



Lessons Learned from the *Listeria* Outbreak in Cantaloupes

Wesley Kline, Cumberland Co. Cooperative Extension, Rutgers, NJ

Everyone by now should have heard about the *Listeria* outbreak in CO cantaloupes. With 28 deaths and at least 105 people from 26 states still recovering, this is the most deadly food-borne illness outbreak in 25 years. The Food and Drug Administration (FDA) was able to quickly trace the outbreak to one farming operation in CO (Jensen Farms). The company recalled the melons, but it was too late. *Listeria* can take a long time to develop and will multiply even under refrigeration (40°F or lower). *Listeria monocytogenes* is usually associated with raw/poorly pasteurized milk, soft cheeses, raw meats and cold cuts.

How did *Listeria* get on the melons? After investigation, FDA has reported the following:

1. There is no evidence the contamination came from the field. They were not able to find *Listeria* in the field. That does not mean it could not have been a factor in early contamination.
2. *Listeria monocytogenes* was found in pooled water on the packing house floor. The water collected near packing equipment and conveyors that moved melons. Wet areas can be a reservoir for *Listeria*.
3. The packinghouse floor could not be cleaned easily and the drains were not accessible for cleaning.
4. A truck was used to move cull melons to a cattle operation where the truck or driver could have picked up *Listeria* and spread it into the packinghouse.
5. The farm had purchased used grading equipment which was not easily cleaned and sanitized. FDA was able to collect *Listeria* from the packing equipment.
6. The melons were not pre-cooled to remove field heat prior to placing in a cold room. Warm fruit put in cold storage results in condensation on the outside of the fruit - an environment for *Listeria* to grow. Cantaloupe collected from the cold storage tested positive for *Listeria monocytogenes* strains that were the same as those from the outbreak.



What are the lessons produce growers should learn from this outbreak and what impact will this have on local growers?

1. That a food borne outbreak can happen on any farm. It does not mean just CA or FL. Every grower needs to assess their operation and see where there may be potential risks. Even if you do not need a third party audit, do a self assessment.
2. Food safety needs to be a team effort. Everyone in the operation must buy into the need for food safety. Jensen Farms had a third party audit before the recall, but an audit is only as good as the farm wants it to be. Anyone can clean up the packinghouse for the day of the audit then go back to the "old ways". It is time everyone makes food safety an impor-

Contents



16 Ordering Potato Seed - Ensuring the Highest Standards



11 New Seed Treatments for Onion Maggot

6 NYS Advises Garlic Growers to Beware of Imported Nematode

This publication contains pesticide recommendations. Changes in pesticide regulations occur constantly and human errors are possible. Some materials may no longer be available and some uses may no longer be legal. All pesticides distributed, sold or applied in NYS must be registered with the NYS Dept of Environmental Conservation (DEC). Questions concerning the legality and/or registration status for pesticide usage in NYS should be directed to the appropriate Cornell Cooperative Extension (CCE) specialist or your regional DEC office.

CCE and its employees assume no liability for the effectiveness or results of any chemicals for pesticide usage. No endorsement of products or companies is made or implied. **READ THE LABEL BEFORE APPLYING ANY PESTICIDE.**



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

Contact Us

Cornell Vegetable Program	18
Capital District Vegetable & Small Fruit Program	19

Beans

The Magnitude & Distribution of Western Bean Cutworm in NY Dry Beans	04
Smallest US Dry Bean Harvested Area Since 1921	05

Food Safety

Lessons Learned from the <i>Listeria</i> Outbreak in Cantaloupes	01
--	----

Garlic

NYS Advises Garlic Growers to Beware of Imported Nematode	06
---	----

General

Donations to Farm Families Hurt by Irene and Lee	03
NYS Energy Authority Gives Ag Disaster Assistance	03
Looking for a Farm Loan? FSA Can Help!	06

Meetings

GAPs Food Safety Workshops: Develop Your Own Farm Food Safety Plan	03
Empire State Fruit & Veg Expo, Direct Marketing Conf, & Becker Forum	07
Winter Wednesday Vegetable Production Webinars	08
Growing Cherries: 2011 in Review	08
Upstate NY Potato Advisory and Cornell Potato Breeding Line Show & Tell	08
Growing & Marketing Ethnic Vegetables	08
Processing Pea, Beet and Carrot Advisory Meeting	08
Cornell Economic Outlook Conference	08
New England Vegetable & Fruit Conference and Trade Show	08
Basic Farm Business Management Planning	09
NYS Dry Bean Industry Advisory Committee Meeting	09
Managing Crops & Soils for Few Pests and Greater Yields	09
Vegetable Growers Association of NJ Convention	09
2012 NOFA-NY Winter Conference: The Cooperative Economy	09
Ontario Processing Vegetable Industry Conference	09
Mid-Atlantic Fruit & Vegetable Conference	09

Onions

New Seed Treatments for Onion Maggot: What Growers Need to Know	11
Correction: NY Onion Production	14

Pesticides

Pesticide Training & Recertification Classes (Ontario County)	10
Pesticide Recertification Day	10
Cleaning Pesticide Application Equipment at the End of the Season	10

Potatoes / Tomatoes

Late Blight on Tomatoes & Potatoes in Eastern USA in 2011	14
Wet Weather During Northern Potato Harvest	15
Ordering Potato Seed - Ensuring the Highest Standards	16
North American Certified Seed Potato Health Certificate	17
United States Standards for Seed Potatoes	17

"Building Strong and Vibrant New York Communities"

Cornell Cooperative Extension provides equal program and employment opportunities.

Please contact Cornell Cooperative Extension if you have special needs.

Cornell Cooperative Extension does not endorse or recommend any specific product or service.

tant part of their culture in the operation!

3. Water was a big factor in this outbreak. Make sure you have your water tested for the packinghouse and that it is potable (drinking standards).
4. Treat the water used in cleaning produce on the packing line. The water may be potable from the well, but what if fruit comes in contaminated? The contamination can spread to other fruit during grading and packing. (Note: Municipal water is chlorinated but the chlorine (Cl) level is much too low to be effective in washing produce. From 50 – 150 ppm Cl is needed. See the *2011 Cornell Guidelines for Vegetables*, Postharvest Handling section on pg. 68 or at: <http://www.nysaes.cals.cornell.edu/recommends/10frameset.html> ed. C. MacNeil, CVP)
5. Monitor the disinfectant used during packing. Depending on the disinfectant monitoring times vary. Check to make sure you are using the best way to monitor. If using Chlorine it is important to check pH and concentration on a regular basis (at least every hour).

(From: *Cultivating Cumberland*, Nov, 2011, Vol. 16, Issue 11)

For more information on farm food safety go to the Good Agricultural Practices (GAPs) website at: <http://www.gaps.cornell.edu/> or contact Robert Hadad, Cornell Vegetable Program, at 585-739-4065 or rg26@cornell.edu, or Laura McDermott, Capital District Vegetable & Small Fruit Program, at 518-791-5038 or lqm4@cornell.edu ■

GAPs Food Safety Workshops: Develop Your Own Farm Food Safety Plan

Cornell Cooperative Extension, NYS Dept. of Agriculture & Markets, and the National GAPs Program collaborate on 2-day workshops to help produce growers learn about GAPs and write their own farm food safety plans. After attending the workshop, growers are invited to a mock third party audit during the growing season.



Upcoming Workshops :

January 4 & 5 — Mt. Morris

February 15 & 16 — Rochester

March 14 & 15 — Albany

March 28 & 29 — Syracuse

Check back to <http://www.gaps.cornell.edu/> for registration info or call Craig Kahlke at 585-735-5448. ■

Donations to Farm Families Hurt by Irene and Lee

Robert Smith, Farm Credit East

Farm Credit East and United Way are coordinating an effort to help farm families hurt by Irene and Lee with donations to show “farm community concern.”

This support is for any farm family with at least \$10,000 of crop loss/damage in designated disaster counties in NY, NJ, MA, CT, RI and NH who has applied by

December 1st. The donations will be given in mid-December. Farm Credit East and their employees, CoBank, Yankee Farm Credit and United Way - Greater Capital Region have made significant contributions.

Others are welcome to contribute. Go to:

<http://www.unitedwaygcr.org/donate.aspx> Click “in Honor of”, and type in “Farm Assistance.” Or send a check to United Way GCR – 2011 Farm Assistance, United Way of the Greater Capital Region, PO Box 13865, Albany, NY 12212. ■

NYS Energy Authority Gives Ag Disaster Assistance

NY Farm Bureau

The NYS Energy Research & Development Authority (NYSERDA) has opened an Agriculture Disaster Energy Efficiency Program to assist on-farm producers in NYS damaged by Tropical Storms Irene and Lee. Under this program \$4.17 million is available to provide assistance to replace and install energy efficient electric and natural gas distribution and use equipment, and systems damaged during the storms in non-residential facilities. Farms seeking assistance must provide supporting documentation, invoices, estimates. NYSERDA will reimburse for projects that have been completed.

Applications will be accepted on a first-come, first-served basis **through 5 pm on Thursday, December 15th**, or until funds are exhausted. Applications are available at <http://nyserdera.ny.gov/agriculture-disaster-program> Call 800-732-1399. ■

It's amazing what your roots can become with a little help.



www.serenadesoil.com

The Magnitude & Distribution of Western Bean Cutworm in NY Dry Bean Fields

Keith Waldron, Field Crops IPM, NYS IPM Program, in cooperation with Carol MacNeil, Cornell Vegetable Program, and Abby Seaman, NYS Vegetable IPM Program

Western bean cutworm (WBC) is an emerging pest in NY, with the capacity for substantial damage to dry beans. WBC has historically been a pest of corn and dry beans in the High Plains of the US. Recently infestations have steadily moved eastward. By 2009 WBC was confirmed in PA, NY and Quebec, previously having been detected in MI and Ontario, Canada. Pheromone trapping in 2010 and 2011 in corn and dry bean fields showed that WBC was broadly distributed and numbers were rising in NY. In 2010, 54 of 55 traps in 29 counties caught WBC moths. A total of 67 WBC traps in 37 counties were monitored statewide this season in collaboration with Cornell Entomology, the NYS IPM Program, Cornell Cooperative Extension field staff, and grower and agribusiness cooperators. Average number WBC/trap/yr in 2010 was 13.4, while in 2011 the number was 21.4.

Background - WBC is a late season pest of dry beans, and 8 - 10% yield losses due to WBC feeding have been reported. It begins as leaf feeding and, once the larvae grow to the 3rd stage, they begin feeding on pods, and then directly feeding on the developing beans. Entry holes promote infection by fungi and bacteria. Direct feeding on beans can cause yield loss, and quality is affected because of the presence of chewed, shriveled, moldy beans that make it through the combine. 2% pick caused by direct feeding can down-grade the beans, and heavier damage can cause rejected loads. WBC thresholds for dry beans have not yet been established. Pheromone traps are used to determine the number of moths present and time of peak moth flight. Pod feeding typically occurs 10 - 21 days after peak moth flight so having a trap at the field helps determine when to scout for WBC damage, to determine whether/when a spray is needed. In addition, the threshold for field corn is 4% of plants with WBC egg masses. Michigan State University and Ontario researchers suggest if a corn field has reached threshold, then adjacent dry bean fields should be considered at risk and should be scouted for pod feeding and sprayed if damage is observed.

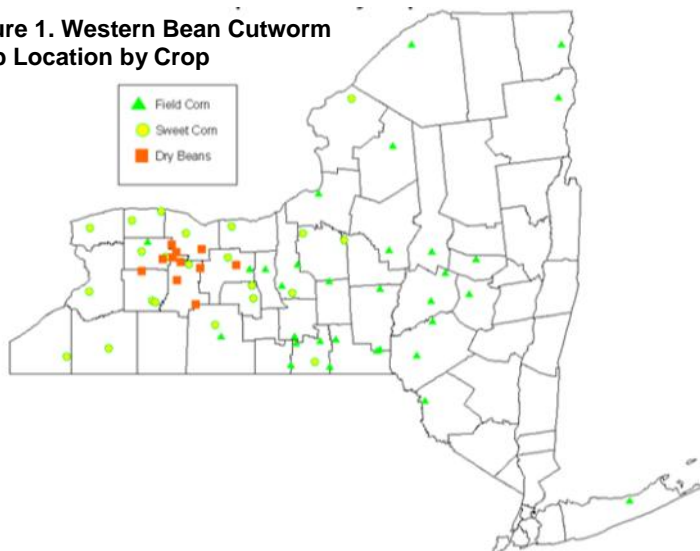
Discussion – WBC moths were found in WBC pheromone traps in dry bean fields (cranberry, black bean or kidney bean) at eleven of 12 locations in Genesee, Livingston, Monroe, Ontario, and Wyoming counties. Numbers of WBC moths collected approached the MSU monitoring guideline of 100 moths/trap in Attica and Stafford. Using the MSU guideline for detecting risk of WBC injury, corn fields adjacent to dry bean monitoring sites in Attica and Stafford were scouted for egg masses and dry bean fields checked for pod injury, but none was detected. As of the time of this report, no dry bean yield impacts have been attributed to WBC this season (John McCreedy, pers. com.) though some kidney bean damage may have been observed in a couple of cases (Steve Blowers, pers. com.) Early indications are that WBC did not have an economic impact on dry bean production this season. It is possible that dry weather conditions during peak moth activity may have caused mortality of WBC egg masses. The Attica field received a fungicide + potato leaf hopper insecticide application in early August. If WBC eggs or larvae were present they would have been killed. As WBC populations increase there is the potential to observe more "pick" in harvested dry beans, especially in large seeded classes like light/dark red kidney. When beans are threshed, the combine may be better able to separate out small damaged beans like blacks. There were reports in 2011 of field corn damage the Malone and Chazy, NY, with as much as 50% of ears infested with WBC larvae. Unfortunately, no WBC traps were in those areas. Yield impacts, if any, are not yet known.

Table 1. Total WBC moths collected from Dry Bean Fields in Western NY

County	Town	Total WBC
Genesee	Stafford	96
Livingston	Caledonia E	19
Livingston	Caledonia W	22
Livingston	Leicester	0
Livingston	Lima	33
Livingston	Wayland	9
Monroe	Churchville	24
Monroe	Mendon	49
Monroe	Mumford	24
Ontario	Hopewell	59
Wyoming	Attica	164
Wyoming	Pavilion	56
TOTAL		555

Many of the WBC moths captured have been in excellent condition suggesting the insect is overwintering locally. The increase in average number of WBC caught per trap from 2010 and 2011 indicates the potential that WBC will

Figure 1. Western Bean Cutworm Trap Location by Crop



continue to establish in NY. For states/provinces to our west, the influx of WBC has been relatively rapid with economic injury to host crops occurring within a few years of introduction. Several factors contribute to our risk of WBC establishing economically significant populations in NY: Lake effect – mild fall, snow cover along lakes (Increase overwintering survival); High humidity (increase the survival rate of eggs and young larvae); Multiple host crops - field/sweet corn and beans (Increase in overall popula-

tion); High % of acres in reduced and no-till (Increase overwintering survival); and, Soils – light and sandy (Increase overwintering survival).

In summary, WBC populations are currently below economically damaging levels, however, they are increasing. WBC moths are well distributed in western NY and peak flights of WBC moths can be expected the end of July – the first of August. The physical appearance of captured WBC moths suggest they are

overwintering locally and could be expected to increase risk of economic impact to NY dry bean and corn production in the future.

*Acknowledgement: This study was funded by a grant from the **NYS Dry Bean Industry**. Thanks to John McCreedy, the WNY Crop Management Association, and Don Sweet for their assistance. ■*

Smallest US Dry Bean Harvested Area Since 1921

Vegetables and Melons Outlook/VGS-347/Oct. 27, 2011, Economic Research Service, USDA

US dry bean markets find themselves moving up into relatively unfamiliar territory as prices continue to reach for the sky in reaction to a small 2011 crop, strong prices for other field crops, and moderate demand. The October US dry bean production estimate was down 38% from a year earlier. Harvested area for the 2011 dry bean crop is currently expected to be 1.12 million acres—the lowest since 1921. The first production estimate of dry beans by class will be released by USDA on December 9.

The 2011/12 dry bean season opened in September with a preliminary estimate of \$40.90 per cwt for the industry aggregate grower price—54% above a year earlier but less than the record high (unadjusted for inflation) price of \$47.20 per cwt received in March 1974. Grower

prices continued to move higher into October with very limited open-market sales. (Prices were up in October compared to a year ago 65 - 70% for dark and light red kidneys in the Midwest, and 140% for black beans in Michigan.) These limited supplies and strong prices will likely attract imported product. As a result, dry bean import volume is expected to see double digit increases in 2011, while export volume likely falls below 8 million cwt for the first time since 2006/07.

Although dry bean stocks entering the 2011/12 season were the highest in a decade, total available supplies will likely be among the lowest of the past 2 decades. In combination with moderate world demand, the weak U.S. dollar, and smaller crops in some competing and

consuming nations (including Canada and Mexico), it is not surprising that nominal dollar prices are reaching record highs this fall. After adjusting for the impact of inflation, this year's season average dry bean grower price is expected to be the highest since 1989. See the complete report at: <http://www.ers.usda.gov/Publications/VGS/2011/10Oct/VGS347.pdf> ■



HELENA

People...Products...Knowledge...

Chris Daum: 585-738-3889
daumc@helenachemical.com

John Ivison: 585-509-2262
ivisonj@helenachemical.com

Cris Wunder: 315-727-1300
wunderc@helenachemical.com

Kevin Witkop: 585-738-9882
witkopk@helenachemical.com

165 S. Platt St. • Suite 100 • Albion, NY 14411
585-589-4195 (Office)

3704 Yaegel Rd. • Geneva, NY 14456
315-789-4450 (Office)



Worm Power



Feeds the soil . . . so the soil can feed your plants!

Worm Power® Certified organic earthworm products

- Raise soil fertility
- Improve plant performance and vigor
- Increase germination & root growth
- Odorless, easy to handle
- Excellent results in greenhouse, transplant, vineyard & landscape

For grower use & garden center resale in:

- 1 lb, 3 lb and 15 lb bags
- Brew bags for liquid fertilizer
- Shaker cans
- Cubic yards for growers

For more info or to order, call
800 544-7938 Code A048 or go to
www.harrisseed.com

One of many supplies for organic production brought to you by Harris® Seeds



NYS Advises Garlic Growers to Beware of Imported Nematode

Michael Moran, NYS Department of Agriculture & Markets,
www.agriculture.ny.gov

11/10/11 - NYS Agriculture Commissioner Darrel J. Aubertine alerted New York's garlic growers that **Stem and Bulb Nematode (*Ditylenchus dipsaci*)**, a serious pest of garlic and other crops, has been found in the State on imported seed garlic. The Commissioner provided advice to growers on options to help protect their crop. The presence of Stem and Bulb Nematode, *also known as the Bloat Nematode*, in seed shipments destined for NYS has been confirmed by US Customs and Border Protection (CBP) Agricultural Specialists. Once established, Stem and Bulb Nematode will cause a significant decline in production and, at times, death of the plants. The USDA's Animal and Plant Health Inspection Service (APHIS) continues to work with CBP to identify and address pathways by which this nematode may enter the United States. Given the potential economic impact of this pest, APHIS has initiated a review to determine appropriate ways to prevent further spread within the US.

In follow up, U.S. Customs and Border Protection (CBP) initiated Operation Stem Bloat Nematode, where they sampled all imported shipments of garlic for seed and found 40 – 50% of the shipments were infested with the nematode. "We were surprised at the volume of shipments found to be infested with this nematode, given how clean and disease-free the garlic cloves appeared", said Ann Marie Paul, CBP Assistant Director of Field Operations, Buffalo, NY. These findings initiated a temporary change in national protocol on garlic entering the country from Canada by requiring all shipments (whether labeled for seed or food), from Detroit to Maine entry points, to be sampled and tested for the presence of this nematode.

The Stem and Bulb Nematode is a microscopic worm that can cause yellowing and death to garlic plants. Some host crops can experience swelling and distortion of plant parts and rotting of stem bases. While the nematode poses no risk to human health, it can affect international trade of certain commodities. It is nearly impossible to eliminate because it can survive on a range of other hosts, as well as in the soil itself. Other host crops include onions, potatoes, alfalfa, strawberries and ornamental plants.

To help prevent Stem and Bulb Nematode from entering the country and impacting our local crop, growers should always require a valid phytosanitary certificate when they purchase foreign seed. If growers have concerns about a shipment of seed, they should contact their local Cornell Cooperative Extension (CCE) agent to have the seed tested. Garlic growers can also reach out to CCE for testing to receive confirmation that a crop is nematode free, whether just imported or grown on their farm for several years. The Department has provided a \$69,122 grant to the NYS Agricultural Experiment Station in Geneva for testing and analysis of garlic seed. The grant will also assist with determining the extent of this pest's presence in NY.

Cornell Cooperative Extension held three meetings last year where growers expressed their concerns regarding the possible presence of Stem and Bulb Nematode. The Garlic Seed Foundation has also been hearing from growers. According to David Stern, Director of the Foundation, "We are hearing from an increasing number of growers regarding problems with their garlic crop due to this Nematode. The attention to this issue by NYSDAM, Cooperative Extension, CBP, APHIS and Dr. George Abawi, with his work at Cornell, is greatly appreciated! We look forward to working with them to address what is becoming a very serious problem for garlic growers."

According to the 2007 US Census of Agriculture, New York has 330 garlic farms that dedicate 306 acres to garlic production. Garlic production is up considerably since 1992 when the State only reported 11 acres grown. The vast majority of the garlic grown in New York State is marketed fresh and is valued at \$24.5 million. New York State is fourth in the nation in terms of acreage devoted to garlic production. ■



Looking for a Farm Loan? FSA Can Help!

The USDA Farm Service Agency (FSA) offers farm loans to farmers and ranchers who have experience and want to own or operate their own farm or ranch, but are unable to get financing from a traditional lender. FSA provides financial assistance and business planning to help ensure the future well-being of American agriculture. For more information, visit www.fsa.usda.gov or, in Ontario, Seneca and Wayne Counties contact:

Canandaigua FSA Office
3037 County Road 10
Canandaigua, NY 14424 ■



DuPont provides solutions and products to help grow better, healthier crops and maximize your crop investment

Fungicides

Curzate® 60DF fungicide
Mankocide® fungicide
Tanos® fungicide

Insecticides/Nematicides

Asana® XL insecticide
Avaunt® insecticide
Coragen® insect control
Lannate® insecticide
Vydate® C-LV insecticide/nematicide
Vydate® L insecticide/nematicide

For more information contact:

Gale Drake, Western & Central NY
Gale.E.Drake@usa.dupont.com
585.447.7305

Carl Bannon, Eastern NY & New England
Carl.D.Bannon@usa.dupont.com
413.253.4017



Empire State Fruit & Vegetable Expo, Direct Marketing Conference, and Becker Forum

Jeanette Marvin, NYS Vegetable Growers Association, Inc.

The **2012 Empire State Fruit & Vegetable Expo and Direct Marketing Conference, will be held January 24 - 26** at the On Center in Syracuse. The **2012 Becker Forum will be held January 23** at the Holiday Inn Liverpool – Syracuse. You can view the program, preregister and pay, all online this year at: www.nysvga.org Click on EXPO. (You should receive your printed Expo program in the mail any day.)

2012 sessions will include: Business and Labor Management, Direct Marketing, Flower Production, Potatoes, Tree Fruit, Tomatoes, Peppers & Eggplant, Vine Crops, Cover Crops, Berry Crops, Cabbage and other Cole Crops, Onions, Winter Greens and Storage, Sweet Corn, Processing Vegetables, Specialty Vegetables, Phytophthora Blight, Greenhouse & Tunnels, Trickle Irrigation, New Invasive Insect Pests, Pesticide Safety, Phone Apps for Ag, Food Safety, and educational sessions in Spanish. Reduced tillage speakers are included in crop sessions. 1 DEC pesticide recertification credit will be given for each hour of pest/pest management programming. Details on some of the sessions follows.

The **Soil Health & Cover Crop** session at last year's Expo had a record attendance of nearly 140 growers, consultants, industry reps and Cornell/CCE staff. This year's session, on January 24th, will cover traditional cover crops as well as the newer crucifer cover crops, and how to best manage them. Featured on the program is Paul Salon, USDA-NRCS Big Flats Plant Materials Center. He'll discuss the newest cover crop technique - mixing diverse grasses, legumes and crucifers to maximize soil building and crop yields. Chris Martin, Martin Farms, Brockport, and Joe Brightly, Brightly Farms, Hamlin, will describe their experiences and experimentation with different cover crops, including some innovative planting methods. George Abawi, Cornell, will document the many soil and crop benefits that have occurred with good soil management in his long-term cover crop

and tillage trial. Finally, Thomas Bjorkman, Cornell, will explain how to get the most from your cover crops without risk.

Reduced tillage grower-speakers are on the program in the Processing Vegetable, Sweet Corn, Vine Crops and Cabbage sessions, sharing how they do it and the soil-building and crop benefits they've seen. Donn Branton, Branton Farms, LeRoy, will share his decades of experience with zone and no-till in processing vegetables. Dan Brainard, Michigan State University, brings research results on the benefits of reduced tillage and cover crops in sweet corn. Tim & Nick Stanton, Stanton's Feura Farm, Feura Bush, will describe their success with reduced tillage in vine crops and other vegetables. Casey Kunes, Hemdale Farms, Seneca Castle, will discuss their experiences and what they've learned since expanding reduced tillage to the majority of their transplanted cabbage crop.

The **NYS Flower Industries** joins the Expo for the first time on January 25th and will offer an afternoon of greenhouse topics. The session will include: Cultural tips for growing proven winners by Jessica Boldt, Pleasant View Gardens; Vegetable varieties for bedding plant sales by Bill Russell, Harris Seed; Save time for greenhouse sanitation by Betsy Lamb, NYS IPM Program; New plant varieties and opportunities for 2012 by Don Brown, Griffin; and an Update on peat moss availability and alternatives in transplant production with Neil Mattson, Cornell.

Wondering if you are getting the most bang for your buck from your **Trickle Irrigation** system? In this January 25th session growers will learn how to design a trickle system from expert Rob Rider of OA Newton Irrigation Systems in Bridgeville, DE. Steve Reiners, Cornell, will discuss how to know when you need to irrigate and how to determine when crops have had enough. Bring your pencils to do a little math in this session! Penn State Extension Specialist Steve

Bogash will talk about adding nutrients or 'fertigating' vegetable crops. Growers from across the state will discuss how they use this low input, water saving mode of irrigation to their advantage on their farms.

Join **Berry** growers January 26th for the day long program featuring national expert Barclay Poling, NC State, speaking on strawberry plasticulture systems. This technique is becoming more important as growers raise more day neutral berries. Cornell entomologist Dr. Greg Loeb will describe how to control insects in the longer season day-neutral strawberries. Alan Eaton, U. of NH, and Martin Lowney, USDA Wildlife Service, will share bird management strategies. Growers will share how to use netting effectively in berries. The session will include information on controls for the Brown Marmorated Stink Bug and Spotted Winged Drosophila, two new invasive pests recently found in NY. Marvin Pritts, Courtney Weber and Greg Loeb, Cornell, will talk about the potential of bramble crops in high tunnels.

A special feature of the Berry Day is a **Berry Grower Roundtable**. The topic for this informal discussion is 'Tools that make berry growing easier'. Bring photos, small equipment or any ideas to share with the group. John Shenk, Eco-Weeder, will discuss his equipment.

Be sure to check out the Expo program, with the overview of all the sessions, and the option of preregistering online, at: www.nysvga.org/expo/. For more information, contact the NYS Vegetable Growers at jmarvin@rochester.rr.com or call 315-986-9320.

The 2012 Empire State Fruit & Vegetable Expo is sponsored by the NYS Vegetable Growers Assoc, Empire State Potato Growers, NYS Berry Growers Assoc, NYS Farmers' Direct Marketing Assoc, NYS Horticultural Society, Cornell University and Cornell Cooperative Extension.

(Edited by C. MacNeil, CVP) ■

Upcoming Meetings

Winter Wednesday Vegetable Production Webinars

Presented by the Extension Vegetable and Small Fruit Production Program, Penn State

Dates & topics available:
see description
12:00 noon - 1:00 pm

Dates and topics:

December 7 - Dealing with weather extremes: excess heat and moisture

January 4 - New resources for beginning organic vegetable growers: What you need to know and where to find it

February 29 - Vegetable disease management: What you need to know for 2012

March 14 - New insect pests

To register go to: <http://www.cvent.com/events/winter-wednesday-lunch-series-vegetable-production-webinars/event-summary-5bd38ff53bbf47e7a31275cb16c444f6.aspx>

Growing Cherries: 2011 in Review

Thursday, December 8

9:00 am - 11:00 am

Hector Fire Hall, Rt 414, Hector

Brown rot, spotted winged drosophila and brown marmorated stinkbug covered in detail. DEC credits. \$10/person or \$15/farm. Pre-register 607-687-4020, meh39@cornell.edu.

Upstate NY Potato Advisory and Cornell Potato Breeding Line Show & Tell

Thursday, December 8

9:30 am - 3:00 pm

CCE Ontario County
480 N Main St, Canandaigua

The 30th annual meeting is coming up! Growers, processors, packers, extension, college and state personnel will discuss the concerns, needs and opportunities of the industry. In addition, Walter De Jong, Cornell potato breeder, will host his annual Show & Tell of the most promising potato lines coming along. Weather related closure questions? Contact Carol MacNeil at 585-313-8796. Reservations required **by Monday, December 5th**. Contact Don Halseth at 607-255-5460 or deh3@cornell.edu

Growing & Marketing Ethnic Vegetables

Friday, December 9

9:00 am - 2:30 pm

CCE Ontario County
480 N Main St, Canandaigua

Ethnic vegetables and greens are a fast-growing sector of fresh market crops in the Northeast. Although currently unfamiliar to many Americans, these vegetables are popular among the large and growing immigrant populations of New York State.

Frank Mangan, University of MA, will speak on Latino, Asian and African vegetables and greens. Robert Hadad, Cornell Vegetable Program, will share details on seed sources and local considerations in variety selection. \$20.00 includes lunch. Pre-registration required by December 7th - 585-394-3977 x427 or nea8@cornell.edu

Processing Pea, Beet and Carrot Advisory Meeting

Tuesday, December 13

9:30 am – Coffee and Donuts
10:00 am – Pea, Beet & Carrot Mtg
First United Methodist Church
8221 Lewiston Rd/Rt 63, Batavia

DEC pesticide and CCA credits available. Free, including lunch, and no reservation required. For more info contact: Julie Kikkert at jrk2@cornell.edu or 585-394-3977 x404.

Growers, processors, and ag business reps will discuss the season, hear results from projects funded for 2011, and make priorities for research funding in 2012 by the NYS Vegetable Research Assoc/Council.

Cornell Economic Outlook Conference

Tuesday, December 13

9:00 am - 3:30 pm

Statler Hotel Ballroom, Cornell, Ithaca

National economic outlook, outlook for crops, dairy, fruits & vegetables, and immigration laws, plus Marcellus Shale Development: implication for agriculture. Go to http://dyson.cornell.edu/outreach/ag_outlook_conference.php for registration and program info, or contact Carol Thomson at cmt8@cornell.edu or 607-255-5464.

New England Vegetable & Fruit Conference and Trade Show

Tuesday - Thursday, December 13 - 15
Radisson Hotel, Manchester, NH

For more info contact Jon Clements at 413-478-7219 or go to <http://www.newenglandvfc.org/>

<p>Basic Farm Business Management Planning</p> <p>5 dates and locations, choose the one most convenient for you</p>	<p>Helping your farm business achieve success, \$25. Choose the site, time most convenient for you. Contact Sandy Buxton at 518-380-1498 or sab22@cornell.edu</p> <p>December 14 - CCE-Columbia Co, 479 Ste Rte 66, Hudson, 6:00 – 8:30 pm</p> <p>January 14 - CCE-Washington Co, 411 Lower Main St, Hudson Falls, 9:30 am to noon.</p> <p>February 7 - CCE-Washington Co, 411 Lower Main St, Hudson Falls, 6:00 – 8:30 pm.</p> <p>April 4 - CCE-Albany Co, 24 Martin Rd, Voorheesville, 6:00 – 8:30 pm.</p> <p>May 10 - CCE-Greene Co, Acra, 6:00 – 8:30 pm.</p>
<p>NYS Dry Bean Industry Advisory Committee Meeting</p> <p>Friday, December 16</p> <p>9:30 am - 3:00 pm</p> <p>LeRoy Country Club</p> <p>7759 E Main Rd, LeRoy</p>	<p>Growers, handlers, processors and agribusiness reps will discuss the season, hear results from projects funded for 2011, and set priorities for research funding in 2012 by the NYS Dry Bean Industry Committee. 2.0 DEC, plus CCA credits will be available. <i>Sponsor opportunities are still available!</i> Reservations required by Monday, December 12th. Weather related questions? Contact Carol MacNeil at 585-313-8796 or crm6@cornell.edu.</p>
<p>Managing Crops & Soils for Fewer Pests and Greater Yields</p> <p>Monday, December 19</p> <p>1:00 - 3:00 pm</p> <p>Sam Yoder's Farm, 12041 Northeast Rd, Conewango Valley</p>	<p>Prevention of vegetable diseases with rotations and cover crops; field crop rotations; choosing the right cover crop. DEC credits will be available. Contact Dean Sprague at 716-699-2377 x123 or das57@cornell.edu. Pre-register by Wed, Dec 14th.</p> <p><i>From Conewango Valley:</i> At the intersection of NY83 and US62, go east on US62N for 1.5 mi. Continue straight on NY241 when US62 turns. Northeast Rd is the next left. Go 1.5 mi to Yoder's shop on the left.</p> <p><i>From US86:</i> Take exit 16, go east through Randolph to NY 394E and follow it. Shortly, turn left onto NY241. Go ~6 mi to the stop sign at Seager Hill and turn left, staying on NY241. Shortly, turn right onto Northeast Rd. Go 1.5 mi to Yoder's shop on the left.</p>
<p>Vegetable Growers Association of NJ Convention</p> <p>Tuesday - Wednesday, January 17 - 18</p> <p>Trump Taj Mahal, Atlantic City, NJ</p>	<p>For more info contact Rocco DiGerolamo, Jr. at 857-797-1686 or visit: www.njveggies.org</p>
<p>2012 NOFA-NY Winter Conference: The Cooperative Economy</p> <p>Friday - Sunday, January 20 - 22</p> <p>Saratoga Springs</p>	<p>Key speakers: John Ikerd, Professor Emeritus of Ag Economics, U. of MO, Kathlyn Terry, Appalachian Sustainable Development, and Paul and Maureen Knapp, 2012 NOFA-NY Farmers of the Year. Register online at www.nofanyconference.org or call Katie (Membership & Registration Coordinator) at 585-271-1979 ext. 512.</p>
<p>Empire State Fruit & Vegetable Expo, Direct Marketing Conference and Becker Forum</p> <p>Monday - Thursday, January 23 - 26</p>	<p>OnCenter Convention Center, Syracuse, and Holiday Inn, Syracuse – Liverpool. See the article on page 7 for details on online pre-registration and on some of the sessions.</p>
<p>Ontario Processing Vegetable Industry Conference</p> <p>Tuesday - Wednesday, January 24 - 25</p> <p>London, Ontario</p>	<p>For more information: 519-681-1875 or opvg@opvg.org or visit www.opvg.org</p>
<p>Mid-Atlantic Fruit & Veg Conference</p> <p>January 31 - February 2</p> <p>Hershey, PA</p>	<p>For more info contact William Troxell at 717-694-3596, pvga@pvga.org or visit www.mafvc.org</p>

Pesticide Trainings & Recertification Classes

Pesticide Training & Recertification Classes

Mondays, February 6, 13, 20, 27

7:00 pm - 9:30 pm

(Exam: March 5, 7:00 pm - 11:00 pm)

CCE Ontario County
480 N Main St, Canandaigua

Anyone interested in obtaining pesticide certification and meeting the DEC experience/education requirements, or current applicators seeking pesticide recertification credits should attend. **This is NOT a 30-hour certification course.**

The cost for the pesticide training to obtain a license is \$120.00, includes training manuals and attendance at all four classes. **This does not include the \$100.00 DEC exam fee, due the day of the exam payable by check.** Certified applicators, private and commercial, seeking recertification credits will receive 2.5 core credits per class. The cost for recertification is \$70.00 for all four classes or \$20.00 per class. To receive registration materials contact CCE Ontario County at (585) 394-3977 x427 or x436, nea8@cornell.edu or rw43@cornell.edu. The registration form is available on-line at www.cceontario.org

Pesticide Recertification Day

Thursday, March 15

The Century House
997 New Loudon Rd/Rt 9, Latham

Pesticide use, safety, pest management, up to 6 DEC credits. Morning - core credits; afternoon - category specific credits for 3a, 1a, 7a and private categories.

Registration required. Contact Chuck Schmitt at 518-765-3513 or [cgs34@cornell.edu](mailto:cds34@cornell.edu)

Cleaning Pesticide Application Equipment at the End of the Season

Andrew Landers, Cornell

This procedure should also be followed whenever the pesticide type is changed and before sprayer maintenance. **Reminder:** Remember to wear the personal protective equipment (PPE) listed on the pesticide label.

1. Be sure that all mixed pesticides have been used up from the sprayer or removed and disposed of properly.
2. Flush sprayer with clean water, making sure to wash all inside surfaces of the tank, including the underside of the lid. Use of a tank rinse system is preferred so that rinsing can be done in the field where the rinse water can be applied to the crop. If a tank rinse system is not available, fill the spray tank about half full with clean water and flush the system for at least 5 minutes using both agitation and spraying. Be sure to open and close any control valves during the rinse process. The rinsate should be applied to the crop at labeled rates. Repeat this procedure two more times.
3. Hose down the outside of the sprayer making sure to reach all parts, scrubbing if necessary.
4. Remove suction, main and in-line fil-

ter elements and wash them thoroughly in clean water using a soft bristle brush. Put the filters back on the sprayer when clean.

5. Remove the nozzles, nozzle screens and nozzle bar end caps (if used) and wash them thoroughly in clean water with the appropriate cleanser and rinse. Remember to use a soft bristle brush, such as an old toothbrush, when cleaning nozzle parts.
6. Partly fill the sprayer with clean water and run the sprayer to flush out all parts.
7. Refill the tank with clean water, adding any detergent recommended by the pesticide manufacturer. Remember, use commercial cleansers according to their directions. Agitate the solution and pump it through the sprayer plumbing system.
8. Discharge the cleaning solution from the sprayer through the sprayer plumbing system, making sure to drain the system as thoroughly as possible.
9. Rinse the sprayer and flush the plumbing system with clean water.
10. Inspect the sprayer for deposits that

may remain in the tank or plumbing system. If any remain, use some of the cleaning solution and scrub the problem spots. Rinse the sprayer out completely.

11. Repeat steps 7 to 9.
12. Hose down the outside of the tractor and sprayer, scrubbing if necessary.
13. If changing from one type of pesticide to another, refit nozzles, filters and other parts that may have been removed in the cleaning process.
14. When cleaning and preparing the sprayer at the end of the season, safely store nozzles and filters to keep them clean and damage-free. Leave valves open and the tank lid loosely closed.

For more on sprayers and spraying pesticides go to Andrew Lander's Cornell Pesticide Application Technology website at: <http://web.entomology.cornell.edu/landers/pestapp/> Click on In-field Cleaning of Sprayers for photos, research results regarding effectiveness of cleaning agents, applicator/cleaner safety regarding pesticide residues on equipment. ■

New Seed Treatments for Onion Maggot: What Onion Growers Need to Know

Christy Hoepting, CCE Cornell Vegetable Program, and Brian Nault, Dept of Entomology, NYSAES

Finally! We have options!

Believe it or not, I have worked on control of onion maggot via seed treatments for the past 15 years. In fact, my Master's Degree involved management of onion maggot. And, I am absolutely thrilled that New York onion growers FINALLY have not one, but TWO new seed treatment options for control of onion maggot. Sepresto® was first introduced for the 2011 growing season, but is available only on Nunhem's onion varieties. Also available for the 2012 growing season on all onion varieties is Farmore® FI500. Both of these insecticide seed treatments are only available in packages that also include fungicides. Altogether, NY onion growers now have FIVE insecticides (counting diazinon), labeled for onion maggot control (Table 1). Of these, 3 are seed treatments; decisions for which one to use must be made when seed orders are placed. In making these decisions, it is important to know the relative effectiveness of the insecticides, what diseases the fungicides in the seed treatment packages control and how to extend the useful life of these precious new insecticides. The information that follows addresses these questions and should assist you in making a decision on how to control maggots as well as early season seedling diseases.

The new seed treatments on the scene

Sepresto® has a novel mode of action compared to Lorsban and Trigard and is a combination of two neonicotinoids with a 3:1 ratio of clothianidin (same active as Poncho) and imidacloprid (same active as Gaucho and Admire). It also controls seedcorn maggots, which can also kill onion seedlings if left unprotected. Sepresto is available exclusively on Nunhem's onion varieties such as Hendrix and Pulsar, and only as part of a seed treatment package, "CAPS". The "C" is for Coronet, "A" is for Allegiance, "P" is for Pro Gro and "S" is for Sepresto. Diseases controlled by these fungicides are discussed later in this article.

Table 1. Insecticide roster for control of onion maggot in onion in New York, 2012.

Trade Name	Company	Active Ingredient for OM	Chemical Class (IRAC ² group)	Application
Diazinon AG500 Diazinon 50WP Etc.	Makhteshim	diazinon	OP (1)	Pre-plant broadcast & incorporate
Lorsban 4E, 75WG, Advanced and OLF ¹	Dow AgroSciences (Lorsban), other companies for OLF	chlorpyrifos	OP (1)	At planting in-furrow, Post-planting banded spray over row
Trigard	Syngenta	cyromazine	triazine (17)	Seed treatment
Sepresto	Bayer Crop Sciences	clothianidin + (imidacloprid)	neonicotinoid (4) + neonicotinoid (4)	Seed treatment
Farmore FI500	Syngenta	spinosad + (thiamethoxam)	spinosyn (5) + neonicotinoid (4)	Seed treatment

¹OLF: other labeled formulation such as Warhawk. ²IRAC: Insecticide Resistance Action Committee

Farmore® FI500: Syngenta's Farmore Technology has been around for a few years now: Farmore F300 consists of 3 fungicides including mefenoxam, fludioxonil and azoxystrobin that make up a seed treatment package for control of mostly soil-borne pathogens and is labeled on several crops. A couple of years ago, Syngenta launched Farmore FI400, which includes the insecticide thiamethoxam (same active as Cruiser, Platinum and Actara), and is labeled on cucurbits, leafy Brassicas and carrots, predominantly for control of beetles and aphids. Farmore FI500 is essentially FI400 with the addition of spinosad for control of onion maggot and seedcorn maggots and it is only labeled on onions, but on all varieties. Spinosad represents yet another different chemical class for managing onion maggot in NY.

How do the new seed treatments rate?

In Table 2, the relative performance of several insecticides that were evaluated for onion maggot control on muck in NY is summarized. Clearly, the active ingredient, fipronil has been an outstanding performer for onion maggot control. Unfortunately, after more than a decade of outstanding results, we had to give up the dream of this active ever seeing the light of day as a registered product on onion as all of its agricultural uses were discontinued a couple of years ago.

It is very exciting that the newly registered Sepresto has performed neck and neck with the industry standard, Trigard + Lorsban (in-furrow). Thus, **when using Sepresto seed treatment, it does not need to be accompanied with an application of Lorsban** in order to achieve excellent control of onion maggot. Unfortunately, this option is only available on Nunhem's onion varieties.

Although far from a robust database, the newly registered Farmore FI500 provided an average of 81% control of onion maggot. This trial was conducted under very high onion maggot pressure and under such conditions, Farmore FI500 performed neck and neck with Trigard and slightly better than Sepresto. We do have a lot of trial experience with the spinosad component of Farmore FI500, which

Continued on page 12

has consistently provided excellent control of onion maggot (88%) and we expect this to be an excellent seed treatment for control of onion maggot. Research is planned for 2012 to help determine the need for Lorsban with Farmore FI500.

Interestingly, one of the neonicotinoid components of Sepresto (specifically, imidacloprid) and one in Farmore FI500 (specifically, thiamethoxam) provided very poor control of onion maggot in NY studies. In fact, clothianidin and spinosad are the active ingredients doing all the work in Sepresto and Farmore FI500, respectively. In other onion growing regions where onion thrips is a problem earlier in the season than they are in NY, these systemic components might provide some protection against onion thrips, but that is NOT the case in NY. All registered seed treatments provided better control of onion maggot than Lorsban alone. It is important to note that resistance to Lorsban and Trigard had occurred at several of the trial locations, which brought the averages down. However, with implemented resistance management strategies at these sites that involved rotating away from Trigard, Trigard provided excellent control of onion maggot in the last two years of trials. Trigard is the only insecticide labeled for onion maggot that does not also control seedcorn maggots; where this pest is a concern Lorsban should be used in-furrow with Trigard seed treatment.

Precautions for resistance management

Onion maggot is notorious for developing resistance to insecticides, first to organochlorines, then to carbamates and organophosphates (OPs), including Lorsban and probably also to Trigard (resistance never confirmed, but effectiveness noticeably declined in many fields). Onion maggot can develop resistance to an insecticide within 4-5 years of continuous exposure. Because onions may be grown in the same field or adjacent field year after year, local populations of onion maggot get exposed to the same insecticide year after year. Once resistance to a chemical class has developed in an onion maggot popula-

Table 2. Relative efficacy of seed treatments evaluated (not all labeled) for control of onion maggot, listed in order of best to worst performance: B. Nault *et al.* (Cornell University) 2004 to 2009.

Rank	Insecticide (a.i)	No. of Trials	Ave. OM Control	Comments
1	Regent*/Mundial ST¹* (fipronil)	12	94%	Provided significantly better control than Trigard 38.5% of the time
2	Trigard ST + Lorsban IF¹ (cyromazine + chlorpyrifos)	11	90%	Provided significantly better control than Trigard alone 36% of the time
3	Poncho*/Sepresto ST (clothianidin ± imidacloprid)	13	90%	
4	Entrust*/Regard ST* (spinosad)	17	88%	
5	Farmore FI500 (spinosad + thiamethoxam)	1 ²	81%	Trial conducted under very high pressure. Trigard provided 80% and Sepresto 74% control in this trial
6	Avicta ST* (abamectin)	4	81%	Also controls nematodes
7	Trigard ST (cyromazine)	15	80%	Did not provide significant control over untreated 6% of the time
8	Lorsban IF (chlorpyrifos)	14	68%	Did not provide significant control over untreated 14% of the time
9	Gauche* (imidacloprid)	1	31%	Did not provide control of onion thrips in NY
10	Cruiser* (thiamethoxam)	1	20.6%	Did not provide control of onion thrips in NY

¹ ST: seed treatment; IF: in-furrow treatment. ² trial conducted by C. Hoepting, 2010.

* not labeled for use on onion.

tion, the population can become controllable again after eliminating exposure for a few years, but, resistance and difficulty in controlling the infestation will occur faster with resumed continuous exposure. Because onions are a minor use crop and onion maggot is mostly a problem in New York, Michigan and Wisconsin within the United States, there is not a lot of interest from chemical companies to pursue the registration of insecticides for onion maggot control. Consequently, it is essential to preserve the useful life of Sepresto and Farmore FI500. The best way to ensure this happens is to follow a resistance management strategy.

First, individual growers should rotate among chemical classes on all of their acreage every year. Unfortunately, Sepresto is only available on Nunhem's varieties, so unless a grower has exclusively Nunhem's varieties, it will be impossible to have his entire acreage treated with Sepresto. In this case, it is recommended to rotate the ground from year to year that is cropped to Nunhem's varieties treated with Sepresto. Better yet, use Sepresto every other year. Second, do not use Lorsban in-furrow in combination with Sepresto seed treatment. A practical rotation sequence to cautiously bring in new chemistries follows on the next page.

For large onion growing regions like Elba and Orange County where several growers' acreage is intermingled, it would be ideal if all growers followed the same rotation strategy (such as the one outlined on the next page), so that the onion maggot population in the region is not exposed to all chemical classes every year. Implementing such a regional management strategy would require a lot of grower cooperation. If this is simply not possible, rotating chemical classes on individual fields, even if out of synchrony with the neighboring field will still go a long way towards preserving the useful life of our new (and old) chemistries. Onion maggot flies do not move great distances, so any level of chemical rotation should be beneficial.

The Onion Maggot Plan

- Trigard (+ Lorsban in-furrow if you have seed maggots) on majority of acreage
- Continue to experiment with Sepresto on Nunhem's varieties
- Experiment with Farmore FI500 on whatever acreage you feel comfortable, we encourage trialing at least a portion without the addition of Lorsban in-furrow

- Trigard (+ Lorsban in-furrow if you have seed maggots) on all varieties

2012

- Sepresto on Nunhem's varieties rotated to different ground than previous year (ideally the ground that had Farmore FI500 in 2012)
- Farmore FI500 on all remaining varieties (verdict will be in on need for Lorsban accompaniment)

2013

2014

2015

- Sepresto on Nunhem's varieties
- Farmore FI500 on all other varieties

REMINDER: Add Pro Gro for onion smut to Trigard and Farmore FI500; Use mancozeb in-furrow with all 3 seed treatments for smut!

Regarding fungicides in seed treatment packages – make sure you have onion smut protection!

Direct seeded onions cannot be grown in muck soils where onions have been grown for decades without fungicide treatments for control of onion smut due to the high buildup of this very persistent pathogen. Treatment to combat this disease includes Pro Gro seed treatment plus mancozeb in-furrow. Fortunately, Nunhem's Sepresto seed treatment package (CAPS) includes Pro Gro for control of onion smut. Despite containing three fungicides, Farmore FI500 does not provide control of onion smut, so Pro Gro still needs to be added to this seed treatment, as it would to Trigard. Application of mancozeb in-furrow is still recommended in addition to both of these seed treatments for adequate onion smut control.

Pro Gro provides decent control of damping off pathogens caused by *Pythium* spp. Additional protection against *Pythium* spp. is provided by Allegiance in the Nunhem's seed treatment package. In Farmore FI500, Apron and Maxim provide control of damping off pathogens caused by *Pythium* spp. and *Rhizoctonia solani*, respectively. In addition, Maxim provides some protection against *Fusarium* spp., which can especially be problematic in some red onion varieties.

In the Nunhem's seed treatment package, Coronet is unique in providing control of *Botrytis allii* and *Aspergillus* spp., which are both seed-borne fungi that cause losses from neck rot and black mold, respectively, especially in storage. If Nunhem's varieties are grown from bare root transplants, it is recommended that the seed be treated with Coronet (via CAPS), because bare root onion transplants can become infected with *B. allii* during transplant production in Arizona. ■

Table 3. Summary of fungicide packages included in Nunhem's varieties and Farmore FI500.

Trade Name	Active Ingredient	FRAC ³ group	Disease Controlled		
			Onion Smut	Damping Off	Other
Nunhem's CAPS seed treatment package:					
Coronet ¹ (BASF)	Pyraclostrobin + boscalid	11 7	No	Yes – <i>Rhizoctonia solani</i>	<i>Botrytis allii</i> <i>Aspergillis spp.</i> <i>Penicillium spp.</i>
Allegiance (Bayer)	Metalaxyl ²	4	No	Yes – <i>Pythium spp.</i>	<i>Fusarium spp.</i>
Pro Gro (Chemtura)	Thiram + carboxin	M3 7	~ 44% control ⁴	Yes – <i>Pythium spp.</i>	<i>Botrytis allii</i> <i>Penicillium spp.</i>
Sepresto (Bayer)	Clothianidin + imidacloprid	insecticides	For onion maggot control (~90% control)		
Farmore FI500 (all Syngenta materials):					
Apron	Mefanoxam	4	No	Yes – <i>Pythium spp.</i>	
Maxim	Fludioxonil	12	No	Yes – <i>Rhizoctonia solani</i>	<i>Fusarium spp.</i>
Quadris	Azoxystrobin	11	No	No	
Regard	Spinosad	Insecticide	No	For onion maggot control	
Cruiser	Thiamethoxam	insecticide	No	Does not control onion maggot	

¹ same actives as Pristine. ² metalaxyl = mefanoxam (Apron). ³ FRAC: Fungicide resistance action committee. ⁴ for 80%+ control of onion smut, include mancozeb in-furrow with Pro Gro treated seed.

Correction: NY Onion Production

Carol MacNeil, CCE Cornell Vegetable Program

The NY onion statistics reported in the November *Veg Edge*, from the National Agricultural Statistics Service, New York Office, www.nass.usda.gov/ny did not reflect the losses in Eastern New York from Hurricane Irene or Tropical Storm

Lee. In that report the NY onion crop for 2011 was forecast at 2.95 million hundredweight (cwt), down 4% from last year. Harvested acreage was estimated at 8,200 acres, down 16% from last year's acreage of 9,800. Yields were ex-

pected to average 360 cwt. per acre, up from 315 last year. However, the excessive rains of the two storms resulted in the loss of about 50% of Orange County's crop. ■

Late Blight on Tomatoes & Potatoes in Eastern USA in 2011

W. Fry, K. Myers, G. Danies, I. Small, Plant Pathology, Cornell

As part of an Agriculture and Food Research Initiative (AFRI), USDA, grant involving more than 20 collaborators from throughout the US, our lab had received in 2011 more than 80 suspected late blight (LB) samples by September, 19th. At least 79 were positive for LB. We received samples from CT, DE, FL, ME, MN, NH, ND, PA, RI, VA and WI. Our major focus was to determine genotype (using microsatellite markers for LB strain), and convey information on the LB strain as rapidly as possible to extension personnel who submitted the sample. Microsatellite analysis can be done on infected tissue or on sporangia from lesions, so data can be obtained without culturing the pathogen. In many cases, information was returned to the submitter within 24-48 hr of receipt of the sample. The data were uploaded to a national website that reported these various occurrences of LB.

Preliminary analyses to date (19 September) indicate that the genotypes of *Phytophthora infestans* strains in at least 70 of these samples corresponded to those that had been detected in previous years. These lineages were:

US8 - A2 mating type, resistant to the fungicide mefenoxam, not aggressive on tomato, very pathogenic to potato, one sample

US11 - A1 mating type, resistant to mefenoxam, aggressive to tomato and potato, one sample

US22 - A2 mating type, sensitive to mefenoxam, aggressive on tomatoes, but also pathogenic on potato, 15 samples

US23 - A1 mating type, sensitive to mefenoxam, aggressive on both tomatoes and potatoes, 39 samples

US24 - A1 mating type, sensitive to mefenoxam, aggressive mainly on potatoes, 14 samples

There were at least seven samples containing genotypes that we had not previously seen. We are currently investigating their mating types, sensitivities to mefenoxam, host preference and relative aggressiveness. We are also investigating their relatedness to other strains.

Phenotypic analyses (the course of disease development, etc.) were conducted in the lab on isolates from the US8, US22, US23 and US24 clonal lineages collected in 2010. Isolates from the US8 and US24 clonal lineages had been obtained almost exclusively from potatoes. We found that sporulation on tomatoes was typically only about 10% that of sporulation on potatoes for each of these two lineages. Thus, it seems that neither US8 nor US24 is likely to cause a sustained epidemic on tomatoes. US8 and US23 appeared to sporulate about equivalently on potato, and more abundantly than did US22 or US24, so US8 and US23 may be the most aggressive potato pathogens. In contrast, US22 and US23 were aggressive to both potato and tomato. Using lesion growth rate and sporulation as criteria, US23 appeared to be somewhat more aggressive on both potato and tomato than was US22.

This project was supported by the Agriculture and Food Research Initiative Competitive Grants Program 2011-68004-30104 from the USDA National Institute of Food and Agriculture.

(From the Fall 2011 Potato News, Empire State Potato Growers, Inc) ■



**LOCAL FARMS,
LOCAL FOOD.**

Farm Bureau® is driving customers to farm stands. Why not yours?

With publicity and advertising, Farm Bureau drives customers to your retail market or farm stand for fresh produce and a modest "members only" discount.

Join the 145 farms and wineries already participating. MemberSupport@nyfb.org

**FARM BUREAU
NEW YORK**

Wet Weather During Northern Potato Harvest

Vegetables and Melons Outlook/VGS-347/October 27, 2011, Economic Research Service, USDA

Wet weather interrupted the fall potato harvest this year for many growers from the upper Midwest to the Northeast. Soggy fields may cause growers to abandon more acreage than normal, and there may be more problems with potatoes deteriorating in storage. Given the wet, cool spring weather across northern States that delayed planting and crop development, yields will likely be below trend in many areas. Favorable weather in Washington and Idaho over the last few months allowed late season varieties to bulk up and harvest to progress unimpeded. However, early harvest of some processing potatoes (with growers sacrificing yields to fulfill contract obligations) may impact the average yields for both States. Despite a 6% increase in planted area, with acreage abandonment higher than anticipated and yields below the 5-year average, the 2011 fall potato crop could hover around 380 million hundredweight (cwt), 4% above a year earlier.

In North Dakota, despite a slow start to the harvest, by October 9 growers had almost caught up to the 5-year average of 84% of potatoes harvested. In Wisconsin, potato harvesting was finishing up in mid-October with reports of average yields and good quality. In Maine,


farmers had problems with spring and fall rains that may limit the amount and quality of the potatoes they are able to harvest.

As harvest progresses, grower prices traditionally decline seasonally in September and bottom out in October. Preliminary September all-potato grower price is 29% higher than a year earlier and 30% above the monthly average for 2006-10. Prices could drop in coming months if growers sell potatoes that are unlikely to hold up in storage. If quality and storage issues develop, the season average price for 2011/12 could remain above historical levels. The average US grower price for fresh (tablestock) potatoes reached a marketing year high of \$23.05 per cwt in August, \$9.78 per cwt above a year earlier.

As demonstrated in the summers of 2008 and 2011, when fresh potatoes are short—for example, when potatoes are shipped to processing plants to fulfill contract terms—prices in the fresh market can rise rather quickly. In August, the average grower price for U.S. processing potatoes was \$7.24 per cwt, down \$1.17 per cwt from May's marketing year high. Industry sources report that chip plants are already using potatoes from storage and supplies will be tight until produc-




tion is available from winter growing regions. Fryers are looking to lock up supplies for the coming marketing year. According to USDA Agricultural Marketing Service's Market News, potato processors were buying potatoes from growers on the open market during the last week of September. Open market prices paid to growers (field-run, bulk and less dirt, rot, and green tare, f.o.b. [free on board]) for french-fry quality russet Burbank potatoes were \$2.50 per cwt over field-delivery contract (expected to return the grower between \$9 and \$10 per cwt) with a few purchases \$2 per cwt over field delivery contract (expected to return the grower \$8-\$8.60 per cwt).

For the complete report go to: <http://www.ers.usda.gov/Publications/VGS/2011/10Oct/VGS347.pdf> ■



Bejo Seeds: Proud supporter of the NYS Vegetable Industry, present, past and future.

Bejo offers a full line of high-quality vegetable seed, including a strong assortment of organically-produced seed. Ask us about our new blackrot resistant cabbage varieties!



Bejo Seeds, Inc.
1088 Healey Road, Geneva, New York 14456
315-789-4155 www.bejoseeds.com

Northeast Sales: Jan van der Heide
j.vanderheide@bejoseeds.com
805-689-1783 - cell

GROWING
green
has never been easier



RootShield®* Biological Fungicide

CEASE®* Microbial Fungicide/Bactericide

MilStop®* Foliar Fungicide

NemaShield® Beneficial Nematodes

BotaniGard® Mycoinsecticide

Mycotrol O®* Mycoinsecticide

SuffOil-X®* Insecticide/Miticide/Fungicide

Molt-X®* Botanical Insecticide/Nematicide

* OMRI Listed Products



BioWorks®
How You Grow Matters™
RESPONSIBLE :: ECONOMICAL :: PROVEN

www.bioworksinc.com
1.800.877.9443
Victor, NY

Ordering Potato Seed - Ensuring the Highest Standards

Sandy Menasha, CCE – Suffolk Co.

(Don't forget the December 8th Potato Advisory Meeting and Cornell Potato Breeding Line Show & Tell! See page 8 for details. C. MacNeil, CCE, CVP)

Seed potato fields in many areas of NYS and the Northeast were affected by the excessive rainfall and flooding in 2011, resulting in both seed supply and quality concerns for the 2012 planting season. Growers are thus encouraged to order potato seed as soon as possible to make sure the varieties they want are available; don't wait until the last minute to place your order. Growers are also encouraged to buy certified potato seed to ensure they are receiving and planting the highest quality seed. In order for seed to be sold as certified, seed potatoes must meet the minimum requirements described in the standards for seed potato certification (1NYCRR Parts 106 and 107) which include: Use of pretested and approved seed stocks.

- A minimum of 2 field inspections.
- A bin inspection of tubers after harvest.
- A winter test.
- A Federal-State shipping point inspection to ensure conformity with New York certified seed grades.

Only seed meeting all of the requirements listed above and bearing official tags (bags and totes) or certificates (bulk loads) issued by the certification agency may be represented for sale as "Certified" seed. *Note: certified seed is not disease free but does not exceed the tolerances set forth by the agency based on visual inspections.* When ordering seed be sure to ask your seed growers if they can supply you with certification tags or certificates to guarantee you will be receiving certified, high quality seed potatoes. If you are purchasing/receiving non-certified seed, be sure to cut open some tubers before you accept the load as there is no legal guarantee on the

level of disease present. Also, for a fee, a NYS Ag and Markets inspector can be hired to inspect seed loads upon delivery.

NYS Dept. of Agriculture & Markets Inspectors:

Albany – 518-457-2090

Rochester – 585-427-0200


Syracuse – 315-487-0852

Both the New York and the Maine 2011 Certified Seed Potato Crop Directories are out and available free of charge:

New York 2011 Certified Seed Potato Crop Directory: If you haven't received a copy call 607-255-9869, or write the New York Seed Improvement Project, 103C Leland Lab, Cornell University, Ithaca, NY 14853.

Maine 2011 Certified Seed Potato Crop Directory: Call 207-764-2036, check on the web at www.maine.gov/agriculture/pi/potato/index.htm, or by write to the Dept. of Agriculture, Food & Rural Resources, Division of Plant Industry, 744 Main Street, Suite 9, Presque Isle, ME 04769.

(From the Long Island Fruit & Vegetable Update, November, edited by C. MacNeil, CCE – CVP) ■



Crop Production Services

Fancher 585.589.6330 Avon 585.226.2700
Cohocton 585.384.5221 Sodus 315.483.9146
www.cropproductionservices.com



Order online at
Johnnyseeds.com

Winslow, Maine U.S.A.



To stay on the cutting edge with new specialty items contact Di Cody.

1-800-854-2580, Ext. 5306

- Award-Winning Development
- Innovative Products
- On-site Customer Support



Filling Your Crop Needs



Elba Muck: Doug Rathke 716.474.0500 cell; 585.757.6642	Knowlesville: Kirk Zinkievich 585.798.3350
Batavia: Mike Hammond 585.343.4622	Gainesville: Larry Dumbleton 585.322.7273
Caledonia: Dale Bartholomew 585.538.6836	Agronomist: Don Jones 585.734.2152



Chemicals, fertilizer, seed, custom application, airflow spreading & seeding

Siegers...more than seed

Solutions

Dominator & Impact

Blake Myers
(585) 303-3252
vegetableseeds@aol.com

SERVICE • SELECTION • SOLUTIONS
1-800-962-4999 • www.siegers.com

North American Certified Seed Potato Health Certificate

Carol MacNeil, CCE Cornell Vegetable Program

To ensure that you know the full history of the seed lot that you're purchasing, and the disease history of the farm you're buying from, be sure to ask for a copy of the North American Certified Seed Potato Health Certificate. The certificate includes results of the field, harvest and lab inspections regarding seed

borne potato diseases, including late blight. You can see a copy of this certificate at the Potato Association of America website at:

<http://potatoassociation.org/Industry%20Outreach/seed.html> Click on North American Seed Health Certificate under Seed Certification. ■



United States Standards for Seed Potatoes

USDA Agricultural Marketing Service, Reprinted - January 1997

(For the complete grade standards go to: <http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5050320>)

§51.3001 Grade.

"U.S. No. 1 Seed Potatoes" consist of unwashed potatoes identified as certified seed by the state of origin by blue tags fixed to the containers or official State or Federal State certificates accompanying bulk loads, which identify the variety, size, class, crop year, and grower or shipper of the potatoes, and the State certification agency. These potatoes must meet the following requirements:

- (a) Fairly well shaped.
- (b) Free* from:
 - (1) Freezing injury;
 - (2) Blackheart;
 - (3) Late Blight Tuber Rot;
 - (4) Nematode or Tuber Moth injury;
 - (5) Bacterial Ring Rot;
 - (6) Soft rot or wet breakdown; and
 - (7) Fresh cuts or fresh broken-off second growth.
- (c) Free from serious damage caused by:
 - (1) Hollow Heart; and,
 - (2) Vascular ring discoloration.
- (d) Free from damage by soil and any other cause.

§51.3002 Tolerances.


In order to allow for variations incident to proper grading and handling in the foregoing grade, the following tolerances, by weight, are provided.

(a) For defects:

- (1) 10 percent for potatoes in any lot which are seriously damaged by hollow heart;
- (2) 10 percent for potatoes in any lot which are damaged by soil;
- (3) 5 percent for potatoes in any lot which are seriously damaged by vascular ring discoloration;
- (4) 11 percent for potatoes which fail to meet the remaining requirements of the grade including therein not more than 6 percent for external defects and not more than 5 percent for internal defects: Provided, that included in these tolerances not more than the following percentages shall be allowed for the defects listed:

* Percent

Bacterial Ring Rot	0.00
Serious damage by dry or moist type Fusarium Tuber Rot	2.00
Late Blight Tuber Rot	1.00
Nematode or Tuber Moth injury	0.00
Varietal mixture	0.25
Frozen, soft rot or wet breakdown	0.50



STOKES®

SEEDS

Contact
George Dobson
for the highest in
quality seed and service

585-734-7214
1-800-263-7233
www.stokeseeds.com

Contact the Cornell Vegetable Program

Cornell Vegetable Program (CVP) Specialists



Robert Hadad
Extension Specialist
Food safety; Western region fresh market vegetables; marketing; organic

Phone: (716) 433-8839 x228
Cell: (585) 739-4065
Email: rgh26@cornell.edu



Julie Kikkert*
Extension Specialist
Processing crops: sweet corn, snap beans, peas, beets and carrots

Phone: (585) 394-3977 x404
Cell: (585) 313-8160
Email: jrk2@cornell.edu



Judson Reid
Extension Specialist
Greenhouse production; small farming operations; Eastern region fresh market vegetables

Phone: (315) 536-5123
Cell: (585) 313-8912
Email: jer11@cornell.edu



Christy Hoepting
Extension Specialist
Onions, cabbage, field research and pesticide training

Phone: (585) 798-4265 x38
Cell: (585) 721-6953
Email: cah59@cornell.edu



Carol MacNeil
Extension Specialist
Potatoes, dry beans and soil health; Editor of Veg Edge

Phone: (585) 394-3977 x406
Cell: (585) 313-8796
Email: crm6@cornell.edu

John Gibbons, Field Technician
Phone: (585) 394-3977 x405
Email: jpg10@cornell.edu

Katie Klotzbach, Field Technician
Phone: (585) 798-4265
Email: kep39@cornell.edu

Visit our website at
<http://cvp.cce.cornell.edu>

CVP Administration

Mark Giles*, Regional Ag Team Leader
Cornell University
Phone: (607) 255-6619
Email: fmg4@cornell.edu

Angela Parr, Administrative Assistant
Veg Edge, Enrollment, & Sponsorships
Phone: (585) 394-3977 x426
Email: aep63@cornell.edu

Steve Reiners*, Co-Team Leader
Cornell University
Phone: (315) 787-2311
Email: sr43@cornell.edu

** Member of the Cornell Vegetable Program Administrative Management Team*

Cornell Cooperative Extension Offices of the CVP

Allegany County CCE
Belmont, NY
Phone: (585) 268-7644

Cattaraugus County CCE
Ellicottville, NY
Phone: (716) 699-2377

Erie County CCE
East Aurora, NY
Phone: (716) 652-5400

Genesee County CCE
Batavia, NY
Phone: (585) 343-3040

Monroe County CCE
Rochester, NY
Phone: (585) 461-1000

Niagara County CCE
Lockport, NY
Phone: (716) 433-8839

Onondaga County CCE
Syracuse, NY
Phone: (315) 424-9485

Ontario County CCE
Canandaigua, NY
Phone: (585) 394-3977

Orleans County CCE
Albion, NY
Phone: (585) 798-4265

Seneca County CCE
Waterloo, NY
Phone: (315) 539-9251

Wayne County CCE
Newark, NY
Phone: (315) 331-8415

Yates County CCE
Penn Yan, NY
Phone: (315) 536-5123

CVP Region Berry Program

Deborah Breth, Lake Ontario Fruit Program Team Leader
Monroe, Niagara, Onondaga, Orleans, Oswego & Wayne Co.
Phone: (585) 798-4265 x36
Email: dib1@cornell.edu
Website: <http://lof.cce.cornell.edu>

Cathy Heidenreich, Berry Extension Support Specialist
Allegany/Cattaraugus, Erie, Genesee, Ontario, Seneca & Yates Co.
Phone: (315) 787-2367
Email: mcm4@cornell.edu
Website: www.fruit.cornell.edu/berry.html

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
Phone: (607) 255-6619
Email: fmg4@cornell.edu

Steve Reiners, Co-Team Leader
Cornell University
Phone: (315) 787-2311
Email: sr43@cornell.edu

County CCE Offices

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
Washington: George Armstrong and Rich
Moses
Warren: Kim Feeney
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...

Dec 7, Jan 4, Feb 29, and Mar 14 - Winter Wednesday Vegetable Production Webinars, *see page 8.*

December 8 - Upstate NY Potato Advisory and Cornell Potato Breeding Line Show & Tell, *see page 8.*

December 8 - Growing Cherries: 2011 in Review *see page 8.*

December 9 - Growing & Marketing Ethnic Vegetables *see page 8.*

December 13 - Pea, Beet and Carrot Advisory Meeting *see page 8.*

December 13 - Cornell Economic Outlook Conference *see page 8.*

December 13-15 - New England Vegetable & Fruit Conference and Trade Show, *see page 8.*

December 14, Jan 14, Feb 7, April 4, or May 10 - Basic Farm Business Management Planning, *see page 9.*

December 16 - NYS Dry Bean Industry Advisory Committee Meeting, *see page 9.*

December 19 - Managing Crops & Soils for Fewer Pests and Greater Yields, *see page 9.*

January 4-5, February 15-16, March 14-15, or March 28-29 - GAPs Food Safety Workshops, *see page 3.*

January 17-18 - Veg Growers Assoc of NJ Convention *see page 9.*

January 20-22 - 2012 NOFA-NY Winter Conference *see page 9.*

January 24-26 - Empire State Fruit and Vegetable Expo, Farmers' Direct Marketing Conference & Becker Forum, *see front cover.*

January 24-25 - Ontario Processing Vegetable Industry Conference, *see page 9.*

January 31-February 2 - Mid-Atlantic Fruit & Vegetable Conference, *see page 9.*

February 6, 13, 20, 27 - Pesticide Training & Recertification Classes, *see page 10.*

March 15 - Pesticide Recertification Day, *see page 9.*

Thank You to Our Sponsors

See their full advertisements on the pages listed

- **AgraQuest** - page 3
- **Bejo Seeds Inc** - page 15
- **BioWorks Inc** - page 15
- **Crop Production Services** - page 16
- **DuPont Crop Protection** - page 6
- **Growmark FS** - page 16

- **Harris Seeds** - page 5
- **Helena Chemical Company** - page 5
- **Johnny's Selected Seeds** - page 16
- **NY Farm Bureau** - page 14
- **Siegers Seed Company** - page 16
- **Stokes Seeds** - page 17