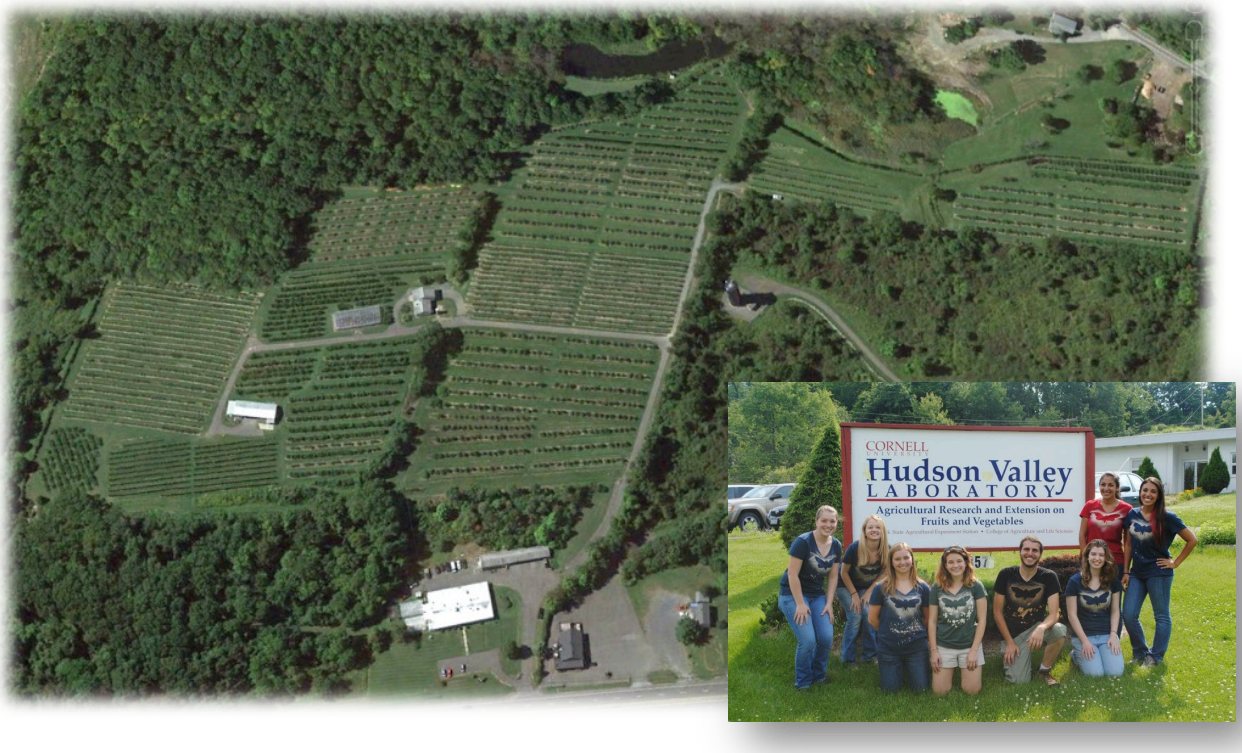
Summary of Research and Extension Activities at Hudson Valley Research Laboratory for 2013 – 2015

Dave Rosenberger, Plant Pathologist (Retired)
Gemma Reig Cordoba, Horticulturist
Peter Jentsch, Entomologist
Albert Woelfersheim, Facilities Coordinator
Dan Donahue, ENY Horticulture Team Tree Fruit Specialist
With contributions from Ulster County Extension Educators
Teresa Rusinek, Jim O'Connell



Highland, NY
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(V.1)

Contents

Support Staff, 2013-2015

Without the focused efforts of those listed below, very little would have been accomplished!
Without the diversity and humor they brought to the lab, life would have been dull!

Albert Woelfersheim	Facilities Coordinator, 1992 to present
Donna Clark	Administrative Assistant, 1984 to present
Henry Grimsland	Part-time Research Assistant, Entomology, 2010-2015
Jeffry DiMetro,	Seasonal Field Worker, 2009-2015
Tim Lampasona	Research Technician, Entomology, 2012 to present
Anne Rugh	Technician, Plant Pathology, 2004 to 2013
Joe Whalen	Technician, Horticulture, 2008 to 2015
Michael Fraatz	Summer Research Assistant, Entomology, 2015
Katherine Aponte	Summer Research Assistant, Entomology, 2015
Jared Jaeger	Summer Research Assistant, Entomology, 2015
Jonathon Binder	Summer Research Assistant, Entomology, 2015
Michelle Robinson	Summer Research Assistant, Entomology, 2014
Taylor Truncali	Summer Research Assistant, Entomology, 2013
Dina Truncali	Summer Research Assistant, Entomology, 2013-2014
Derek Swehla	Summer Research Assistant, Entomology, 2014
Susan Weibman	Summer Research Assistant, Entomology, 2013
Brianna Flonc	Summer Research Assistant, Entomology, 2013

Pawan Angara	CALS/CCE Summer Research Intern, Entomology, 2014
Danielle Carolei	CALS/CCE Summer Research Intern, Entomology, 2013
Kaitlyn Kelder	CALS/CCE Summer Research Intern, Entomology, 2013
Zachary Coto	Summer Research Volunteer, Entomology, 2013-2015
Kellyn Will	Summer Research Volunteer, Entomology, 2013-2014
Peninah Feldman	Summer Research Technician, Plant Pathology, 2013
Iana Kostina	Seasonal Research Technician, Plant Pathology, 2013
Jordan A. Pringle	Summer Research Volunteer, Plant Pathology, 2014-2015
Franco Julia-Wise	Summer Research Volunteer, Plant Pathology, 2014

Plant Pathology Projects/Activities 2013-2015

Compiled by David Rosenberger
Plant Pathologist and Professor Emeritus, Hudson Valley Lab, Highland, NY

Although I retired in February of 2014, I have remained professionally active in the following areas since my retirement:

- Research: Worked through summers of 2014 and 2015 to complete several long-term field trials at HVL.
- Extension: Published blog posts and extension articles relevant to disease control in tree fruits, and participated in fruit grower meetings.
- Mentoring: Provided support as requested by HVL staff and other colleagues.
- Continued learning: attended scientific conferences and fruit grower meetings to stay informed about new developments.

Details are provided below.

Developed HVL's Plant Path website and blog:

A website for my plant pathology program at the Hudson Valley Lab was developed during summer of 2013 (Fig. 1). Blog posts about seasonal developments were posted regularly in 2014 and occasionally during 2015. The website also archives weather data from HVL for the years 1984 – 2012 when a NEWA station was installed, apple scab infection periods for 1974 – 2012, reports on fungicide field trials conducted at HVL 1974 – 2013, and some historical documents about the lab. A more detailed history of the scientists who worked at HVL since 1923 is under development.

Conducted fungicide field trials in 2013:

Four fungicide field trials were conducted during summer of 2013 and results were published in *Plant Disease Management Reports* under the following titles:

- Comparison of Copper Products Applied at Green Tip to Control Fire Blight on Apple
- Effects of Blossom Protect and New Copper Formulations on Control of Blossom Blight (Erwinia amylovora) and on the Incidence and Severity of Fruit Russet
- Comparison of Flint, Inspire Super, ProPhyt, and Agri-Fos for Controlling Early-Season Apple Disease
- Post-infection Efficacy of Fungicides Against Sooty Blotch and Flyspeck

Results from field trials were used to formulate disease control recommendations that were presented at fruit grower meetings and in extension newsletters.

Evaluated RIMpro for apple scab management:

RIMpro is a proprietary, cloud-based decision support system that was developed in Europe to assist growers in managing apple scab. RIMpro is useful for identifying the start of the scab season, for identifying key infection periods during the period between tight cluster and first cover, and for determining the end of the primary scab season (Fig. 2).

Figure 1. Home page for the HVL Plant Pathology website.

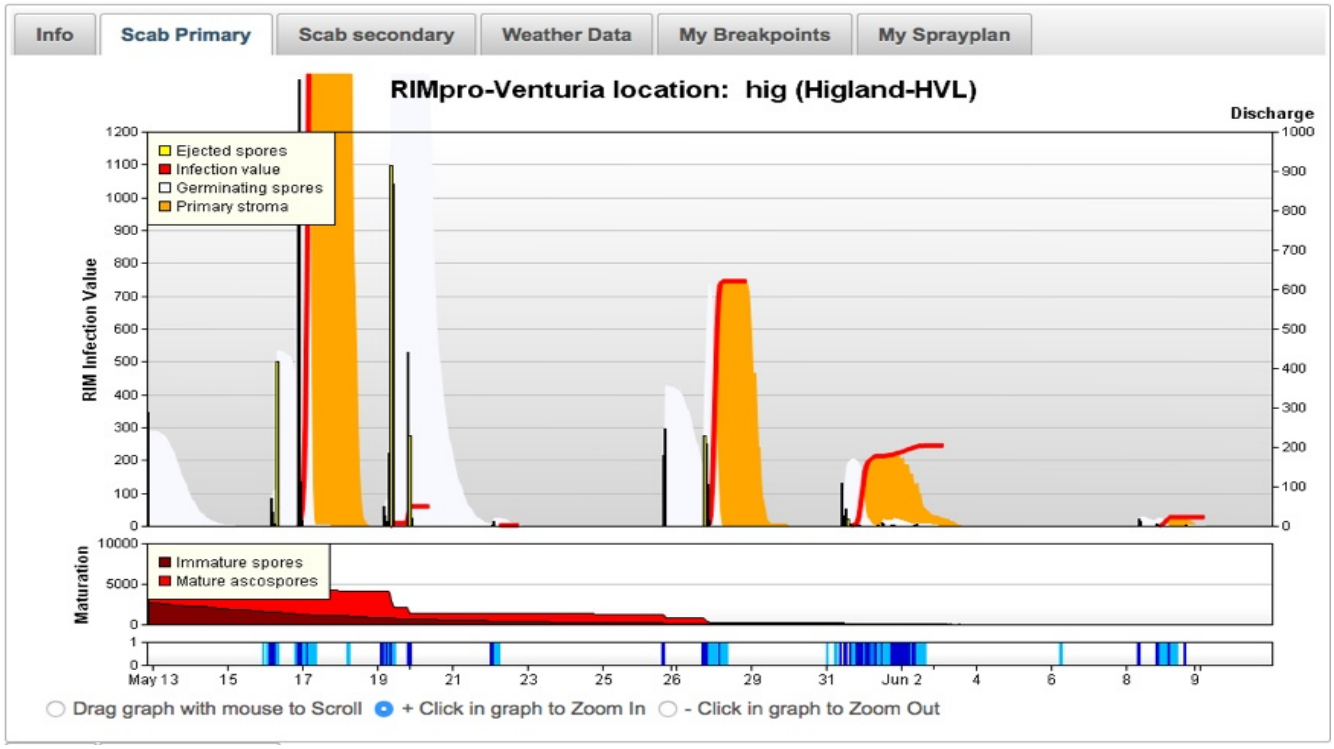


Figure 2. RIMpro output for scab risk at Highland showing that most of the primary scab risk (red lines) was concentrated in just three infection periods during spring of 2015.

The RIMpro scab model is also useful for estimating spore discharge during extended wetting periods, thereby indicating how many spores may be released during the later phases of multi-day wetting periods when such releases might necessitate an additional fungicide cover before the end of the wetting period if heavy rains removed the fungicide protection present when the rains began. Thanks to assistance from several colleagues (Vincent Philion in Quebec, Dan Cooley and Jon Clements in MA, and the program owner, Marc Trapman), I was able to access RIMpro for the 2014 and 2015 seasons and used it to monitor scab development for three different locations in eastern New York (Highland, Peru, Chazy). We attempted to make RIMpro available to New York growers prior to the 2015 season, but that proved impossible because of complications in making NEWA weather data accessible in the format required by RIMpro. Those difficulties are currently being resolved and RIMpro will launch in the U.S. in March of 2016. Based on my two years of experience with this program, I suspect that it will become a critical tool for apple scab management in the future because it provides more accurate real-time information concerning risks of apple scab infection than anything that we have used in the past. It is clearly superior to apple scab maturity assessments made with squash mounts and will provide scab risk assessments for any geographic location throughout the primary scab season.

Monitored infection risks for scab and blight:

Conditions that favored or suppressed apple scab and fire blight were monitored throughout April, May, and June of each growing season. Grower alerts were issued via extension educators and/or blog posts and extension newsletters. In 2015, warm weather during bloom resulted in a very high risk for fire blight according to the MaryBlyt, Cougar Blight, and RIMpro fire blight models, but very little fire blight actually developed in Hudson Valley orchards. In attempting to determine why all three models gave us false alarms for fire blight risk, we realized that relative humidity was exceptionally low throughout bloom. Recent studies have documented the importance of relatively humidity for fire blight infections, but none of the models currently incorporate relative humidity into their risk assessments. This problem with current models was highlighted in presentations at three different fruit research/ extension meetings held during fall of 2015.

Fig. 3. Disease symptoms caused by ToRSV at the graft unions of three trees from the trial where rootstocks were inoculated with ToRSV one year after planting. LEFT: Shiro plum on Krymsk-1 rootstock showing stem pitting in the rootstock. CENTER: Orangered apricot on Cadaman rootstock showing brown-line at the graft union. RIGHT: Stanly plum on Istara rootstock showing brown-line at the graft union.

Tested susceptibility of stone fruits to ToRSV:

As part of a field trial initiated in 2009, 500 cherry, apricot, peach, and plum trees were destructively evaluated in 2014 and 2015 to determine if they had become infected with tomato ringspot virus (ToRSV) following rootstock inoculations that we performed in 2010. The objective was to determine if any of the germplasm was resistant to ToRSV and to identify symptoms caused by ToRSV on the 52 different scion/rootstock combinations included in the trial. All of the cherry and plum trees removed in 2015 were tested for ToRSV in Dr. Marc Fuch's lab at Geneva where bark samples from above and below the graft union were ground and subjected to ELISA tests. Bark over the graft unions was removed to reveal the impacts of ToRSV infection on growth of the wood both above and below the graft unions. Many trees showed severe symptoms of ToRSV (Fig. 3). None of the scion-rootstock combinations remained virus-free following inoculation, but further statistical analysis is required to determine if some scion-rootstock combinations were less affected by the virus than others.

Tested susceptibility of cherries to X-disease:

In a field trial initiated in 2009, a total of 349 cherry trees that included 20 cultivars and 7 rootstocks (41 different scion-rootstock combinations) were inoculated with X-disease. Trees were observed for symptoms over the next six years. Infected trees of many but not all cultivars developed enlarged leaf stipules that were previously identified as an indication for X-disease (Fig. 4). The X-diseased Montmorency trees on Mahaleb died as expected based on previous studies in the literature. However, the infected Balaton and Danube tree remained alive but produced small worthless cherries. Initial review of the data indicated that

Fig. 4. Enlarged stipules growing from leaf nodes on 'Whitegold' cherry trees infected with the X-disease phytoplasma.

none of the germplasm evaluated was completely resistant to the effects of X-disease, but more detailed analysis of the data is being completed to determine if some combinations were less affected by the disease than others

Virus susceptibility of new apple rootstocks:

Red Delicious trees propagated on 48 different rootstocks were planted in an Entomology research orchard at the Hudson Valley Lab in 2011 with the objective of testing the rootstocks' resistance to infection by ToRSV. When Red Delicious are grown on rootstocks that are susceptible to ToRSV (such as MM.106), the trees develop a graft union dysfunction after six or seven years that results in tree decline. Sometimes infected trees that break at the graft union (Fig. 6). The susceptibility of the new rootstocks to ToRSV is unknown, so this test was initiated at the behest of Terence Robinson who provided the trees for the test. The rootstocks of nearly 200 test trees were inoculated with ToRSV by inserting a bark patch from an MM.106 rootstock known to be infected with ToRSV. Trees will be assayed for presence of the virus in either 2016 or 2017.

Fig. 6. Breaking graft union on a Red Delicious tree on MM.106 rootstock that was infected with ToRSV. On the bark sections that were removed, note the brown line of disorganized tissue that developed at the graft union and contributed to the decline of this 5-yr-old tree.

This field trial may also provide data on how rootstocks respond when they become infected with apple stem pitting virus (ASPV) and apple chlorotic leaf spot virus (ACLSV) because we discovered during fall of 2015 that the MM.106 rootstock that we used for inoculum carried these two viruses in addition to ToRSV. ASPV and ACLSV are considered latent viruses in apples because they do not cause symptoms in most cultivars, but there have been reports that one of these latent viruses may be causing decline of Red Delicious trees on G.935 rootstocks in some plantings in western NY. As a result, there is increased concern about how new rootstocks may react to latent viruses, and this planting may provide some serendipitous but useful information on how the rootstocks in the test respond when infected by ASPV and ACLSV.

Impacts of glyphosate on apple tree health:

Multi-year studies of the impact of glyphosate on apple tree health were concluded in 2013 and results were summarized in an article in *New York Fruit Quarterly*. Glyphosate continues to cause occasional tree losses on some sites and visible, but perhaps not harmful, trunk damage in most orchards where it is used. Detailed studies with replicated plots showed that glyphosate exposure did not have any consistent effect on internal browning of Empire apples during long-term storage even though it did have statistically significant effects in some orchards in some years. Although glyphosate is known to make plants in some cropping systems more susceptible to diseases, we found no evidence that glyphosate exposure impacted apple tree susceptibility to the shoot blight phase of fire blight or to black rot cankers or the common wood rot pathogen *Schizophyllum commune*. Thus, while careless use of glyphosate can damage trees, the impacts of glyphosate exposure were less extensive that we originally feared.

Sanitizing apple storages during summer:

Even though apple storage rooms may look "clean" after floors are washed, work done by a high school honors student, Franco Julia-Wise, who worked with me during spring and summer of 2014 showed that large numbers of *Penicillium* spores remained in rooms that have been emptied, cleaned, and had the floors washed with water. *Penicillium* species cause blue mold decay of apples during storage, and the spores of these fungi are much more persistent

and difficult to kill than are organisms associated with food-borne illnesses. However, spores that persist in storage rooms become airborne when cooling fans are turned on in the fall and can initiate decay at fruit wounds that might be present in the freshly-harvested fruit. We know that most of the *Penicillium* spores settle to the floor or onto other flat surfaces in still air, so we had hoped that applying sanitizers to the floor after rooms were cleaned and washed would eliminate most of the inoculum in the room. However, spore trapping done inside the closed rooms a week after sanitizers had been applied to floors showed that spore concentrations in the air were still very high when the cooling fans were turned on prior to spore trapping. Thus, it appears that treating only floors was not enough to lower the amount of Penicillium spores in rooms because too many spores remained airborne or had settled onto walls and ledges where they escaped the effects of the sanitizer applied to floors. Based on this research, it appears that fogging rooms to kill all airborne spores along with spores that may have settled on walls and floors and is the only way to be certain that rooms are free of *Penicillium* spores before rooms are refilled in the fall.

Continued support for HVL scientists:

Since my retirement in spring of 2014, I have continued to support scientists and staff at HVL by pruning and spraying some of the plant pathology field plots, by suggesting and/or reviewing research proposals, and by assisting with diagnosis of tree fruit problems that are brought to the attention of the scientists and extension educators at the Hudson Valley Lab. One recent example of the latter involved Fuji apples with white growth in the seed cavity (Fig. 7) that some grocery chains were calling moldy core, a fungal disease that they felt justified rejections of delivered loads of packed fruit. Closer inspection at HVL showed that the "growth" was not fungal in nature but was actually apple callus tissue that was growing in the seed cavities due to the high sugar content in these Fujis.

During summer of 2015, I assisted in organizing a tour of the Pacific Northwest apple-growing region for Peter Jentsch, Gemma Reig Cordoba, Dan Donahue, Anna Wallis, and myself. We visited the Washington State University research station in Wenatchee and then joined the tour organized by the International Tree Fruit Association. This team-building activity provided participants with a better understanding of production practices and challenges in the arid Pacific Northwest where the majority of apples sold in the US are grown.

Fig. 7. Apple callus cells growing in the seed cavity of Fuji apples that were rejected on the false premise that they had moldy core, a fungal disorder.

Provided disease diagnosis via e-mail: I continue to receive and respond to e-mails requesting assistance with disease diagnosis or advice on disease control strategies. During 2015, I responded to more than 150 such e-mailed requests. In some cases, the "detective work" required to diagnose problems that were described or photographed required additional e-mail exchanges before the issues were fully resolved.

Other professional activities:

Both prior to and after my retirement, I regularly participated in both the national and more regional meetings of the American Phytopathological Society (APS) as well several regional fruit-related research/extension conferences where fruit experts share observations and research results at the end of each growing season. These professional meetings provide participants with information about new problems and solutions several years before that information becomes available from published sources.

From August 2012 through August of 2013, I served as the APS Division Forum representative from the Northeastern Division of APS. The Division Forum representatives are elected by each division and work together to foster collaborations and communication among divisions and with the larger national society. As a Division Forum member, I was privileged to attend the Western Division meeting in Tucson in 2013, the Central Division Meeting in Madison in 2014, and the Southern Division meeting in Atlanta in 2015. These division meetings provided interesting insights into disease management problems unique to other regions of the country.

I served on a graduate student committee for a Ph.D. student at the University of Massachusetts (Angella Madiera, 2013) who studied sooty blotch of apple under the direction of Dr. Daniel Cooley and for a Ph.D. student at Cornell (Sara Villani, 2015) who studied fungicide resistance in Venturia inaequalis with Dr. Kerik Cox.

At the local level, I continued to participate in meetings and tours organized by Cornell's Tree Fruit program work team (PWT). The Fruit PWT enables regular information exchange among all of the faculty, extension educators, and consultants working on fruit crops in New York State.

Horticulture Program
2013-2015

Gemma Reig Córdoba (gr343@cornell.edu) Postdoctoral Research Associate, Department of Horticulture

Apple Planting System Trials

We are continuing taking data (yield, pruning time, trunk circumference and fruit quality) from 2 established apple planting systems trials in the Hudson Valley. Yield and pruning data are useful for economic comparisons.
One trial is established at Dressel Farm (New Paltz, NY) since 2006 (Figure 1). Gala and Early Red Fuji cultivars are compared on Slender Pyramid (SP), Slender Axis (SA), Vertical Axis, (VA) and Tall Spindle (TS) systems all propagated on important new Geneva rootstocks including G.41, G.16, G.11, and G.210 compared to standards such as B.9, M.9, M.26 and M.7 (Table 1). This trial will finish in 2017.

Figure 1. Gala harvested at Dressel Fruit Farm (2015).

The second trial, the Red Delicious trial was established near Hudson, NY, at Yonder Fruit Farm in 2007 in response to the continuing need to produce more local Red Delicious apples more profitably (Figure 2). Super Chief Delicious is compared on Tall Spindle (TS), Super Spindle (SS), Vertical Axis (VA) and Triple Axis (TSS) systems all propagated on important 6 Geneva rootstocks (G.11, G.16, G.30, G.41, G.210 and G.935) compared to standards such as B. 118, M.9, M.26 and M.7 (Table 2). This trial will finish in 2018.

Figure 2. Red Chief harvested at Chiaro Farm (2015).

Sweet Cherry Planting Systems and Rootstocks

We are continuing taking data from the NC140 regional research project on sweet cherry systems and rootstock established at Crist Farms in Walden, NY. This trial (planted in 2010) is comprised of 4 tree architectures at high densities using the SSA and UFO, the TSA, and the KGB and 3 of the Gisela rootstocks (3,5,6) with varying vigor levels (Figure 3) grafted on Regina cultivar. Therefore, this trial studies the influence of training system, rootstock vigor, and growing conditions (site) on annual fruiting unit growth, bacterial canker incidence, pruning time, yield, trunk circumference and fruit quality (Figure 4, Table 3).

Table 1. Gala and Fuji data from 2015.

Cultivar	System	Winter prunning time/tree (min)	TCSA (cm^2)	No. root Suckers	Yield/tree (kg)	Fruit size (g)	Yield /acre (bu)	YE (kg/cm^2)	Crop load (#fruit/cm^2)	Flesh Firmness (N)	Fruit Soluble Solids (Brix)
	SA	1.5	38.5	0.5	25.1	176.1	*1155.6*	0.7	3.8	72.4	13.1
	SP	*2.5*	*62.4*	*3.0*	*49.9*	*181.3*	862.1	0.9	4.8	70.7	13.2
Gala	TS	0.9	28.6	0.6	16.0	173.3	1084.9	0.6	3.6	*73.8*	*13.5*
	VA	2.2	43.8	0.6	37.0	180.5	973.6	0.9	5.0	73.4	13.3
	LSD P≤0.05	**1.0**	**11.3**	**1.0**	**10.4**	**11.7**	**286.2**	**0.3**	**1.5**	**6.7**	**0.6**
	SA	1.4	46.9	1.5	28.2	265.9	*1240.9*	0.6	2.3	67.1	14.2
	SP	*2.2*	*78.3*	*3.1*	*48.1*	243.8	781.4	*0.7*	*2.7*	66.5	*14.6*
Fuji	TS	1.4	33.6	1.3	9.4	248.3	622.5	0.4	1.5	*67.7*	*14.6*
	VA	2.0	68.6	1.0	40.5	258.7	981.4	0.6	2.3	*67.7*	14.3
	LSD P≤0.05	**0.9**	**14.6**	**1.1**	**15.3**	**47.5**	**396.3**	**0.4**	**1.8**	**3.4**	**0.8**

Table 2. Red Delicious data from 2015.

System	Yield (Kg/tree)	Fruit size (g)	Yield/acre (bu)	Firmness (N)	Fruit Soluble Solids (Brix)
SS	16.3	202.1	*1866.3*	72.6	11.8
TS	20.9	199.7	1445.3	72.6	11.7
TSS	28.7	*220.7*	1367.5	*73.3*	12.0
VA	*29.7*	199.0	1045.7	71.3	*12.5*
LSD Pr≤0.05	**16.61**	**70.74**	**926.51**	**7.71**	**1.30**

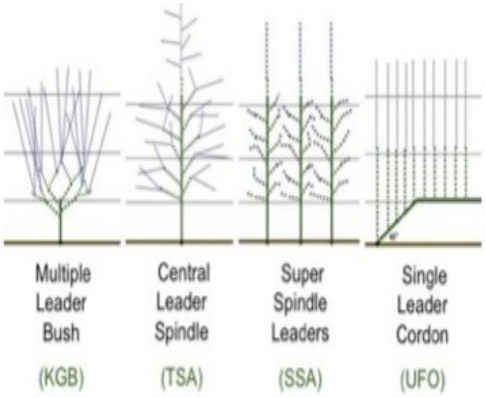


Figure 3. Cherry planting systems.

Figure 4. Mayor canker infection (lesion length >2.5 cm) in TS (2015).

At sixth leaf (2015), yield was evaluated for the first time, there was no production the years before. In general, Tall Spindle system produced the highest yields in all three rootstocks, followed by UFO, KGB and SSA. However, the yields were pretty low, in general, less than 10 kg per tree. This trial will finish in 2020.

Rootstock Trials

We also are continuing taking data (yield, number of suckers and trunk circumference) from 2 large comparative rootstock trials in the Hudson Valley in addition to those associated with the planting systems trials at Yonder's and Dressel's. One trial, established in 2005 at Crist Milton

Table 3. NC-140 Sweet Cherry (Regina) trial data from 2015.

System	Rootstock	TCSA (cm^2)	Summer Prunning (min/tree)	Harvest weight (Kg)	Harvest time (min/tree)	Fruit weight (g)	Fruit diameter (mm)	SSC (Brix)
KGB		51.3	*5.0*	4.6	10.5	11.1	*27.7*	*15.5*
SSA		38.9	4.5	3.2	8.6	11.9	31.6	14.4
TSA		*60.5*	1.0	*6.5*	*20.9*	10.9	27.0	15.3
UFO		50.8	3.7	4.6	13.2	*12.2*	27.6	15.2
	LSD P≤0.05	**23.6**	**1.5**	**1.6**	**5.6**	**2.7**	**7.7**	**1.1**
	Gi3	25.9	3.0	4.2	10.7	11.8	29.6	15.6
	Gi5	41.1	3.3	*5.0*	13.6	11.6	27.9	15.6
	Gi6	*84.1*	*4.3*	*5.0*	15.6	11.3	28.0	14.2
	LSD P≤0.05	**13.2**	**1.9**	**1.8**	**2.7**	**6.6**	**7.8**	**1.0**
	Gi3	25.7	2.8	4.7	10.3	10.7	27.0	16.0
KGB	Gi5	41.7	4.7	4.3	8.4	11.5	27.7	16.2
	Gi6	86.6	7.6	4.9	13.4	11.0	28.2	14.5
	Gi3	22.3	6.5	3.5	8.3	11.6	27.9	15.3
SSA	Gi5	29.7	3.9	3.8	9.8	12.2	28.6	14.7
	Gi6	64.7	3.0	2.4	7.9	12.0	28.6	12.9
	Gi3	35.0	0.5	5.3	15.4	10.8	26.6	15.6
TSA	Gi5	51.8	1.1	7.0	23.3	10.9	27.0	15.8
	Gi6	94.8	1.4	7.1	23.2	11.1	27.5	14.6
	Gi3	20.9	2.4	3.5	9.3	13.7	26.8	15.6
UFO	Gi5	41.1	3.5	5.0	12.6	11.8	28.3	15.4
	Gi6	90.4	5.1	5.4	17.8	11.1	27.7	14.6
	LSD P≤0.05	**11.4**	**0.9**	**1.6**	**5.3**	**2.8**	**7.7**	**0.9**

Farm, has 56 different rootstocks from all over the world (39 Geneva rootstocks, 4 Japan Morioka rootstocks, 4 PiAu rootstocks, 2 JTE rootstocks B.118, 1 O.3 and 5 Malling rootstocks) all on Fuji (Figure 5). This trial has finished in 2015.

The second trial is a NC-140 sponsored trial located at the Hudson Valley Lab. The identical planting plan is copied in 6 other states with Fuji and a similar one with Honeycrisp on top in 15 other states. There are five complete rows (0.5 acre) of Aztec Fuji with as many as 3 trees per rep (4 rep in total) and per rootstock (27 rootstocks in total). This planting is testing 8 new Budagovsky rootstocks (Russia), 3 new Pilnitz stocks (Germany) and 12 Geneva rootstocks and compared to standards such as M9T337 and M.26 (Figure 6). Due to the huge crop from 2014, trees produced few fruits this summer. This trial will finish in 2019.

Figure 5. Fuji harvested at Milton Farm (2015).

Figure 6. Fuji Aztec harvested at HVRL (2015).

Precision Pruning and Thinning Trials in Gala and Honeycrisp

These two trials are located at the HVRL in addition to those located in grower's orchards around NY State. They were set up in 2013 (precision thinning) and 2015 (precision pruning) and they belong to the Precision Crop Load Management Program, the aim of which is develop and extend to apple growers this program to optimize fruit size and crop value.
Precision crop load management involves identifying a target fruit number per tree based expected yield and expected fruit size and then precisely thinning the fruits per tree to that level (full bloom, petal fall, 12mm and 18 mm). This is accomplished by pruning to a specific bud load, followed by chemical thinning using crop growth models (carbohydrate model) to guide the number of thinning sprays, which is followed by hand thinning to the target fruit number (Figure 7).

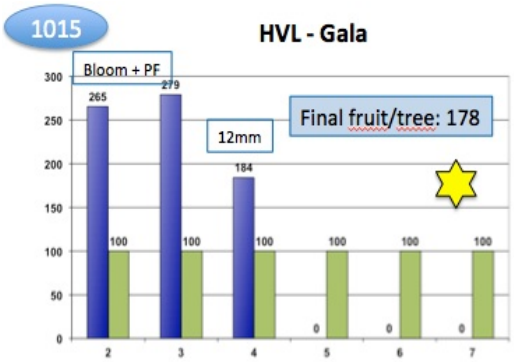


Figure 7. Chemical thinning results from Gala at HVRL.

Precision Irrigation Trial

This trial is established at Minaird Farm since 2015 in addition to other 3 apple farms from NY State (one in Orleans, Wayne and Clinton Counties). The aim of this project was to conduct a precision irrigation management program using the new Cornell Apple Irrigation Model.

At each site, soil water level was managed according to the irrigation model to minimize water stress while other trees were left non-irrigated. Tree growth, tree stress, crop yield, fruit size and fruit quality were evaluated. Results from these trials will be published this year in New York Fruit Quarterly.

Sensitive to Winter Cold

Since 2009 grape and peach buds are being tested at the lab for sensitivity to winter cold using a "Differential Thermal Analyzer". This data together with data from Cornell vineyards in the Lake Erie and Finger Lakes is posted every two weeks, from December 1 through March, on the <grapesandwine.cals.cornell.edu> website. The varieties evaluated are Riesling, Cabernet Franc, Cayuga white and Concord. Clicking on a variety name will bring up individual graphs of minimum/maximum temperatures.

Sunburn Trial

In 2015 Peter Jentsch, David Rosenberger and Gemma Reig started a trial to evaluate the efficiency of different products (Raynox, ScreenDuo, and Deco 405) compared to control to reduce Sunburn on Honeycrisp and Cameo under irrigation and non irrigation conditions. The efficiency of these products has being tested for the first time under Hudson Valley conditions. From each tree, all fruits were harvested, weighted and the presence or not of sunburn was evaluated. A sample of 5 marketable fruits at each harvest was used to evaluate the fruit quality.

The preliminary results of this trial showed that the highest percentage of fruits with Sunburn was at first harvest (2nd week of September). In the irrigation block, the preliminary results

in Honeycrisp showed that Raynox, Deco 405+Raynox, Deco 405 and ScreenDuo seemed to reduce Sunburn incidence compared to control. However, in the non irrigation block this trend was not observed (Figure 8). In contrast, these products did not show the same efficiency on Cameo fruits at the irrigation block, even in the non irrigation block (data not shown).

Contrary to that expected in general trees with irrigation showed higher percentage of Sunburn than trees without irrigation. June and July were dry months in the Hudson Valley. So decide to put irrigation late in the season (beginning of August) in this Honeycrisp blocks could not help to reduce Sunburn. However, this hypothesis needs to be confirmed in the following years.

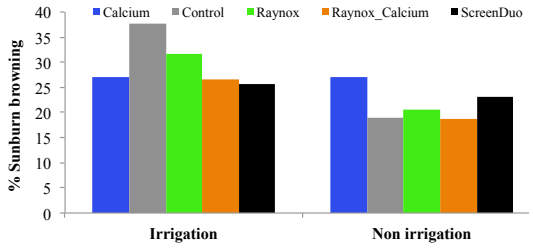


Figure 8. Percentage of Sunburn browning on Honeycrisp at 1st harvest date.

At Milton Farm (Crist Brothers, NY) the efficiency of Raynox was also tested in Honeycrisp. However, the results do not matched expectations and they need to be analyzed in depth.

NY-1 and NY-2 Evaluations

In 2011, a small NY-1 and NY-2 rootstock trial was established at the HVRL. NY-1 was grafted on Nic.29, M9T337, G.11, G.41 and G.935, while NY2 was grafted on B.9, M9T337,G.11, G.41 and G.935. Five trees per each rootstock-scion combination were evaluated on yield, leaf mineral content and fruit quality in 2015 (Table 4 and 5).

To estimate bushels/acre and $/acre (Table 5), each fruit from each scion-rootstock combination in both NY-1 and NY-2 was weighted and the percentage coverage red color was visually estimated. Each weight was then divided in 3 categories based on harvest maturity recommendations. Category 1 (Cat.1): <180 g. or <100 size at $1/lb; Category 2 (Cat.2): 180-204.9 g. or 100 size at $1.12/lb; Category 3 (Cat.3): ≥205 or ≤ 88 size at 1.25/lb. Color was not taken into consideration; most of the fruit presented around 90% red skin color.

Table 4. Fruit Quality Data for NY1 and NY2.

Cultivar	Rootstock	% color	Flesh firmness (N)	SSC (Brix)	Acidity (g./L.)
	337	95	66.9	12.8	3.1
	G11	94	67.3	13.0	3.2
NY1	G41	93	66.1	12.9	3.6
	G935	94	67.5	12.8	5.0
	Nic29	94	65.6	13.0	4.1
Pr ≤ 0.05		NS	NS	NS	NS
	337	93	66.4b	11.8 b	4.1
	B9	95	68.2 ab	12.2 ab	4.1
NY2	G11	95	73.3 a	13.1 a	4.1
	G41	97	68.7 ab	12.0 b	4.5
	G935	96	67.4 b	11.9 b	3.9
Pr ≤ 0.05		NS	*	**	NS

Table 5. Preliminary results from NY1 and NY2 harvested in 2015.

Cultivar	Rootstock	Tree volum (m^3)	Yield (lb/tree)	Fruit weight (g)	% Fruit			Bushels/acre				$/acre			
					Cat. 1	Cat. 2	Cat. 3	Cat. 1	Cat. 2	Cat.3	Total	Cat. 1	Cat. 2	Cat. 3	Total
NY1	337	2.4	26.7	226.5	14.8	21.8	63.4	94.2	137.0 ab	525.2	756.4	3956	6447 ab	27573	37976
	G11	2.4	25.5	216.8	16.8	23.6	59.7	93.2	157.1 ab	471.4	721.8	3916	7390 ab	24750	36055
	G41	2.0	25.9	221.9	22.3	17.5	60.2	168.4	134.8 ab	432.4	735.7	7073	6343 ab	22701	36118
	G935	2.9	35.3	196.7	33.1	29.9	37.0	279.1	294.6 a	427.9	1001.6	11723	13860 a	22463	48046
	Nic29	2.3	23.5	233.9	14.8	14.4	70.8	77.7	94.0 b	494.3	665.9	3261	4423 b	25949	33634
Pr ≤ 0.05		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	*	**NS**	**NS**	**NS**	*	**NS**	**NS**
NY2	337	2.3 ab	48.2 ab	224.4	7.5	28.4	64.1	68.8	292.6 a	799.7 bc	1161.1 ab	2888	13759 a	41972 bc	58620 b
	B9	1.2 c	28.7 c	237.8	6.2	20.5	73.3	41.8	132.8 ab	517.5 c	692.1 c	1754	6247 ab	27160 c	35161 c
	G11	1.7 bc	32.9 bc	271.0	6.7	11.0	82.2	34.3	67.0 b	692.5 bc	793.8 bc	1439	3149 b	36348 bc	40936 bc
	G41	1.8 bc	47.3 b	264.5	2.1	6.2	91.7	18.5	62.7 b	1058.3 ab	1139.5 b	776	2949 b	55547 ab	59273 b
	G935	2.9 a	65.7 a	244.9	2.2	15.0	82.8	25.4	196.8 ab	1368.3 a	1590.5 a	1067	9253 ab	71818 a	82139 a
Pr ≤ 0.05		***	***	**NS**	**NS**	**NS**	**NS**	**NS**	**	***	***	**NS**	**	***	***

Preliminary results show that G935 tend to produce more bushels per acre (Table5). However, more years of evaluation are needed to confirm that.

As part of NY-1 and NY-2 evaluation under Hudson Valley conditions, a maturity and storage evaluation was also done at HVRL.

Fruits from NY-1 and NY-2 were harvest from 6th leaf trees grown on M9T337 rootstock. 150 fruits of NY-1 and NY-2 were harvested 4 weeks at weekly intervals. Three replicates of 10 fruits were used for assessment of harvest indices (% red color, internal ethylene concentration, soluble solids content, acidity, starch pattern index, flesh firmness and greasiness) (Figure 9). The remaining fruit were placed into cold storage at 36 F, and evaluated after 2 and 4 months, plus 1 and 7 days at 68 F.

To understand better the behavior of these two cultivars at harvest and postharvest further analysis need to be done, since we still have some samples at the cooler to be analyzed.

Hedging to reduce Bitter Pit In Honeycrisp?

During summer of 2015, at the HVRL

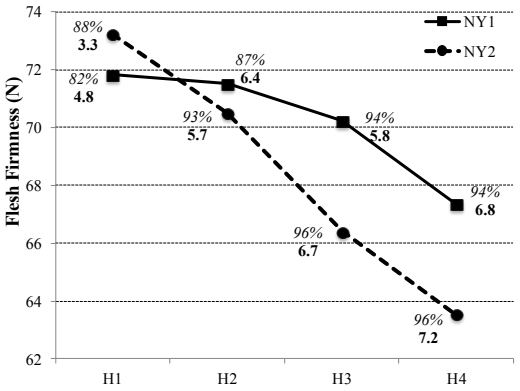


Figure 9. Flesh firmness for NY-1 and NY-2 over the harvests. Italic numbers represent % of red skin color. Bold numbers represent Starch Index.

we used the hedger on 3 different Honeycrisp blocks (20 trees per block) at three different times (end of June, end of July and end of August). We divided each block in two parts, one of each we applied Deco 405 ($CaCl_2$) every 14 days from 30th of June to 12th of August and the other we do not apply Deco 405 at all. All these treatments were compared to one block without hedging and no summer pruning and with and without calcium applications.

From all these treatments, 9 trees were selected for each treatment. Fruit were harvested, counted, weighted and the presence or absence of bitter pit was evaluated. A sample of 5 marketable fruits per tree was evaluated for fruit quality (% red color, internal ethylene concentration, soluble solids content,

acidity, flesh firmness and greasiness). The rest of the marketable fruits were kept at cold storage during 2 months at 36 F. After that, the presence or the absence of Bitter Pit was evaluated for each fruit, and fruit quality was also evaluated.

Although this season Bitter Pit has not been a huge problem in Honeycrisp due to the high crop, these preliminary results showed some differences among treatments (Table 6). Also, some differences on fruit quality among the treatments were found at harvest and postharvest.

Table 6. Percentage of fruits with Bitter Pit on Honeycrisp after 2 months at 36 F and 7 days at 68 F.

Treament	% Bitter Pit
June,$CaCl_2$	0.51 ab
June,No $CaCl_2$	1.50 ab
July,$CaCl_2$	3.29 ab
July,No $CaCl_2$	5.10 b
August,$CaCl_2$	0.00 a
August,No $CaCl_2$	2.88 ab
No hedging,$CaCl_2$	1.19 ab
No hedging,No $CaCl_2$	4.81 b
P≤0.05	*

To validate these results, this technique should be applied more years with high and light crops.

In addition, before each calcium application 120 leaves from each treatment were collected and shipped to Michael A. Rutzke to collaborate in his project named New Leaf Tissue Testing Regime with the Objective to Reduce Bitter Pit in Honeycrisp.

Collaboration to other Projects

In addition to the project mentioned above, I collaborated collecting data this summer, together with Dan Donahue and Sarah Eve Rohwer, for the statewide project named Crop Estimated Project, lead by Mario Miranda.

Entomology Projects / Activities & HVRL Partnerships 2013-2015

Compiled by Peter Jentsch
Entomologist, Hudson Valley Research Lab, Highland, NY

Senior Extension Associate in the NYSAES Department of Entomology: Work as the entomologist at the Hudson Valley Research Laboratory (HVRL). Superintendent of the facility as of November 5th, 2014:

- **Research:** Develop and conduct granted projects from several NYS and Federal Agencies, industry sponsored efficacy screening trials and extension on-farm trials.
- **Extension:** Publishing blog posts and extension articles pertaining to insect pest management in tree fruits, and participated in invasive insect working groups, program work teams, vegetable, grape and fruit grower meetings.
- **Administration:** Development and participate in HVRL Board of Directors meeting, providing perspectives on agricultural research, develop funding opportunities, maintain operations and maintenance for the facility. Assist to develop, fund and hire positions to fulfill the land grant mission of the lab.

Details are provided below.

Development of the HVRL website:

The development of the Hudson Valley Research Laboratory website operating for communication to the agricultural community for extension outreach and general information about the lab to he public. The web site was first developed in 2006, updated to a new non-CALS server in the summer of 2013 (Fig. 1). The site provides an overview to the reader of the partnership between the grower owned facility and Cornell University, archives departmental projects by stationed researchers, links to blog sites of researchers while providing a secured link to donors for funding support.

(http://www.hudsonvalleyresearchlab.org)

A Long-Term Sustainable Economic Ag. Research Model: Developing Partnerships for the Hudson Valley Research Laboratory Inc:

Working with the Hudson Valley Research Lab Board of Directors comprised of farmer representatives from four regional counties, the HVRL achieved its goals for partnership with Cornell University College of Agricultural Life Science (CALS) through a 5-year contract. The document outlined CALS support to provide two faculty and two support staff positions contingent on HVRL Inc. securing 3-year funding to maintain and operate the facility under CALS guidelines to secure the partnership between the two parties.

- Requests for funding to support HVRL were sent to over 740 agricultural interest groups, the eastern NY farm community. Presentations to winter meetings in major commodities combined with follow-up outreach events provided over $240,000, predominately from tree fruit grower, packers, shippers, and consultants
- $300,000 in pledged support for 3-years was provided from the Local Economies Project.
- Yearly Ag. community membership will help provide continued support for HVRL research faculty and staff to continue Ag. programs.

ENY Hort Team Members Supported by HVRL through Office and Laboratory Space:

Four Extension Specialists with technical support in Tree Fruit, Vegetable, Small Fruit and Grape now reside at the HVRL with support for office and lab bench access. Synergy of communication between research and extension personnel has been a critical component of our successful communication to the agricultural community.

Create Post–Doctorate Horticulturalist Position with Funding through ARDP: 2015-2016

Horticulturalist Gemma Reig-Cordoba (see report) was interviewed and hired in 2015, stationed at the HVRL under Dr. Terence Robinson during a 3-year leave, conducting precision field trials on newly developed varieties and susceptibility to sunburn.

Regional Insect Pest Monitoring: 2013-2015

As a part of our outreach to Hudson Valley growers and in cooperation with SWD and BMSB working group members, we maintain agricultural pest monitoring of the native and invasive pest complex throughout the Hudson Valley for tree fruit pests. We monitor seasonal population emergence, using predictive modeling of key pest events, communicate management timings to stakeholder groups through seasonal meetings, Scaffolds Newsletter and 'Jentsch Lab' blog site. We report to commodity groups, working groups and research attendees at regional ESA meetings of yearly findings from research trials, laboratory experiments and on-farm extension trials, newly developed insecticide performance and impact on predatory and biological controls of comparative field and laboratory studies.

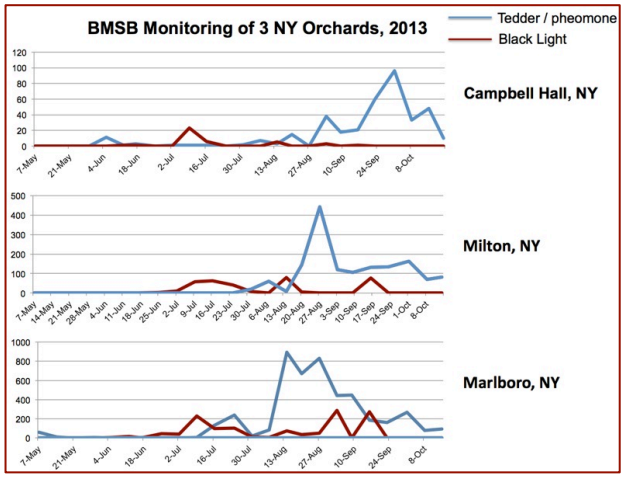


Figure 2. BMSB Trap Data from three HV sites.

- Newly and threatening invasive pests across New York State are monitored through NYS Ag. & Mkts *Cooperative Agricultural Pest Survey* (*CAPS*).

Citizen Science / Community Participation: 2010

We are continuing our Citizen Science Project (CSP) for Brown Marmorated Stink Bug within urban environments and agricultural crops. Working with regional media reporters and digital newspaper media, we assisted in the development of articles on the newly invasive insect, encouraging the submission of both live and digital images through the use of iPhone and GPS enabled 'smartphone' devices to determine the presence of Brown Marmorated Stink Bug populations in NY State. The project is on going as we determine its movement to the northern parts of the state.

We have worked with over 800 CSP participants to map BMSB population spread throughout NY using iMapInvasive and EDDMaps, two on-demand mapping systems.

- We maintain contact with survey participants yearly to query their impressions of BMSB population spread in the Hudson Valley.
- Homeowners surveyed via email have commented on general increases across much of the state to increasing populations in 2013-14.
- NYS grower site traps have shown increasing agricultural spread of the insect throughout NY.

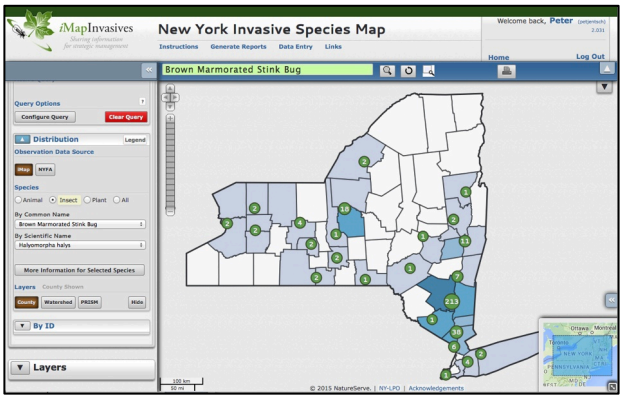


Figure 3. Citizen Science Data to Map Urban BMSB. *iMapinvasives.org*

Development of Pest Management Thresholds and Management Strategies for the Invasive Brown Marmorated Stink Bug, Halyomorpha halys (Stål): (Pentatomidae) In Commercial Tree Fruit in the Hudson Valley of NY: 2014-2015

The objective of this study was to determine effective monitoring methods and thresholds to initiate pest management, to disseminate timely management recommendations to tree fruit growers. The study included management strategies to determine the most effective and least labor-intensive method for employing pest management while evaluating the efficacy of pest management tools labeled for BMSB use. Each of four trap sites was evaluated using three distinct methods of BMSB monitoring to assess BMSB presence, providing management threshold using a 10 adult per trap/wk threshold with recommendations initiating insecticide applications throughout the

season. Delivery for recommendations employed e-mail of Entomology blog site alerts, ENY Hort. Tree Fruit newsletters in conjunction with EDDMap updates weekly to define the presence and spread of BMSB in NYS (http://www.eddmaps.org/bmsbny/).

Additional data on BMSB is communicated to NYS growers using both traditional winter fruit schools, summer twilight and field meetings. Growers employing these recommendations through these multimedia portals reduced BMSB fruit injury from 22.1% in 2012 to 1.5% fruit injury in 2014-15. Use of alternate row middle applications combined with border applications reduced chemical inputs by 30-40% in 2015.

Developing attract and kill strategies of the spotted wing drosophila for organic raspberry production, Drosophila suzukii matsumara (diptera: drosophilidae): 2013-2015

The Spotted Wing (SWD) has become a key pest of NY small fruit since first detected in 2011. Estimated losses in 2012 exceeded 1.3 million in blueberry alone. Yearly infestation levels of 40-100% fruit injury had been observed in un-sprayed berry by mid-August in commercial raspberry and blackberry plantings. Due to escalating SWD populations and the rapid severity of damage they cause as the season progresses, mid-late season management of summer and fall berries now requires intensive insecticide programs. Small fruit growers must employ a 3-4 day application interval for commercial market acceptability of fruit, initiated upon first trap capture of the adult.

Figure 4. Two types of Attract and Kill stations (ATK) made of 3.5" woven polypropylene netting as a substrate, for raspberry concentrate, cider vinegar, yeast, gelatin, Super Absorbent Polymer (SAP) & 1% A.I. solution of insecticide.

This level of committed management has forced many farmers, especially those using organic production systems, to reduce or eliminate late season berry production. The objective of the study was to develop alternative approaches to managing the SWD so as to reduce the need for intensified pesticide use in conventional and organic small fruit production systems. Studies to determine the attractiveness of baits and efficacy of insecticides used within the stations were conducted in the lab in 2014-15. During the spring of 2015 Attract and Kill (ATK) bait stations (Fig. 4.) were tested in three commercial raspberry patches. ATK stations were placed in alternating heights within the centerline of the canopy at 8" and 36". Insecticide and attractants were added in weekly 2 mL sprays.

Placement of the ATK stations at first trap capture provided a 52.6% decrease in the number of eggs lain in fruit with decreasing efficacy in later placement.

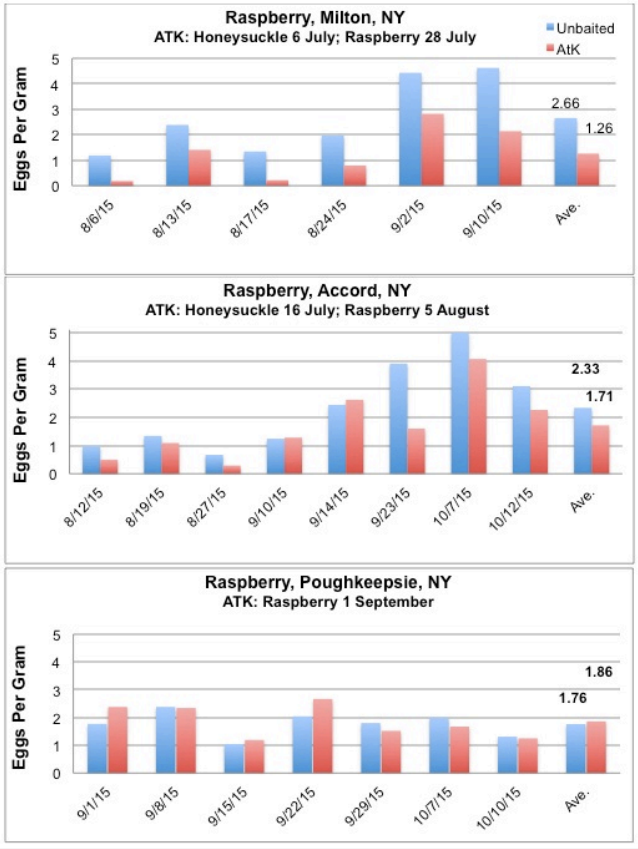


Figure 5. The greatest degree of efficacy was observed with early placement of ATK stations compared to mid and late SWD emergence, showing an average of 52.6%, 26.6% and -5.4% reduction in SWD damage to fruit in the three sites.

During the 2015 growing season ATK stations were placed in one conventional and two organic small fruit farms to determine their effectiveness to reduce injury to fruit. Studies demonstrated the the solution used in ATK had the highest level of attraction to SWD adults compared to natural and synthetic lures in previous studies

Numerous insecticide screening tests were trialed using labeled insecticides for berries for use in conventional and organic production. In caged adult screening studies highest level of mortality (98.7%) and ovipositional deterrence (0.14 eggs/gram) was found to be a 1% A.I. of Spinosad >Zeta-cypermethrin > Malathion and Dinotefuran > Acetamiprid > B.bassiana. The lowest SWD adult efficacy (29.3%) and highest # eggs/gram (3.55) observed in the UTC. Early field studies showed a 47.1% decrease in oviposition in rows treated with ATK. Applications of ATK were found to be more effective in preliminary field studies when placed in raspberry at the first trap capture of SWD adults prior to oviposition. We plan to continue the study, using split research plots to increase the number of stations and improving efficacy using closer application intervals.

Developing a Sustainable System for Orchard Production Practices in Pest Management: Optimizing Entomology, Pathology and Horticultural Research Education: 2013-2015

The intent of this project is two fold. To develop a sustainable orchard, using selections from the Purdue Rutgers Illinois (PRI) breeding program of apple scab resistant varieties, studying the long-term impact of this type of management system on the productivity of scab resistant apple in a high-density platform.

The use of our newly planted experimental disease resistant orchard planting of select PRI varieties was tested to determine the degree to which insecticide, fungicide and herbicide load can be reduced using three production systems; video and audio embedded PowerPoint presentations were developed as on-demand farmer resources to broaden extension outreach to the organic community. Secondly, we employ the orchard as an educational environment to provide horticultural and pest management procedures in both developing and managing organic pome fruit production to maximizing quality and yield. Study of organic methods using a complete replicated block design, has demonstrated the productivity of each management practice, allowing for economic analysis to determine profitability. Yearly workshops in organic pome fruit production provided methodology and practical hands on experience to growers over the past three years.

Insecticide Efficacy-Screening Trials: 2013-2015

On the HVRL 20 acre research farm we can conduct 52 complete replicated plot treatments of new materials for tree fruit each year. Recent emphasis has been on invasive insect pests with residue analysis of efficacy against the BMSB on tree fruit and SWD on raspberry and blueberry in off-station plots.

- We are able to conduct over 145 replicated plot treatments of new chemistries for tree fruit between 2013-15.
- Research reports for the past five years of are archived on the HVRL web site: http://www.hudsonvalleyresearchlab.org

Experimental applications to research plots

Assessments of Native Strains of Entomopathogenic Nematodes for Plum Curculio Management: 2012-2013
Art Agnello Project Leader, Cornell University NYSAES Geneva.
Plum curculio is a key pest in eastern US apple orchards, and is considered to be one of the primary pests limiting organic apple production in this region. Growers typically apply 2 – 3 insecticide treatments to manage plum curculio, but fruit damage levels and fruit yield losses in conventional commercial apple production can range from 0.5 – 3%, even with a complete insecticide control program. Current organic production often relies on multiple applications of kaolin clay, which acts as a physical barrier to the insect's attack. However, plum curculio treatment costs in an organic program can easily range between $150 –

$450/acre/year, with fruit damage often remaining at 20 – 40%. A biological control program for the plum curculio currently does not exist. The purpose of this project is to evaluate the potential of NY

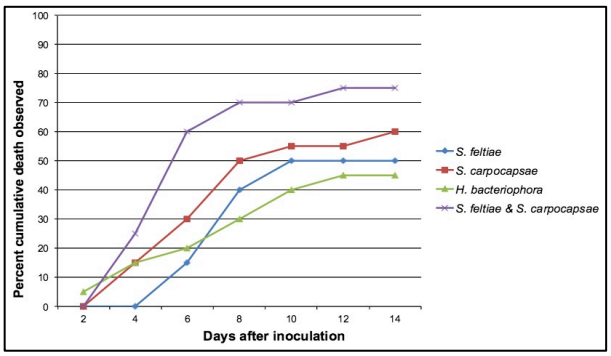


Figure 6. Nematode Efficacy on Plum Curculio Larvae 250-1250 infective juveniles per larva

cold - adapted entomopathogenic (insect - attacking) nematodes to reduce the impact o f plum curculio on apple production, reduce the cost of organic apple production, and provide a higher degree of marketable fruit and a higher profit for all apple producers.

In the laboratory, we conducted trials to determine the potential of *S. carpocapsae* 'NY 001', *S. feltiae* 'NY 04', and *H. bacteriophora* 'Oswego' as plum curculio (PC) biocontrol agents. Exposure of PC larvae to the nematodes was more effective than for PC adults, with the highest mortality obtained using a combination of *S. feltiae* and *S. carpocapsae* (up to 75%); mortality of PC larvae was seen within 14 days (Fig. 6).

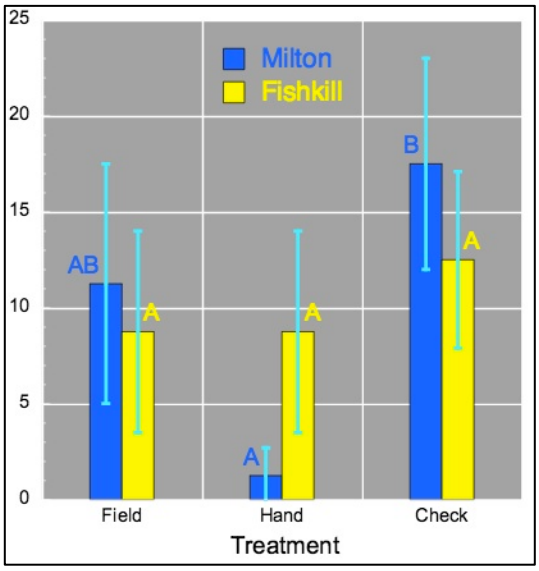


Figure 7. Progression of nematode establishment in field sites as seen from percent soil samples showing presence of nematodes over time in (Empire) and Hudson Valley orchard sites, July 2012 to September

In May of 2012 and Jun of 2015, laboratory reared entomopathogenic nematodes (EPN) were applied to commercial organic orchards to assess the level of nematode establishment. We conducted a larval exposure trial using laboratory-reared PC larvae in micro-plot assays to determine the survival of larvae to the adult stage. Lower adult emergence has been observed in all treatments. Soil core sampling has shown gradual field establishment of EPN populations is taking place at all of the sites, with greater levels being seen for *S. feltiae*.

Full report can be found at:
http://blogs.cornell.edu/agnello/files/2014/02/PC-Nematodes-Report.2013-tg2ywm.pdf

https://blogs.cornell.edu/jentsch/

Extension: Real Time Pest Management Alerts Using An Entomology Blog Site:

The entomology blog site was developed during summer of 2013. The site provides pest management alerts to subscribers through email. Access can also be obtained to archived alerts, articles, reports, PDF files of formal presentations, video and images through computer or smart phone search engines. In 2015 the site was visited 8,626 times with 12,825 page views, averaging 2 pages / visit for 2:06 min. / visit time average. The majority of visitors are from the US (4937), with world-wide outreach to visitors from Canada (189), UK (112), France (35), Iran (38), Serbia (35), South Africa (28), India (21), Australia (28), Greece (28), Italy (21), Spain (21), Indonesia (21), Mexico (6), Germany (4), and Romania (4).

This site provides the entomologist with a vehicle to deliver time sensitive information on pest management issues to hundreds of growers in real time including:

- Invasive insect presence and threshold trigger for management to tree fruit, vegetable, grape and sweet corn growers.
- Pest modeling for damaging insect life stage management prediction.
- Management recommendations for timing applications.
- Computer access to formal presentations on tree fruit insect pest topics with embedded audio.

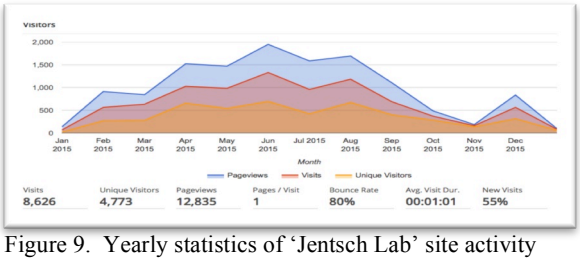
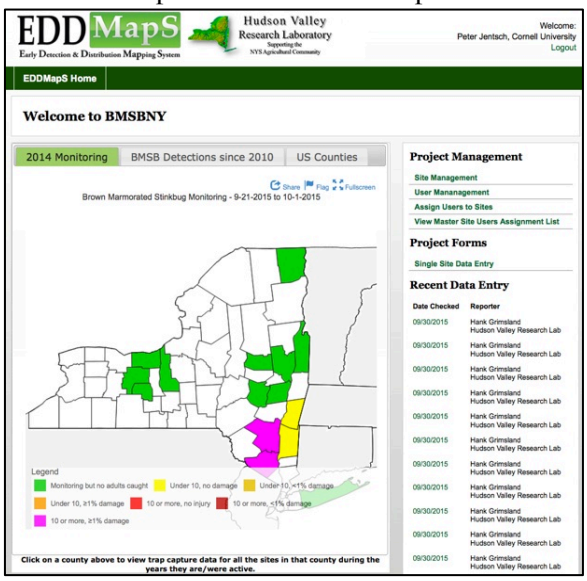


Figure 9. Yearly statistics of 'Jentsch Lab' site activity

Extension: Use of EDDMaps.org to communicate the presence and management threshold of the Invasive Brown Marmorated Stink Bug In Hudson Valley Tree Fruit: 2014-2015

The objective of this extension outreach study was to develop an effective method for distributing BMSB monitoring / trapping information to assist growers in making management decisions.

- Using the SE-IPM EDDMaps system, we partnered to create a NYS monitoring systems for BMSB and communicate presence, levels of insect pressure, action thresholds and damage from the pest in an on-demand platform.



Other professional activities:

I regularly participated in both the national and regional meetings of the Entomological Society of America (ESA) and regional fruit research /extension conferences in the Northeast and Mid-Atlantic, where observations and research results are formally presented by fruit experts. These meetings provide HVRL faculty with science based, replicated studies as well as field extension observations concerning newly invasive insect pests and newly developed solutions. This information provides the foundations to develop regional project studies and grant opportunities for future programming, often well before the pest becomes invasive in NY State.

From 2011 to the present I serve on regional BMSB and SWD working groups to foster collaborations and communication among researchers in developing problem solving solutions for these invasive insect pests. Working Groups are supported by funding through the NE-IPM Center to 1) identify and prioritize the research and extension needs in the Northeast for vulnerable crops, 2) develop effective lines of communication with other working groups within and outside the region and with affected industries, and 3) facilitate development of IPM guidelines for the Northeast. Research reports for SWD and BMSB are archived at http://www.northeastipm.org/working-groups/spotted-wing-drosophila/program-content/2014-presentations-and-reports/

and http://www.northeastipm.org/working-groups/bmsb-working-group/presentations/

Since 2006 I have worked on the CALS Tree Fruit program work team (PWT). The Fruit PWT enables regular information exchange among all of the faculty, extension educators, and consultants working on fruit crops in New York State.

Changes in Facilities & Equipment 2008-2015

Albert Woelfersheim
Facilities Coordinator for the Hudson Valley Research Lab, Highland, NY

My primary objectives include the oversight and maintenance of the physical assets of the New York State Agricultural Experiment Station at Geneva (NYSAES), and of the Hudson Valley Research Laboratory, Inc. (HVRL). As research needs change, we upgrade, or retrofit assets whenever feasible. We continue to pursue opportunities to secure funding for capital improvement of our facilities and purchase of new equipment as the needs arise.

Activities over the past seven years in this report cover large expenditures of resources and efforts in routine maintenance projects completed, upgrades, replacements, and new equipment purchased. Accomplishments are a result of combined efforts from CALS, and HVRL employees, as well as outside contractors. Likewise, work has been funded from various sources attributed primarily through HVRL and Cornell University resources. University funding has generally come through the CALS, the NYSAES, or program research grants.

Maintenance, and upgrades funded by HVRL

March 2008: The Conference Room remodeling project that had begun in December of 2007 was completed.

July 2008: HVRL roof was sealed with aluminized roof coating to seal seams in the roofing, and to reflect solar radiation.

Nov. 2008: Exterior door in the Conference Room was replaced with a fire compliant state fire code regulation door.

March 2009: Ceiling in the rear hall of the lab building was replaced.

May 2009: A new air conditioning system was installed in the Conference Room to replace the old unit that failed.

July 2009: The exterior of the lab building was completely scraped and re-painted.

Jan. 2010: The furnaces and air conditioner for the East half of the lab building were replaced. The air conditioner was replaced at the same time, as this unit was had recently failed, while minimizing furnace installation efforts.

Asbestos pipe insulation prior to abatement in Oct. 2010

Oct. 2010: The asbestos pipe insulation in the crawl space under the lab building was abated, and the pipes were reinsulated. CALS Buildings & Properties (B&P) provided procedural advice, and the director of the NYSAES paid for ⅓ of the project expense.

March 2011: The electrical system in the greenhouses was upgraded to modern electrical code, enhancing employee safety. The work involved installing a new subpanel in the head-house, and using watertight connections and boxes throughout the greenhouses. Most of the materials were purchased with research program funding, while the HVRL hired a contractor to complete the work.

April 2011: Several light fixtures in the lab building were upgraded to improve energy efficiency. This was work that the electrical contractor was able to add on after finishing the greenhouses, and materials were likewise purchased with research program funds.

June 2011: The phone system servicing the lab, shop, and pesticide storage buildings was upgraded with one that was used, but newer.

Feb. 2012: The smoke detectors for the lab building's fire alarm system were replaced since one had already failed, and another was showing signs of malfunctioning.

March 2012: The old insect rearing room was converted into an office to provide more space for new Cooperative Extension employees.

July 2012: The lab roof was again sealed with aluminized roof coating.

Sept. 2012: The cracks in the parking lots and driveways were sealed to prevent excessive moisture from seeping through the blacktop.

Dec. 2012: The Superintendent's office light fixtures were upgraded with energy efficient lights.

March 2012: A storage room was modified for the storage of a retired professor

Sept. 2013: The roof drain in the head-house was replaced since the old one had begun leaking.

Oct. 2014: New gates were installed at the front parking lot and driveway to replace the old, rusty one.

Collapsed roof of C.S.L.E.D. pavilion in Feb. 2010

C.S.L.E.D. pavilion reconstructed and reinforced in Nov. 2010

Rear hallway in HVRL building with new ceiling, and LED light fixtures

Oct. 2014: The parking lots and driveways were seal-coated as a second part of our plan to prevent excessive moisture from seeping through the blacktop.

July 2015: A new mower was purchased for use in the high-density plantings to replace the worn out mower that had been used.

Sept. 2015: The rear, exterior wall of the lab building was scraped, and re-painted.

Jan. 2016: The light fixtures in the rear hallway were upgraded to energy efficient lights.

Changes funded by Cornell University (CALS B&P, NYSAES – Geneva, & HVL research grants):

May 2008: A new videoconference system was installed in the Conference Room, which was compatible with the systems used by Cornell and Cooperative Extension.

Aug. 2008: An additional John Deere Gator was purchased.

Aug. 2008: The flow meter used for precisely metering the water needed for experimental pesticide applications failed, and was replaced.

Oct. 2008: The networked laser printer was replaced.

Spring 2009: A stone fruit virus testing planting was established. The trees were planted in 5 separate plots due to space limitations.

Nov 2010: The pesticide rinse waste disposal pavilion was replaced due to a structural weakness that had been exploited by an excessive snow load during the previous February, which collapsed part of the roof. CALS B&P engineered the project, and hired contractors to complete the job. I provided a local point of contact between the contractors and Cornell.

May 2012: The water softener for the lab building was replaced, because the old one could no longer be repaired.

Pesticide Storage Building in Jan. 2014 showing concrete block water tower at right

Pesticide Storage Building with water tank in current position next to the building, and new, black utility trailer in the foreground

Jan. 2013: A doorway was installed between the Entomology laboratories to provide a way to keep chemicals from being transported through the hallway.

Aug 2014: The sprayer-fill water tank was removed from the concrete block tower, which was beginning to crack, and installed on a concrete pad next to the Pesticide Facility. Most of the work was done by CALS B&P.

Feb. 2010: A new utility trailer was purchased to transport small sprayers, and utility vehicles to test plots at cooperating orchards.

Spring 2010: Two high-density research blocks were established: one to demonstrate a variety of training systems, and the other to provide a block for organic pesticide trials.

Dec. 2010: A new, narrow 4-wheel drive tractor was purchased for use in the new, high-density blocks.

Nov. 2011: One of our handgun sprayers was rebuilt, and outfitted with a larger pump, vertical boom, and air injection nozzles, permitting the sprayer to be used as a tower sprayer in the high-density organic plot.

Jan. 2012: Entomology lab was renovated, and outfitted with heat pump and humidifier to accommodate climate controlled insect rearing.

Dec. 2012: The roof on the fuel tank shed by the barn was replaced due to signs of leakage.

March 2013: Wireless network was installed in the Conference Room using CCE funding, in order to meet their needs for Internet access during many of their meetings.

March 2013: Tractor mounted hedging machine was purchased, facilitating our ability to participate in cherry hedging trials.

Spring 2013: A small berry variety planting was planted with strawberries, raspberries, and blueberries establishing a small-scale research plot for investigating spotted-wing drosophila.

Spring 2013: Several rows of apple trees were planted, establishing a block to be used for virus testing.

Aug. 2014: Approximately ⅕ of the Stone Fruit Virus planting was removed as part of the virus testing protocol.

Nov. 2014: Tower sprayer was purchased to replace a failing air blast that was used for research plot pesticide applications.

Tower sprayer custom-built by Slimline Manufacturing

Dec. 2014: A new snowplow was installed on one of the newer trucks in the HVL fleet, while the old truck and plow were sold.

Summer 2015: A new Haskap berry variety planting was established by CCE, and Haskaps were added to the small berry variety plot.

Summer 2015: About ⅔ of the remaining Stone Fruit Virus planting was likewise removed.

Nov. 2015: A new pond water filter was purchased to replace the failing, old filter system. However, it remains to be installed before spraying and irrigation commence this year.

Cornell Cooperative Extension (CCE)
Eastern New York Commercial Horticulture Program (ENYCHP)
CCE Specialist Activities Conducted Out of the Hudson Valley Research Laboratory in 2015

What is CCE ENYCH Regional Extension Program?

ENYCH staff specialists offer educational and applied research support to fruit and vegetable growers in 18 Eastern New York counties. Our territory stretches from the New Jersey state line in the south to the Canadian border. The regional team currently consists of 13 specialist/educators, supported by three technicians and one administrative assistant. The team covers commercial tree fruit, grape, berry, and vegetable producers across the ENY region. The regional program is supported financially by the 18 Cornell Cooperative Extension County Association members, supplemented by specialist-generated grant funds, grower fees, and federal Smith-Lever funds administered through the Cornell University College of Agriculture and Life Sciences.

The Hudson Valley Research Laboratory contributes office and laboratory space to the four ENYCHP team members currently housed at the facility

ENYCHP Staff Housed at the Hudson Valley Research Laboratory

Dan Donahue: Tree Fruit Specialist
518-322-7812
djd13@cornell.edu
Applied Research and Survey Projects in 2015
- Black Stem Borer Distribution, Biology, and Role in Apple Tree Decline
- Fall Weed Control in Apples
- Precision Orchard Management
- Brown Marmorated Stink Bug Survey
- Precision Honeycrisp Harvest Management
- Apple Harvest Maturity Program

Teresa Rusinek: Vegetable Specialist
845-389-3562
tr28@cornell.edu
Applied Research and Survey Projects in 2015
- Edamame, a New Crop for the HV
- Tomato Variety Evaluation Trial
- Winter Squash Disease Resistance Evaluation Trial
- Developing Best Management Practices for High Tunnel Vegetable Production
- Improving Vegetable Nutrient Management in High Tunnels
- NYSERDA Greenhouse Germination & Energy Efficiency Study
- Brown Marmorated Stink Bug Survey

Jim O'Connell: Grapes & Berries Specialist
845-943-9814
jmo98@cornell.edu
Applied Research and Survey Projects in 2015
- Haskaps, a New Crop for the Hudson Valley
- Improving Farm Worker/Management Communication in the Hudson Valley

Sarah Rohwer: Technical Support Specialist
845-691-7117
ser37@cornell.edu

Partial List of Educational Opportunities Provided by ENYCHP Staff Housed at the HVRL in 2015
- Two Days of Winter Tree Fruit School
- Winter Berry & Grape School
- Winter Vegetable School
- Educational Sessions at the Empire State Producers Expo
- Winter Apple Pruning Demonstrations
- Special Permit Pesticide Applicator Safety Training
- Apple Thinning Meetings
- Apple Storage Technology Workshop
- Plum Pox Virus Workshop
- Tomato Variety Twilight Meeting
- Nursery Greenhouse School
- Root Crops Twilight Meeting
- High Tunnel Best Practices Workshop
- Beginning Farmer Webinars
- Vineyard Pruning Workshops
- Vineyard Site Selection Workshop
- Vineyard Canopy Management Workshop

Developing a spray program for grape growers - *Jim O'Connell*

Pest management is an important part of growing any crop. Even experienced growers look to Cornell Cooperative Extension for advice on what to spray and when. Grape growers will frequently seek my advice on specific components of their spray program (e.g. botrytis sprays). More recently though I have had new or inexperienced grape growers seek my advice for a full season spray program. Based on the type of grapes (wine, concord, or table) I have been able to put together a program for various growers. These programs will be implemented in the 2015 growing season. I plan to follow up with them as the season progress to see what changes may need to be made to their programs.

2015 Apple Pruning Demonstrations in the Hudson Valley – Dan Donahue

Demonstrations of modern apple tree pruning techniques were held at Crist Bros. Orchards in Milton, Ulster County, and at Yonder Farms in Valatie, Columbia County, in early March. The demonstrations were sponsored by the Cornell Cooperative Extension Eastern New York Commercial Horticulture Program (ENYCHP), and featured Cornell University's internationally renowned professor of pomology, Dr. Terrence Robinson. Professor Robinson and his staff demonstrated the latest pruning techniques on state of the art "tall spindle" apple plantings. The concurrent educational sessions were conducted in both English and Spanish, with 100 in attendance at the Milton site, and another 40 in Valatie. Local growers as well as an orchard equipment fabricator from Western New York demonstrated the use self-propelled pruning/harvest platforms. The use of platforms greatly reduces the need for ladders, improving both worker safety and efficiency.

2015 Hudson Valley Pruning Demo

Photograph by Dan Donahue, ENYCHP

2015 Hudson Valley Platform Demo,
Photograph by Dan Donahue, ENYCHP

Edamame Trial in Red Hook, Dutchess County - *Teresa Rusinek, Chuck Bornt, Bob Weybright, Jesse Strzok, Sarah Rohwer*

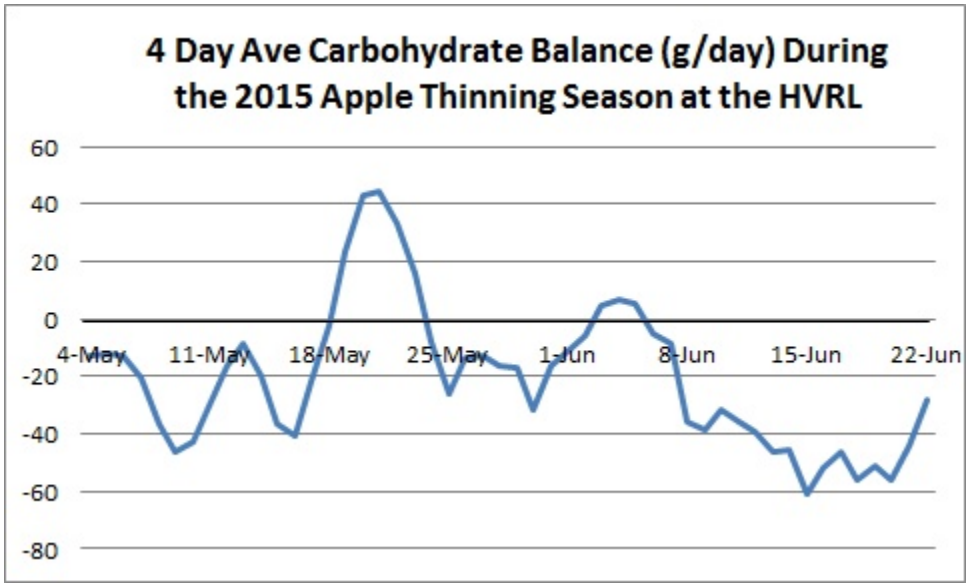
ENYCHP vegetable specialists are working with a local farmer to pinpoint the obstacles to growing and marketing vegetable soybeans, commonly referred to as edamame. These beans are harvested green and sold as a fresh market crop direct

to consumer in the pod, or frozen, either in the pod or removed from the pod. It is a crop small scale and large scale farmers could become quickly skilled at growing with some assistance. This trial, which includes 6 varieties of edamame, will help determine if it is feasible and economical to grow the crop in the mid and lower Hudson Valley regions of NY; determine the proper cultural properties required for edamame to be grown in eastern NY (variety selection, spacing etc.);investigate value added aspects of edamame production including freezing of fresh product to be used later after production has ended, and offer growers alternative crop to add to their market portfolio and tap into a market niche.

2015 Precision Thinning Trials: Monitoring June Drop - Dan Donahue

In 2014, we experienced a significant carbohydrate deficit during the month of June. From June 6-13, and again June 24-July 4, 2014, carbohydrate production did not meet the high demands of fruit growth and shoot growth. As a result, researchers surmised that the result was a larger than normal June drop. The substantial June drop was interpreted as over-thinning, and contributed to last year's short crop in the Hudson Valley, costing growers many thousands of bushels of fruit.

For the 2015 season I measured the diameter of fruit, and analyzing the growth patterns in six of our Precision Thinning trials with the goal of monitoring for a June Drop response under the less-than-ideal growing conditions we experienced in the first half of the 2015 growing season. To recap, around this time in 2014 we experienced, but only noticed in hindsight, an acute drop in carbohydrate production. The carbohydrate model indicated a four-day average deficit of 68.8 grams/tree during the second week in June. A portion of last season's shorter-than-expected crop in the Hudson Valley has been attributed to an "excessive" June drop, and this acute dip in carbohydrate production by the trees was thought, in hindsight, to have been a significant factor. It is interesting to note that at the time, the only calls that came in to our Extension Office reporting an unusual degree of fruit drop were from southern Orange County. Below is a picture of per tree carbohydrate production for the critical post-petal fall period of mid-May through mid-July at the Highland Lab as predicted by the carbohydrate model. The model projects through June 22nd. The "0" line indicates a neutral balance, that is the tree is producing as much carbohydrate as it uses. Note that at the Hudson Valley Research Lab (HVRL), we had been running a deficit for almost 30 days. In a case such as this, the tree has to draw on reserves in order to maintain the growth of fruits and shoots. The consequence of a prolonged carbohydrate deficit is likely to be reduced fruit growth. On June 15th, the model reported a four day average deficit of 60.9 grams/tree. While approximately 12% less



that the acute drop experienced in 2014, this time it is coupled with a 30 day period of carbohydrate deficit. A problem here is that we really didn't know what to make of this. Yes, our crop picked out shorter than expected last season, but additional factors may have played into the disappointment, including the exceedingly dry harvest season, and the very human impulse not to recognize that we had the potential for a short crop all along.

Continued fruit measurements and analysis through early July eventually showed that June drop was not a concern in 2015. As a result, growers were advised to continue hand-thinning aggressively in order to reduce excessive crop load, with the objective to increase both fruit size and flower bud initiation. Hand thinning could be continued without concern about June drop, and the potential risk of over-thinning.

Pre-Harvest Cracking in 2nd & 3rd Pick Honeycrisp - *Dan Donahue*

I began to observe small cracks on fruit in some blocks of Honeycrisp on Monday, September 14th. On Tuesday I observed severe cracking damage in two orchards that had received 6.5" of rain since September XX. I began to record data on cracking in Columbia County, as I collected samples for an unrelated research project. Here's what I found:

% if apples with cracking

Block #1: 2%

Block #2: 12%

Block #3: 7%

Block #4: 6%

Block #5-11: no damage

Blocks #12 & 13: high percent damage observed, but no data available to confirm the degree

In addition, I have one report from Ulster County of severe losses to cracking in a block of Honeycrisp; I will be looking at that block tomorrow. Here is an example of the damage. Cracks are not limited to the "shoulder" of the apple, they can be found anywhere. Some cracks are relatively fresh, others, like this example, have begun to heal over. Cracking was not observed in Honeycrisp sampled the prior week (September 8 & 9).

Photo by D.J. Donahue

Is "excessive" rainfall the cause? NEWA stations indicate that Columbia County and Northern Dutchess was the recipient of a large volume of rain over a short period of time:

- Red Hook: 3.75" since 09/09/15
- Hudson: 4.57" since 09/10/15
- Grower Report: 6.5" recently

Ulster& Orange Counties appear to have received less:

- HVRL: 1.57" 09/14/15
- New Paltz: 2.60" since 09/12/15
- Marlboro: 2.17" since 09/10/15
- Modena: 2.88" since 09/10/15

In addition to considering the timing and volume of rainfall, we can also speculate on the role of other factors in why this condition is occurring in some blocks but not in others:

- Crop load
- Fruit sizing in the block
- Irrigated or not
- Relative maturity of the fruit in the block (for example, there was a nine

day spread between first picks in my three Honeycrisp Precision Thinning trials).
- Rootstock choice and/or tree vigor
- Tree age
- PGR use (i.e. Harvista delaying maturity and reducing cracking???)

This condition has been rarely seen in the past, and perhaps we will never see it again, but it would be good to understand as much as possible now while we have the opportunity.

Additional Rainfall May Put Trellis Systems at Risk - *Dan Donahue & Anna Wallis, ENYCHP, and Peter Jentsch, HVRL*

Trellis Failure - Gala/Tall Spindle, September 2015

Photograph by D.J. Donahue

Stress Factors

- 2 – 4" of rain over the next several days, possible more if the hurricane hits.
- High winds, increasing in severity if Hurricane Joaquin turns inland this weekend.
- Heavier than average crop this season
- Fruit size has increased dramatically due to recent rains and favorable temperatures
- Some mature tall spindle blocks have become too tall for the supporting trellis structure.
- Undersized support posts (even if they are closely spaced)
- Ineffective anchor systems
- Trellis wire(s) not adequately tensioned
- While it may seem that trellis on hillsides would be most vulnerable, this is not necessarily the case. The quality of trellis construction, stability of the underlying soil, strength of prevailing winds, deviation of the trellis structure from true vertical (plumb), and the extent that trees have been allowed to grow beyond the top wire are more important considerations. Trellis's fail on perfectly flat sites if the forces acting on the structure move from vertical towards horizontal.

Stress Failures

- Anchors giving away in soft ground
- Trellis posts giving away in soft ground
- Trellis posts snapping at the base
- Top wire breaking under load (not very common)

Quick Fixes to Shore Up a Weak Trellis System

- Identify your weakest, at risk trellis systems.
    - Inspect anchors
    - Check for broken posts & heaving posts
    - Check wire tension

- Re-set weak anchors or reinforce with some heavy weight (large block, equipment, etc.)
- Set 2"x6" studs as crutches on leaning posts to reduce sideways movement
- Re-tension trellis wires, starting with the top wire (as long as the anchors can handle it)
- Tie off the top of a failing post to a stronger post on the opposite the direction of movement. Tying off to the base of the post in the adjacent row would be strongest, but will effectively block that row middle to wheeled traffic, and could be dangerous if not very well marked with high-visibility flagging. It would be best to entirely block traffic from the affected row middle.

Invasive Grape Pest Monitoring – *Jim O'Connell*

Tim Weigle, the statewide grape IPM specialist and team leader Lake Erie Regional Grape Program oversees an annual monitoring program for invasive grape pests. With the help of local educators and technicians, traps to monitor potential invasive grape pests were placed in vineyards throughout New York State. In the Hudson Valley, there were five grower cooperators in Columbia, Dutchess, and Ulster Counties who participated in this monitoring program. I made the initial contact with growers, explained the details of the program, and set out the traps in late July 2015. Traps were serviced and maintained, by Sarah Rohwer, ENY technician on a bi-monthly basis through mid-October. Traps were checked for the presence of any of the invasives and their presence or absence was recorded. At the conclusion of the project, a final report will be submitted to the project lead.

Stress-Induced Watercore in NY-2 -

Anna Wallis & Dan Donahue

Stress-Induced Watercore has been identified as an issue for this variety in all production regions of NY, this season, especially as fruit gets closer to maturity. This form of watercore resembles typical watercore in that it produces *glassy, water-soaked tissue* within the flesh of the fruit. However, rather than being associated with the vascular bundles, this tissue is found *directly under the skin*, *on the most*

Stress-induced water core – external view. *Photo by Dan Donahue*

sun-exposed side of the fruit. It is hard to detect without cutting into the fruit, but not impossible. Translucent, water soaked tissue is apparent just under the skin, and can appear like a darker, blotchy, poorly defined discoloration.

Stress-induced water core. *Photo by Anna Wallis*

ENYCHP, HVRL, and Cornell Faculty are cooperating on further studies to address this issue:

- We are investigating preconditioning as a means of treating this fruit in both the Hudson and Champlain Valleys. Storing fruit at temporarily at higher temperatures for a brief period will increase metabolism in the fruit, hopefully leading to dissipation or re-absorption of the sorbitol and water back into cells. Thus, glassy, water-soaked tissue would be reduced.
- A longer-term air-storage trial is being carried out at the Hudson Valley Lab.
- A more complex storage trial is being conducted by Dr. Chris Watkins in Ithaca.

These trials will provide more information on this phenomenon and benefit growers for next year's harvest.

Grower Outreach Metrics for ENYCHP Staff Activities at the HVRL in 2015

Phone consults	391
E-mail consults	503
Number of farm visits	625
Number of field/classroom meetings	22
Number of attendees at those meetings	1213
Number of webinars/other distance	5
Number of participants in those webinars	94
Newsletters	
Produce Pages	6
Veg newsletter	23
tree fruit newsletter	6
tree fruit grower alerts - email	37
apple harvest maturity reports - email	3
berry newsletter (print)	13
berry newsletter (email)	13
grape newsletter	8
grape e-newsletter	8

Publications by Dave Rosenberger, 2013-2015

Refereed publication and professional meeting abstract:

Beckerman, J, Sundin, G, Rosenberger, D. 2014. Do IPM Concepts contribute to the development of fungicide resistance? Lessons learned from the apple scab pathosystem. Pest Management Science 71(3):331-342. (First published on-line 6 Feb 2014 DOI 10.1002/ps.3715.)

Rosenberger, D.A., and Rugh, A.L. 2014. Selecting and timing fungicides to control sooty blotch and flyspeck on apples in southeastern New York. (Abstr.) Phytopathology 104(Suppl. 1):S1.6. http://dx.doi.org/10.1094/PHYTO-104-3-S1.1

Book Chapters — short contributions:

Hickey, K.D., and Rosenberger, D.A. 2013. Calyx-End Rot. Pages 39-40 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Hickey, K.D., and Rosenberger, D.A. 2013. Nectria Twig Blight. Pages 48-49 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Rosenberger, D.A. 2013. Dry Eye Rot. Page 39 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Rosenberger, D.A. 2013. Postharvest Diseases. Page 75 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Rosenberger, D.A. 2013. Blue mold. Pages 76-77 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Rosenberger, D.A. 2013. Phomopsis Canker, Rough Bark, and Fruit Decay. Page 55 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

van der Zwet, T., and Rosenberger, D.A. 2013. Mycosphaerella Leaf Spot. Pages 45-46 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

van der Zwet, T., and Rosenberger, D.A. 2013. Fabraea leaf spot. Pages 28-30 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Rosenberger, D.A., and Xiao, C.L. 2013. Fungi causing miscellaneous postharvest diseases. Page 86 *in* "Compendium of Apple and Pear Diseases and Pests, 2nd edition ", T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. APS Press, St. Paul, MN. 218 p.

Technical reports describing field trials:

Rosenberger, D.A., Meyer, F.W., Rugh, A.L., Feldman, P.M., and Kostina, J. 2014. Post-infection efficacy of fungicides for controlling summer diseases on apples, 2013. Plant Disease Management Reports 8:PF013. Online publication. DOI:10.1094/PDMR08.

Rosenberger, D.A., Meyer, F.W., Rugh, A.L., Feldman, P.M., and Truncali, D.N. 2014. Comparison of copper products applied at green tip to control fire blight on apples, 2013. Plant Disease Management Reports 8:PF014 Online publication. DOI:10.1094/PDMR08.

Rosenberger, D.A., Meyer, F.W., Rugh, A.L. Feldman, P.M., and Truncali, D.N. 2014. Control of apple scab and cedar apple rust with Flint 50WDG, Inspire Super EW, ProPhyt, and Agri-Fos, 2013. Plant Disease Management Reports 8:PF015 Online publication. DOI:10.1094/PDMR08.

Rosenberger, D.A., Meyer, F.W, Rugh, A.L., Sudol, L.R., and Hyatt, T.M. 2013. Evaluation of new fungicides for early-season disease control in apples, 2012. Plant Disease Management Reports 7:PF040. Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., Meyer, F.W, Rugh, A.L., Sudol, L.R., and Hyatt, T.M. 2013. Evaluation of new fungicides for controlling Fabraea leaf spot on pears, 2012. Plant Disease Management Reports 7:PF041. Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., Rugh, A.L., Hyatt, T.M., and Meyer, F.W. 2013. New postharvest fungicides and formulations for controlling blue mold in stored apples, 2012-13. Plant Disease Management Reports 7:PF042. Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., Rugh, A.L., Hyatt, T.M., and Meyer, F.W. 2013. Controlling gray mold in stored apples with new postharvest fungicides and formulations, 2012-13. Plant Disease Management Reports 7:PF043. Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., and Rugh, A.L. 2013. Control of bitter rot with postharvest applications of Scholar, 2011. Plant Disease Management Reports 7:PF044. Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., Meyer, F.W, Rugh, A.L., Sudol, L.R., and Hyatt, TM. 2013. Comparisons of Inspire Super and Pristine for controlling summer diseases on apples, 2012. Plant Disease Management Reports 7:PF045. Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., Meyer, F.W, Rugh, A.L., Sudol, L.R., and Hyatt, TM. 2013. SDHI fungicides for apple disease control in programs limited to two chemistries per treatment, 2012. Plant Disease Management Reports 7:PF046 Online publication. DOI:10.1094/PDMR07.

Rosenberger, D.A., Meyer, F.W, Rugh, A.L., Sudol, L.R., and Hyatt, TM. 2013. New SDHI fungicides used alone or in combinations for early-season disease control on apples, 2012. Plant Disease Management Reports 7:PF047. Online publication. DOI:10.1094/PDMR07.

Extension Newsletter publications

Cox, K., and Rosenberger, D. 2015. Fungicide update for New York. Scaffolds 24(1):2-5.

Reprinted:

Tree Fruit News, Eastern NY Commercial Horticulture Program, Vol. 3(1):2-4.
Fruit Notes, Lake Ontario Fruit Program

Rosenberger, D. 2015. Prebloom signs of fire blight? Scaffolds 24(2):4-5.

Rosenberger, D. 2015. Contorlling early-season apple diseases in organic orchards. Scaffolds 24(5):7-10.

Cox, K., Rosenberger, D., Breth, D., Carroll, J. 2015. Guidelines for managing fire blightin 2015. Scaffolds 24(6):4-7.

Cox, K., and Rosenberger, D. 2015. End of season disease management in apples. Scaffolds 24(24):5-7.

Rosenberger, D., and Cox, K. 2014. Fungicide considerations for tree fruits in 2014. Scaffolds Fruit Journal 23(1):4-6. On-line at http://www.scaffolds.entomology.cornell.edu/2014/SCAFFOLDS%203-24-14.pdf.

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Healthy Fruit, University of Massachusetts Fruit Program 22(2), 8 April 2014. (J. Clements, ed.).

Tree Fruit News, Eastern NY Commercial Horticulture Program 2(1):2-4,7-8, 3 April 2014. (Steve Hoying, ed.).

Rosenberger, D. 2014. Apple scab warning for the Hudson Valley. Scaffolds Fruit Journal 23(4):1-2. On-line at http://www.scaffolds.entomology.cornell.edu/2014/SCAFFOLDS%204-14-14.pdf.

Rosenberger, D. 2014. Dealing with fire blight in June. Scaffolds Fruit Journal 23(13):5-6. On-line at http://www.scaffolds.entomology.cornell.edu/2014/SCAFFOLDS%206-16-14.pdf.

Reprinted:

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Blog posts at http://blogs.cornell.edu/plantpathhvl/blog/ :

5 January 2015: Trunk Disease Problems on 'Crimson Topaz'

16 February 2015: Top-working Could Speed Production of Cider Apples

11 April 2014: Apple scab warning

14 April 2014: Scab Spores Ready to Go!

14 April 2014: Clarification on Scab Spores Ready to Go

15 April 2014: Spring Checklist for Stone Fruit Disease Control

16 April 2014: Avoid Adding Insult to (Frost) Injury

22 April 2014: Apricots at Full Bloom

24 April 2014: Brown Rot & Black Knot Warning on Stone Fruit

27 April 2014: Scab Warning

1 May 2014: Fungicide Strategies after the Rain

5 May 2014: Protecting Pollinators during Bloom

6 May 2014: Mark Wild Cherry Hosts for X-disease Now

8 May 2014: Fire Blight (not yet!)

8 May 2014: Preventing Brown Rot Blossom Blight

12 May 2014: Fire Blight Risk Remains High

12 May 2014: Apple Scab/Mildew Threats

14 May 2014: Bacterial Spot on Stone Fruits

16 May 2014: Bacterial Spot on Stone Fruits

16 May 2014: Scary Weather for Apple Diseases

20 May 2014: Update on Fire Blight Risks

22 May 2014: Assessing Hail-related Fire Blight Risks

28 May 2014: Dealing with Fire Blight After Bloom

29 May: Apple Diseases Appearing Now

14 June 2014: Dealing with Fire Blight

24 June 2014: More on Fire Blight
30 June 2014: Apple Summer Diseases, Herbicide Problems, and Irrigation
4 July 2014: A Flood of Fungal Problems?
28 July 2014: Time to Clean Up Apple Storage Rooms

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Lehnert, R. 2015. Those rotten Honeycrisp. Good Fruit Grower 66(11):36-37.
Bitter rot on collapsed Honeycrisp fruit with smaller lesions on adjacent fruit.
Cross-section of bitter rot lesions on Honeycrisp.
Honeycrisp fruit fully engulfed by white rot.

Breth, D. 2014. Apple rust diseases. *In: Apple IPM for Beginners*, D. Breth, ed. 2014. Cornell University Cooperative Extension Lake Ontario Fruit Program. On-line at http://fruit.cornell.edu/orchard-ipm/ .
Fact sheet #8:
Photo 1a: Cedar apple rust gall on red cedar
Photo 1b: Active spore production of cedar apple rust.
Photo 3: Cedar apple rust infection of apple
Photo 4: Quince rust infection of apples

In: Compendium of Apple and Pear Diseases and Pests, 2nd edition, T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. 2014. APS Press, St. Paul, MN. 218 p.
Pg. 15, Fig. 10: Pycnial and aecial stages of cedar apple rust lesions on leaves.
Pg. 29, Fig. 32: Fabraea leaf spot infection on pear fruit.
Pg. 36, Fig. 42 Blotch, caused by *Phyllosticta solitaria,* on an apple.
Pg. 55, Fig. 76: Internal and external symptoms of Phomopsis fruit decay in the calyx end of 'Delicious' apples.
Pg. 55, Fig. 77: Core rot of an apple with Phomopsis fruit decay, cause by *Phomopsis mali*, with a gas pocket.
Pg. 69, Fig. 91: Fingerlike fruiting structures of the black root rot pathogen *Xylaria polymorpha*.
Pg. 91, Fig 121: Raised, expanded blister spot lesions on a 'Mutsu' apple.
Pg. 108, Fig. 144: Russet ring on 'Mutsu".
Pg. 122, Fig. 164: Frost rings on apples and pears.
Pg. 124, Fig 169: Dried, separated pith if an apple shoot struck by lightening.
Pg. 131, Fig 184: Soft scald on a 'Honeycrisp' apple.

Publications by Gemma Reig-Cordoba, 2013-3015

Lordan, J., Robinson, T., Francescatto, P., Reig, G., Wallis, A., Lakso, A. Precision Irrigation: How and why we should irrigate. New York Fruit Quaterly, *In press*.

Publications by Peter Jentsch, 2013-2015

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Jentsch, P. J. 2015. Results of Insecticide and Acaricide Studies in Eastern New York. Cornell University's Hudson Valley Laboratory Pub. # HV2014. On-line. (http://blogs.cornell.edu/jentsch/files/2013/10/2011.Final-147bzjh.pdf)

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Jentsch P. J. 2013. Assessing the Invasiveness of the Asian Brown Marmorated Stink Bug in NY. Fruit Quarterly, Volume 21 No. 3. On-line: http://www.nyshs.org/pdf/2008-Volume-16/Vol-16-No-3/Hudson-Valley-Stink-Bug-Management.pdf

Jentsch P. J. 2012. The Unpredictable Brown Marmorated Stink Bug in New York State. Fruit Quarterly, 20 (1). On-line: http://www.nyshs.org

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- Jentsch P. J. 2015. Brown Marmorated Stink Bug: Field Confusion. Scaffolds Fruit Journal 24(19). On-line. http://www.scaffolds.entomology.cornell.edu/2015/SCAFFOLDS%208-3-15.pdf
- Jentsch P. J. 2015. San Jose Scale Crawler Emergence. Scaffolds Fruit Journal 24(11). On-line. http://www.scaffolds.entomology.cornell.edu/2015/SCAFFOLDS%206-8-15.pdf
- Jentsch P. J. 2015. Pre-bloom Problems. Scaffolds Fruit Journal 24(4). On-line. http://www.scaffolds.entomology.cornell.edu/2015/SCAFFOLDS%204-20-15.pdf
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- Jentsch P. J. 2014. Hudson Valley Pest Management Updates. Plan For Early Scale Management. Scaffolds Fruit Journal 23(2). On-line. http://www.scaffolds.entomology.cornell.edu/2014/index.html
- Jentsch P. J. 2014. Hudson Valley Pest Management Updates. Reducing The
- Impact From 17-Year Cicada In Tree Fruit. Scaffolds Fruit Journal 23(2). On-line. http://www.scaffolds.entomology.cornell.edu/2014/index.html
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- Jentsch P. J. 2013. Hudson Valley Pest Management Updates. Mite Mgt. Scaffolds Fruit Journal 22(18). 3-5 On-line. http://www.scaffolds.entomology.cornell.edu/2013/index.html
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- Jentsch P. J. 2013. Hudson Valley Pest Management Updates. IPM Update. Scaffolds Fruit Journal 22(13). On-line. http://www.scaffolds.entomology.cornell.edu/2013/index.html
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Blog posts at https://blogs.cornell.edu/jentsch/ :

Jentsch 2015.

- Leafhopper and ECB damage increasing: Maintain terminal growth of newly planted trees. June 16th
- Leafroller Management: Finding the (re) application window. June 16th
- If You're In The Open…Get Covered…..CM, SJS & PLH Mgt…..OBLR June 14th. June 10th
- Curculio migration continues as codling moth eggs develop. Stayed covered!. May 25th.
- Black Stem Borer found in 'Pink Lady' apple, Highland NY. May 24th.
- Drought Forecast: Stink bug on the rise. May 14th.
- Plum Curculio Damage on Cherry & Pear Increasing. May 11th.
- PC management in apricot: Earlier than in apple! May 7th.
- Pink: To Spray or Not To Spray (GFW): (Scouting Report) April 30th
- Pink: To Spray or Not To Spray (TPB): (Scouting Report) April 27th
- Dogwood Borer and Scale, Not to be Taken Lightly: (Scouting Report) April 24th
- Jentsch 2015. Tree Fruit Management @ ½" Green: (Scouting Report) April 20th
- Jentsch 2015. Pear Psylla Hunt Finds First Eggs: April 6th

Jentsch 2014.

- BMSB Harvest Update: Damage to Red Delicious at Harvest: October 2nd, 2014
- BMSB Trapping Update: Flucuating Temperatures = Sporatic Trap Captures.
- BMSB Update: Increasing Damage to Pink Lady Apple Observed In Columbia County.
- Hudson Valley Pest Management Updates. Reducing The
- BMSB Trap & Scouting Update: BMSB Trap Numbers Continue to Drop. Site Specific Management Required: September 30th
- BMSB Trap & Scouting Update; BMSB Managed Orchard Trap Numbers Drop Dramatically, Yet Continued Management Is Required: September 19th,
- BMSB Trap & Scouting Update: BMSB Trap Numbers Continue to Drop. Site Specific Management Required: September 30th, 2014
- BMSB Update: Assessing Fruit Damage at Harvest. Is it Hail, Bitter Pit, Apple Maggot or Stink Bug?
- Cornell in the News: CBS2 Report on Spotted Wing Drosophila
- BMSB Trap & Scouting Update; All Trap Sites Above Threshold For Management: Sept. 11th
- Sweet Corn Report, September 9th
- Workshop Invitation: Establishing A Successful High Density Organic Orchard Cropping System. Hoying, Rosenberger, Cook & Jentsch @ HVRL
- BMSB Trap & Scouting Update: September 5th
- Spotted Wing Drosophila Update: August 29th.
- BMSB Trap & Scouting Update: August 28th
- Sweet Corn Report, August 27th
- Extensive damage from BMSB Observed On Peach in Highland, NY: August 25th
- BMSB Update: August 20. Confirmed Late Season Feeding to Apple, Peach and Pepper
- Mite Management Using Reduced Risk Pest Management Programs and Biological Control.
- DEC Approves Special Local Needs (SLN) registration for Envidor 2 SC
- Late Bite: Summer OBLR Emergence OFM, ECB, DWB and BMSB; Aug.18th
- Brown Marmorated Stink Bug: August 15th Update.
- Apple Maggot: When Control Is No Longer Needed. August 14th.
- Sweet Corn Report: July 31st

- Brown Marmorated Stink Bug: July 30th Trap Site Data Update
- Spotted Wing Drosophila (SWD) Update: July 30th. SWD Fruit Injury to 'Prelude' Raspberry in Southern Dutchess County.
- Spotted Wing Drosophila (SWD) Update: July 28th. SWD Adults in Dutchess County
- Spotted Wing Drosophila (SWD) Update: July 25th. SWD in Hudson Valley Raspberry and Blueberry. http://blogs.cornell.edu/jentsch/2014/07/
- Brown Marmorated Stink Bug: July 24th Trap Site Data Update
- Brown Marmorated Stink Bug: Update July 19th. Intensify Scouting Efforts.
- Apple Maggot at Treatment Threshold at the Hudson Valley Lab. July 18.
- Codling Moth 2nd Generation Management This Week.
- Sweet Corn Report: July 15th 2014
- Obliquebanded Leafroller and Tufted Apple Bud Moth Management This Week in the Mid-Hudson Valley.
- San Jose Scale Damage Increasing on Hudson Valley Apple
- Jentsch P. J. 2014. Fruit with Frass. Assessing 1st Generation Codling Moth Injury
- Jentsch P. J. 2014. Brown Marmorated Stink Bug Trapping in the Hudson Valley: June 19th
- Jentsch P. J. 2014. Controlling Potato Leafhopper To Reduce Fireblight and Maintain Growth on Young Apple Trees
- Jentsch P. J. 2014. Time To Weigh In Hard On Scale This Week!
- Jentsch P. J. 2014. OBLR Update: First Egg Hatch Predicted For June 20th
- Jentsch P. J. 2014. Brown Marmorated Stink Bug Update (BMSB): Eggs And Nymphs Found On Bartlett Pears. http://blogs.cornell.edu/jentsch/2014/06/
- Plum Curculio Migration Nearing Its End: Regional PC Model Update.
- When Obliquebanded Leafroller (OBLR) Fly: OBLR Management at 1st Hatch.
- Brown Marmorated Stink Bug In NYS: Urban & Agricultural Assesment.
- Early Pear Psylla Management: 1st of 2 pre-bloom application trial results.
- Insect Degree Day Models for Management As of May 24th.
- Mite management without oil at PF-1C
- Delicious and Ginger Gold at 80% PF http://blogs.cornell.edu/jentsch/2014/05/
- When Petals Fall: Insect pest management decision-making at PF.
- Bloom: Preserving the King. http://blogs.cornell.edu/jentsch/2014/05/
- Logistics of tarnished plant bug management.
- http://blogs.cornell.edu/jentsch/2014/05/
- Jentsch P. J. 2014. First Flight: Considerations for Early 'Worm' Management to NY Apple. http://blogs.cornell.edu/jentsch/2014/05/
- Jentsch P. J. 2014. Hudson Valley Insect Management at Tight Cluster: April 28, 2014
- http://blogs.cornell.edu/jentsch/2014/04/
- Jentsch P. J. 2014. Scouting Report for 21 April. http://blogs.cornell.edu/jentsch/2014/04/
- Jentsch P. J. 2014. Scouting Report for 14 April. http://blogs.cornell.edu/jentsch/2014/04/
- Jentsch P. J. 2013. NYS Insecticide Materials and Efficacy to Manage the Asian Invasive Brown Marmorated Stink Bug (http://hudsonvf.cce.cornell.edu/bmsb1.html).

Photographs published:

Bill Cary, The Indianapolis Star April 3, 2015. It's stink bug season: Here's how to get rid of them. USA Today Adult BMSB

In: Compendium of Apple and Pear Diseases and Pests, 2nd edition, T.B. Sutton, H. S. Aldwinckle, A.M. Agnello, and J.F. Walgenbach, eds. 2014. APS Press, St. Paul, MN. 218 p.
Pg. 177, Fig. 287 & 288: Potato leafhopper adult & nymph.
Pg. 178, Fig. 289: Marginal leaf yellowing caused by potato leafhopper feeding.
Pg. 178, Fig. 290: White apple leafhopper adult.
Pg. 178, Fig. 291: White apple leafhopper nymph.

Pg. 179, Fig. 292: Extensive leaf stippling damage caused by leafhopper nymph feeding.
Pg. 178, Fig. 293: Late instar rose leafhopper nymph with dark spots on the base of thoratic hairs.

Meeting Presentations by Dave Rosenberger, 2013-2015

11-Jan-13	*Controlling powdery mildew, scab, and summer diseases on apples.*	Long Island Agricultural Forum, Riverhead, Long Island, NY
22-Jan-13	*Apple fungicides and management options for common fungal diseases.*	Ohio Produce Growing and Marketing Association (OPGMA) Congress, Sandusky, OH
22-Jan-13	*Impacts of Glyphosate on Apple Trees*	Ohio Produce Growing and Marketing Association (OPGMA) Congress, Sandusky, OH
22-Jan-13	*Bacterial disease of tree fruit*	Ohio Produce Growing and Marketing Association (OPGMA) Congress, Sandusky, OH
11-Feb-13	*Re-Defining the Hudson Valley Lab: Mission, Organization, Financing*	Upper Hudson /Champlain Commercial Tree-Fruit School, Lake George, N&
12-Feb-13	*Tree Fruit Disease Roundup.*	Hudson Valley Commercial Fruit Growers' School, Kingston, NY
14-Feb-13	*Adjusting Management Strategies for Controlling Scab and Mildew on Apples*	Vermont Tree Fruit Growers Association, Middlebury, VT
14-Feb-13	*Managing Orchards During Summer to Avoid Unexpected Problems*	Vermont Tree Fruit Growers Association, Middlebury, VT
18-Feb-13	*Apple and Peach Disease Roundup*	President's Day Fruit Grower Educational Meeting, Biglerville, PA
18-Feb-13	*Managing Herbicides and Water to Avoid Crown and Trunk Diseases on Apples*	President's Day Fruit Grower Educational Meeting, Biglerville, PA
25-Feb-13	*Societal Changes are Creating Opportunities and Challenges*	International Tree Fruit Association, Boston, MA
1-Mar-13	*Plant Pathology Research on Tree Fruits at the Hudson Valley Lab*	International Tree Fruit Association Tour of the Hudson Valley Lab, Highland, NY
12-Apr-13	*Seasonal Update on Tree Fruit Diseases and Fungicides for Their Control*	Conference call with OMAFRA educators and Ontario apple consultants.
30-Apr-13	*Seasonal Update on Scab Control and Tree Fruit Fungicides*	Wisconsin Apple IPM call-in with Extension educators and consultants
21-May-13	*Update on the Current Situation for Tree Fruit Disease Control*	Columbia County Petal Fall Meeting, Hudson, NY
21-May-13	*Update on the Current Situation for Tree Fruit Disease Control*	Ulster County Petal Fall Meeting, Milton, NY
24-May-13	*Update on the Current Situation for Tree Fruit Disease Control*	Saratoga Co. Petal Fall Meeting, Half Moon, NY
28-May-13	*Update on the Current Situation for Tree Fruit Disease Control*	Champlain Valley Petal Fall Meeting, Peru, NY
18-Jul-13	*Review of Tree Fruit Disease Control Projects at the Hudson Valley Lab*	Grower Tour of Research Plots at the Hudson Valley Lab, Highland, NY
1-Aug-13	*What We Have Learned about Impacts of Glyphosate on Apple Tree Health*	Fruit Field Day at the NY State Ag Experiment Station, Geneva, NY
6-Aug-13	*Decay Control in the Absence of Postharvest Fungicides*	Apple Storage Workshop, Ithaca, NY
6-Aug-13	*Impacts of Glyphosate on Internal Browning: Results from Four Years of Research*	Apple Storage Workshop, Ithaca, NY
2-Sep-13	*Overview of Field Research at the Hudson Valley Lab*	Tour for Chilean Apple Consultants, Highland, NY

5-Sep-13	*Review of Fungicide Trials at the Hudson Valley Lab in 2013*	Annual Tour of Agrichemical Field Trials, Highland, NY
5-Sep-13	*Overview of Field Research at the Hudson Valley Lab*	Tour for Korean agricultural officials, Highland, NY
9-Oct-13	*Overview of Research at the Hudson Valley Lab*	Ulster County Legislative Tour stop, Highland, NY
22-Oct-13	*Minimizing Fruit Russet and Captan Injury on Apples*	New England, NY, & Canadian Fruit Workers Conference, Burlington, VT
22-Oct-13	*Open Questions on the Risks and Benefits of Copper Sprays on Tree Fruits*	New England, NY, & Canadian Fruit Workers Conference, Burlington, VT
23-Oct-13	*Phytoplasma, Spiroplasma, Xylella, and Liberibacter: Background in Insect-Transmitted, Xylem- or Phloem-Limited Bacterial Diseases of Plants*	New England, NY, & Canadian Fruit Workers Conference, Burlington, VT
24-Oct-13	*Selecting and Timing Fungicides to Control Sooty Blotch and Flyspeck on Apples in Southeastern New York*	Northeastern Division APS Meeting, Southington, CT
12-Nov-13	*Minimizing Fruit Russet and Captan Injury on Apples*	Great Lakes Fruit Workers Conference, Bowmanville, Ontario
12-Nov-13	*What Have We Learned About Glyphosate and Apple Tree Health?*	Great Lakes Fruit Workers Conference, Bowmanville, Ontario
12-Nov-13	*Fungicides for Controlling Summer Diseases on Apples (Poster)*	Great Lakes Fruit Workers Conference, Bowmanville, Ontario
19-Nov-13	*Tying Up Loose Ends: Recent Research at the Hudson Valley Lab*	Department Seminar, Geneva, NY
3-Dec-13	*Selecting Apple Fungicides to Avoid Diseases, Crop Injury, and Unintended Consequences*	Annual Meeting of the Connecticut Pomological Society, Glastonbury, CT
3-Dec-13	*Trivial Pursuits: Research/Observations on a Rat's Nest of Tree Fruit Problems*	Annual Meeting of the Connecticut Pomological Society, Glastonbury, CT
17-Dec-13	*A 40-Year Perspective of Research on Tree Fruit Diseases*	New England Fruit and Vegetable Conference, Manchester, NH
17-Dec-13	*Selecting Fungicides to Minimize Resistance Development and Avoid Phytotoxicity and Fruit Finish Problems*	New England Fruit and Vegetable Conference, Manchester, NH
21-Jan-14	*Managing Fungicides to Reduce Fruit and Leaf Injury*	Empire State Producers Expo, Syracuse, NY
25-Jan-14	*Growing Apples Organically*.	NOFA Winter Conference, Saratoga Springs, NY
2-Apr-14	*Background on Copper Sprays*	Organic Pesticide Certification Training, Highland, NY
6-May-14	*Update on Current Apple Disease Control Strategies*	Wisconsin Apple Talk Conference Call, Madison, WI (via conference call)
19-May-14	*Update on the Current Situation for Tree Fruit Disease Control*	Columbia County Petal Fall Meeting, Red Hook, NY
19-May-14	*Update on the Current Situation for Tree Fruit Disease Control*	Ulster County Petal Fall Meeting, Marlboro, NY
27-May-14	*Update on the Current Situation for Tree Fruit Disease Control*	Saratoga Co. Petal Fall Meeting, Clifton Park, NY
4-Jun-14	*Update on the Current Situation for Tree Fruit Disease Control*	Champlain Valley Petal Fall Meeting, Peru, NY
6-Aug-14	*Managing Postharvest Diseases Organically*	Michigan State University Controlled-Atmosphere

		Storage Clinic, Belmont, MI
17-Sep-14	*Disease Management Strategies for Organic Apple Orchards*	Small Acreage Organic Orchrard Establishment Workshop, Highland, NY
3-Nov-14	*Changes and Challenges: Perspective on 40 Years of Change and Major Challenges for the Next Generation of Agricultural Scientists*	Great Lakes Fruit Workers Meeting, Traverse City, MI
2-Dec-14	*Reasons for the Severe Fire Blight in 2014 and How to Prevent a Recurrence in 2015*	Annual Meeting of the Connecticut. Pomological Society, Glastonbury, CT
16-Jan-15	*Fire blight -- what happened in 2014 and where do we go from here?*	Massachusetts Fruit Growers' Association Annual Meeting, Belchertown, MA
28-Jan-15	*Fire Blight in New York - Epidemics, Management and Recovery*	Nova Scotia Fruit Growers Annual Convention, Greenwich, Nova Scotia, Canada
28-Jan-15	*Management of Summer Diseases and Storage Rots in the Orchard*	Nova Scotia Fruit Growers Annual Convention, Greenwich, Nova Scotia, Canada
9-Feb-15	*Managing Summer Fruit Rots*	Northeastern NY Commercial Tree Fruit School, Lake George, NY
9-Feb-15	*Complexities of Funding Extension and Applied Research*	Northeastern NY Commercial Tree Fruit School, Lake George, NY
10-Feb-15	*Controlling Summer Fruit Rots in Apples*	Lower Hudson Valley Commercial Tree Fruit School, Kingston, NY
10-Feb-15	*Complexities of Funding Extension and Applied Research*	Lower Hudson Valley Commercial Tree Fruit School, Kingston, NY
18-Feb-15	*Fire Blight in My Orchard — Now What?*	Ontario Fruit and Vegetable Convention, Niagara Falls, Ontario, Canada
18-Feb-15	*Managing Summer Fruit Rots in Apples*	Ontario Fruit and Vegetable Convention, Niagara Falls, Ontario, Canada
21-Feb-15	*Disease Management Strategies for Honeycrisp*	58th International Fruit Tree Association□s Honeycrisp Intensive Workshop, Halifax, Nova Scotia, Canada
4-Mar-15	*Fire Blight and NEWA –How To Control Blight in 2015*	North Jersey Commercial Fruit Growers Meeting, Flemington, NJ
4-Mar-15	*Apple Scab Models & Suggestions for Scab Control in 2015*	North Jersey Commercial Fruit Growers Meeting, Flemington, NJ
10-Sep-15	*Disease Management Strategies for Organic Apple Orchards*	Small Acreage Organic Orchard Establishment Workshop, Highland, NY
20-Oct-15	*Fire Blight Questions from 2015*	77th New England, NY, Canada Fruit Pest Management Workshop, Burlington, VT
11-Nov-15	*Fire Blight Models Triggered Wasted Sprays in the Hudson Valley in 2015*	Great Lakes Fruit Workers Meeting, Geneva, NY
2-Dec-15	*Lack of Fire Blight in the Hudson Valley in 2015 Raises Questions About Blight Models*	Certis Fire Blight Workshop Winchester, VA

Meeting presentations by Gemma Reig-Cordoba, 2013-2015

Tall Spindle orchard establishment, training and pruning. Organic Tree Fruit Workshop at HVRL (10th od September 2015).

Apples of the world: Cultivars and Orchard Systems in Spain. Empire State Producer Expo (19th and 20st of January 2016). This presentation was exposed together with Jaume Lordan.

Meeting Presentations by Peter Jentsch, 2013-2015

Out-of-State presentations at meetings of tree fruit professionals:

Invasive species presentations to the Amish communities in Penn Yan and Romulus, NY

Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards. December 1, 2015 , The Connecticut Pomological Society Annual Meeting , *(30 min.; 90 attendees primarily growers, chemical field reps.).* http://cfgrower.com/the-connecticut-pomological-society-meeting/

Development of Attract and Kill Strategies of Spotted Wing drosophila for Organic Raspberry Production in NY. March 14-17, 2015, *Entomological Society of America Eastern Branch Meeting,* Atlantic Sands Hotel & Conference Center, Rehoboth, DE , *(30 min.; 40 attendees primarily growers).*

Management of the Brown Marmorated Stink Bug. January 30th, 2015; *New England Vegetable and Fruit Conference in Hudson, MA, (30 min.; 110 attendees primarily growers).*

Management of the Spotted Wing Drosophila. January 30th, 2015; *New England Vegetable and Fruit Conference in Hudson, MA, (30 min.; 110 attendees primarily growers).*

Development of Attract and Kill Strategies of Spotted Wing drosophila for Organic Raspberry Production in NY. December 4th, 2014; *89th Annual Cumberland-Shenandoah Fruit Workers Conference, Winchester, VA. (69 University faculty, fruit extension educators, and private consultants).*

Celebrating the Contributions in the Entomological Career of Dr. Harvey Reissig. March 17th , 2014; *Entomological Society of America Eastern Branch Meeting,* Crown Plaza at Fort Magruder, Williamsburg, VA*, (12 min.; 40 attendees, extension, researchers and graduate students).*

Ecology and Management of the Spotted Wing drosophila. December 17th, 2013; *New England Vegetable and Fruit Conference in Manchester, NH, (30 min.; 100 attendees primarily growers).*

Management of the Brown Marmorated Stink Bug. December 18th, 2013; *New England Vegetable and Fruit Conference in Manchester, NH, (30 min.; 110 attendees primarily growers).*

Managing Resistance in the Tree Fruit Lep Complex. December 17th, 2013; *New England Vegetable and Fruit Conference in Manchester, NH, (30 min.; 120 attendees primarily growers).*

Monitoring and Management of the BMSB in Urban and Agricultural Environments in New York State. October 23, 2013. New England, New York, Canadian Fruit Pest Management Workshop. Burlington Vt. (65 University faculty, fruit extension educators, and private consultants)

Attract and Kill Strategies for the Invasive Brown Marmorated Stink Bug, Halyomorpha halys (Stal): (Pentatomidae), in NY Organic Vegetable Production. . Northeast IPM Brown Marmorated Stink Bug Working Group meeting, November 27, 2013, Alson H. Smith Research and Extension Center, Virginia Agriculture Experiment Station, Winchester, VA *(20 min.; 75 attendees; fruit growers, extension agents, researchers and graduate students, total contact hours = 25).*

In-State presentations at meetings of tree fruit professionals:

Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål): What can we expect in 2016. *February 2, 2016; Lake Ontario Winter Fruit Schools, Niagara County CCE Training Center, Lockport, NY (30 min.; 200 Fruit growers, fruit extension educators, and private consultants*; *total contact hours = 133)*

Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål): What can we expect in 2016. *February 2, 2016. Lake Ontario Winter Fruit Schools, Newark Garden Hotel, Newark, NY (30 min.; 200 Fruit growers, fruit extension educators, and private consultants*; *total contact hours = 133)*

Emerging Invasive Insects In Eastern New York. July. 21, 2015. Fire Training Center, 9 Training Center Lane, New Hampton, NY (3*0 min.;* 35 USDA-APHIS-PPQ-PDC evaluation control team members/ Ag. & Mkts staff; *total contact hours = 28*)

Insecticide Resistance Strategies for managing Spotted Wing Drosophila. March 4, 2015, Clarion Hotel, 8250 Park Road, Batavia, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Biological Control of Spotted Wing Drosophila in the Hudson Valley of NY State. Mar. 4, 2015. Clarion Hotel, 8250 Park Road, Batavia, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Insecticide Resistance Strategies for managing Spotted Wing Drosophila; Jan. 14, 2015. CCE Albany County, 24 Martin Road, Voorheesville, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Biological Control of Spotted Wing Drosophila in the Hudson Valley of NY State. Jan. 14, 2015. CCE Albany County, 24 Martin Road, Voorheesville, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Insecticide Resistance Strategies for managing Spotted Wing Drosophila; Dec. 17, 2014. Ramada Inn, 1305 Buckley Road, Syracuse, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Biological Control of Spotted Wing Drosophila in the Hudson Valley of NY State. Dec. 17, 2014. Ramada Inn, 1305 Buckley Road, Syracuse, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Sprayer Considerations for Managing Spotted Wing Drosophila. Dec. 17, 2014. Ramada Inn, 1305 Buckley Road, Syracuse, NY (3*0 min.;* 55 conventional organic fruit and vegetable growers, extension educators; *total contact hours = 28*)

Attract and Kill Strategies for the Invasive Spotted Wing Drosophila in NY Organic Small Fruit Production. Northeast IPM Spotted Wing Drosophila Working Group meeting, September 16, 2014, Hudson Valley Research Lab, Highland, NY *(20 min.; 25 attendees; Ag researchers and graduate students, total contact hours = 7).*

Overview of Three Years of ARDP Funded Research in Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) Management in NY Tree Fruit. Apple Research & Development Program NYSAES, Jordan Hall , Geneva, NY November 12, 2014; *(15 min.; 20 attendees; researchers & ARDP Board Members; total contact hours = 5).*

Organic Pesticide Applicator Training for Fruit and Vegetable Growers; 'IPM in Organic Pest Management Programs' Cornell Cooperative Extension, April 3-4, 2014 Hudson Valley Laboratory, Highland, NY (13*0 min.;* 27 organic fruit and vegetable growers, 2 extension educators; *total contact hours = 63*)

Onion Bulb Mite & Brown Marmorated Stink Bug in Hudson Valley Vegetable Crops. Onion School, March 7, 2014 Cornell Cooperative Extension Orange County, Middletown, NY (25 *min. 65 conventional and* organic vegetable growers, extension educators; *total contact hours = 25*)

Migration and Population Increase of the BMSB in NYS. Agrassistance Mtg; March 7, 2014, Studebakers Restaurant, Lyons, NY (60 *min. :120* conventional tree fruit growers, extension educators; *total contact hours = 120*)

Managing Sweet Corn Insects and Resistance with New Insecticides. Northern Commercial Vegetable Growers' School, February 25, 2014, Plattsburgh City Recreation Department, Plattsburgh, NY (25 *min.: 25 conventional and* organic vegetable growers, extension educators; *total contact hours = 10*)

Management of the Stink Bug Complex in Commercial Vegetable Production. February 24th, 2014; Hudson Valley Commercial Vegetable School, The Falcon, Marlboro, NY (25 *min. :80 conventional and* organic vegetable growers, extension educators; *total contact hours = 33*)

Strategies for Late Season SWD Management in Berries and Grapes. February 13th, 2014; Hudson Valley Commercial Fruit Growers School, Garden Plaza Hotel, Kingston, NY (30 *min. :30 conventional and* organic small fruit growers, extension educators; *total contact hours = 15*)

Management of the Stink Bug Complex in Commercial Tree Fruit. February 12th, 2014; Hudson Valley Commercial Fruit Growers School, Garden Plaza Hotel, Kingston, NY (30 *min. :209 conventional and* organic tree fruit growers, extension educators; *total contact hours = 104*)

Update on the Plans for the Hudson Valley Research Laboratory. February 11th, 2014; Hudson Valley Commercial Fruit Growers School, Garden Plaza Hotel, Kingston, NY (15 *min. :209 conventional and* organic tree fruit growers, extension educators; *total contact hours = 51*)

Review of the 2014 Pest Management Season in ENY. Cornell Cooperative Extension Eastern NY Commercial Horticulture Program, Upper Hudson / Champlain Commercial Tree Fruit School, February 10, 2014, Fort William Henry Hotel and Conference Center, Lake George, NY (30 *min. :65 conventional and* organic tree fruit growers, extension educators; *total contact hours = 32*)

Organic Insect Tree Fruit Pest Management. NOFA-NY Winter Conference, January 26th, 2014 Saratoga Hilton, Saratoga Springs, NY(30 *min. :70 conventional and* organic tree fruit growers, extension educators; *total contact hours = 35*)

Brown Marmorated Stink Bug Management Update. January 10th, 2014; Seneca Produce Auction Growers Meeting, 2295 Yerkes Road, Romulus, NY (45 *min. :30 conventional and* organic vegetable growers, extension educators; *total contact hours = 5*)

Brown Marmorated Stink Bug Management Update. January 9th, 2014; Finger Lakes Produce Auction Growers Meeting, 3691 State Route 14A, Penn Yan Yan, NY (45 *min. :50 conventional and* organic vegetable growers, extension educators; *total contact hours = 5*)

Monitoring *the BMSB in Urban and Agricultural Environments in New York State.* Agricultural Invasive Species session. November 13, 2012. Annual CCE Agriculture and Food System In-service, Ithaca, NY, *(30 min.; 20 CCE Vegetable Extension educators, total contact hours = 10*

Panel Discussion on Invasive Insect Presence Between the Urban and Agricultural Environmental Interface in New York State. Agricultural Invasive Species session. November 14, 2013. Annual CCE Agriculture and Food System In-service, Ithaca, NY, *(30 min.; 20 CCE Vegetable Extension educators, total contact hours = 10*

Insect Pest IPM of Hudson Valley Pome Fruit: Early Season Management *May 21th, 2013 Hudson, NY* (40 Orchardists, fruit extension educators)

Insect Pest IPM of Hudson Valley Pome Fruit: Early Season Management *May 21th, 2013 Milton, NY* (40 Orchardists, fruit extension educators)

Insect Pest IPM of Hudson Valley Pome Fruit: Early Season Management *May 24th, 2013 Lake George, NY* (40 Orchardists, fruit extension educators)

Insect Pest IPM of Hudson Valley Pome Fruit: Early Season Management *May 24th, 2013 Lake Champlain, NY* (40 Orchardists, fruit extension educators)

Results from 2012-2013 Hudson Valley Insecticide Trials. *February 14, 2013 Hudson Valley Fruit School, Kingston, NY (30 min.; 55 tree fruit growers, fruit extension educators, and private consultants*; *total contact hours = 28)*

Recommendations for SWD Management in 2013 in ENY. *February 14, 2013 Hudson Valley Fruit School, Kingston, NY (30 min.; 55 tree fruit growers, fruit extension educators, and private consultants*; *total contact hours = 28)*

Creature Features: Predictions and Management of BMSB and 17-Year Cicada in the Hudson Valley for 2013. *February 13, 2013 Hudson Valley Fruit School, Kingston, NY (45 min.; 85 tree fruit growers, fruit extension educators, and private consultants*; *total contact hours = 64)*

Tree Fruit Insect Round-Up. Managing the Hudson Valley Pome Fruit Insect Complex. *February 12, 2013. Hudson Valley Fruit School, Kingston, NY (45 min.; 85 tree fruit growers, fruit extension educators, and private consultants*; *total contact hours = 64)*

Updates on the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) in NY State February 11, 2013, *Upper Hudson & Lake Champlain School, Lake George, NY (30 min.; 85 tree fruit growers, fruit extension educators, and private consultants*; *total contact hours = 43)*

Updates on the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) and Spotted Wing Drosophila, *Drosophila suzukii* in NY State. January 22, 2013, 2013 Fruit & Vegetable Expo, Oncenter, Syracuse NY (3*0 min.; 85* fruit & vegetable producers, landscape professionals, fruit extension educators; *total contact hours = 43*)

Managing Insecticide Use *January 10, 2013. Aroma Thyme Restaurant, Ellenville, NY* (*90 min.;* 21 fruit growers, fruit extension educators; *total contact hours = 31.5*)

2012 Insect Pest Management of Tree Fruit Updates. *January 10, 2013, Long Island Agricultural Forum, Riverhead, NY* (*20 min.;* 45 fruit growers, fruit extension educators, and private consultants; *total contact hours = 23*)