Fruit Notes

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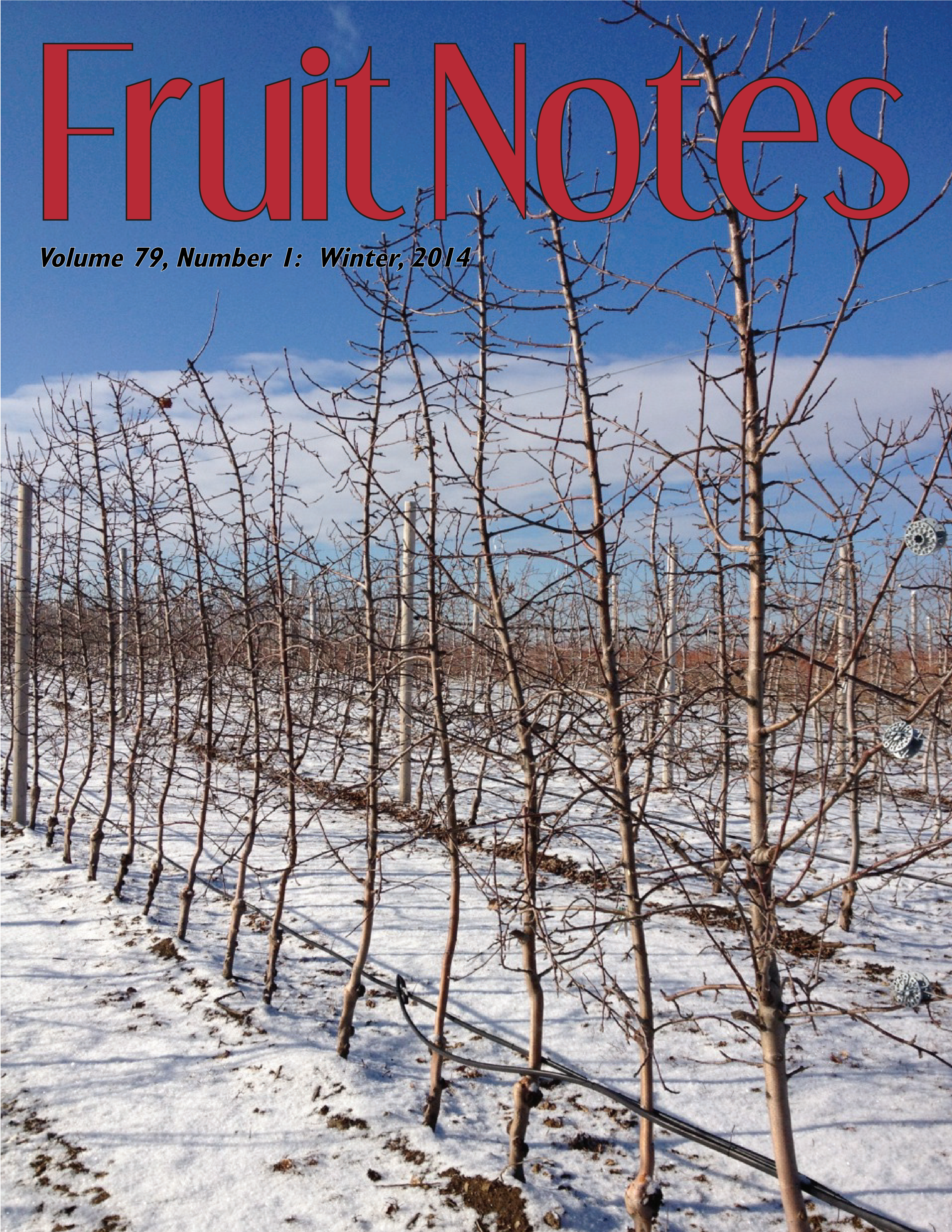

Fruit Notes

Editors: Wesley R. Autio & Winfred P. Cowgill, Jr.

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Cover: Mature super spindle apple trees at the UMass Cold Spring Orchard Research & Education Center, winter 2013. Jon Clements photo.

Evaluation of Venue, Gramoxone, Aim, and Rely Herbicides for Root and Crown Sucker Control in Apple and Cherry

Timothy J. Smith and Esteban Gutierrez
Washington State University

Root and crown suckers are unwanted natural vegetative growth commonly produced by many rootstocks of deciduous fruit trees. These are especially common on Mazzard, the most common sweet cherry rootstock. However, there are strains of the apple rootstock Malling 9, such as the "Nic 29," and Budagovski 9 that have this problem, and some pear rootstocks such as Pyrodwarf and individual "Bartlett seedling" produce significant problematic suckers. These rootstocks are planted on about 60,000 acres of Pacific Northwest orchards.

Growers often treat these suckers as they would a perennial weed, but without the option of treating them with a systemic herbicide. In fact, they are compelled to remove the suckers by mechanical or chemical methods prior to the application of glyphosate, the most common herbicide used in orchards, due to concern of excessive uptake of the herbicide into the fruit tree. The removal of the suckers by hand labor is very expensive and only possible when the sucker growth is scant. Even with light sucker growth, labor costs about $50-75 an acre, depending upon the density of the suckers. At times, the suckers are too dense to cut by hand. Labor to do this operation is becoming more expensive and difficult to find.

Sucker removal is most commonly carried out by contact herbicide application, mostly with paraquat (Gramoxone) or glufosinate-ammonium (Rely), and less often, with carfentrazone-ethyl (Aim). Venue is considered an interesting alternative to these current choices.

Sucker removal is a procedure intended to injure or eliminate part of the tree attached to the green young bark at the base of a two or three year old tree. It is critically important that the product used is safe to apply to the young bark of the lower 12 inches of the trunk and the portion of the rootstock above the soil level. If the product is highly effective on suckers, it is also possible that it could damage or kill the young bark, leading to tree death. It is far less likely that a product will damage the corky bark of an older tree. To be most useful, the product must be safe in younger orchards. The paraquat labels prohibit use in orchards with "green stems." Many growers place paper or plastic wraps around the base of young trees to protect the bark from paraquat or glyphosate, but this often protects the crown suckers also, and their hand removal is made difficult by the shielding. In past trials and experience, it appears that to a great extent, it is the concentration of any specific product in solution, rather than the rate per acre that determines the risk of application to green barked trees. For example, 2.5 pints of Gramoxone in 25 gallons per acre of carrier is much more likely to damage the green bark of young trees than the same rate applied mixed with 50 gallons per acre.

Materials & Methods

Two rates of Venue SC (pyraflufen-ethyl) and Non-Ionic Surfactant (NIS 0.25% v/v) were tested for effect on root and crown suckers in apple and cherry. The Venue SC was applied at 3 fluid ounces or 4 fluid ounces per acre in about 40 gallons of water carrier with 1 quart / 100 gallons Regulade NIS. This rate of water was sufficient to fully wet the sucker growth.

The comparison products were Aim ((carfentrazone-ethyl) at 2 fluid ounces per acre + Regulade 0.25% v/v, or Rely ("Liberty," gluphosinate-ammonium) 280 at 56 fluid ounces per acre + 0.25% v/v, or Gramoxone Inteon (paraquat) 2.5 pints per acre, all in about 40 gallons

Apple trees prior to treatment.

Apple trees 14 days after Gramoxone sprays.

Apple trees 14 days after Venue sprays.

Apple trees 10 days after Gramoxone spray.

Comparison of Venue (near) and control (far).

Cherry trees prior to treatment.

Cherry trees 14 days after Gramoxone sprays.

Cherry trees 14 days after Venue sprays.

Cherry trees 30 days after Gramoxone sprays.

Cherry trees 30 days after Venue Sprays.

of water per acre. Damage to near-by tree foliage is common when Aim mist drifts, so we don't recommend its use. This is included for comparison only.

The cherry orchard used for the trial is north and west of the intersection of Edgemont and Steinbach roads in Wenatchee Heights. It is a mature orchard, Sweetheart cultivar on Mazzard roots, and has what would be considered a problem population of root suckers. There are about 1 to 10 root suckers per square foot under the trees in many areas of the block, though this is variable from replicate to replicate. There were very few crown suckers growing from the base of the trunk. All treated replicates had an average of 0.5 to 2 suckers per square foot. The tree trunks trunks are mature, about 12 – 15 inched diameter, with corky bark. At the time of application, the suckers were over optimum maximum height, ranging from 4 to 16 inches height. They were low enough that spray coverage was quite thorough, but coverage was not 100% complete in some heavy patches.

The apples are at WSU Sunrise research orchard, block 1a and 1b, cultivar Fuji or Gala, on various strains of Malling 9 and on Budagovski 9. Suckers were very common on every 5th row, which was planted with the Nic 29 strain of M9, with suckers growing from both roots and the above-surface parts of the rootstock. The sucker growth was perhaps too advanced for optimum results; it would have been better timing about two weeks earlier. (It took time to find these plot sites.) The trunks are immature, 2 – 4 inches diameter, and with thin, lightly corked or unsuberized bark.

All materials were applied with a tractor-carried boom weed sprayer. The apple orchard was treated in a relatively narrow 3 foot wide swath width, about 18 inches out from the young trees on each side of the row. The boom had one 8002 flat fan nozzle on the outside (tractor side) and an OC 02 nozzle on the distal end of the boom to provide for overlap. The boom was about 21 inches above the soil surface, and the nozzle tips were 18 inches from the surface. Nozzles were spaced 12 inches apart on the boom. The tractor drove at 2.5 mph and at 20 psi, the 2 nozzles had a total output of 39 ounces per minute. The carrier rate per acre was calculated: (495 x 0.305 gal) / (2.5 mph x 1.5 ft.) = 40.2 gpa.

The cherry orchard was treated very similarly, but the swath was 7 feet wide, 3.5 feet out from either side of the tree row. Two 8002 flat fan nozzles were added to the tractor side of the boom, for a total of three, with one OC02 nozzle on the end of the boom. This increased the swath width to 3.5 feet. At 22 PSI boom pressure, the total boom output increased to 81 ounces per minute, and a resulting 40.7 gallons per acre application rate. Calculation: (495 x 0.6328 gal. per min) / (2.2 mph x 3.5 ft. swath) = 40.7 gpa.

Results

The various treatments differed in degree of damage to suckers over time, and speed of damage to the suckers. The control of suckers was relatively good by 30 days after treatment with all treatments relative to the untreated check. The paraquat gave rapid, effective results within 7–10 days in both apples and cherries, The Venue was both rapid and ultimately effective in the cherries at both 3 and 4 fl.oz / A, but appeared more practical at the 4 fl.oz./A rate in the apples. While the Mazzard cherry root suckers were very sensitive to Venue, the Budagovski 9 apple rootstock was moderately sensitive, and the Malling 9 was the least damaged. However, the Bud 9 and M9 suckers that recovered somewhat were almost all oversized at the time of application Those apple suckers that were less than 10 – 12 inches in length, and not "woody" at their bases were completely controlled, and had not regrown from below the surface by 60 days after application.

The Aim was also quite effective, more so on the cherries. The Rely was ultimately effective, but took 20-25 days to reach the level of control reached in 10-14 by Venue, Aim and Gramoxone. Growers are usually expecting a product to control and remove the suckers as rapidly as possible to enhance irrigation efficiently. There was no apparent trunk or crown damage in the 4th year small apple trees, despite the relatively "green" bark. There was no apparent damage to the much older cherry trunks.

In summary, all of the products were effective, especially so in the cherries. The paraquat and the Venue at 4 fl.oz. in 40 gpa spray rate seemed to be the most practical. These damaged only the targeted suckers. They are more rapid in effect than Rely, less of a drift hazard to fruit than Aim, but Venue is far less toxicity hazard to the applicator than paraquat. Venue appears to be a good choice for late spring or early summer crown and root sucker control in apples, cherries (and probably pears).

Massachusetts Fruit IPM Report for 2013

Dan Cooley, Arthur Tuttle, Jon Clements, and Sonia Schloemann
University of Massachusetts

Most specific observations made at the UMass Cold Spring Orchard in Belchertown, MA.

Winter was more-or-less ho-hum. Snow cover was virtually non-existent until early-February. A low of minus 4 degrees F. was recorded on January 24. No damage to stone fruit buds was expected.

Spring was – about time after last year! – more normal in terms of temperature and timing. April was quite dry, however, with less than 2 inches of rain, while May was wet with nearly 6 inches of rain – every year growers struggle with scab because, like clockwork, it starts raining in May about bloom. McIntosh apple king bloom was about May 6, and by May 14 we were pretty much into petal fall. (McIntosh full bloom was pegged as May 8-10.) Bloom stage pictures available on the UMass Fruit Advisor (http://www.umassfruit.com).

Summer was at times hot, with nearly a week of low to mid-90s in mid-July. (High of 94 on 19-July.) It never got particularly dry all summer, and in fact was actually quite wet – nearly 7 inches of rain in June, more than 5 inches in July, and 4 inches in August.

The peach crop was generally very good and we are at a point of over-production in early August during the peak. Flavor was a bit dilute because of all the rain. Signs of X-disease in several peach trees at the UMass Orchard were observed, and we appear to be headed into a period of increased X-disease incidence every 10-15 years, the last bout during the late 90's into the early 2000's. (http://www.scaffolds.entomology.cornell.edu/1999/6.21_diseases.html) Chokecherry was found in the Orchard perimeter and numerous sweet cherry trees have been planted in the last 10 years, altogether which harbor X-disease.

Apple harvest started right on schedule. Pretty exceptional weather during most of September and October lead to a large crop being adequately harvested. The only exception being once empty bins in short supply once they were filled. McIntosh are now being over-produced as demand has waned while there is no sign yet of Honeycrisp demand peaking. Expect apple prices to be considerably below what growers received for last year's short crop.

Depending on interpretation of beginning and end of primary scab season and model used, there were only 4-5 primary apple scab infection periods in 2013. Once again (as in 2012), dry weather between green tip and bloom resulted in no scab infection periods during this time. Then, depending on model, there were 3-4 infection periods during May (in some locations back-to-back), and one during the first week in June when

Peach X-disease at UMass Cold Spring Orchard, Belchertown.

primary scab was (probably) over, at least as declared by the models. The rest of June was quite wet, and where primary scab was not adequately controlled (or was not over) secondary scab became somewhat of a problem in some orchards. Year-in and year-out, managing apple scab typically presents growers with the most grief. (Crop load management, aka fruit thinning, is a close second.)

Fireblight pretty much took the year off as conditions for infection were not favorable until after bloom in most orchards. (Hurrah!) And, despite the dry early spring period, powdery mildew was not anywhere near as prevalent in 2013 compared to 2012.

The Massachusetts NEWA network (http://newa.cornell.edu) now include 21 on-site weather station/orchards (plus 23 airports, total 44 locations) providing fruit and vegetable growers with daily developmental models (including forecasts) to aid in decision-making for management of insect and disease pests. Some of these locations were a centerpiece for providing Extension team-based IPM recommendations on diversified fruit & vegetable farms via the Extension IPM (eIPM) Project, which also provided training in monitoring and management of key pests to eight mentor growers and six partner growers across Massachusetts.

Overall insect pressure seemed average, although Oriental fruit moth and codling moth seemed to be in greater abundance. An increased number of brown marmorated stink bug (BMSB) were noted in mid-fall, both in orchard border settings and around buildings (including the UMass Amherst campus) although an extensive season-long trap network (mostly in orchards) yielded few BMSB catches. It's unclear whether we are yet seeing economic damage from this pest in orchards (or other crops). In two locations where "stink bug-like" damage was reported by growers, and where we had traps, we could only find native stink bugs. A dedicated BMS page was placed on the UMass Fruit Advisor.

Brown marmorated stink bug.

Spotted Wing Drosophila (SWD) reappeared as expected after establishing themselves in 2012. A statewide trapping and monitoring program was established by UMass Extension and partially funded by the Mass. Dept. of Ag. Resources. Trap catches were low at first, but as expected, increased dramatically in most sites by late summer. More aggressive management of SWD by growers using insecticides was commonplace. A dedicated SWD web page was placed on the UMass Fruit Advisor.

We began a Northeast

SARE funded study, Towards Sustainable Disease Management in Northeastern Apples using Risk Forecasts and Cultural Controls with 13 commercial orchards in New England and University/ extension research facilities in MA, NH, and ME. Collaborating scientists are William MacHardy, Cheryl Smith, and George Hamilton of NH and Glen Koehler and Renae Moran of ME. Scab sanitation strategies, advances in the delayed 1st scab spray strategy (delay until pink), PAD counts, and spring ascospore trapping and maturation are the foci of the study. Additional commercial orchards will be added over the next year.

We also participated in the 4th year of an SCRI (Specialty Crops Research Initiative) study, Manipulating Host- and Mate-finding Behavior of Plum Curculio: Development of a Multi-Life Stage Management Strategy for a Key Fruit Pest. We performed "trap-tree" experiments for PC management at 1 orchard in New England and participated in a nematode bio-control study. Tracy Leskey, USDA-ARS Kearneysville is the project director.

Spotted wing drosophila on peach.

There were 30+ research/data-collection/demonstration trials/ plots conducted at the UMass Cold Spring Orchard in 2011, including for example: app. 7 chemical thinning trials, 1 drop control experiment, 3 fruit set, 2 cultivar evaluation (D. Greene); NE-1020 Multi-state Evaluation of Winegrape Cultivars and Clones (S. Schloemann); NC-140 rootstock planting with Honeycrisp and Gala apple, and Redhaven peach (W. Autio); evaluation of Cyazypyr™ for plum curculio and Fontelis® for apple scab (J. Clements).

We convened six growing season Twilight Meetings for commercial tree fruit growers in Massachusetts, Rhode Island (in cooperation with Rhode Island Fruit Growers' Assoc.), and New Hampshire (in cooperation with U. of New Hampshire) during April, May and June. Healthy Fruit was published 21 times from March-September with timely integrated pest management information for pome and stone fruit. The Massachusetts Fruit Growers' Association Summer Meeting was held at Honey Pot Hill Orchards in Stow – Win Cowgill of Rutgers was the invited speaker on horticultural practices to improve fruit production.

The International Fruit Tree Association (IFTA) held it's Annual Conference in Boston, MA during late February and was attended by 350 growers, scientists, extension, and industry people from most all apple producing states/provinces in North America plus 20 other countries.

Powdery Mildew Control and Resistance Management in Fresh-Market Pumpkins in New Jersey

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An applied research trial screening fungicides for powdery mildew (Erysiphe cichoracearum) control in fresh market pumpkins ('Solid Gold') in New Jersey was conducted at the Rutgers Snyder Research and Extension Farm, Pittstown, NJ during 2013. Our goal was to evaluate which fungicides were most efficacious for the control of powdery mildew, while maintaining optimal marketability, on pumpkin in northern New Jersey. Powdery mildew resistance to commonly used fungicides at weekly applications were also evaluated.

Pumpkins are an important crop in New Jersey agriculture with 31.1 million pounds produced on 2,300 acres at a value of 6.4 million dollars (2010 NASS data http://www.nass.usda.gov). Ensuring that farmers have the best methodology and knowledge of fungicide efficacy necessary to control disease is crucial to keeping pumpkins an economically sustainable crop.

Powdery mildew is a fungal disease that affects a wide variety of crops, including cucurbits. Leaves of pumpkin plants affected by powdery mildew develop lesions on top and bottom leaf surfaces, stems, and handles. As the disease progresses, leaves turn yellow, die and eventually collapse. If the plants defoliate prematurely, yield can be reduced. The loss and weakening of foliage can expose the fruit to sunburn, as well as contribute to deformities and undesirable/diseased handles, which can impact yield and the potential marketability (fruit quality) of the fruit.

A field trial was established utilizing a completely randomized design with ten treatments, four replications. Forty 20ft. x 10ft. plots were planted with 5 plants each spaced 2 feet apart. Hills were hand thinned to one plant per hill. The pumpkin variety 'Solid Gold', from Rupp Seeds, Wauseon, OH, was planted. Seed was pre-treated for cucumber beetle and soil born diseases with a proprietary seed treatment, FarMore®LI400 for Cucurbits from Syngenta, containing Cruiser® FS insecticide, Apron XL®, Maxim®, and Dynasty® fungicides.

On June 20, 2013 the field was prepared with primary tillage using chisel plowing. Triple -15, was broadcast at 675 lbs. per acre based on soil test recom-

Fungicide treatments (Bravo treatments actually were the generic formulation Chloronil 720).

Untreated Control (UTC)
3 pt. Bravo + 6 fl. oz. Quintec alternating with 3 pt. Bravo + 5 oz. Rally
3 pt. Bravo + 18.5 oz. Pristine alternating with 3 pt. Bravo + 5 oz. Rally
16 fl. oz. Fontellis alternating with 6 fl. oz. Quintec
3 pt. Bravo + 16 oz. Cabrio
3 pt. Bravo + 5 oz. Rally
3 pt. Bravo + 6 fl. oz. Quintec
3 pt. Bravo + 5 lbs. Microsulf Sulfur 80W alternating with 3lbs. Manzate Pro-Stick + 5 lbs. Microsulf Sulfur
3 pt. Bravo + 3.4 fl. oz. Torino
3 pt. Bravo + 20 fl. oz. Inspire Super

Photo 1. Fungicide application

mendations and disked into the top 8 inches of soil, followed by roller harrowing to firm the seedbed. The pumpkin seeds were planted on June 21, 2013 utilizing a water wheel trans-planter with no water. Following seeding, the field was treated with 1.3 pints/acre of Dual II Magnum® herbicide applied between rows followed by 6 pints per acre of Strategy™ herbicide broadcast over top of the entire seedbed the same day. The field was irrigated with a traveling gun to apply the equivalent of 0.75 acre-inches of water to activate the herbicide.

Weekly scouting for powdery mildew following Rutgers Pumpkin IPM protocol to determine treatment start date commenced five weeks post-planting. The protocol calls for treatments to begin when one lesion per fifty leaves is observed. This threshold was reached and treatments were begun on August 2, 2013. Treatments were applied on a weekly basis, for a total of eight applications ending on September 19, 2013 (refer to the fungicide treatment list).

To control downy mildew in the research plots and to prevent competing with powdery mildew, a weekly maintenance fungicide control program was overlaid on the plots. Sprays of 2.75 oz. Presido®/A alternated with 4 oz. Ranman®/A were applied season long beginning July 11 when downy mildew was detected in central NJ. This was earlier than normal; downy mildew treatments in Northern New Jersey typically begin later in August.

Photo 2. Pumpkin trial 6 weeks after planting.

Table 1. Effects of various fungicide treatments on pumpkin fruit size, incidence of decay and bad handles, mildew incidence on leaves, and canopy quality rating, Rutgers Snyder Farm, 2013. All plots were 10 feet by 20 feet. Plants were thinned to a final density of five per plot.

Treatment	Average weight (lbs)	Decay (%)	Bad handles (%)	Mildew rating (1-5) on leaf (26-Sep)		Canopy quality rating (1-5)		
				Top	Bottom	26-Aug	10-Sep	26-Sep
Untreated control	22.1 abc	32 a	24 a	5.0 a	5.0 a	3.1 a	4.5 a	5.0 a
Bravo/Quintec alternating with Bravo/Rally	23.2 abc	3 b	3 b	1.0 c	2.5 d	1.3 b	1.3 c	2.5 e
Bravo/Pristine alternating with Bravo/Rally	18.7 c	0 b	0 b	2.0 bc	3.8 c	1.5 b	2.8 b	4.3 abc
Fontellis alternating with Quintec	21.8 abc	11 ab	0 b	1.0 c	1.8 d	1.5 b	1.5 c	3.5 cd
Bravo/Cabrio	24.4 ab	12 ab	0 b	3.0 b	4.8 ab	1.8 b	4.5 a	5.0 a
Bravo/Rally	22.7 abc	4 b	0 b	1.7 bc	4.0 bc	1.0 b	2.0 bc	4.3 abc
Bravo/Quintec	22.5 abc	0 b	0 b	1.0 c	2.3 d	1.3 b	1.5 c	3.0 de
Bravo/Sulfur alternating with Mancozeb/Sulfur	22.7 abc	6 b	0 b	3.0 b	4.3 abc	1.0 b	2.3 bc	4.8 ab
Bravo/Torino	21.3 bc	3 b	0 b	1.8 bc	4.5 abc	1.0 b	1.3 c	4.0 bc
Bravo/Inspire Super	26.7 a	0 b	4 b	2.8 bc	4.5 abc	1.5 b	2.8 b	5.0 a

*Mean within a column not followed by a common letter are significantly different at odds of 19 to 1 (Duncan's New Multiple Range Test, $P = 0.05$).

Table 2. Effects of various fungicide treatments on pumpkin yield (total, marketable, green, and potential marketable), Rutgers Snyder Farm, 2013. Sound green fruit likely would develop orange color, so potential marketable yield was calculated as the marketable yield plus the green yield. All yield data represent harvests from five plants in a 20 square-foot plot.

	Total yield		Marketable yield		Green yield		Potential marketable yield	
Treatment	Number	Pounds	Pounds	Percent	Pounds	Percent	Pounds	Percent
Untreated control	6.5 ab	146 abc	59 c	44 b	0 c	0 b	59 c	73 b
Bravo/Quintec alternating with Bravo/Rally	8.3 a	193 a	134 ab	73 a	49 a	22 a	182 a	95 a
Bravo/Pristine alternating with Bravo/Rally	7.5 ab	135 bc	125 ab	93 a	10 bc	7 ab	134 ab	100 a
Fontellis alternating with Quintec	8.3 a	177 abc	132 ab	75 a	26 abc	14 ab	158 ab	89 a
Bravo/Cabrio	5.5 b	132 c	114 b	88 a	0 c	0 b	114 b	88 a
Bravo/Rally	8.0 a	181 abc	158 a	88 a	16 abc	8 ab	174 a	96 a
Bravo/Quintec	7.0 ab	155 abc	130 ab	85 a	25 abc	15 ab	155 ab	100 a
Bravo/Sulfur alternating with Mancozeb/Sulfur	7.3 ab	165 abc	137 ab	85 a	17 abc	9 ab	153 ab	95 a
Bravo/Torino	8.8 a	186 ab	143 ab	79 a	37 ab	19 a	180 a	98 a
Bravo/Inspire Super	5.3 b	138 bc	124 ab	90 a	9 bc	6 ab	133 ab	96 a

*Mean within a column not followed by a common letter are significantly different at odds of 19 to 1 (Duncan's New Multiple Range Test, *P* = 0.05).

Photo 3. Untreated control.

Photo 5. Fontellis plus Quintec.

Photo 4. Chloronil 720 plus Quintec alternating with Chloronil 720 plus Rally (standard NJ treatment).

Photo 6. Chloronil 720 plus Quintec.

Treatments were applied using a PTO driven Hardy Sprayer utilizing a diaphragm pump and spray boom mounted on an International Harvester Super A tractor. A fixed boom mounted with with 8003XR flat fan nozzles with #50 stainless steel (comp 304) mesh screens in with plastic nozzle bodies. Nozzles were mounted at 18" spacing. All treatments were applied at 70 PSI traveling at 2.5 mph applying 49 GPA.

Treatment plots were rated for powdery mildew and canopy cover, Figure 1. Canopy was subjectively

Photo 7. Chloronil 720 plus Torino.

rated on a 1-5 scale. Rating dates were August 26, September 10 and September 26. Fruit was harvested on September 27. Data collected at harvest included marketable fruit weight, green fruit weight (less than 50% orange =unmarketable), number of decayed fruit (unmarketable), and % fruit with good handles, Table 1.

Because some treatments resulted in delayed harvest (green fruit) we coined the term, “Potential Marketable Yield” (Table 2). Commercial growers typically wait until the leaves deteriorated and all fruit orange before fruit is harvested. Sound green fruit likely would develop orange color, so potential marketable yield was calculated as the marketable yield plus the green yield. (Figure 3)

Highest Potential Marketable Yield was Treatment 2 -Bravo®/Quintec® alternated with Bravo/Rally® 182 lbs per plot followed by Bravo/Torino™ at 180 lbs./plot and Bravo/Rally® at 174 lbs./plot (Table 2). Lowest Potential Marketable Yield was the Untreated control at 59 lbs./ plot followed by Bravo/Cabrio® at 114 lbs./ plot, Bravo/Super Inspire® at 133 lbs./plot and Bravo/ Pristine® at 134 lbs./plot.

In analyzing the data, a relationship between canopy and weight of green fruit was observed; the lower the canopy rating (more green leaves), the higher the weight of green fruit (Figure 3), meaning maturity was delayed. The results show that the best fungicide treatments kept the canopy greener longer, fruit greener and thus delayed maturity. Our criteria for harvest was 50 or more of the fruit had to be solid orange

Treatment 2, Bravo/Quintec alt. Bravo/Rally, had the highest quality canopy rating of powdery mildew

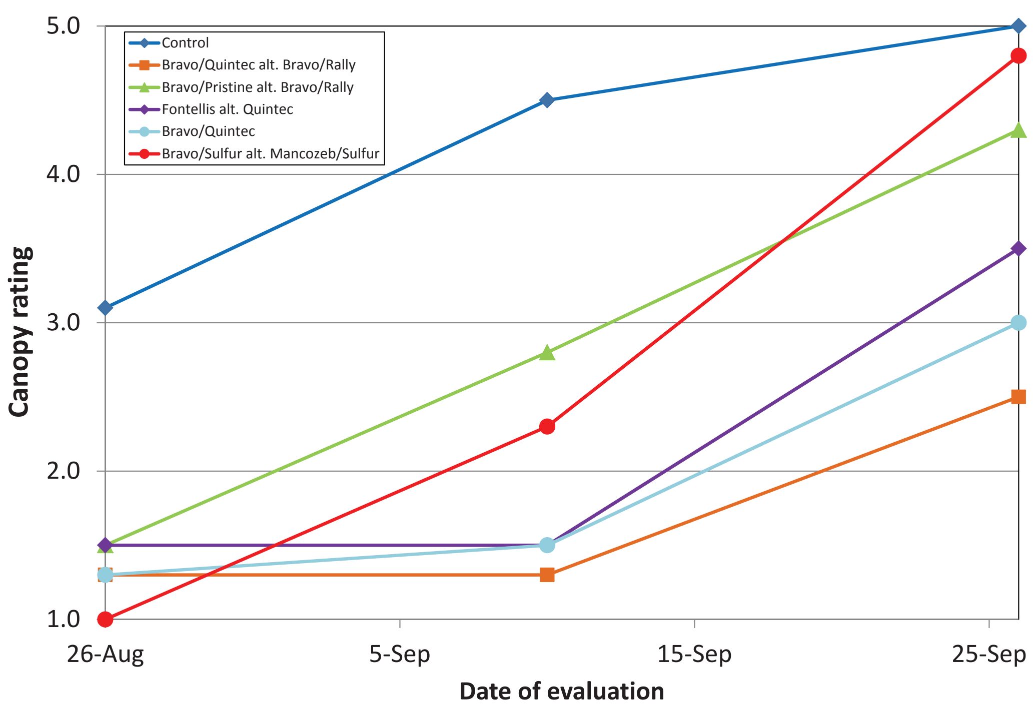

Figure 1. Canopy ratings of plants treated with various fungicide programs in 2013 at the Rutgers Snyder Farm. Ratings: 1=0-20%, 2=21-40%, 3=41-60%, 4=61-80%, and 5=81-100% of the canopy missing due to powdery mildew.

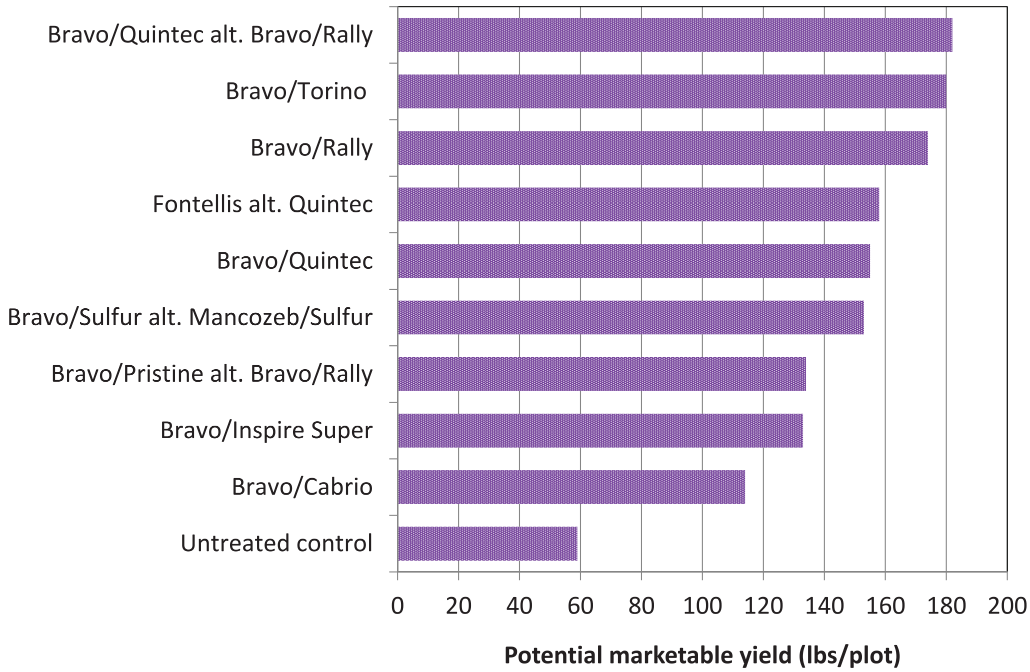

Figure 2. Per-plot yields of pumpkin plants treated with various fungicide programs in 2013 at the Rutgers Snyder Farm. Each plot was 10x20 feet and included five plants.

through harvest at 2.5 (Table 1, Figure 1-lower numbers are better), followed by Bravo/Quintec at 3.0 and Fontelis® alternated with Quintec at 3.5. Poorest canopy quality was Untreated Control at 5, Bravo/Cabrio at 5 and Bravo/ Inspire Super (5=no canopy left).

Powdery Mildew was rated at three different times, approximately two weeks apart at the end of the season. Both tops and bottoms of the leaves were rated separately. Powdery Mildew exhibits initial symptoms on the leaf bottoms, as the spray from flat fan nozzles spraying down from a boom does not give as good coverage on the bottom leaf surface. The best Powdery Mildew control on the leaf bottoms on 26-September was Fontelis® alternating with Quintec® at 1.8, Bravo/Quintec at 2.3, Bravo/ Quintec alternated with Bravo/ Rally at 2.5 (Table 1 - lower numbers better). The poorest Powdery Mildew control on the leaf bottoms on 26 September was Untreated Control at 5, Bravo/ Cabrio at 4.8, Bravo/Torino at 4.5 and Bravo/Inspire Super at 4.5 (Table 1).

All treatments significantly improved handle quality compared to the untreated control (Table 1). The

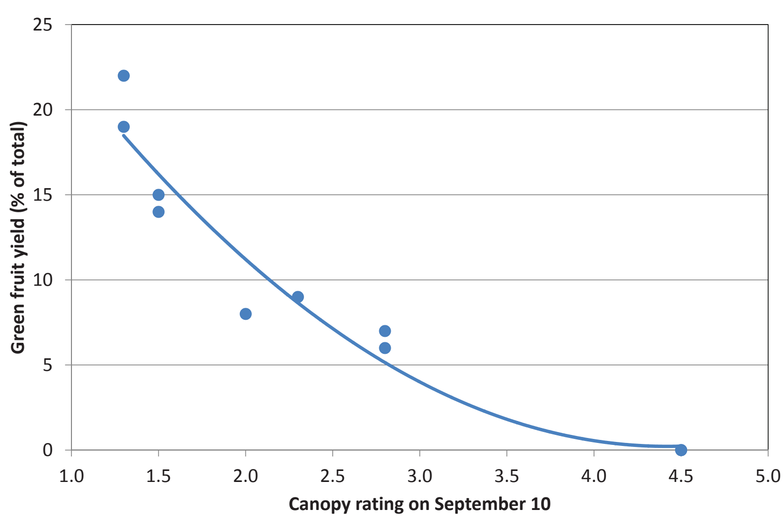

Figure 3. The relationship between canopy (rating on September 10) and the percent green fruit. A rating of 1 means that only 0-10% of the canopy is missing due to powdery mildew; whereas, a rating of 5 means that 80-100% is missing.

highest incidence of decay among treated plots were seen in Treatments 4 and 5, Fontelis alternating with Quintec and Bravo/Cabrio with 11% and 12% incidence decay, respectively, compared to 32% with the untreated control. Decay appeared to be caused by phytophora, and would not be impacted with the fungicides in this trial

Conclusions

Powdery mildew can be effectively controlled throughout growing season with weekly applied fungicides once the powdery mildew threshold is met.

Maintaining good canopy cover with green foliage allows the fruit to fully mature with healthy handles and increase in size for greater marketable yield.
Maintaining healthy foliage full season allows farmers to maximize yield.

The highest Potential Marketable Yields were from plots treated with Bravo®/Quintec® alternated with Bravo®/Rally®, followed by the treatment Bravo®/Torino™, then Bravo®/Rally®

Cabrio®, Pristine® and Inspire Super™ all show resistance to Powdery Mildew and should not be used to control Powdery Mildew. Rally® is also showing signs of resistance buildup and should be only used in combination and rotated weekly.

Grower Recommendations for New Jersey and New England

- Once the powdery mildew threshold is met (when one powdery mildew lesion per fifty leaves) begin weekly fungicide sprays.
- Consider rotating your systemic fungicides with each weekly application.
- Consider using a rotation of systemic fungicides from 3-4 different FRAC groups, never apply the same one two times in a row, always combine with a protectant fungicide.
- Always use one of the protectant fungicides Bravo®, Mancozeb, Copper for resistance management combined with the weekly systemic.
- Maintain fungicide sprays to keep the canopy foliage healthy until the majority of fruit is mature
- Remove the fruit promptly from the field when mature to avoid phytophora infection of the fruit.

Pumpkin harvest at Rutgers Snyder Farm, Pittstown, NJ.

Uncommon Disease Problems in Tree Fruit: A Brief Look Back at 2013.

Dave Schmitt
New Jersey Agricultural Experiment Station

Two unusual disease observations were made on tree fruit in southern New Jersey counties this past season. The first, White Rot (*B.dothididea*) appeared on newly planted trees this past spring in several orchards. While white rot is a common fruit and scaffold disease it is not commonly seen attacking newly planted trees. The second, Black Pox (*H papulosum*) was widespread, mostly at low levels, in Golden Delicious at harvest.

Figure 1. White Rot Trunk Canker on Gingergold apple.

White rot is commonly seen on fruit of susceptible varieties in summer. We have observed severe limb infections on Rome which resemble fire blight in drought stressed years. We have also observed trunk cankers on ginger gold in high density systems (Figure 1).

In the spring of 2013 a new high density planting of mixed varieties on a M9/M111 interstem began to exhibit symptoms of root problems. New shoots were wilting on hot days and eventually showed signs of stress (Figure 2). Initially it was thought phytopthera root rot might be the cause. Upon examination the roots were found to be slimy, orange in color and many of the fine roots were dead. In addition the discoloration was moving from the roots up into the trunk (Figure 3). Phytophthera lost favor as a cause after Dr. Lalancette was not able to culture it from samples.

Trees continued to collapse throughout the spring and by summer were exhibiting classic sypmtoms of white rot canker : sunken margins; orange, papery, peeling bark;and black picnidia (Figures 4 and 5). It's impossible to say how these trees were infected and nothing could be done to prevent the infections from

Figure 2. Trees showing water stress.

Figure 3. Root symptoms of White Rot.

Figure 4. White Rot Trunk Canker.

Figure 5. White Rot bark lesion showing picnidia.

Figure 6. Black Pox on Golden Delicious.

progressing once symptoms appeared. Sanitation of infected twigs and rogueing of dead trees, along with applications of effective fungicides were the only option to prevent further spread of the disease.

Black Pox is considered a minor disease of apple caused by the organism *Helminthospoirum papulosum*. It occurs in the Mid-Atlantic but is more commonly observed in the south. It is a wet weather disease. Infections can occur as early as mid-May and have an incubation period of 3-6 months. Symptoms can appear on wood, leaves and fruit. The most obvious symptoms appear on fruit and consist of sunken, black lesions surrounded by a red halo (Figure 6). We observed this in many orchards especially where there were frequent rains in June (The weather station in South Harrison Twp., Gloucster County recorded 12.8" total rainfall for the month). Disease incidence in postharvest samples was mostly minimal, however up to 30% infected fruit were recorded in poorly sprayed orchards. Most of our typical summer fungicides are effective gainst this disease. Minor secondary pest outbreaks are often associated with changes production practices. In this case it was the result of too much rain, and not enough coverage.

Dr. Ronald J. Prokopy died nearly 10 years ago on May 22, 2004.

Fruit Notes
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