We are also evaluating 3 tomato rootstocks this year with two different scions in work supported by Syngenta Seed. More details are available on the Cornell Vegetable Program webpage. Call Katie (585-798-4265) or Judson (585-313-8912) if you have questions. ■

Chart 1. Grafted vs. non-grafted cucumber yield over time.

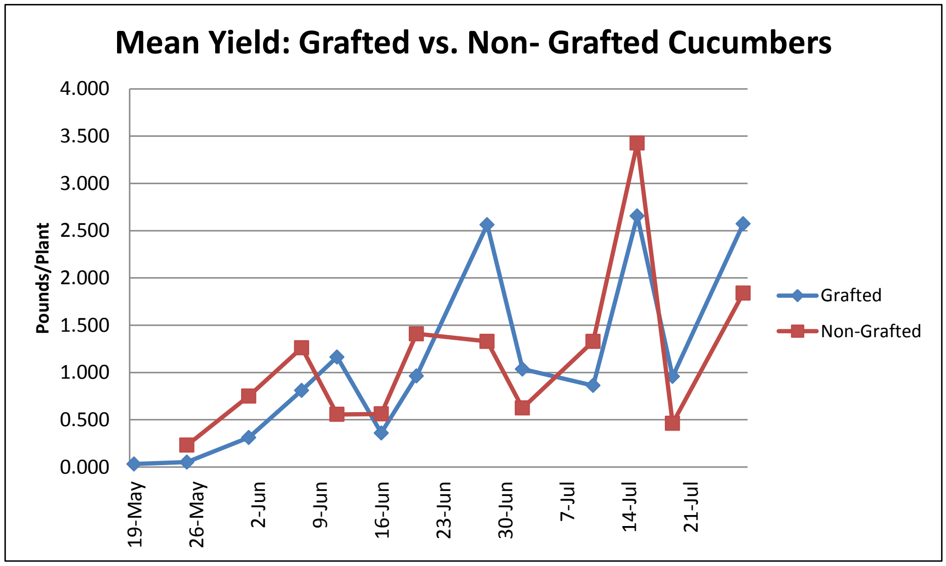
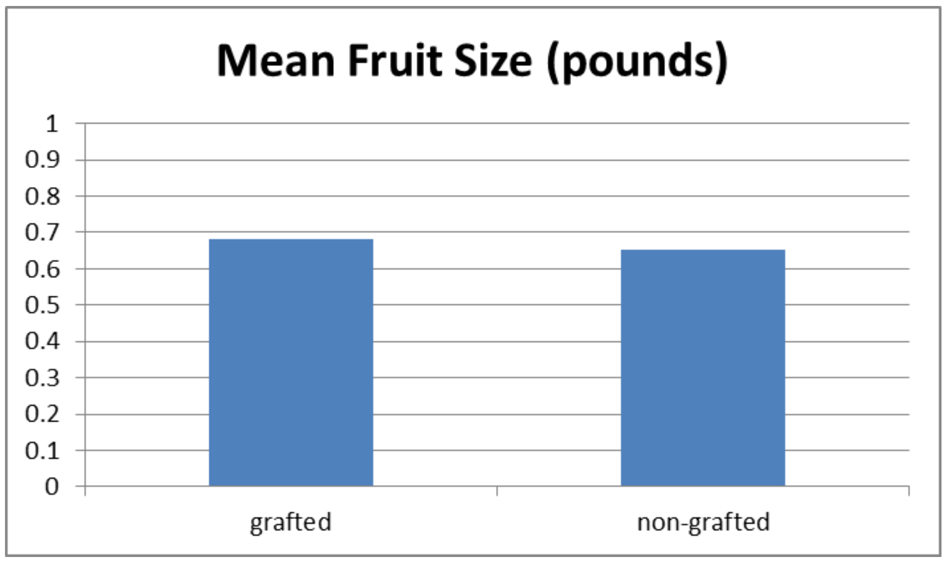


Chart 2. Mean fruit size.



Optimizing Strawberry Production with a Reduced Tillage System

Laura McDermott, CCE Capital District Vegetable & Small Fruit Program

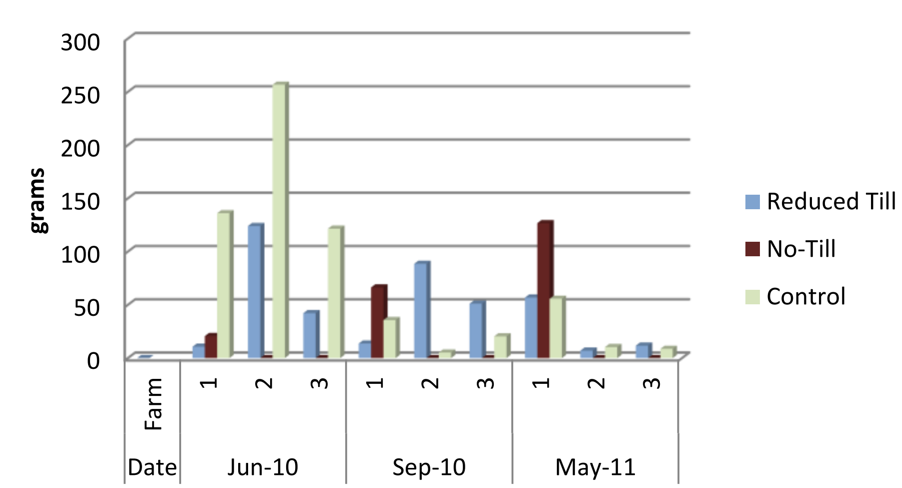
This project, supported by a NESARE (http://nesare.org/) Partnership grant, sought to improve weed control during the establishment year of a perennial matted row strawberry system while also reducing cultivation and herbicide inputs and improving soil health. *(Many thanks to cooperators Stanton's Feura Farm, Lansing Farm and Gray's Farm and Greenhouse.)*

A recently completed (Nov. 2009) Cornell University project that focused on controlling weeds in strawberries during the establishment year by transplanting dormant berry plants into a killed cover crop showed great promise, but revealed a barrier. Most growers had difficulty planting through the cover crop which resulted in slower establishment during the first month and possibly caused skips. Research has shown that control of weeds during the first weeks of the growing season makes the most difference to yield in a matted row system. There have also been studies that support the use of cover crops as a way to decrease incidence of plant disease.

The reduced-till system uses a sub-soiler to loosen soil deeply followed by coulters and a rolling basket that prepare a 6-10" wide seedbed. This technique allows the longer rooted strawberry plant to be correctly planted while still having minimum soil disturbance between the rows. By only tilling this narrow area, the chance of new weed seeds being brought to the surface for germination is reduced. Because the strawberry plants will get off to a good start, they should out-compete weed competitors in the tilled zone. The addition of the shank allows for improved water drainage therefore reducing disease pressure from soil borne diseases like Phytophthora fruit rot. The use of reduced tillage tools usually requires a single trip across a field for it to be fitted for planting – an important advantage that translates into less labor, reduced fuel consumption and a decreased risk of soil compaction.

The results from the study were variable. In Table 1, the dried weed weight from all sampling dates on all farms is reflected. All 3 farms saw significantly larger weeds during the first month after planting in the conventionally prepared (control) trials than for the reduced till or no-till trials. However, this does not mean that there were more weeds, rather the data in Table 2 suggests that specifically for Farm 1 and 3 that the weeds were more numerous but much smaller in the reduced till treatment than in the conventional treatment. This may be explained because it took longer for the weeds to emerge through the killed cover crop.

Table 1. Dried Weed Weight



Data in Table 2 suggests that numbers and types of weeds varied dramatically from farm to farm.

Farm 1 showed a higher number of perennial weeds than both other farms, due to the fact that this trial was installed into a killed sod on Farm 1. That high ratio of perennial weeds to annual weeds continued through the next 2 sampling periods. This tendency does not bode well for the productive life of the planting, as perennial weeds are difficult to eradicate once established in a matted row strawberry system.

Farm 2, whose data in Table 1 indicate that the weeds in the control treatment were larger one month after planting, still had higher numbers of weeds as illustrated in Table 2. This same trend was seen in the data from Farm 3 – larger weeds in the control treatment, but higher numbers of weeds in the reduced till treatment.

For all 3 farms, the differences in sizes of weeds in the three treatments diminished as time progressed and the farmer had more tools available to control weeds. The number of weeds however did not develop a clear pattern throughout the year of monitoring. This may be due to the individual farm weed pressure and the type of weeds existing on each farm.

Yield was measured by harvesting all the trusses from randomly selected areas within each treatment. The berries were counted, put in primary, secondary and tertiary categories and then weighed. For Farm 1 and 2 the control treatment yielded significantly more berries than did the reduced till or no-till treatments. Farm 3 however, which had the largest volume of berries of all 3 farms, yielded almost 1/3 more in the reduced till treatment than the control. This farmer will be installing 1 acre of reduced till June bearing strawberries this season.

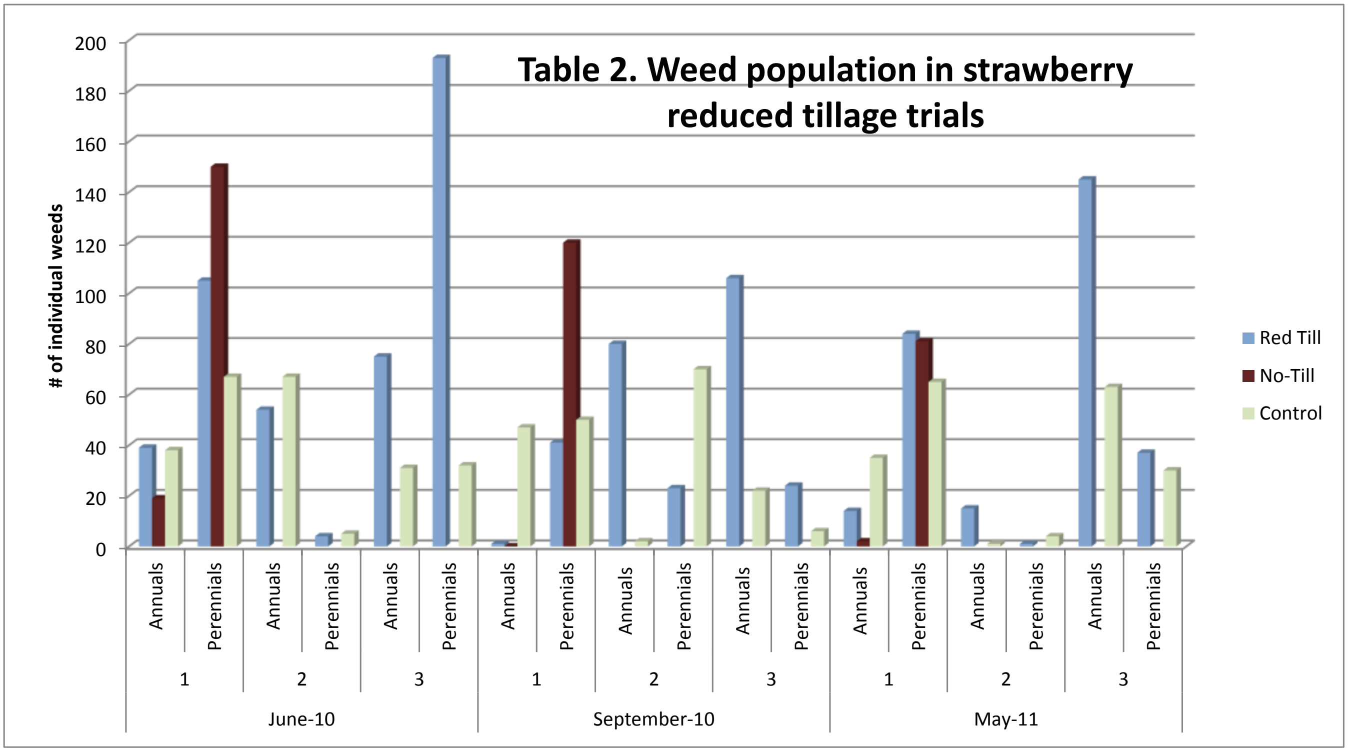


Table 2. Weed population in strawberry reduced tillage trials

Results of this study are inconclusive, but there appears to be promise in using reduced tillage in a matted row strawberry system. This system may be useful for organic growers or to growers that need to better utilize their equipment.
From a farm profitability perspective, labor savings just for tillage averaged 37% and fuel savings 40% for the reduced tillage system compared to primary tillage for field preparation. The range reported by growers for savings in fuel ranged from 27-60% and savings in labor costs ranged from 25-60% (Anu Rangarajan, Cornell University). These figures are estimates from agronomic crops and some larger scale vegetable crops, but similar savings could be found on strawberries.

The reduced tillage approach would be more attractive if we could prove that yield of this high value crop would not suffer. The results from this study imply that farmers should experiment with reduced till in their matted row strawberries in order to maximize production and minimize costs. For more information about this project or other reduced till work with small fruit, contact Laura McDermott at lgm4@cornell.edu or518-746-2562. ■

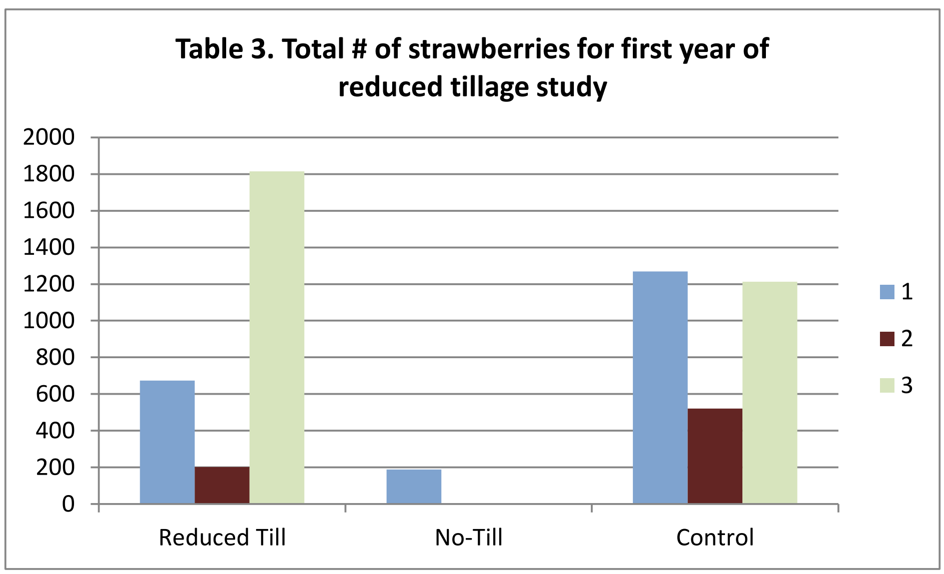


Table 3. Total # of strawberries for first year of reduced tillage study

Testing for Garlic Bloat Nematode

Crystal Stewart, CCE Capital District Vegetable & Small Fruit Program, and George Abawi, Cornell

Garlic growers are now able to submit samples to Cornell Nematologist George Abawi's lab for testing using a standardized submission form. Submission is being subsidized through a Specialty Crop Block Grant, and will cost $20 per sample of garlic or soil, for NYS growers and industry reps. Growers are encouraged to sample different plantings separately, selecting 10 representative bulbs per planting per sample. Soil should be tested to a depth of 6-8 inches, and in 10+ sites through the suspect field then mixed before bagging. Make sure samples are secured against leaking or damage during shipping. Garlic samples should be surrounded in a layer of absorbent material such as paper towel. Soil should be placed in a Zip-Loc bag and should <u>not</u> be dried before shipping.

If you have questions about sampling, please contact your local vegetable specialist for assistance. To send in a sample, fill out the submission form (below) as completely as possible and mail overnight or first class with your check and your sample. You should receive results within two weeks. ■

Bloat Nematode Diagnostics Lab
SAMPLE SUBMISSION FORM

Cornell University Cooperative Extension

Location where the sample was taken

☐ Home Owner ☐ Commercial Growers ☐ Others

Collection Date ________________

Business Name ________________________________

Contact Person ________________________________

Address ________________________________

____

County ________________

Phone ________________________________

Email ________________________________

Referring Agent (i.e. CCE Educator)

Name ________________________________

Email ________________________________

Sampling Instructions

Samples can be collected anytime, but best close to harvest and before planting. Send 10 representative bulbs/ variety/ garlic sample, or one pint or more of a composite soil sample (> 10 subsamples)/ field or bed. Pack garlic and soil sample separately and avoid exposure to sun and high temperature. Send early in the week by overnight delivery, if possible.

Describe the nature and extent of the problem

____

____

____

Production History

☐ Organic ☐ Conventional

Previous Crops 2011 __________ 2010 __________ 2009 __________ 2008 __________

Objective of Testing

☐ Sale for Seed ☐ Sale for Food ☐ Sale for Seed and Food

☐ Seed for Replanting ☐ Poor Growth/Quality ☐ Soil Infestation

Size of Planting

☐ < 1/4 Acre ☐ 1/4 – 1/2 Acre ☐ 1/2 – 1 Acre

☐ 1-2 Acres ☐ > 2 Acres ☐ Area Affected ________________

Fee: $20/sample (garlic or soil) for NY growers and industry reps; $40 for all others.

Make check payable to ***Cornell University***. Write ***Garlic Project*** on the check's memo line.

Mail sample and payment to: Cornell - NYSAES, Barton Lab, Room 11, 630 West North St, Geneva, NY 14456

Minimizing Energy Use for Produce Cooling

Mike Mager, Arctic Refrigeration, Batavia

Equipment Load - A fruit or vegetable cooler is totally different from a restaurant or convenience store cooler. In a restaurant or convenience store, the cooler has a constant load, the product already arrives pre-cooled and packaged, and the cooler humidity is designed to be as low as possible to keep the product and packaging dry. In a fruit and vegetable cooler the product arrives at varying temperatures anywhere from 50° – 90° F and has to be cooled as quickly as possible to retain its moisture and quality. The quicker the product is cooled the longer the shelf life. Also, humidity is kept as high as possible so we don't get product shrinkage or break down. Fruit and vegetable coolers are designed to store specific products. If we have 5,000 pounds of apples and 5,000 pounds of sweet corn we may have the same cubic volume and possibly even weight, but sweet corn generates 10 times more heat (of respiration) than apples so the refrigeration system must be sized accordingly.

Insulation Load - In a fruit or vegetable cooler the majority of our cooling load is the product, pulling field heat out. The cooler wall load is usually about 25% of the total load. Adding excessive insulation may be a waste of money because it doesn't change the size of the refrigeration equipment. The amount of insulation will hit a point of diminishing returns. Using more than you need will cost more than the energy it saves. The insulation load must be calculated for the specific requirements. *(If a cooler will be used to store produce during the warm season then more insulation may be needed. ed. C. MacNeil, CVP)* A closed cell foam insulation like urethane is best as it does not absorb moisture which would reduce its insulating properties.

Infiltration Load - Outside air entering the cooler is the biggest load factor that a person can change: the cooler must have a good vapor barrier, the cooler should be tight and well-sealed. The cooler door is a big factor in refrigerant load. The size of the door, tightly sealing door gaskets, and strip curtains on the door openings, greatly affect refrigerant load, as does the number of door openings per hour.

Purchase BTUs Not Horsepower - Depending on compressor size and manufacturer there is a lot of variance between BTU's and Horse Power. You could have 3 different compressors of the same H.P. and they may vary by 25% difference in cooling capacity.

Defrost Air, Electric, Hot - Gas Air defrost turns the compressor off with a time clock while the evaporator fans run, good for maybe 38°F and higher temps. Electric defrost has heater elements in the coil to melt frost, and hot gas defrost is a reverse cycle refrigeration system that uses hot refrigerant gas to melt the frost.

To Operate Below 38°F - Electric defrost has the least expensive up front cost but is the most expensive to operate. Hot gas defrost systems are about 20 - 30% more expensive than electric defrost but they are the most energy efficient defrost system to operate. NYSERDA has given Customer Rebates to cover cost difference of these systems.

Multiple Refrigeration Systems - Having 2 smaller systems in a cooler compared to 1 larger system is more energy efficient. For example, we could have 2 - 7-1/2 H.P. systems and start them separately, reducing starting load by 50% of the larger 15 H.P. system. Also when the cooler reaches temperature, one smaller compressor can handle the load instead of short cycling and starting and stopping a large compressor. This also provides the benefit of redundancy in case of a breakdown.

Controls - Use only digital thermostats. They are much more accurate and you can set the differential between on and off. There are several companies in the marketplace that offer control packages to save energy by eliminating defrosts. They work well on normal walk-in coolers where the load remains constant. In fruit and vegetable coolers, however, the load can change daily. This confuses these energy saving packages and may result in nuisance ice ups and actually cost more to operate.

Outside Air Cooling - We use computer systems to cool with outside air, modulating the amount of cold air that can enter the storage to maintain temperature. They can also be tied into refrigeration systems. When it's warm outside the refrigeration runs and when it's cool outside we cool with outside air automatically within 0.1°F. This is the most energy efficient system there is. Arctic installed a cabbage storage where we turn 70 H.P. of refrigeration off and use 6 H.P. to cool with outside air. This system is used on potato, cabbage, onions, and carrots, as well other crops. ■

Farmer's Market Nutrition Program

Steve Miller, Farmers Market Nutrition Outreach Program, Cornell

The NYS Health Department and the NYS Department of Agriculture and Markets have created a system that will enable farmers participating in the NYS Farmers' Market Nutrition Program (FMNP) to participate in the NYS WIC Vegetables and Fruits Check Program.

To participate in the WIC Vegetables and Fruits Check Program farmers must:

- Be currently enrolled in the New York State FMNP
- Participate in a mandatory webinar training session (below)
- Sign a separate agreement provided by the Department of Agriculture and Markets detailing various aspects of the Program.

We invite you to join "New York State WIC Vegetables and Fruits Check Program", a webinar hosted by the NYS Department of Agriculture and Markets in cooperation with the NYS Health Department and Cornell Cooperative Extension. The Program will be repeated on the following dates:

- Monday, May 14, 7:00 – 8:30 PM
- Weds, May 16, 7:00 – 8:30 PM

Training is required for farmers to participate in this $30 million program. We hope that many farmers in the FMNP program will participate in the WIC Vegetables and Fruits Check Program as well. More information and webinar registration instructions are at: http://gallery.mailchimp.com/dd5466fdebdd7d5992ddb16ec/files/2012_Webinar_Invite_Letter.pdf ■

Do You Have Surplus Produce?

Foodlink, Rochester, NY

Partnering with your local food bank is a solution for surplus produce that can benefit both you and your community. Foodlink is the local food bank for Allegany, Genesee, Livingston, Monroe, Ontario, Orleans, Seneca, Wayne, Wyoming, and Yates Counties. In this service area we partner with 450 agencies that provide service to 150,000 individuals in need. If you have a farm in one of these counties and have surplus harvested product, or productive fields that you may not harvest, there are three ways you can partner with Foodlink:

- **Donation:** Foodlink has trucks in each of these counties at least once a week. We can pick up product and provide you with a receipt for your donation which will allow you to receive a tax deduction.
- **Gleaning:** Foodlink can bring out a team of volunteers to glean unharvested product. We accept all liability and will provide an insurance waiver when we come out to glean.
- **Reimbursement for Harvesting**: On a per-case basis, Foodlink is interested in paying farmers for the cost of harvest. We can work out a fair price for both parties and send our trucks to the farm to pay for and pick up the product.

For more information, go to www.foodlinkny.org Contact: John Baldanza, jbaldanza@foodlinkny.org or 585-328-3380 x149, or Mitch Gruber, mgruber@foodlinkny.org or 585-328-3380 x113. ■

Grants for Processing Crops Research Awarded

Julie Kikkert, CCE Cornell Vegetable Program

The New York Vegetable Research Association and Council awarded a total of $138,258 for 10 research projects. The funds for these grants are contributed by the growers and processors through the processing contracts. The following projects were awarded for 2012:

Researchers	Title	Award
Abawi, Moktan	Final Evaluation of Pea Varieties for Resistance to Major Root Disease Pathogens.	$8,324
Abawi, Moktan	Final Evaluation of Fungicide Application Protocols to Control Leaf Spot and Decay in Beets	$8,824
Bellinder	Weed Management Research for Sweet Corn, Peas, Snap Beans, Beets, & Carrots	$31,300
Dillard, Strauss, Kikkert	Alternatives to Ronilan for White Mold Control and Incidence of Phytophthora Blight in Snap Beans	$19,020
Griffiths	Breeding Snap Beans for Host Plant Resistance	$29,900
Griffiths, Hart	Development, Validation and Utilization of Molecular Markers for *Bean yellow mosaic virus* (BYMV) Resistance Genes in Snap Beans	$9,500
Nault, Hessney	Evaluating the Performance of Anthranilic Diamides for European Corn Borer Management in Snap Bean	$11,390
Reiners, Ballerstein	NYS Processing Snap Bean Variety Evaluations	$11,000
Reiners, Ballerstein	NYS Processing Sweet Corn Variety Evaluations	$6,000
Reiners, Ballerstein	NYS Processing Green Pea Variety Evaluations	$3,000
	TOTAL AWARDS	**$138,258**

Guidelines for Managing Onion Thrips on Onion

Brian Nault and Anthony Shelton,

Onion thrips, *Thrips tabaci*, is the major insect pest of onion and its control is critical to the production and profitability of this crop. Thrips feeding can reduce bulb yields by 30-50% and losses can be even more severe if thrips infect the crop with *Iris yellow spot virus* or create damage that permits other pathogens to infect the crop. Insecticide use is the most important tactic for thrips control, but this strategy must be used carefully and in a manner that will prevent or slow down the ability of thrips to develop resistance.

This article provides guidance for managing onion thrips infestations in onion fields using insecticides in a manner that will be successful and should minimize the development of resistance. To do so, there are three areas that should be considered before making insecticide applications: **(1) general information about commonly used products like Radiant, Agri-Mek and Movento (2) timing applications of these products, and (3) an approach for using these products to manage thrips all season long.**

General Information. ***What works?*** A number of products are registered for thrips control on onion in New York, but few work well **(Table 1)**. Only four products have consistently demonstrated good to excellent control of onion thrips: Radiant, Entrust, Agri-Mek and Movento. **Radiant** is highly effective against both thrips larvae and adults and has residual activity lasting >7 days. **Entrust** is similar to Radiant, but lacks the residual activity that Radiant provides. **Agri-Mek** provides moderate to excellent control of onion thrips adults and larvae and has a residual activity of 5-7 days. The Agri-Mek label states "thrips suppression" rather than "thrips control" because this product is mediocre against western flower thrips, which is a serious pest of onion in the western US, but not in New York. **Movento** is systemic and has residual activity of >10 days, but it does not work well late in the season or against adults. Therefore, Movento should be used early when it easily moves systemically throughout the plant and when adult populations are often lower than they are later in the season. You must have a Section 18 label before applying Movento.

Are Penetrating Surfactants Important? Radiant, Agri-Mek and Movento must penetrate the leaves to maximize effectiveness against thrips. Therefore, a penetrating surfactant must be included in the spray tank. There are many types of penetrating surfactants, and research in NY in 2010 showed that these insecticides performed equally well against thrips when either the non-ionic surfactant **Induce**, the methlyated seed oil **MSO** or the organosilicone surfactant **Silwet L-77** was added to the spray mixture. (Note: A penetrating surfactant is very different from a spreader-sticker!)

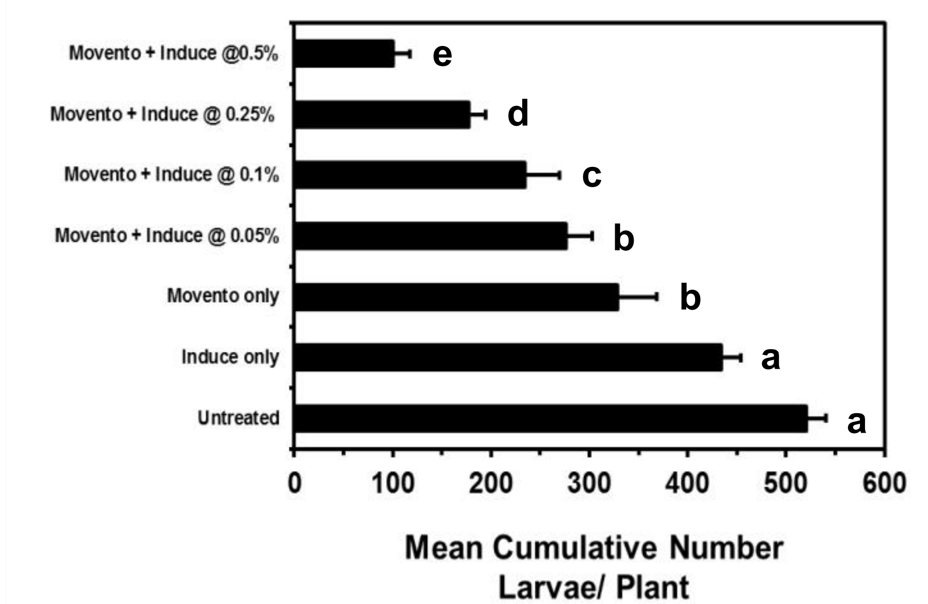
In 2011, thrips control was evaluated using Movento with varying rates of Induce. Larval thrips in the untreated control and Induce only treatment were significantly greater than the number of larvae in all Movento treatments (mean cumulative number larvae/ plant) **(Fig. 1).** The level of thrips control significantly increased as the rate of Induce increased, with the best control being achieved with the 0.5% vol:vol rate.

Table 1. Conventional products labeled to manage onion thrips on onion in NY in 2012.

Spinosyn	Avermectin	Tetramic Acid	Neonicotinoid	Carbamate	Organo-phosphate	Pyrethroid
Radiant SC	Agri-Mek SC*	Movento[a]	Assail 30SG	Lannate LV	MSR Spray	Ambush or OLF**
Entrust					Penncap-M	Mustang Max
						Pounce or OLF**
						Warrior or OLF**

*Labeled for onion thrips suppression only. [a] Section 18 approved for 2012.
**OLF: other labeled formulation.

Figure 1. Mean number of onion thrips larvae per plant in plots treated with Movento and various rates of Induce.



Do Tank Mixes with Fungicides Affect Control? Two years ago, we noticed a drop in thrips control when Agri-Mek and Movento were "tank mixed" with a fungicide that included a spreader sticker (*e.g*., Bravo Weather Stik®). We were concerned that the spreader sticker used to aid in leaf disease control interfered with the insecticide's ability to penetrate the leaf surface. While spraying these insecticides separately from fungicides would eliminate this problem, it also would be a more costly and less efficient approach to managing thrips and foliar diseases. Therefore, studies were carried out in 2010 to understand how various combinations of insecticides, penetrators, fungicides and spreader stickers affected the level of thrips and foliar disease control. s we feared, when Radiant, Agri-Mek and Movento were combined with Chloronil 720, which contains a spreader sticker, **thrips control was significantly reduced by 12 to 35%.**

In a similar trial in 2011, the efficacy of Agri-Mek SC and Movento were evaluated when tank mixed with other fungicides to determine if the reduction in efficacy observed with tank mixes of Chloronil 720 occurred with other fungicides. In addition to the insecticide x fungicide mixtures, half of the treatments included Induce @ 0.5% vol:vol, while the other half did not include a penetrating surfactant. Two applications were made one week apart and the numbers of thrips larvae were recorded one week after each spray.

The total number of thrips in the untreated control over the two sampling dates was very high, exceeding 1,500 larvae per plant in the untreated control (over 150 larvae per leaf; data not shown). When averaged across all fungicide and penetrating surfactant treatments, Agri-Mek and Movento provided an equivalent level of thrips control **(Fig. 2A).** When compared with numbers in the untreated control, these products reduced the thrips population by around 50%.

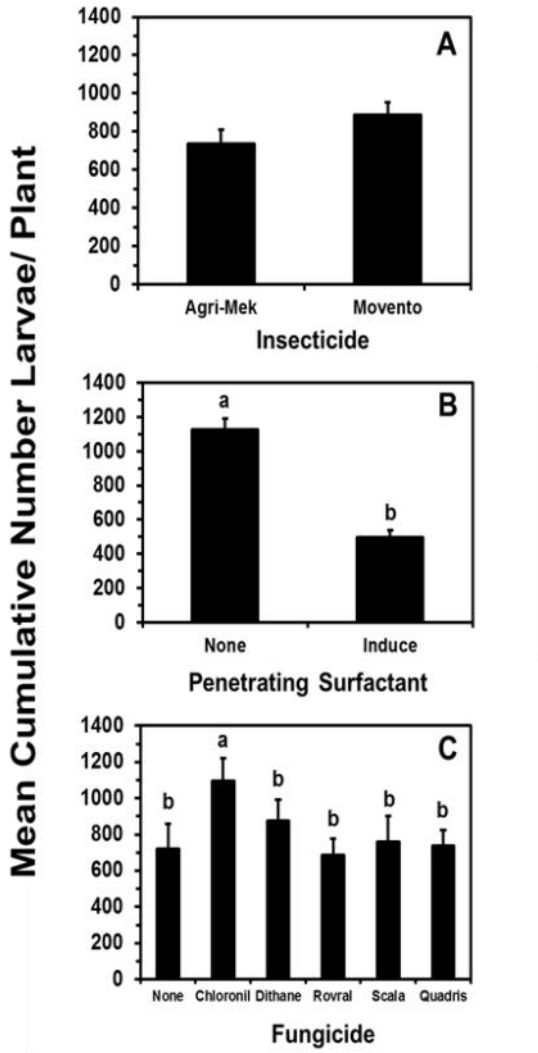
The total number of onion thrips larvae per plant in plots that did not include Induce was significantly higher than the number in plots that included Induce, indicating the importance of using a penetrating surfactant with Agri-Mek and Movento for controlling thrips **(Fig. 2B)**.

When all Movento and Agri-Mek treatments were averaged (with and without Induce), the mean cumulative number of thrips larvae in the Chloronil 720 treatment was significantly greater than the untreated control and all other fungicide treatments (**Fig. 2C).** No significant differences existed among the other fungicide treatments. Our results indicated that Chloronil 720 interfered with the ability of Movento and Agri-Mek to control thrips. **However, in 3 of 4 trials, we learned that adding a penetrating surfactant (high rate) to the Chloronil 720 and insecticide mixture restored the high level of thrips control provided by the insecticide.**

Managing Insecticide Resistance. Insecticide resistance in thrips populations is a major concern. Resistance in thrips populations to the pyrethroid Warrior has been documented in many New York onion fields. Resistance in thrips to organophosphates and carbamates may be common throughout New York. Caution should be taken when using products in these three classes. If you see that you are not getting the control you should and think resistance may be the cause, contact your CCE educator.

Because only a few highly effective products are available for thrips control and insecticide resistance is a concern, targeting the same generation of thrips with one product is suggested. **Based on past studies, two applications of the same product timed 7 to 10 days apart may be necessary to see a reduction in the thrips population**.

Figure 2. Total number of onion thrips. Larvae/plant in various insecticide, penetrating surfactant or fungicide treatments in NY in



Timing Insecticide Applications. Onion fields should be scouted for onion thrips each time before a decision is made to spray the field. In many cases, infestations will begin along an edge or edges of the field. When this occurs, many thrips may be seen along edges and many fewer or none in other parts of the field. If possible, only spray the infested edges rather than the entire field. Otherwise, wait to spray the entire field when the average number of thrips sampled throughout the entire field

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reaches a threshold (see more below). When weather is hot and dry, thrips populations can build rapidly and thresholds can be reached very quickly. In this case, scouting may need to occur more frequently. In contrast, if weather is cool and wet, weeks may go by before the thrips population increases to the threshold.

Timing insecticide applications following an action threshold can be challenging because of weather events (*e.g*., rain) and other farming practices (*e.g*., timing fungicide sprays). However, using an action threshold to determine when to spray can save money and time and keep resistance from developing as quickly. Based on results from field studies from 2006 - 2011, we found that the utility of an action threshold is highly dependent on the efficacy of the product used **(Table 2).** For example, Radiant continues to be the most effective product and provides excellent thrips control when applied at a threshold of 3 thrips larvae/leaf. Basically, Radiant has such good activity against onion thrips that it can control a population even when it has been allowed to build to a relatively high level. In contrast, Movento, Lannate LV and often Agri-Mek need to be applied using a more conservative threshold (only 1 thrips larva per leaf) to manage the population.

Table 2. Action thresholds for selected insecticides suggested for managing onion thrips on onion.

Products	Action Threshold
Radiant SC	3 thrips per leaf
Agri-Mek SC	1 thrips per leaf
Movento	1 thrips per leaf
Lannate LV	1 thrips per leaf

Sequences of Insecticide Applications for Season-Long Control. Sequences of insecticides used to manage onion thrips infestations are shown in **Tables 3 & 4**. Sequences and products selected for these examples are based on experience from several small-plot onion research trials.

Onion thrips infestations typically occur in onion fields in downstate NY before upstate NY because temperatures are warmer earlier in the season in downstate NY. The treatment window for onion thrips varies considerably among fields because the period between thrips colonization and harvest varies considerably. In most cases, transplanted fields will need to be sprayed earlier and for a shorter period compared with direct-seeded fields. For transplanted fields, action thresholds for thrips control are often reached in early to mid-June and protection is needed for about 4 to 6 weeks. For direct-seeded fields, action thresholds are often reached in late June to early July and protection is needed for 6 to 8 weeks. These generalizations were taken into consideration to estimate the total number of sprays needed in a sequence to protect the onion crop from thrips **(Tables 3 & 4)**.

Sequences begin with Movento and end with Radiant (**Table 3 & 4).** Do not use Movento if onion thrips adults have recently migrated into the field from nearby alfalfa or small grains because Movento is very weak against adults. Agri-Mek and Lannate LV are options between Movento and Radiant applications. Agri-Mek has a 30-day pre-harvest interval, so this product should be used during the first half of the season. **Radiant is the most effective product against larvae and adults, so it is positioned at the end of the insecticide use sequence when thrips populations are highest.**

Table 3. Sequence of insecticides to apply for onion thrips control in transplanted onion fields. Two applications of each product should be applied based on action thresholds.

		Transplanted Onions*
Application #	**Product**	**Action threshold/ Timing of spray to consider**
1	Movento	1 thrips larva per leaf
2	Movento	7 to 10 days after 1st Movento spray if needed [1]
3	Agri-Mek SC	1 thrips larvae per leaf
4	Agri-Mek SC	7 days after 1st Agri-Mek spray
5	Radiant SC	3 thrips larvae per leaf
6	Radiant SC	3 thrips larvae per leaf

*Note: If after using Movento and Agri-Mek (first four sprays) there are at least 4 weeks remaining before onions are pulled, consider inserting two applications of Lannate between the Agri-Mek and Radiant sprays (see direct seeded onions below). Conversely, if after using Movento there are only 2 to 3 weeks remaining before onions are pulled, eliminate the Agri-Mek sprays and go to Radiant.

[1] If the thrips population is reduced to a low level (*e.g.*, below 1 thrips per leaf) after the first Movento spray and does not reach threshold again until 3 weeks later, consider avoiding another application of Movento. Based on insecticide resistance management principles, the second application would affect the next generation of thrips and this should be avoided if possible. The recommendation would be to continue the sequence with the next product, which would be Agri-Mek or Radiant.

Insecticides that belong to the same insecticide class or have the same mode of action used sequentially against some insect pests can accelerate the development of insecticide resistance. The Colorado potato beetle is notorious rapid increases in insecticide resistance and rotation of insecticide classes has extended the life of products used to manage it. Obviously, we want to avoid insecticide resistance development in onion thrips populations. Therefore, we encourage the use of products belonging to different insecticide classes (a class of insecticide is based on its mode of action- see http://www.irac-online.org/teams/mode-of-action/) and suggest following the guidelines outlined in **Tables 3 & 4**. Additionally, for each product (Radiant, Agri-Mek and Movento), only two applications should be applied during the season and they must be applied consecutively.

Table 4. Sequence of insecticides to apply for onion thrips control in direct-seeded onion fields. Two applications of each product should be applied based on action thresholds.

		Direct-Seeded Onions*
Application #	**Product**	**Action threshold/ Timing of spray to consider**
1	Movento	1 thrips larvae per leaf
2	Movento	7 to 10 days after 1st Movento spray if needed [1]
3	Agri-Mek	1 thrips larva per leaf
4	Agri-Mek	7 days after 1st Agri-Mek spray
5	Lannate*	1 thrips larvae per leaf
6	Lannate*	7 days after 1st Lannate spray
7	Radiant	3 thrips larvae per leaf
8	Radiant	3 thrips larvae per leaf

*Note: If control of thrips using Movento and Agri-Mek (first four sprays) has provided control up to 2 or 3 weeks before onions will be pulled, eliminate the Lannate applications and go to Radiant.
[1] **Same as comment in footnote #1 in Table 3.**

Additional Thoughts on Controlling Thrips. Insecticides should be applied with ground rigs using moderate pressure and a high volume of water and proper nozzle types and spacing. The goal should be to cover as much of the onion canopy as possible. Research at Cornell showed that applications made using at least 40 gpa, 40 psi and twin-flat fan nozzles achieved excellent coverage and also should minimize drift.

Other ways of controlling thrips besides using insecticides are being studied. Our research team has shown that thrips populations can build on early season volunteers and that some of these volunteers may be infected with *Iris yellow spot virus*, so removing volunteers as early as possible should be part of an overall management strategy. Our team also has shown that reducing the amount of nitrogen at planting will reduce populations of onion thrips larvae during the season. Reducing the amount of nitrogen applied to onion fields will save money and potentially may reduce the percentage of bacterial rot problems in storage. Additionally, we have shown a difference among onion cultivars in their susceptibility to thrips feeding. Cultivars that have a yellow-green leaf color and lower levels of wax were less susceptible to thrips feeding compared with blue-green color foliage with higher levels of wax. While additional work needs to be done on these alternative management practices, experimenting with other ways of reducing thrips infestations will be important to preserve the very few effective insecticides. ■

Understanding Bacterial Diseases of Onion in New York

S. Beer, J. Asselin, J. Bonasera, and A. Zaid, Cornell; and Christy Hoepting, CCE Cornell Vegetable Program

More attention needed for bacterial diseases of onion in New York: Following storage in 2007, some New York onions seemed to be affected by a new bacterial disease. The problem turned out to be center rot, caused by the bacterium *Pantoea ananatis*. Later, symptoms of center rot were found in fields of onions growing in several New York muck-land areas, where most onions are grown in New York. Also, onion growers and other industry officials in New York reported that bacterial problems were becoming more severe, and no effective means were available to reduce losses consistently. These factors instigated further investigations of bacterial disease problems of onion in New York by the authors. During 2010 and 2011, we found several other bacteria infecting onions that were not previously recognized in New York. Further, we found that muck-soil may be an important source of overwintering inoculum for several of the bacterial diseases. In addition, we made progress in developing techniques useful for evaluation of potential controls, and pilot studies suggested that further study of some new control strategies was warranted. If the results of further studies prove promising, these strategies may be worthy of adoption by New York onion growers. In this article, we review briefly some of our recent field and laboratory research.

Bacteria Associated with Cull Onions: New York growers have reported losing 10% to 40% of their stored onions to suspected bacterial decay in some years. Although sour skin, caused by *Burkholderia cepacia,* and center rot, caused by *Pantoea ananatis*, have been identified, more than just these two pathogens were likely to be responsible for the unmarketable bulbs that growers cull out during grading following storage. The critical question became, which bacterial pathogens were responsible for the tremendous losses that growers sustain after storing onions in New York? To answer the question, we needed to identify the bacterial pathogens responsible for the losses. This was important because: 1) each bacterial pathogen likely behaves differently from the others; 2) its source of inoculum is likely to be different; 3) the way it initiates disease is likely to be different, and; 4) the conditions favoring or not favoring disease development are likely to differ from those for other bacterial pathogens. The key to control or management of plant disease is to interfere with the disease cycle, so details of the cycle should be known.

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That's a tall order for bacterial disease of onions given our present state of knowledge; however, we are committed to learning more through research.

Thus, with the cooperation of several onion growers in Central and Western New York, we analyzed hundreds of unmarketable onions that grower-packers had graded out because of suspected bacterial decay. We characterized symptoms of each bisected bulb, and then attempted to isolate bacteria from each cull onion. Once purified, colonies of the isolated bacteria were identified using traditional microbiological and biochemical tests. The suspected pathogens *Burkholderia cepacia* and *Pantoea ananatis* were tentatively identified often using these tests. However, we isolated many other bacteria and tried to identify them and determine their capability to cause rot in onions.

Using molecular and genetic techniques, we identified many bacteria including *Pantoea ananatis*, *P. agglomerans, P. vagans, Enterobacter cloacae, Pseudomonas fluorescens* and other *Pseudomonas* spp. Also, rather surprisingly, we isolated and identified *Rahnella species* from about 40% of the culls. To the best of our knowledge, *Rahnella* spp., which occur commonly in the environment, have not been reported as pathogens of onion. Additionally, several microbes isolated from cull onions appeared to be yeasts and other similar microorganisms.

Further studies are needed to determine whether the microbes we isolated from the culls (including various bacteria and yeasts) are pathogens of onions. They may in fact be primary pathogens that cause disease, or they may be secondary organisms that colonize partially decayed onions and crowd out the primary pathogen such that when we attempt isolation, we succeed in isolating the secondary organism, rather than the primary pathogen. To determine the pathogenic potential of the isolated microbes, we are testing microbes by introducing them into several types of onion tissues including leaves, slices, sets and seemingly healthy mature bulbs.

The following table summarizes the data on the bacteria isolated from the eight lots of cull onions assayed in 2011 (onions grown in 2010). Note that generally many different bacteria were isolated from each lot of culls. However, some bacteria, like *Burkholderia* sp. and *Enterobacter* sp., were not isolated from some lots, whereas these same bacteria commonly were isolated from other lots. One thing is quite clear: the bacteria isolated from the culls were those present in the culls at the time they were analyzed. That does not mean that the isolated bacteria were, in fact, responsible for the decayed conditions of the bulbs. Strains of *Burkholderia* spp., *Enterobacter* spp., and *Pantoea* spp. clearly can cause decay symptoms in inoculated onions. Strains of *Rahnella* sp. also are capable of causing decay in onion bulbs and sets to different degrees depending on the strain and the environmental conditions following inoculation. Although strains of *Pseudomonas* spp. frequently were isolated from cull onions, none of the several strains that we tested caused any disease symptoms following inoculation into mature onion leaves, bulbs or sets.

Table 1. The percent of cull onions from which specific bacteria were isolated from eight lots of cull onions grown in 2010 and graded in 2011 in Central and Western NY.

	Lot A	Lot B	Lot C	Lot E	Lot F	Lot G	Lot H	Lot D
Burkholderia sp.	14	16	0	4	10	0	2	18
Enterobacter sp.	14	33	12	12	4	0	4	7
Pantoea sp.	10	13	4	8	2	4	2	6
Pseudomonas sp.	27	10	38	65	71	14	18	16
Rahnella sp.	22	3	75	33	47	70	44	9
Total[1]	87	75	129	122	134	88	70	56

[1]Totals that exceed 100 resulted from more than one bacterium isolated from a bulb.

Pathogenic Ability of Microbes Isolated from Onions: To determine the relevance of these bacteria to decay, we attempted to determine whether the isolated strains could cause decay following inoculation into putatively healthy onion tissues. We used onion slices, mature bulbs and onion sets in the laboratory and sprouted onion bulbs and young transplants growing in the lab, greenhouse and controlled environment chambers. Strains of *Pantoea ananatis, Pantoea agglomerans, Burkholderia cepacia* and *Enterobacter cloacae* caused symptoms in inoculated whole onion bulbs or sets. Incubation temperature following inoculation affected the results in a differential manner with respect to the bacteria introduced. Only strains of *Burkholderia cepacia* exhibited characteristic symptoms within two days of inoculating slices of large bulbs incubated in Petri dishes. Only some strains of *P. ananatis, P. agglomerans and Pantoea spp.* caused lesions in inoculated leaf tissues. The yeast-like microbes isolated from the culls have not been tested sufficiently to determine their pathogenic capability to onions, but pathogenic yeasts are known.

Sources of Bacterial Pathogens of Onions: In 2010, we conducted limited tests of materials destined for planting in New York onion fields. We had attempted to isolate bacterial pathogens from several lots of onion seed and transplants and from several lots of muck-land soil. Very few of the samples tested yielded known pathogens of onions, a perplexing result. Because our testing in 2010 was rather limited, we expanded testing in 2011. We also increased our attention to muck-land soils by assessing a greater number of samples and modifying our assay procedures. Soils were collected within a few weeks of onion planting before we might expect bacterial multiplication to occur in the plants. The seed, transplant and soil samples assessed were derived from the same onion plots that were included in the Northeast IPM program study aimed at identifying management factors related (positively or negatively) to the incidence of bacterial decay.

As in 2010, very few of the samples of seed and transplants yielded bacteria pathogenic to onion. However, many strains of *Pantoea agglomerans* were isolated from several of the transplant samples, but with the exception of two of eleven tested samples, they all failed to infect onions in our tests. In contrast, the results with the muck-land soil differed radically from the seed and transplant assessments.

More than 80 samples of soil were assessed and several hundred bacterial strains were isolated and characterized from them. The strains isolated included ALL the bacterial pathogens mentioned above, including *Rahnella* sp. Thus, muck-land soils collected following winter and close to the time of onion planting yielded the several pathogens that we had previously isolated from cull onions. This result suggests that soil may be THE important source of inoculum for the several pathogens that are responsible for the extensive losses sustained by growers. Furthermore, since the pathogens appear to be present in soil, perhaps efforts to reduce the populations of the pathogens in soil may reduce the extent of losses caused by these organisms. We intend to address this relationship in our future research.

Effects of Cultural Practices on Bacterial Decay of Onions: Earlier studies were conducted in plots of sweet onion transplants grown on mineral soils in Seneca County, New York and Lancaster County, Pennsylvania. The results indicated that onions grown at wide, vs. narrow, spacing sustained significantly greater losses from bacterial decay. Also, in a trial aimed at assessing the effect of different levels of nitrogen fertilizer on damage from onion thrips, bacterial decay was significantly greater in plots that had been treated with high levels of nitrogen in comparison to plots that received less nitrogen fertilizer. To determine if similar relationships occur in direct-seeded onions grown on a large scale in muck-land soils, a substantial and factorial field trial was arranged with a collaborating grower located in Oswego County. At harvest, onions in each replicated plot were graded for size, counted and weighed. The numbers of obviously decayed onions were determined by manual assessment. The yield from each replicated plot was bagged separately and stored in the conventional manner by the grower. Following storage for several months, losses due to bacterial decay were assessed. Remarkably, there were about 1.5% decayed bulbs in the total onions in the large experiment. Perhaps 20-fold less that the same grower has experienced in 2010. The basis for the radical difference from one year to the next is not known. Several factors differed: in 2011, much less nitrogen fertilizer was applied at planting, weather conditions during the later part of the growing season were much drier, the test field had been cropped to lettuce the previous season, and no adjuvants were added to fungicide and insecticide sprays during the 2011 season. Some onion growers are concerned that when they use adjuvants that have leaf penetrating properties that entry of bacteria into the leaf is increased, which may result in higher incidences of bacterial bulb rot. It is highly recommended that adjuvants with leaf penetrating properties be used with insecticides, Movento and Radiant, for onion thrips control.

Effects of Sprays of Resistance Inducers on Bacterial Decay: As an alternative to treating onions with bactericidal chemicals, we decided to investigate the possibility that certain chemicals that have been found to induce pathogen resistance in plants following application, might induce resistance to pathogens of onion that cause bulb decay. Resistance inducers stimulate certain metabolic pathways in the plant that result in enhanced resistance to a broad range of pathogens, and in some cases pests. As the enhanced resistance depends on plant metabolism to develop, the materials must be applied several days in advance of anticipated disease initiation.

To increase our chances of obtaining results from the application of the putative resistance inducers, we designed experiments that included procedures to initiate disease in the onions to be sprayed with the resistance inducing materials. We used methods for inoculating leaf tissues that we had developed earlier in our lab and controlled environment studies. For initiating center rot, we pierced leaves with toothpicks freshly dipped in suspensions of the bacteria. This technique was simple, rapid and reproducible. For initiating sour skin, we devised a technique that involved depositing a suspension of *Burkholderia cepacia* into the lumen of an onion leaf, the top of which had been clipped off to facilitate inoculation.

Our preliminary results indicate that sprays of two of the three resistance inducers tested were effective in significantly reducing the incidence of center rot caused by *P. ananatis*. They apparently had no effect on the incidence of sour skin caused by *B. cepacia*. In addition, the disease initiation techniques for both pathogens that we tested in the field were effective in providing useful levels of disease that facilitated judging the effects of materials that may reduce disease incidence. Clearly, these first-year studies must be repeated to confirm the results seen in 2011; that's planned for 2012.

Projects Planned for 2012: The results of our studies in 2011 clearly have shaped our plans for research in 2012. The cull onion survey revealed organisms that are associated with unmarketable bulbs following storage. For example, Enterobacter bulb decay, which was not known in New York until recently, was rather common in Central and Western New York cull onions grown from the 2010 crop. In addition, previously, we had isolated the pathogen, *Enterobacter cloacae*, from several symptomatic growing onions in the field. Furthermore, we isolated the pathogen from muck-land soil collected close to onion-planting time. Finding *Rahnella* spp. in 40% of the cull onions analyzed requires further investigation of that bacterium. We intend to determine the conditions under which it can be problematic to growers, where it resides when not associated with onions and how it behaves in stored onions.

Continued on page 20

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Figure 1. Onion bulbs with bacterial disease culled by graders following routine storage for 5-6 months, and some selected randomly from storage.

The presence in muck-land soil of inoculum of the three bacterial pathogens that seem to be responsible for major losses due to bacteria in New York (*Burkholderia cepacia*, *Enterobacter cloacae and Pantoea ananatis*) suggests the possibility that reducing their populations in soil may well result in reduced incidence of bacterial rot problems. Thus, in 2012, we will test the effect of various cover crops and soil amendments with anti-bacterial action to determine that relationship. In addition, we will evaluate the bacterial quality of water that is used for spraying and irrigating onions. In some situations, growers apply water that leaches through muck-land soil to growing onions. Perhaps, bacterial pathogens are distributed in that manner.

Disease reduction strategies that were tested in 2011 with promising results will be evaluated again in 2012. These include reducing the amount of space allocated to each plant, both between rows and within rows, and reducing the amount of pre-plant nitrogenous fertilizer applied. In addition, our tests of resistance-inducing materials applied to onions by spraying will be repeated and expanded. Finally, the role of adjuvants in the development of bacterial disease will be thoroughly investigated. We hope to further refine our testing protocols and to determine whether resistance inducers are likely to be effective in non-inoculated grower trials.

Overall, we need to learn more about the relationships between the bacteria that cause rot in onions. Hopefully, such knowledge will lead to several approaches for reducing the tremendous losses due to bacteria that NY growers regularly sustain. ■

Checklist of Late Blight Management for 2012

Amanda Gevens, U. Wisconsin-Madison Veg Crop Update, 4/9 (edited by C. MacNeil, CVP)

Late blight (LB) is a potentially destructive disease of tomatoes and potatoes caused by the fungal-like organism, *Phytophthora infestans*. Symptoms of tomato and potato LB include leaf lesions beginning as pale green or olive green areas that quickly enlarge to become brown-black, water-soaked, and oily in appearance. Margins of lesions on leaf undersides can also produce sporulation which looks like a growth of white, fine fuzz. Stems can also exhibit dark brown to black lesions with sporulation. On potato tubers, LB symptoms include firm, brown, corky textured tissue. The time from first infection to lesion development and sporulation can be as fast as 7 days, depending upon the weather.

With the recent presence of the LB pathogen, and the possible presence of LB in potato seed/volunteers in 2012, it is critical that all growers of tomatoes and potatoes be alert and prepared for the disease. Key components of LB management are:

1) Destroy all potato cull piles (before potato sprouts/tomato foliage are present in the field
2) Destroy potato volunteers in all fields
3) Plant certified potato seed from a reputable source, from a seed grower who did not have LB in 2011; use a mancozeb-containing seed treatment; clean and disinfect cutting knives between seed lots.
4) Buy well-inspected disease-free tomato transplants from a reputable source located where LB has not been detected in 2012, or grow your own in a greenhouse that was not heated over the winter (no chance of LB carryover).
5) Apply only university recommended effective fungicides for control of LB, when disease forecast tools indicates risk of disease development (LB Severity Values reach 18), and stay on a fungicide spray program, based on a LB forecast tool if possible.
6) Scout frequently and thoroughly for disease in all potato and tomato fields
7) Have an action plan in case LB is identified in a field. Depending on extent of infection, plan may vary from: spot spraying a fast-acting herbicide/spot discing, including a wide border area; complete destruction of foliage; to, early potato vine kill with continued maintenance fungicide sprays. Pressure clean all equipment, tractors after driving through an infected area. Plan should limit disease spread within field and from field-to-field. ■

Recent Developments in NYS Regarding Late Blight

Carol MacNeil, CCE Cornell Vegetable Program

The risk of the development of late blight (LB) in potatoes and/or tomatoes in 2012 depends, of course, on whether it's a wet season, but also on the amount of inoculum/infected plant material that is present early in the season to spread the disease to growers' crops.

Sources of LB inoculum - LB was confirmed in potatoes in Genesee, Monroe, Niagara, Oneida, Wayne and Suffolk counties in NYS in 2011, so volunteers and sprouts in cull piles could be a source of LB there. In addition, NY growers use quite a bit of potato seed from other states where LB was a problem in 2011, and even certified potato seed can legally contain a very low level of LB infection. If tomato growers get plants from the south they should be aware that LB has shown up in several locations in south Florida and on the west coast of Florida. LB is expected to move north from there in coming weeks. Petunias (shipped up from the south) could also be a source of LB infection for tomato transplants in the greenhouse.

Possible LB strains in 2011 - Bill Fry, Cornell plant pathologist and late blight expert, and his lab accepted infected potato and tomato samples from NY and other states (CT, DE, FL, ME, MN, NH, ND, PA, RI, VA and WI) so the LB strain could be identified. Some LB strains are more aggressive on potatoes than on tomatoes, or vice versa, and some strains are sensitive to mefenoxam-containing fungicides (Ridomil Gold, OLF*) against which they work extremely well. Other strains are resistant to mefenoxam. Here is what he determined.

Major strains found in 2011:

- US22 - aggressive on tomato and potato, sensitive to mefenoxam, 15 samples
- US23 - aggressive on tomato and very aggressive on potato, sensitive to mefenoxam, 39 samples
- US24 - aggressive mainly on potato, sensitive to mefenoxam, 14 samples

Few samples of these strains found in 2011:

- US8 - not aggressive on tomato, very aggressive on potato, resistant to mefenoxam, 1 sample
- US11 - aggressive on tomato and potato, resistant to mefenoxam, 1 sample

Unidentified strains in 2011 – There were a number of samples where the strain could not be identified as a previously identified strain. Research on these continues.

(Note: Steve Johnson, plant pathologist, U. Maine Extension, reported that Maine has requested an emergency exemption for a new fungicide seed treatment because of concerns regarding LB in Maine-produced seed potatoes.)

Be sure to clean and disinfect your cutter knives between seed lots! In addition to the risk from LB, a number of other potato tuber diseases have shown up in seed that could affect the 2012 crop.

Early season fungicides for late blight (S. Menasha, LI Fruit & Veg Update, 4/5/12) - Both US23 and US24 occurred in Maine last year and many LI/NY growers use Maine seed. Both US23 and US24 are sensitive to mefenoxam fungicides. Therefore, you might expect Ridomil to be recommended at potato planting, but neither Ridomil Gold Bravo nor Quadris Ridomil are listed for LB control as an in-furrow treatment. This is because you can't get full coverage on all the eyes on the seedpiece nor contact all areas of the tuber surface. Tom Zitter, Cornell, recommends the use of a mancozeb-containing seed treatment (Maxim MZ, or OLF) to help reduce tuber to tuber movement of LB during the seed cutting and planting operation. Mancozeb has been shown to be effective.

Once potatoes emerge there are options for applying more effective LB fungicides. If conditions are favorable for disease development soon after emergence it may be prudent to apply one of these materials to the young canopy. Mefenoxam-containing fungicides (Ridomil Gold Bravo, OLF*) may be a good option since we are more likely to see the sensitive US23 and US24 strains in 2012.
**OLF – Other labeled formulations*

Contact us regarding any suspect tuber, sprout or potato/tomato foliar lesions – Possible LB infection should be reported so, if confirmed, samples can be sent to Bill Fry's lab at Cornell for isolate identification. Turnaround time can be as short as 3 - 4 days and the information can assist you in choosing the best fungicide to use. (For sampling and handling instructions: In the Cornell Vegetable Program area contact Carol MacNeil at crm6@cornell.edu or 585-313-8796. In the Capital District Vegetable & Small Fruit area contact Chuck Bornt at cdb13@cornell.edu or 518-859-6213.)

Resources Regarding Late Blight:
NYS recommendations for LB management in potatoes/tomatoes are in the *2012 Cornell Vegetable Guidelines* at: http://www.nysaes.cals.cornell.edu/recommends/ Additional information will be provided in the weekly Cornell Vegetable Program and Capital District Vegetable & Small Fruit Program newsletters during the growing season.

Abby Seaman's, NYS IPM, LB web-site (NYS counties with LB confirmed; resources for growers): http://lateblight.nysipm.cornell.edu/

USAblight website (all US counties with LB confirmed; resources for growers): http://usablight.org/ ■

Control Rye Grain Cover Crops Now; Avoid Problems with Mustards

Thomas Björkman, Cornell - Geneva (edited by C. MacNeil, CVP)

Cover crops serve many good soil management goals on vegetable farms. Part of a successful cover-crop strategy is avoiding some of the problems that can occur. Recent work has addressed the problem of crop inhibition following a cover crop. There are two situations where we have consistently measured inhibition of the following crop by 15 - 40%. One is when an overwintering grain crop is allowed to get too old. The other is when a vine crop follows a spring mustard cover crop.

Kill/incorporate small grains (rye, wheat, triticale) early, preferably when they are only about 6 inches tall. If mixed with a legume, you can delay a little longer. It has been common practice to let rye, etc. get to the boot stage before they are killed. The expectation has been that a couple of weeks for decomposition will eliminate negative allelopathic germination and crop growth effects, nitrogen tie-up, and rough trash. Unfortunately research showed that it doesn't work when beans, sweet corn, cucumbers, tomatoes, peppers or cabbage were subsequently planted. All of the crops had an unacceptably large amount of inhibition. The inhibition occurred even when ample nitrogen was applied to overcome nitrogen tie-up.

Don't plant vine crops where a live crucifer cover crop was growing in the spring. Crucifer cover crops are good for suppressing soilborne diseases, and have proven valuable preceding beans, onions and celery. Don't do it before vine crops however! Over four years when yellow and brown mustard were planted very early in the spring, incorporated at flowering, and followed by seeded pickling cucumbers and Jack O'Lantern pumpkins large reductions in stand and growth consistently occurred. Researchers in Michigan and Florida have found the same effect on cantaloupes and watermelon. (Note: Be sure to kill/incorporate any crucifer cover crops that overwintered before they set seed!)

Regardless of the cover crop allow at least 3 weeks after killing/incorporating before planting to allow time for breakdown of the residues to reduce problems with seed maggots. For more information on cover crops go to the Cornell Cover Crops for Vegetables website at: www.covercrop.net ■

Rye cover crop.
Photo: Carol MacNeil, CCE Cornell Vegetable Program

Calcium/Magnesium Content, Effective Neutralizing Value of Ag Limes

Carol MacNeil, Cornell Vegetable Program (information from Nate Herendeen, WNY Crop Management Association)

Growers sometimes ask about the magnesium vs calcium content of lime. They should also be interested in the Effective Neutralizing Value (ENV) of lime as it is the true indicator of the pH change you can expect from applying a given quantity of lime per acre. In addition, lime recommendations are given in tons/acre of 100% ENV lime, while most liming materials have a 50 - 90% ENV, requiring proportionally higher application rates. The NYS Dept. Ag & Markets publishes information on the calcium and magnesium content of lime as well as the Effective Neutralizing Value (ENV).

Geologically, any that comes out of the Niagara escarpment deposits is high magnesium lime (dolomite) and most others have a low magnesium content. These run from Michigan thru the Ontario peninsula along the Niagara escarpment through Rochester, Wayne County, possibly to Watertown. The primary calcic (high calcium) limestone in the west is from the Buffalo – Genesee - Seneca escarpment. All the marl limes are low magnesium. For a list of Licensed Lime Dealers in NYS go to: http://www.agriculture.ny.gov/PI/commodities/Lime%20listing.pdf ■

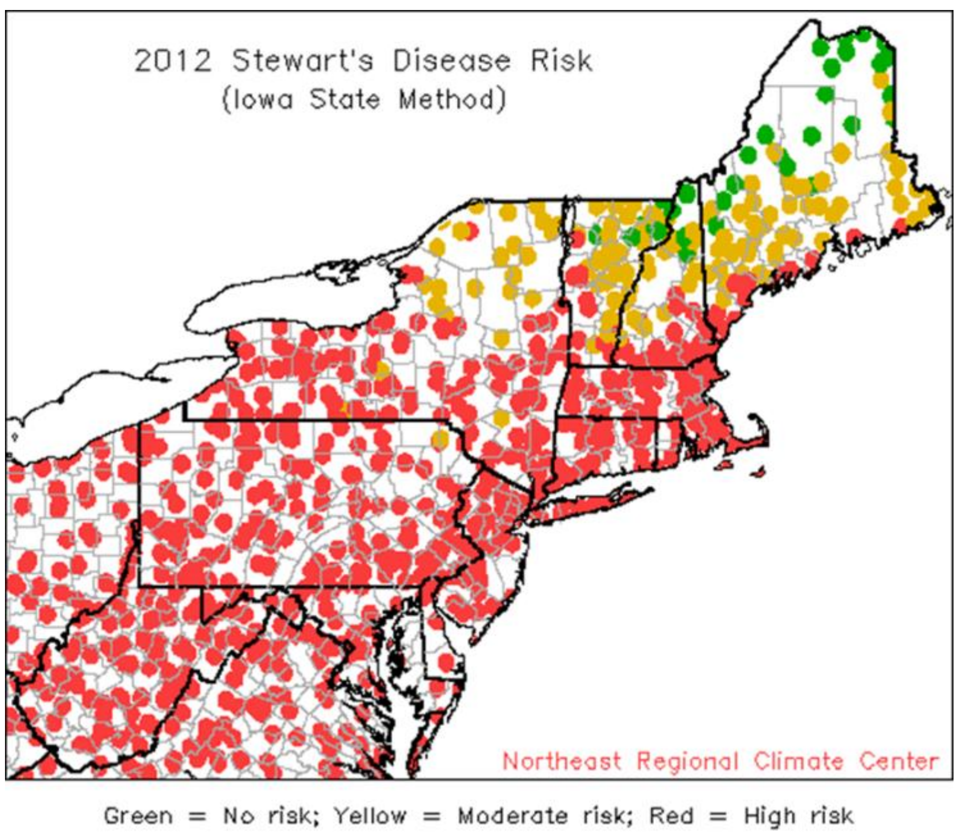
Stewart's Wilt of Sweet Corn - Risk for 2012

Stewart's wilt is a bacterial disease of sweet corn that can result in plugging of the vascular tissue of plants, wilting, yellow/brown streaks on the leaves, and serious yield reduction, especially in susceptible varieties. The bacteria which causes Stewart's wilt is carried by the corn flea beetle. Corn flea beetles are very small (2 mm or 1/12 in.), shiny black beetles that move very quickly when disturbed. Adult beetles feed on corn plants causing small circular holes or elongated "scratch" marks. If a winter is cold many corn flea beetles will die and the risk of Stewart's wilt is reduced. Warm winter temperatures suggest that survival of large corn flea beetle populations is likely, therefore a high prevalence of Stewart's disease is possible (though the amount of disease present the previous year is also a factor).

The Iowa State University Model predicts the prevalence of Stewart's Disease based on average temperatures for the months of December, January and February. If the mean monthly temperatures for December, January and February are each above 24°F high disease risk is predicted (red/dark dots on map). If one or two of the three months average above 24° F, the risk is low to moderate (yellow/light dots). If all three months average below 24° F, survival of the beetle is unlikely and the risk of Stewart's Disease is negligible (green/dark dots only in Maine, northern New England). Except for the North Country/Adirondacks, most of NYS is predicted to have a high risk of Stewart's wilt.

For information on the bacterial disease Stewart's Wilt, the corn flea beetle which carries the disease, and on conventional and organic management to decrease disease risk (varietal resistance, insecticide applications, cultural practices) see the 2012 Cornell Vegetable Guidelines, Sweet Corn Varieties and Corn Flea Beetle at: http://www.nysaes.cals.cornell.edu/recommends/26frameset.html

(map from the NYS IPM NEWA website, Crop Pages, Sweet Corn, Stewart's Disease at: http://newa.cornell.edu/) ■



Performance of Tomato Varieties for Late Blight, Early Blight, and Septoria Leaf Spot

Tom Zitter, Cornell, 3/12

Both the Ph2 and Ph3 genes are needed to withstand infection by the new races/genotypes of late blight (LB). In varieties that have only one of the better genes (Ph3) infection might be limited with just a few fungicide sprays. Anything with just the Ph2 gene alone, however, will not survive the new US22 or US23 strains of LB.

Performance of Tomato Varieties (**H**ybrids, **O**pen **P**ollinated and **He**irlooms) for Late Blight (LB), Early Blight (EB), and Septoria leaf spot (SLS)

Tomato Variety	**Specifics, Seed source**	**Ref. of LB/EB Resistance**	**Genetics**	**Comments**
Fresh Market Reds (a few resistant for LB)				
Legend OP	Det, rnd red, 14-16oz; **Territorial**	Not tested locally; dev. Baggett, Ohio State	Reported tolerant US8, US11; *Ph2* gene only	*Ph2* gene will <u>not provide resistance</u> for LB races US22, US23
New Yorker OP	Det, rnd red, 4-6 oz, early; **Online**	Not LB tested locally; dev. NYSAES, Geneva	Resistance from *Ph1* gene only	*Ph1* gene will <u>not provide resistance</u> for new LB races
West Virginia 63 OP	Indet., rnd red, 6.5oz **Online**	Not tested locally; dev Gallegly, W. Virginia U	Reported as *Ph2* gene	*Ph2* gene will <u>not provide resistance</u> for new LB races
Defiant PhR	Det, 6-8oz, **Johnny's** (20@$5)	Resistant for EB and LB, <u>including US22, US23</u>	*Ph2* & *Ph3 genes*; EB Resistance genes - both parents	Should perform well in NE US. Suited for vine-ripe; <u>Susceptible to Septoria</u>
Mt. Merit	Det, rnd red, mid to late season; **Bejo**	Resistance for EB and LB, <u>including US 22, 23</u>	*Ph2* & *Ph3*; EB Resistance genes -both parents	Should perform well in NE US; like others in Mountain series; <u>Sus. Septoria</u>
Heirlooms (none resistant to LB)				
Saladette (large cherry), Plum (a few with resistance for LB)				
Juliet, <u>Plum cluster</u> F1	Indet, 1½ -2 oz; **Johnny's, #**707 (10@$3)	Intermediate resistance for LB - US17 and EB (09)	South Asia, *Ph* gene(s) likely	Larger sister of 'Santa'; Susc. to Septoria
Mountain Magic F1, **<u>Large cherry</u>**	Indet, 2oz; **Bejo; Johnny's** (10@$4); **Seedway** (100@$30)	<u>Excellent</u> with US22, US23 (09-11); multi. isolate res. US11, US17	*Ph2* & *Ph3 genes, both parents*; tolerant for EB	Susc. to Septoria
Plum Regal F1, **<u>Plum</u>**	Det; **Bejo; Seedway** (1000@$83)	Good w/ US22, US23 (09-11); multi isolate res. US11, US17; (dev Gardner, N. Carolina State)	*Ph3 gene, one parent*; tolerant for EB, gene from one parent only	Susc. to Septoria
Small-fruited Grape, Cherry, Pear (assorted colors)				
Matt's Wild Cherry <u>Sm. Red</u> He	**Indet, ½ in, clusters; Johnny's, ID: 732**	Excellent w/ US17 (02, 06); observed res. US22 (09)	None reported	Rampant vines; Probably *Ph3*; E. Mexico

(**From Meg McGrath, Cornell – Long Island**: Since 2005 LB has continued developing into May in Florida, which is several weeks later than in the past. This indicates there are new pathogen strains (genotypes) able to tolerate warmer temperatures. Additionally, new genotypes are more aggressive on tomato than the genotypes responsible for LB in potato have been on tomato in the past.) ■

Focus on Tomato Webcasts

Phil Bogdan, Plant Management Network

(The Plant Management Network is an effort of the American Phytopathological Society, Crop Science Society of America, and American Society of Agronomy)

A new online tomato resource for field and greenhouse growers, consultants, and other professionals has been launched by the Plant Management Network. Called *Focus on Tomato* http://www.plantmanagementnetwork.org/fot , it features 24/7 on-demand webcasts to help users protect and manage their tomato crops more profitably and effectively. These presentations are given by university professors and extension specialists recognized for their expertise and research on tomato management. Current webcasts include the following titles and are accessible through the *Focus on Tomato* homepage at http://www.plantmanagementnetwork.org/fot

- Managing Fertility in Drip-Irrigated Processing Tomatoes - Tim Hartz, U. CA -Davis
- Pre-harvest Food Safety Practices for Tomato - Jeri Barak, U. WI-Madison
- Antibody-Based Diagnostic Tools for Identifying Tomato Diseases - Chris Smart, Cornell
- Tomato Grafting Technique - Cary Rivard, Kansas State
- Emerging Tomato Diseases in the SE US and Methods for Their Control - Kelly Ivors, NC State

In addition, one new *Focus on Tomato* webcast will be published each month. If users visit the site within 60 days of publication all webcasts can be viewed without a subscription. To get alerts of the latest webcasts, sign up for PMN's free online newsletter, PMN Update, at: http://www.plantmanagementnetwork.org/update/default.cfm ■

Over 300,000 Acres Removed from NYS Golden Nematode Quarantine

Daniel Kepich, USDA APHIS, Avoca

In February 2012, USDA Animal and Plant Health Inspection Service (APHIS) and New York State Department of Agriculture and Markets announced removal of 262,118 acres in Livingston County, 43,520 acres in Genesee County and 729 acres in Steuben County, New York from the area under quarantine for golden nematode. This action was based on survey results and criteria outlined in the U.S. and Canadian *Guidelines on Surveillance and Phytosanitary Actions for Potato Cyst Nematodes*. Restrictions on the interstate movement of regulated articles from these areas are no longer required, which will significantly benefit producers and the cooperative golden nematode program. The remaining 410.2 acres in Livingston Country and 63,159 acres in Steuben County will continue to be regulated to mitigate the risk of spread to noninfested areas of the United States. This is the largest removal of land from the golden nematode quarantine since 1944, and it followed several decades of soil surveys to confirm these areas are free from golden nematode.

Efforts are ongoing to remove additional acreage affected by the quarantine in Cayuga, Nassau, Orleans, Seneca, Steuben and Wayne counties with the overall goal of reducing the quarantined area by 90% within the next five years.

These links provide more details:

- http://www.aphis.usda.gov/plant_health/plant_pest_info/nematode/index.shtml
- http://www.agriculture.ny.gov/AD/release.asp?ReleaseID=1995

Golden nematode, one of the most damaging potato pests in the world, was first detected in a potato field on Long Island in 1941. By that time it had infested potato fields upstate through infected seed potatoes. The presence and threat of spreading of golden nematode has posed a financial burden for farmers in the quarantined townships. Farmers in the regulated area are required to have their equipment steam cleaned prior to leaving the farm to kill any nematodes that may be present in the soil on the equipment. In addition, potatoes and other commodities must be inspected and certified for interstate movement. ■

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Contact the Capital District Vegetable & Small Fruit Program

Capital District Vegetable and Small Fruit Program (CDVSFP) Specialists

Chuck Bornt, Team Leader
Extension Specialist
Vine crops, sweet corn, potatoes, tomatoes and reduced tillage

Office: (518) 272-4210 ext 125
Cell: (518) 859-6213
Email: cdb13@cornell.edu
Address: 61 State Street
Troy, NY 12180

Laura McDermott,
Extension Specialist
Small fruits, leafy greens, labor, high tunnels, and food safety

Office: (518) 746-2562
Cell: (518) 791-5038
Email: lgm4@cornell.edu
Address: 415 Lower Main Street
Hudson Falls, NY 12839

Crystal Stewart,
Extension Specialist
Small and beginning farms, organic, root crops, brassicas, and garlic

Cell: (518) 775-0018
Email: cls263@cornell.edu
Address: 141 Fonclair Terrace
Johnstown, NY 12095

CDVSFP Administration

Mark Giles, Regional Ag Team Leader
Cornell University
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Cornell University
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Cornell Cooperative Extension Offices of the CDVSFP

Albany County CCE
William Rice Jr. Extension Center
24 Martin Road
Voohreesville, NY
Phone: (518) 765-3500

Columbia County CCE
Education Center, 479 Rte. 66
Hudson, NY 12534
Phone: (518) 828-3346

Fulton & Montgomery Counties CCE
50 E. Main Street
Canajoharie, NY 13317
Phone: (518) 673-5525

Greene County CCE
Agroforestry Resource Center
6055 Route 23
Acra, NY 12405
Phone: (518) 622-9820

Rensselaer County CCE
61 State Street
Troy, NY 12180
Phone: (518) 272-4210

Saratoga County CCE
50 West High Street
Ballston Spa, NY 12020
Phone: (518) 885-8995

Schenectady County CCE
Schaffer Heights
107 Nott Terrace, Suite 301
Schenectady, NY 12308
Phone: (518) 372-1622

Schoharie County CCE
Extension Center
173 S. Grand Street
Cobleskill, NY 12043
Phone: (518) 234-4303

Warren County CCE
377 Schroon River Road
Warrensburg, NY 12885
Phone: (518) 623-3291

Washington County CCE
415 Lower Main Street
Hudson Falls, NY 12839
Phone: (518) 746-2560

Advisory Members

Albany: Tim Albright and Tim Stanton
Columbia: John Altobelli, Bryan Samascott, Jody Bolluyt (organic)
Fulton: Eric and Stephanie Grey
Greene: Pete Kavakos, Jr. and Jim Story
Montgomery: Jim Hoffman and Ken Fruehstorfer (organic)
Rensselaer: Larry Eckhardt and David Mesick
Schenectady: Al Lansing and Keith Buhrmaster
Saratoga: Cyndi Pastore and Craig DeVoe
Schoharie: Bob and Linda Cross, and Jake Hooper
Warren: Kim Feeney
Washington: George Armstrong and Rich Moses
Industry Representatives: Jay Matthews and Paul Peckham

If you have questions or comments about this publication or the Capital District Program in general, please contact your county's grower advisory member or the Agricultural Program leader of your local Cornell Cooperative Extension office.

Dates to Remember...

May 2 - *Veg Edge Weekly* begins (formerly PestMinder)
All enrollees in the Cornell Vegetable Program will receive 20 issues of *Veg Edge Weekly* newsletter, starting May 2 through September 12.

May 18 - Food Entrepreneur Workshop: Recipe to Market, 9:30 am - 3:30 pm, Village of Salem Proudfit Hall, 181 Main St/ Rt 22, Salem, NY 12865. Food business basics, and critical issues before launching a food business. Olga Padilla-Zakour, NYS Food Venture Center, Cornell – Geneva, will lead the workshops.

$50 fee; Pre-register by May 11th. Details and registration form at: http://bit.ly/Recipe2market2012Brochure. Contact Steve Hadcock at 518-380-1497, or Trish Kozal at 518-854-3032 with questions. *Sponsored by the CCE Capital Area Ag & Horticultural Program, and the Battenkill Kitchen, Inc.*

May 19 - Food Entrepreneur Workshop: Acidified (Pickled) Foods, 8:30 am - 4:00 pm, Battenkill Kitchen, Inc., Historic Salem Courthouse, 58 E. Broadway, Salem, NY 12865. Hands-on training to provide small processors with the basic processing steps. Olga Padilla-Zakour, NYS Food Venture Center, Cornell – Geneva, will lead the workshops.

$50 fee; Pre-register by May 11th. Details and registration form at: http://bit.ly/Recipe2market2012Brochure. Contact Steve Hadcock at 518-380-1497, or Trish Kozal at 518-854-3032 with questions. *Sponsored by the CCE Capital Area Ag & Horticultural Program, and the Battenkill Kitchen, Inc.*

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