Fruit Notes

Volume 78, Number 4: Fall, 2013

Fruit Notes

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

Fruit Notes (ISSN 0427-6906) is published four times per year by the Stockbridge School of Agriculture, University of Massachusetts Amherst. The cost of a 1-year hard-copy subscription is $40 and for an electronic subscription is $20. Each 1-year subscription begins January 1 and ends December 31. Some back issues are available for $10 each. Payments via check must be in United States currency and should be payable to the **University of Massachusetts Amherst**. Payments by credit card must be made through our website: *http://www.umass.edu/fruitadvisor/*.

Correspondence should be sent to:

Fruit Notes
Stockbridge School of Agriculture
205 Bowditch Hall
University of Massachusetts Amherst
Amherst, MA 01003

Table of Contents

Cover: Nitaka Asian Pears on a fourth-eaf tree at Rutgers Snyder Farm, Pittstown, NJ. This tree is part of a mutil-state research project, "Enhancing Direct-Market Farm Profitability: Testing Asian Pear Adaptation, Sustainability, and Productivity In the Northeastern Region." Win Cowgill photo.

Increasing Fungicide Use in New England Apples

Daniel Cooley, Arthur Tuttle, Sara Villani, Kerik Cox, Glen Koehler, Thomas Green, and Peter Werts

Growers in the Northeast have found in recent years that they are approaching the limits on captan use in a given season, 40 lbs. of Captan 80 WDG or 64 lbs. of Captan 50W per acre. This translates to 32 lbs. of active ingredient per acre for either product. Both captan and the ethylene-bisdithiocarbamate fungicides (EBDCs) such as Dithane, Manzate, Penncozeb and Polyram have been used more frequently over the last 10 years. Primarily, this is because the sterol inhibitor (SI or DMI) fungicides such as Rally, Vintage, Procure, Inspire and Indar have lost effectiveness against apple scab in many orchards. As the scab fungus has become increasingly resistant to the SI fungicides, growers have turned to the old standard protectants, captan and the EBDCs.

Fungicide programs have moved away from the "10-day delay spray" based around the four-days plus post-infection activity of the SI fungicides, generally using programs that begin earlier and require more frequent protectant fungicide applications. This is because the major apple disease, scab, has developed widespread resistance to the SI fungicides. Beginning in the late 1990's, practical resistance of apple scab to SI's was detected in orchards in New York and throughout the U.S. Kerik Cox's lab at Cornell obtained samples of *Venturia inaequalis*, the fungus that causes scab, from 64 orchards in New England from 2004 – 2012, and found that 61% of the orchards had SI-resistant scab and another 16% of the orchards were moving towards resistance. Only 23% of the orchards had scab that was still sensitive to SI fungicides (Villani and Cox, unpublished data).

As a result, growers have increasingly used protectant, multi-site fungicides, because they the apple scab fungus has never developed resistance to them in spite of decades of heavy use in apples. The combination of captan plus an EBDC, the so-called "captozeb" program was widely recommended, requiring early and frequent fungicide applications. Rather than starting fungicide applications at tight cluster and then making three to five subsequent applications roughly 10 days apart as was done with the SI programs, growers start at or near green tip and re-apply fungicides approximately every 5 to 7 days with a protectant program.

While this general change in fungicide use patterns has been widely discussed in the apple industry, there has been virtually no real data on the specific changes in apple fungicide use over the last decade. Using a detailed set of pesticide use data from a set of five growers in New England, this analysis looks at apple fungicide use from 2004 to 2012. The number of acres in the program on individual farms varied in size from 35 acres to 193 acres. Over the eight years, an average of 430 total acres was in the program each year.

The amount of each fungicide active ingredient (AI) used by each grower in each year was calculated on a per acre basis. Due to limitations in the available data, this was done on a whole-orchard basis. For a given farm in a given year, the total amount of each fungicide used was divided by the total acres in the program for that farm. This gave the pounds of AI/acre used in that orchard during that year.

But the simple AI/acre alone is not enough to evaluate fungicide use. Since the recommended rates per acre of fungicides varies widely, it's useful to look at fungicide use patterns in terms of the recommended rates. For example, suppose a grower has a 50 acre orchard. During scab season, he sprays two times with a full rate of Captan on the entire orchard, and during the summer uses half the full label rate on half the orchard in three applications. Captan 80WDG has a maximum label rate of 5 lb./A. So, 50 acres x 5 lb./acre x 2 applications gives 500 lb., and 25 acres x 5 lb./acre x 3 applications gives 375 lb., for a total of 875 lb. of Captan 80WDG used for the season. He also sprays half the orchard with a full rate of Flint 50WG two times. The Flint 50WG maximum label rate is 2.5 oz./acre. So 25 acres x 2.5 oz./acre x 2 applications gives 125 oz. of Flint 50WG used for the season.

If we look strictly at the amount used, 875 lb. (14,000 oz.) vs. 125 oz., there is over 100 times as

much Captan used as Flint. Yet each application was at the recommended rate or less, and appropriate for apple disease management. To get a more realistic picture of the grower's use of the fungicides, we need to adjust the amount used to reflect recommended use rates. To do this, we calculate a number called dosage equivalents, or DE. DEs are calculated by dividing the total pounds of fungicide used in a season in an orchard for each fungicide by the pounds recommended in the maximum label rate per acre for one application of that fungicide.

For Captan in the 50 acre orchard example, the orchard is 50 acres, so the amount of Captan 80WDG used per acre for the season is 875 lb./50 acre, or 17.5 lb./acre. The maximum label rate for Captan 80WDG is 5 lb./acre, so the number of dosage equivalents used in the orchard that year is 3.5. For Flint 50WG, 125 oz. were used over the season. This is an average of 2.5 oz./acre. The maximum label rate for Flint 50WG is 2.5 oz./acre, so the DE for Flint is 1.0.

Of course, this isn't the actual pattern the grower used for each material, but it does give a good estimate for the number of times each was used in the season. For example, the grower sprayed half the orchard with a full rate of Flint twice, not the whole orchard once. But we can see that overall, he used Flint much less than he used Captan, and this reflects the real use: five Captan applications vs. two Flint applications, with two full-orchard Captan sprays and no full orchard Flint sprays. Obviously growers do not always apply the maximum label rate of a fungicide, nor do they usually spray their entire orchard. Sprays are adjusted to fit the situations in each block, which vary by cultivar, location, size and disease history, to name a few important variables. In addition, the data used in this study did not always specify whether applications were tank mixes of fungicides. In the use rate calculations, each fungicide was considered individually, meaning that if a grower mixed two fungicides at full rates and then made a single application, this would count as 2 DEs, one for each fungicide. DEs aren't perfect, but are a good estimate.

Both the total pounds of fungicide active ingredient per acre and the number of maximum rate applications increased significantly from 2004 to 2012 (Figure 1). The 7 to 8 applications/yr. observed in 2004-05 are similar to numbers observed from 1991 to 1997 in New England when DMIs were commonly applied on an extended schedule (Cooley et al. 1994; Cooley & Autio 1997). While fungicide use in the five orchards varied across the years, in general the trend was up, from just under 8 to over 11 dosage equivalents.

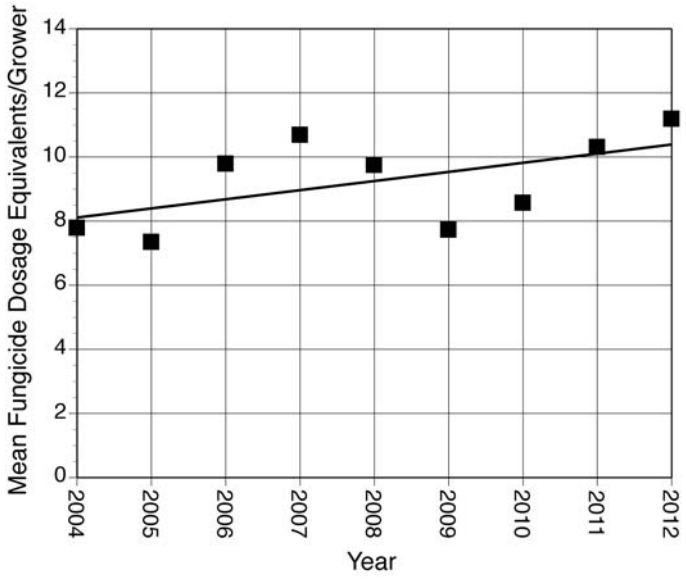

Figure 1. Fungicide use in terms of mean dosage equivalents per orchard for five New England orchards, 2004 to 2012. Dosage Equivalents = (total lb. fungicide used for the growing season) ÷ (number of acres of orchard).

Individual fungicides and classes of fungicides were then evaluated. The majority of the applications made over the nine-year period were for Captan and the EBDCs, the multi-site protectants. The trend lines for Captan and the EBDCs show increasing use (Figure 2); the actual mean number of Captan applications increased from 2.4 to 4.9, and actual EBDC applications from 1.2 to 2.9. By comparison, the SIs and the strobilurins had relatively lower and constant or decreasing use rates (Figure 2). The low number of max-apps for the SIs and strobilurins indicates that growers generally did not apply these over the entire production acreage, used less than the maximum label rate and/or made fewer applications than they did with Captan and the EBDCs.

The third most used fungicide over the period was thiophanate-methyl (Topsin-M,

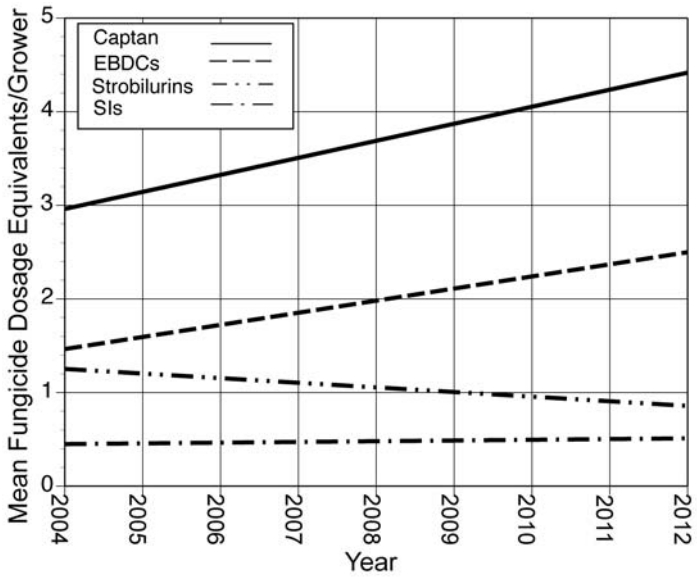

Figure 2. Fungicide use trend lines in terms of mean dosage equivalents per orchard by different fungicide classes including captan, ethylene bisdithiocarbamates, strobilurins (QoIs) and SIs (DMIs) for five New England orchards, 2004 to 2012.

of the dosage equivalents per grower were for by captan and the EBDCs (Figures 4 & 5). These protectant fungicides accounted for 89% of the lb. AI used in 2004-06, and for 93% in 2010-12. Overall, the pounds A.I. of fungicide increased, and most of the increase came from captan and the EBDCs. This is not surprising since these fungicides are recommended at much higher rates, as noted earlier. Captan use increased from nearly 12 lb. A.I./acre to approximately 16.5 lb. A.I./acre, the equivalent of an increase from 15 lb. to over 20 lb of Captan 80 WDG per acre. Similarly, EBDC use increased from 9 lb. A.I./acre to 12.2 lb. A.I./acre, equivalent to an increase of 12 lb. to 16.3 lb. of Dithane 75DF. While proportion of captan and EBDCs used increased only slightly, the amounts increased by approximately 33% for these fungicides. Each of the other fungicides contributed 3% or less to the lb. A.I. used. Of these, the next highest amount used was for thiophanate-methyl, and its use remained constant at about 0.8 lb. A. I. per acre, equivalent to 1.2 lb. (19 oz.) of T-Methyl). The trend in use is slightly up, but not significantly, meaning that use has been the same over the nine years. Another older systemic fungicide, dodine (Syllit), shows decreased use. At the same time, anilinopyrimidine (Vangard, Scala) use has increased. It may be that these fungicides, which are effective in the very early part of the growing season and are a different type of systemic, have replaced the older dodine, which also tends to be used early but has a history of resistance development in many areas. Finally, copper use remained steady over the nine year period, at about 0.5 DE. Since copper is almost always used in just one very early spray, this indicated that it was either not used over all the acres on a farm or was generally used at less than the maximum label rate.

Three-year averages were calculated for both mean pounds of active ingredient used per acre by each grower, and for the mean dosage equivalents used per year by each grower. Most of the lb. AI/acre/grower and

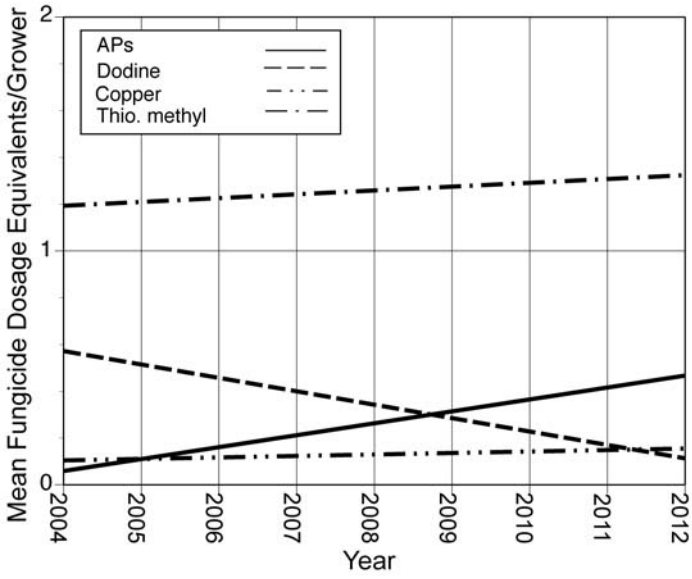

Figure 3. Fungicide use trend lines in terms of mean number of dosage equivalents per orchard (right) by different fungicide classes including thiophanate-methyl, dodine, anilinopyrimidines and copper compounds for five New England orchards, 2004 to 2012.

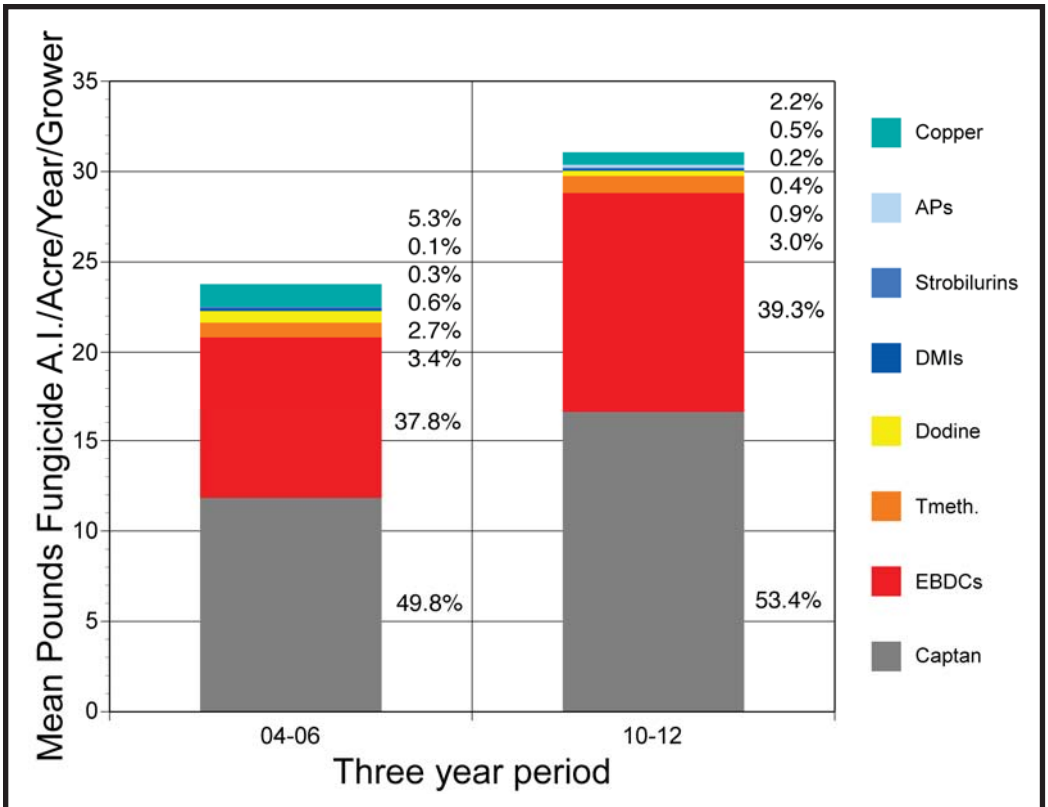

Figure 4. The mean pounds of fungicide AI per acre per year per grower applied in five New England Orchards calculated for two three-year periods, 2004-06 and 2010-2012.

Topsin M 70WDG.

In terms of dosage equivalents, captan and the EBDCs still dominated use, but to a lesser extent than they did for A.I./acre. They accounted for 55% of the dosage equivalents in the 2004-06 period, and 63% in 2010-12. Captan DEs increased from 2.9 to 4.0, while the EBDCs increased from 1.6 to 2.3. The only other fungicides that exceeded a DE of one were the strobilurines, which increased from 1.2 to 1.4, and thiophanate-methyl, which decreased from 1.2 to 0.9.

This analysis clearly shows that the protectant fungicides, captan and the EBDCs, dominate fungicide use in New England apple production, and their use is increasing. These fungicides were developed in the 1940's and 50's, and have been used on crops since then. Because they have multi-site activity, there are no known cases of fungal resistance to them, making them unique among the fungicides used for season-long apple disease control in New England. However, these fungicides have frequently come under regulatory review because studies indicate that they can be carcinogenic in laboratory animals. Canada is presently proposing a phase out of EBDC use in apples for health reasons.

Given this, the increasing use of EBDCs and captan in apples in New England is problematic. However,

Table 1. Fungicide pounds of active ingredient applied per acre per year per grower, and dosage equivalents applied per year per grower for two three year periods.

	Pounds A.I./Acre/Grower/Year		Dosage Equivalents/Grower/Year	
Fungicide(s)	2004-06	2010-12	2004-06	2010-12
Captan	11.8	16.6	2.9	4.0
EBDCs	9.0	12.2	1.6	2.3
Strobilurins	0.1	0.1	1.2	1.4
DMIs	0.2	0.1	0.6	0.3
Thiophanate-methyl	0.8	0.9	0.6	0.5
Dodine	0.6	0.3	1.2	0.9
APs	0.01	0.2	0.04	0.4
Coppers	1.3	0.7	0.1	0.2

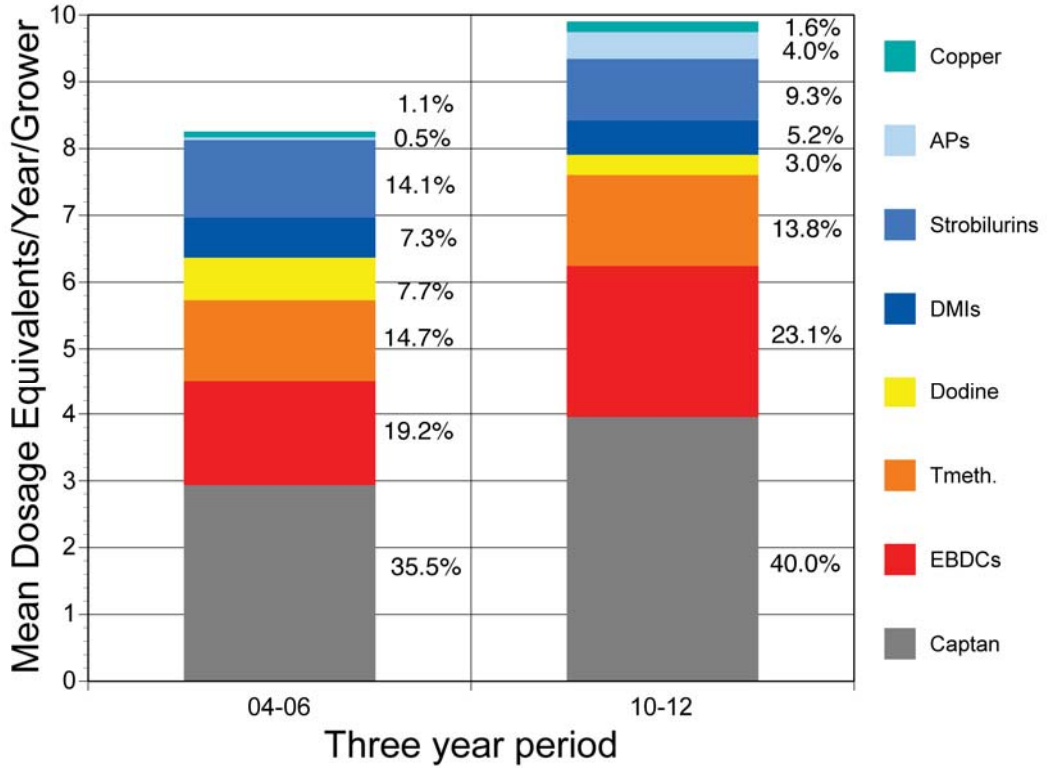

Figure 5. The mean dosage equivalents applied year per grower applied in five New England Orchards calculated for two three-year periods, 2004-06 and 2010-2012.

growers have very few alternatives to these multi-site protectants because virtually all other fungicides have a high risk of causing fungal resistance. The pesticide industry is increasingly marketing pre-mixed fungicide products containing two active ingredients, both with single-site systemic activity. This mixing both broadens the number of diseases that the products control, and theoretically decreases the risk of fungal resistance. Yet *V. inaequalis* populations with resistance to multiple active ingredients have been found in the Midwest and in New York. The protectants are the most effective way to deal with resistance in apple scab and other apple diseases.

Loss of the EBDCs and captan would also make disease management more difficult because the protectant fungicides are very effective against a number of apple diseases (Table 2). The EBDCs are rated as excellent to good against cedar apple rust, sooty blotch/flyspeck and the summer rots. However, while the EBDCs are very effective against summer blemishes and rots, they cannot be applied later than 77 days pre-harvest, so their utility against these diseases is limited. Captan is not as broadly effective, but is good against sooty blotch/flyspeck and fair against bitter rot. Neither fungicide controls powdery mildew.

Without captan and the EBDCs, the DMIs and QoIs could provide good to excellent control of powdery mildew. The DMIs are excellent against cedar apple rust, and the QoIs excellent against sooty blotch/flyspeck. However, the DMIs are not effective against summer rots, and the QoIs are only moderately effective against them.

In general there are alternatives to captan and EBDC that will control the major apple diseases. However, they are all fungicides that have a higher risk of producing resistance in fungal pathogens. In addition, they are all more expensive than the protectants.

After many years of reductions in apple fungicide use based around IPM and to a large extent post-infection systemic fungicides, fungicide use has steadily increased over the last 10 years. Growers are justifiably reluctant to implement IPM methods that could reduce fungicide applications. For over 70 years, commercial apple growers in New England have relied almost exclusively on chemicals to control diseases. Even the IPM reductions in In the 1980's and 90's were dependent on fungicides, the SIs. IPM developed because entomologists and plant pathologists warned that sooner or later chemicals disappear, either because they lose effectiveness or because the public demands they be banned. IPM strategy sought to reduce the need for

Table 2. List of apple fungicides labeled in New England in 2013 and their efficacy against the most important apple diseases. Control ratings: 0 = none, 1 = slight, 2 = fair, 3 = good, 4 = excellent, — = Unknown or does not apply. Adapted from the New England Tree Fruit Management Guide.

Trade Name (active ingredient)	Fungicide Family	Resist. Risk	*Scab*	*PM**	*CAR**	*SBFS**	*Black/ White Rot*	*Bitter Rot*
Scala (pyrimethanil)	AP	High	3	—	0	0	0	0
Vangard (cyprodinil)	AP	High	3	1		0	0	0
Topsin M (thiophanate-methyl)	Benzimidazole	High	2	2	0	4	4	1
Dithane (mancozeb)	EBDC	Low	3	0	4	4	3	4
Manzate (mancozeb)	EBDC	Low	3	0	4	4	3	4
Penncozeb (mancozeb)	EBDC	Low	3	0	4	4	3	4
Polyram (metiram)	EBDC	Low	3	0	4	4	3	4
Indar (fenbuconazole)	DMI (SI)	High	4	3	4	2	0	0
Procure triflumizole	DMI (SI)	High	4	4	4	0	0	0
Rally (myclobutanil)	DMI (SI)	High	4	4	4	0	0	0
Rubigan (fenarimol)	DMI (SI)	High	4	4	4	0	0	0
Tebuzol (tebuconazole)	DMI (SI)	High	4	4	4	2	0	0
Topguard (flutriafol)	DMI (SI)	High	4	4	4	0	0	0
Inspire Super (difenoconazole + cyprodinil)	DMI (SI) + AP	Med.	4	3	4	4	0	0
Syllit (dodine)	Guanidine	Med.	2	0	1	1	1	0
COCS, Cuprofix, Kocide (coppers)	Inorganic	Low	3	0	0	_	_	_
Sulfur (sulfur)	Inorganic	Low	2	2	0	1	1	–
Captan, Captec (captan)	Phthalimide	Low	4	0		3	1	2
Cabrio (pyraclostrobin)	QoI	High	4	3	2	4	3	3
Flint (trifloxystrobin)	QoI	High	4	4	2	4	3	2
Sovran (kresoxim-methyl)	QoI	High	4	4	2	4	3	2
Fontelis (penthiopyrad)	SDHI	High	4	3	3	__	__	__
Luna Tranquility (fluopyram + pyrimethanil)	SDHI + AP	Med.	3	3	2	__	__	__
Luna Sensation (fluopyram + trifloxystrobin)	SDHI + QoI	Med.	4	4	3	4	3	2
Merivon (fluxapyroxad + pyraclostrobin)	SDHI + QoI	Med.	4	4	3	4	3	3
Pristine (boscalid + pyraclostrobin)	SDHI + QoI	Med.	4	3	2	4	3	3

* PM – Powdery Mildew; CAR – Cedar Apple Rust; SBFS – Sooty Blotch / Flyspeck

chemicals by developing other tools to manage disease: disease resistance, cultural controls, biological controls and monitoring crop health and important pathogens. But attempts to commercially grow disease-resistant apple cultivars have not succeeded. The idea that scab inoculum can be measured, and if low enough growers can eliminate one to three early fungicide sprays has never been widely accepted because growers feel it is too risky. If scab begins early in the year, it can explode, causing significant damage and increasing fungicide costs. Reliable biocontrols for apple scab and other apple diseases have simply never been developed. There are no obvious alternatives to chemical control, and the most IPM can accomplish in the present situation is guide growers in the most efficient and effective ways to use fungicides. Currently, the focus in apple disease management is to reduce risks: the risk that there will be economically significant disease outbreaks, and the risk that scab and other diseases will become resistant to fungicides.

References

Cooley, D. R., R. Elliott, J. Mason, S. Wright and W. R. Autio. 1994. Second-level integrated pest management, 1991 to 1993: Diseases. *Fruit Notes* 59(1): 13-15.

Cooley, D. R. and W. R. Autio. 1997. Disease-management components of advanced integrated pest management in apple orchards. *Agric. Ecosyst. & Env.* 66: 31-40.

Survey of New England Apple Growers On Using Sanitation and Delaying Early-season Fungicide Applications

Renae Moran[1], Glen Koehler[1], Cheryl Smith[2], George Hamilton[2], William MacHardy[2], Lorraine Berkett[3], Heather Faubert[4], Mary Concklin[5], Arthur Tuttle[6], Jon Clements[6] and Daniel Cooley[6]

[1]University of Maine; [2]University of New Hampshire; [3]University of Vermont; [4]University of Rhode Island; [5]University of Connecticut; [6]University of Massachusetts

A survey was conducted in spring 2012 to learn about the extent to which New England apple growers know about and use sanitation and scab assessment methods that can reduce scab inoculum and in some cases allow them to eliminate very early fungicide applications. Growers were asked 11 questions using SurveyMonkey®, an online survey conducting program. Growers in Maine received an email invitation May 2 to take the survey, and growers in New Hampshire and Massachusetts received the same email invitation May 7. A reminder was sent June 1 to growers who had not yet completed the survey. Growers in Vermont, Rhode Island and Connecticut were invited to take the survey via a weblink, which was sent to them by email. Twenty-five growers in Maine received the survey by regular mail with five (20%) returning completed surveys by mail. By July 11, a total of 507 growers were invited to take the survey and 115 (23%) had responded.

Farm Size

Farm size ranged from 1 acre to over 50 acres. The number of acres represented was estimated to be 3170, based on the number of farms within each size category and the average farm size within each category. Farms greater than 50 acres were estimated to be 100 acres in size. Most farms were less than 10 acres, accounting for 52% of the farms in the survey (Figure 1). The relative number of midsized farms, or those farms that were 10 to 50 acres in size, accounted for 30%, and large farms represented the smallest sector accounting for less than 20%.

Sanitation

Growers were asked if they had used any sanitation method for scab reduction in their orchard. The majority, 67%, indicated that they had used some method of sanitation in their orchards. Growers who responded yes to this question were asked to indicate the number of acres on which they used sanitation in recent years. The estimated proportion of the total acres in the survey on which growers used sanitation was 41%, or 1300 acres. Growers who used sanitation did not use it on the entire orchard, but on an estimated 77% of their production

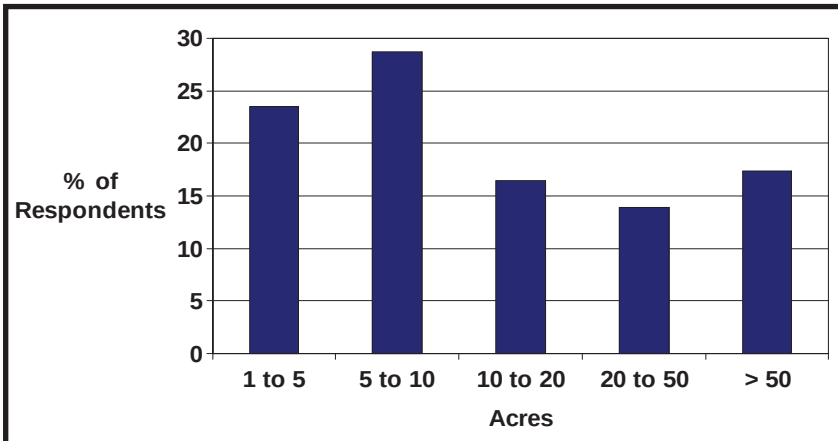

Figure 1. Number of farms, as a percentage, within each size range. Total number of respondents was 115.

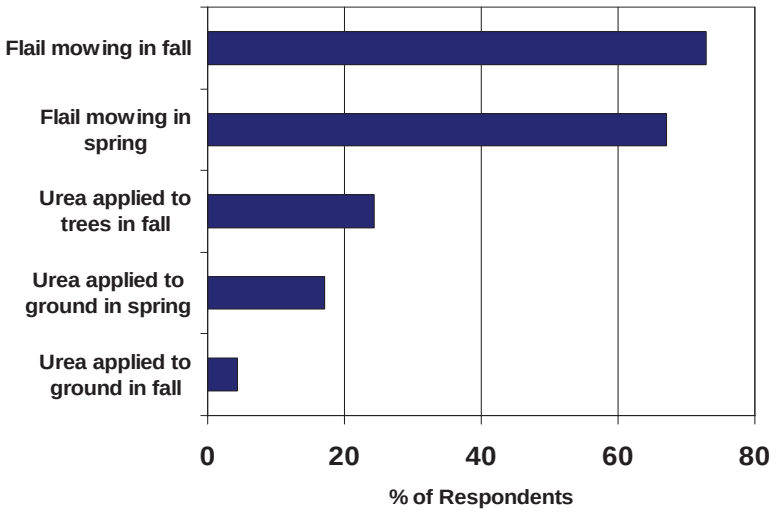

Figure 2. Scab sanitation methods used by New England apple growers. Total number of respondents was 70. Some growers indicated more than one method being used in their orchard.

acres.

Of the 70 growers who used santiation, the most common method was flail mowing in spring or fall, with 94% mowing once during either time and 46% respondents flail mowing in both spring and fall. Applying urea was used by 40% either directly to trees in fall or to the to the ground in spring. Few growers, 4%, applied it to the ground in fall.

Thirty-three percent of the growers indicated that they did not use sanitation in their orchards. The most common reasons for not using sanitation was not possessing a flail mower, indicated by 54%, and lack of time when it needed to be performed, indicated by 46%. Only 16% indicated that they did not know enough about scab sanitation to use it effectively.

Scab Indexing

The scab index, or potential ascospore dose (PAD), which is measured by counting the number of shoots that have scab in September or October, was not used as frequently as sanitation. Only 15% of growers surveyed indicated that they routinely do a scab index. Lack of time when it needed to be done was the most common reason, indicated by 37% of respondents, followed by not knowing how to do an index, indicated by 36%. Twenty-four percent indicated that scab indexing was not done because they will not delay the use of fungicides in spring. Four percent of growers indicated that they did not do indexing because their varieties were resistant to scab, and therefore an index was not needed.

Growers who measure the scab index do so to determine if they can save time and money by delaying the first fungicide application, or to measure the level of scab risk in their orchards as a way to more effectively manage the disease.

Delaying the First Fungicide

Since copper is applied as a fertilizer and for fireblight management, growers were asked when the first non-copper fungicide was applied. Most growers, 79%, apply the first non-copper fungicide at either green tip, or at half-inch green. Sixteen percent indicated that they apply their first scab fungicide at tight cluster or

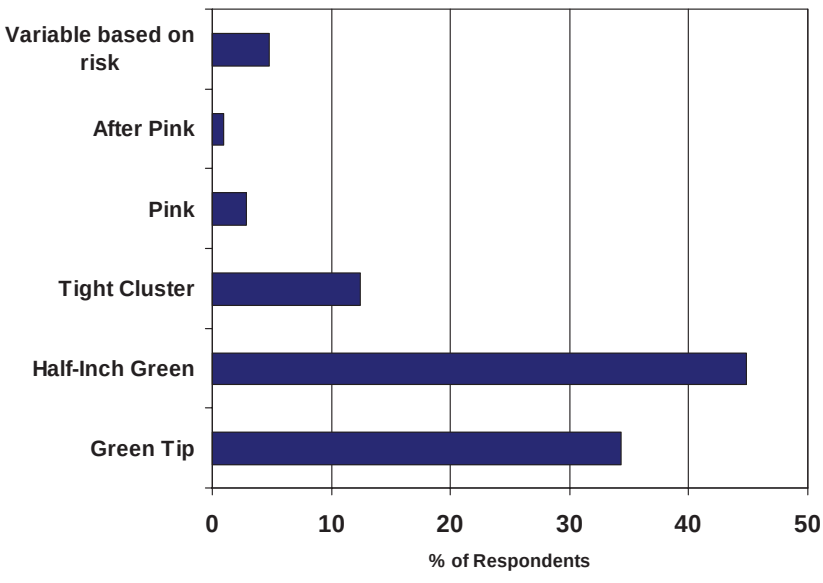

Figure 3. Bloom stage when the first noncopper fungicide is applied in apple orchards. Total number of respondants was 105.

Survey and Responses

1. Please, indicate the number of acres of managed apple orchards in your operation.	Response	Acres
1 to 5	25%	81
5 to 10	29%	248
10 to 20	17%	285
20 to 50	14%	560
>50	17%	2000
Total		3174
Answered question: 115. Skipped questions: 0		

2. Have you used scab sanitation methods in your orchard?	Response
No	33%
Yes	67%
Answered question: 115. Skipped questions: 0	

3. If you have NOT used scab sanitation, please indicate why (select all that apply).	Response
I do not know how to use scab sanitation.	16%
I do not think sanitation makes a difference in the amount of scab in my orchard.	16%
Scab sanitation requires extra time when I have none to spare.	43%
I want to winterize my sprayers and not use them in the fall when there is risk of freezing.	22%
Apple leaves do not fall early enough in the autumn to allow for ground application of urea before the ground is covered by snow.	30%
I do not have a flail mower.	54%
There is not enough time between removing winter prunings and bud break to do spring sanitation treatments.	45%
I cannot run a flail mower before budbreak because soil is too wet for tractor traffic or because the flail will do too much damage to grass so	30%
Answered question: 37. Skipped question: 78	

4. Which of the following might help you consider using orchard sanitation (select all that apply)?	Response
A better understanding of the benefits of orchard sanitation and how it works.	47%
Demonstrations of sanitation in orchards managed by growers and/or at the Univ. res. farm.	43%
I am not interested in using scab sanitation.	23%
Answered question: 30. Skipped question: 85.	

5. Approximately how many acres were given scab sanitation treatment(s) in recent years?	Response	Acres
<1 acre	4%	1.5
1 to <3 acres	15%	22
3 to <5 acres	16%	48
5 to <10 acres	26%	142.5
10 to <20 acres	16%	180
20 to <50 acres	10%	175
>50 acres	14%	750
Answered question: 74. Skipped question: 41		

6. Which of the following sanitation methods are done in your orchard (select all that apply)?	Response
Flail mowing in fall.	73%
Flail mowing in spring.	67%
Urea applied to trees in fall.	24%
Urea applied to the ground in fall.	4%
Urea applied to the ground in spring.	17%
Answered question: 70. Skipped questions: 45	

7. Please, indicate which of the following describes the use of fall scab indexing (PAD assessment) in your orchard (select all that apply):	Response
I do not know how to do a fall scab index.	36%
I grow varieties with good resistance to scab and therefore do not need it.	4%
I am not confident that my scab index would be accurate.	19%
I have no time in September to do a scab index.	37%
I will not use a delayed first spray strategy the next spring, so there is no gain from doing it.	24%
I normally do a scab index in all or part of my orchard.	15%
Answered question: 105. Skipped question: 10.	

8. Which of the following describes your reasons for doing a scab index (select all that apply):	Response
To determine if I can save time and money by delaying the first scab fungicide next spring.	11%
If the scab level is high, I want to figure out why, do sanitation measures, and give priority to that block for scab control next spring.	22%
It is worth it to have a measure of the scab level in the orchard, whether or not I am going to delay the first scab fungicide next spring.	22%
I do not perform a scab index in my orchards.	68%
Answered question: 94. Skipped question: 21.	

9. When do you normally plan to make your first fungicide application, excluding copper, in blocks that had good scab control last year?	Response
Green Tip	34%
Half-inch Green	45%
Tight Cluster	12%
Pink	3%
After pink	1%
Timing is based on the risk of scab in each orchard, but is regularly delayed to tight cluster or after in at least one orchard.	5%
Answered question: 105. Skipped question: 10.	

10. Select all of the following statements that you agree with:	Response
Without a scab index from the previous fall, the risk of scab infection from green tip to half-inch green is too high to leave green tissue unprotected.	35%
Even if I had done a fall scab index and found a low amount of scab, the risk of scab is still too high. I'd rather spray more than risk scab.	54%
I don't control scab well enough as it is, so cutting back is not an option.	24%
The first spray serves as a test of the spraying system. Delaying the first spray to a later growth stage when scab risk is higher puts too much pressure on the first spray.	38%
The first scab spray is typically applied at or after the tight cluster bud stage in our orchards that have a lower risk of scab.	23%
Answered question: 99. Skipped question: 16.	

11. Which of the following might help you consider delaying the first scab fungicide spray in low scab risk orchards (select all that apply).	Response
Training in scab sanitation and in doing a fall scab index.	37%
Demonstration of delayed first spray in grower orchards.	40%
Demonstration of delayed first spray in a university research orchard.	31%
Access to disease model forecasts for timing and relative severity of primary scab infection periods.	48%
I am not interested in delaying the first scab spray.	26%
Answered question: 98. Skipped question: 17.	

later, and an additional 5% time the first fungicide based on the risk of scab infection in each orchard block, but typically delay it until tight cluster or later in at least one orchard. A few growers selected more than one stage indicating that the answer may vary according to scab risk in each block.

Delaying fungicide use was considered too risky by 53% of respondents. Twenty-five percent indicated that they were not interested in delaying fungicide, but 75% indicated that they would consider delaying fungicide use with additional demonstration of its effectiveness and training in methods that reduce scab risk such as sanitation and measuring the scab index or PAD.

Summary

About 20% of the apple growers contacted to do this survey supplied information on the use of sanitation and elimination of early fungicide applications for apple scab in New England. Most of these growers currently practice scab sanitation as a routine cultural practice on at least part of their orchards. However, less than half the apple acreage represented in the survey received sanitation. Assessing scab inoculum potential using a formal PAD index is practiced less frequently due to a lack of time, or because of perceived risks of delaying the earliest fungicide applications. About half of the growers said that the risk of scab was too high, even in a clean block, for them to consider delaying. Nearly 80% normally plan to apply a fungicide by half-inch green even in blocks with good scab control the previous year. While about 25% of the growers would not consider delaying sprays, the remaining 75% would, given further training in using and demonstration of the effectiveness of the methods.

White Pine Blister Rust: A New Strain Has Developed

Nick Brazee
University of Massachusetts Extension Plant Diagnostic Laboratory

White pine blister rust (WPBR), caused by the fungus *Cronartium ribicola*, is an aggressive and non-native pathogen that was introduced into eastern North America in 1909. Since its introduction into North America, the pathogen has killed millions of five-needle pines and has nearly eliminated western white pine throughout much of its native range. While New England has only one native five-needle pine, eastern white pine (*Pinus strobus*), this species is abundant and widespread in forested and managed landscapes. While the environmental conditions required for disease development are not as easily satisfied here as they are in western North America, WPBR has killed countless white pines over the past century in New England.

All rust fungi require two botanically unrelated hosts to complete their life cycle. In New England, the WPBR fungus also infects species in the genus *Ribes*, commonly known as gooseberry and currant. *Ribes* are small, woody shrubs that are native to New England forests. However, the introduced European black currant (*R. nigrum*) was widely planted for berry production and is especially susceptible to the disease. As a result, the import, cultivation, sale and planting of black currant was outlawed under a federal quarantine and eradication ban enacted in the 1920s. After an intensive program of manual eradication lasting from the 1920s through the 1950s, the *Ribes* population was significantly reduced in New England. Consequently, the federal ban on *Ribes* cultivation and sale was lifted in the 1960s. Despite the relaxation of the federal ban, state quarantine and eradication laws still exist today in many eastern states, including Mas-


Gooseberry

sachusetts.

In the early 2000s, the pressure to lift the ban on cultivation and sale of *Ribes* intensified, led by commercial berry growers. Numerous varieties of currants and gooseberries with immunity to WPBR had been developed and were marketed as safe for commercial berry production. As a result, Massachusetts law was modified to allow the cultivation and sale of *Ribes* in certain towns after a formal permitting process. Currently, 144/351 cities and towns in the Commonwealth of Massachusetts still prohibit planting of currants and gooseberries (1). Since the modification of the *Ribes* ban in Massachusetts, commercial production of currants and gooseberries continues to increase as berry growers expand into this niche market.

In 2008, researchers in Connecticut observed the WPBR pathogen on black currant bred for immunity to the disease (2). In light of this discovery, researchers in eastern Canada began surveying rust populations in New England and eastern Canada to determine if a new strain of the fungus had been introduced. The researchers determined that it wasn't a newly introduced strain, but a more troubling scenario; a new, virulent strain of the pathogen had naturally developed in northeastern North America. Through genetic mutation, the new strain of the pathogen is capable of infecting numerous cultivars of black current that were bred for immunity to the disease. These previously immune *Ribes* cultivars have been widely planted by commercial berry growers. Survey results confirm the new strain has been detected in New York, New Hampshire, Quebec and New Brunswick and Nova Scotia, in addition to Connecticut.

Widespread concern now exists that WPBR will once again become a serious threat for the long-term health of eastern white pine in New England. Young white pines are more susceptible to the disease because the environmental conditions required for disease development occur most often closer to the ground (high humidity and shade with free moisture on plant surfaces). While the majority of our white pine


White pine blister rust on white pine.

population is mature and less susceptible, a considerable number of young white pines exist in our forests and managed landscapes. Symptoms of the disease include top dieback, browning needles and the presence of stem and trunk lesions accompanied by copious resin flow. The lesions may appear as numerous rupturing blisters with oozing and hardened resin. Insect infestation may often be visible near the lesions. The fungus invades the tree through the needles and slowly progresses downward to the twigs and branches before finally girdling the main trunk. No control measures exist for the pathogen on white pine and spores have been documented to travel several miles. However, chemical control of the fungus on *Ribes* is possible if performed properly by commercial growers.

In light of these new findings, the state of New Hampshire imposed a new moratorium in 2012 banning the planting of currants and gooseberries until further surveying for the new strain can be completed (3). To date, the laws managing the cultivation and sale of *Ribes* in Massachusetts have not been changed to reflect the altered dynamics of WPBR. One of the conditions of legalized cultivation and sale of *Ribes* in Massachusetts and additional northeastern states was that all *Ribes* cultivars would be immune to WPBR. Now that disease immunity has been broken by the fungal pathogen, the law needs to be reexamined before WPBR becomes an epidemic once more.

References

(1) Currants and Gooseberries: Prohibited Towns in Massachusetts. 2012. [http://extension.umass.edu/landscape/sites/landscape/files/publications/currants_gooseberries_prohibited_towns.pdf]

(2) Frederick, ZA, et al. 2011. First Report of White Pine Blister Rust Caused by *Cronartium ribicola* on Immune Black Currant *Ribes nigrum* Cv. Titania in Preston, Connecticut. Plant Disease 95(12): 1589. [http://apsjournals.apsnet.org/doi/abs/10.1094/PDIS-07-11-0609]

(3) Moratorium on Planting Currants and Gooseberries in New Hampshire. 2012. [http://www.agriculture.nh.gov/documents/Ribes.pdf]

Rutgers New Jersey Agricultural Experiment Station (NJAES) Receives Funding For Strawberry Research

Peter Nitzsche, William Hlubik, and Win Cowgill
New Jersey Agricultural Experiment Station

A team of faculty and staff from Rutgers NJAES, U.S. Dept. of Agriculture and three cooperating Universities have received a grant funding for a project entitled: "Improved Variety Selection and Sustainability of Strawberries for the Eastern United States". The project is funded by a grant from the Walmart Foundation and administered by the University of Arkansas System Division of Agriculture, Center for Agricultural and Rural Sustainability. The goal of this project is to expedite the evaluation of strawberry breeding selections by utilizing farmer and consumer input to provide for a more rapid release and commercialization of improved cultivars for eastern U.S. growers and consumers. This project will test larger scale propagation and distribution of advanced selections, with goals of increasing production, improving profitability of local farms, and increasing the availability of high quality fruit.

Rutgers Professor Bill Hulbik teaching master gardeners how to select strawberry tips for propagation from the Earth Center Wallmart strawberry research project, East Brunswick, NJ.

This funding has already facilitated an increase in the propagation of advanced strawberry selections from the Rutgers NJAES breeding program and replicated yield trials have been established at three research sites (Pittstown, NJ, South Brunswick, NJ, NC), and observational trials at 8 conventional and two organic

Table 1. Field performance of NJAES strawberry selections, Pittstown, NJ 2010

Genotype	Marketable yield (lb/A)	Average fruit size (g)[x]	Average °Brix [y]
Chandler	11,372 b[z]	17.1 c	8.4de
NJAES –A	9,719 b	19.2 b	9.4 bc
NJAES – B	12,273 b	20.4 a	9.7 ab
NJAES – C	19,886 a	16.9 c	8.2 e
NJAES – D	6,740 b	17.2 c	10.0 a

[x]Twenty representative fruit/plot
[y]Mean of fruit samples from eight harvest dates
[z]Mean separation within columns by Fisher's Protected LSD, $P \leq 0.05$

Left to Right- Professor Bill Hlubik, John Hauser -Grower, Jim Gimerese-Grower, Dr. Gojko Jelenkovick, Rutgers Straweberry Breeder examine strawberry selections at Rutgers Farm 3 research trials, June 2013, East Brunswick, NJ

farms. Two of these selections are also being custom propagated through an agreement with Nourse Farms a commercial nursery in Massachusetts. To test for consumer preference, blinded taste evaluations will be conducted in the spring of 2014 to evaluate advanced selections over commercially available varieties. The research program is targeted to release the best selections to commercial growers within the next three to four years.

This grant award is part of a $3 million donation made in February by the Walmart Foundation to the University of Arkansas System Division of Agriculture's Center for Agricultural and Rural Sustainability Arkansas (CARS). The competitive grants program, administered by CARS, attracted 56 proposals from agricultural research and extension personnel at land-grant public universities in 29 states. For more information got to the National Strawberry Sustainability Initiative website http://strawberry.uark.edu or The Walmart Foundation website www.foundation.walmart.com.

At least two of the NJAES selections have performed very well in the replicated trials and in grower fields. While in some of the replicated trials yields have been somewhat lower than the commercial standard 'Chandler', fruit size, shape, color, and flavor have been much improved (Table 1).

2014 Mid-Atlantic Fruit and Vegetable Convention

** indicates topic expected to qualify for a category pesticide update training credit*
*** indicates topic expected to qualify for a core pesticide update training credit*
**** indicates topic expected to qualify for a fumigation pesticide update training credit*

Monday, January 27, 2014

020 Keeping Fresh Produce Safe Using Good Agricultural Practices – (fee -$25 – lunch on your own)
10:00 a.m. to 4:00 p.m.
This 5 hour workshop focuses on the basics of farm food safety. Produce and fruit farmers can learn how contamination happens and how to assess risk on your farm. This workshop also helps prepare fresh produce growers to implement and document GAPs on their farms. Growers who sell wholesale may be asked by their buyers to provided evidence of GAP training. Participants will be issued a training certificate. This workshop will presented by Penn State Extension educators, Lee Stivers, Robert Pollock and Thomas Ford. Topics covered in this daylong workshop include: 1) Produce Food Safety – Introduction; 2) Irrigation and Wash Water; 3) Risks from Animals and Manure; 4) Harvester and Handler Health and Hygiene; 5) Harvest and Post-Harvest; 6) Traceability and Recall Programs

040 Equipping a New Generation of Specialty Crop Growers - *Entrepreneurship, Team-Building, Innovation, Market Diversification* – (fee – $65 includes lunch)
10:30 a.m. – 4:00 p.m.
How do I become a better….leader, communicator, entrepreneur, innovator? Whether you are just starting out as a young farmer or have some years of experience under your belt, expand your skill set and gain practical knowledge! Rich Stup with AgChoice Farm Credit will address workforce optimization while Penn State Extension educators Lynn Kime, Winifred McGee and Mark Gagnon will shed light on entrepreneurship and the importance of focusing on the future of your business. Young grower entrepreneurs will share their visions and insights from real world experiences.

060 Employee Etiquette – (fee - $25)
1:30 to 4:30 p.m.
Recruiting and managing employees can be stressful. This workshop will address legal, logistical, and practical employers face as they seek to maximize the value of their workforce. Kimberly A. Nash, Director of Human Resource Services at Brown & Brown Insurance | Alpha Benefits Division, will discuss "Legal Issues Around Having Employees". She will cover what you may legally say in an help-wanted advertisement, how to conduct an effective interview, questions you cannot ask in an interview, how to hire and fire employees and if time allows OSHA/Safe Work Place and Insurance concerns. Issues specific to agricultural employees will be included. Tad Kuntz, Orchard/Farm Market Manager at Masonic Village Farm Market will cover "Writing Employee Policies and an Employee Manual" with specific reference to agricultural employees. The workshop will conclude with a round table discussion with speakers and attendees.

070 Getting Started with Raspberries and Blackberries – (fee – to be announced)
9:00 a.m. to 12:00 noon
This workshop sponsored by the North American Raspberry and Blackberry Association (NARBA) will feature Dr. Marvin Pritts and Cathy Heidenreich from Cornell Univ. They will be covering the basics of getting started in bramble production.

080 Advanced Topics in Raspberry and Blackberry Production – (fee - to be announced – includes lunch)
9:00 a.m. to 1:30 p.m.
This workshop sponsored by the North American Raspberry and Blackberry Association (NARBA) will cover insecticides for bramble crops, current Spotted Winged Drosophila research, revitalizing an aging bramble planting and real-life production experiences of several growers. It will conclude with a luncheon and annual meeting of NARBA.

090 Raspberry and Blackberry Production – (fee – to be announced)
This workshop sponsored by the North American Raspberry and Blackberry Association (NARBA) will be a continuation of the bramble morning sessions. It will include a grower spotlighting his operation plus experts discussing blackberry post-harvest issues, food safety and GAPs for brambles, and how to capitalize on the health benefits of brambles.

Tuesday Morning, January 28, 2014

110 Emerging Trends in CSA's
9:00 **Trends in CSA's** - Carla Snyder and Brian Moyer, Penn State Extension
9:45 **Farm to Work Place** - Lindsay Gilmour and Sonya Claxton, Common Market

180 Tree Fruit - Nigerian Room
9:00 **Invocation** - Ed Weaver, Weaver's Orchard
9:05 **President's Address** - Carolyn McQuiston, Dawson's Orchards
9:15 ****The Worker Protection Standard Paper Trail** - James Harvey, Penn State Univ.
9:45 ***George Goodling Memorial Lecture, Chemical Regulation of Crop Load in Apples: Present Options and Future Possibilities** - Dr. Steven J. McArtney, North Carolina State Univ.

190 Keynote - Nigerian and Trinidad Rooms
10:40 **Changes in Penn State Extension** – Dr. Dennis Calvin, Penn State Univ.
10:55 **Mid-Atlantic Legislative Affairs Update –** United Fresh Produce Association
11:05 **Keynote Presentation – Performance in a Rapidly Changing Environment** – Steven Wiley, Lincoln Leadership Institute (sponsored by DuPont)

NARBA Tour – (fee – to be announced)
This bus tour of nearby points of interest sponsored by the North American Raspberry and Blackberry Association (NARBA) tentatively will include visits to a high tunnel blackberry operation, a blackberry and strawberry farm, a soil and tissue testing laboratory (Agri-Analysis Labs), and an Amish farm.

Tuesday Afternoon, January 28, 2014

210 Wholesale Marketing - Crystal Room
Topics to be Announced

260 New Equipment – Magnolia Room AB
1:30 **Our New Biomass Boiler for Greenhouse Heating** - Thomas Childs, Twin Springs Farm
2:00 **Multi-Crop Picking Assistant** – Steve Zook, Crop Care/Paul Zimmerman
3:15 **Solar Golf Cart, Electric Cultivator, Roller Crimper and More Equipment from the Dickinson College Farm** - Matthew Steiman. Dickinson College Farm
4:00 **To Be Announced**

270 Labor/Farm Management – Magnolia Room CD
1:30 **Farm Succession Law Issues** - Gary Heim, Persun & Heim P.C. and Jeffrey Ouellet, Hartman, Underhill & Brubaker LLP
3:15 **Farm Succession Law Issues** - (continued) Gary Heim, Persun & Heim P.C. and Jeffrey Ouellet, Hartman, Underhill & Brubaker LLP

280 Tree Fruit - Nigerian Room
1:30 **Managing Wildlife in Orchards** - Kyle Van Why , USDA-APHIS
2:00 ***Fruit Production and Pest Management in the Western US - Progress and Needs** - Rachel Elkins, Univ. of California Extension
2:45 ***Bloom Thinning of Apples in the Mid-Atlantic Region** - Dr. Gregory Peck, Virginia Tech.
3:30 ***How to Conserve Biological Control Agents with the Use of Selective Insecticides** - Dr. David Biddinger, Penn State Univ.
4 :15 **SHAP Business Meeting**

Tuesday Evening, January 28, 2014
Social
6:00 **Fruit and Vegetable Grower Reception** – Trinidad and Nigerian Rooms (ticket required)
7:00 **Fruit and Vegetable Growers Banquet -** Trinidad and Nigerian Rooms (ticket required) – buffet dinner, recognitions and awards

Wednesday Morning, January 29, 2011

310 Marketing 101
9:00 **Creating Good Displays** - Brian Moyer and Carla Snyder, Penn State Extension
9:30 **Making Effective Signs** - Brian Moyer and Carla Snyder, Penn State Extension
10:15 **Market Design and Layout** - Caleb Torrice, Tabora Farm & Orchard

320 Raspberry/Blackberries - Wild Rose Room
9:00 **Grower Showcase: Kuhn Orchards** - Sidney Kuhn and Anthony Herring, Kuhn Orchards
10:15 **Raspberry Varieties: How We Determine What Works (grower panel)** - Nate Nourse, Nourse Farms and others
11:00 **What's New with Blackberry Varieties** - Reza Rafie, Virginia State Univ. and John Clark, Univ. of Arkansas

360 Tree Fruit - Nigerian Room
9:00 **Summer Pruning Peaches and Apples** - Dr. Richard Marini, Penn State Univ.
9:45 ***Brown Marmorated Stink Bug – What's Next?** - Dr. Tracy Leskey – USDA-ARS, Dr. Gregory Krawczyk Penn State Univ., Dr. Christopher Bergh – Virginia Tech
10:45 ****Why Very Little of the Chemicals You Spray Get Into the Plant and What You Might Do About It** - Dr. Steven J. McArtney, North Carolina State Univ.
11:15 **Securing the Future of the Fruit Industry through Successful Farm Transitions** - Moderator: Russell Redding, Delaware Valley College; Panel: Sidney and David Kuhn, Kuhn Orchards, Justin and Edward Weaver, Weaver's Orchard, Benjamin and David Wenk, Three Springs Fruit Farm

Wednesday Afternoon, January 29, 2014

410 Fun on the Farm: Agritainment
1:30 **Going With the Flow: Helping Customers on Having a Good Time via Signage, Pricing, Farm Orientation -** Russ Holmberg, Holmberg Orch, CT
2:00 **One and Done: Short Season Agritainment With One Crop** - William Reynolds, Reynolds Pumpkin Farm
2:30 **Pickfest: Bringing Music and Arts to the Orochard** - Steve Frecon and Josh Smith, Frecon Orchards
3:15 **Pricing Pick Your Own and Charging Admission** - Kurt Alstede, Alstede Farms
4:00 **Social Media Update 'Timing is Everything: Using Social Media to Let Customers Know What is Happening On the Farm** - Dr. Kathleen Kelly, Penn State Extension

420 Raspberry/Blackberries – Wild Rose Room
1:30 **Black Raspberries: New Interest in an Old Crop** - Bryan Butler, Univ. of Maryland; Kathlenn Demchak, Penn State Univ.
2:00 '**Niwot' Double-Cropping Black Raspberry** - Peter Tallman, independent raspberry breeder
2:15 **SWD and Other Fruit-Infesting Larvae** – TBA
3:15 **Getting the Most out of SWD Control Measures** - Cesar Rodriguez-Saona, Rutgers Univ.
4:00 "**There are Worms in My Fruit Salad!": Customer Relations in the Face of SWD** - John Berry, Penn State Extension

470 Peaches – Trinidad Room
1:30 ***Effective IPM Programs for BMSB in Peach: Better and Less Spraying** - Dr. Anne Nielsen, Rutgers Extension
2:00 **Ernie Christ Lecture - Performance of Peach Training Systems in the Mid-Atlantic** - Dr. James Schupp, Penn State Univ.
3:00 **Peach Flesh Types: Some Curiosities Uncovered** - Dr. John Clark **,** Univ. of Arkansas
3:30 **Peach Variety Update** - Jerry Frecon, Adams County Nursery

480 Tree Fruit - Nigerian Room

1:30 *__Fungicide Resistance Management__ - Dr. Kari Peter – Penn State Univ., Dr. Norman Lalancette, Rutgers Univ., Dr. Keith Yoder – Virginia Tech.

2:15 *__Herbicide Resistance Weed Management Considerations for Orchards__ - Dwight Lingenfelter, Penn State Univ.

3:00 **Pear Production in Western States: Status, Challenges and Trends -** Rachel Elkins , Univ. of California Extension

3:30 **US Apple and Pennsylvania Apple Marketing Board Updates** - Julie Bancroft , PAMB, TBA, US Apple representative

Wednesday Evening, January 30, 2014

Social/Educational

5:00 **Reception for Pennsylvania Apple Growers** - Cocoa Suites – hosted by the Pennsylvania Apple Marketing Board and Temple-Inland

7:00 **Ice Cream Social for All Convention Attendees –** Great Lobby – hosted by the Pennsylvania Vegetable Growers Association – ice cream served until 8:00PM

7:00 **Musical Jam Session –** bring your instrument & join in

7:00 **Smoothie Competition**

7:00 **Seed Heat Treatment Workshop**

Thursday Morning, January 30, 2014

510 Food Trends: Marketing to What Are Your Customers Eating

9:00 **2014 Food Trends, What Will YOUR Customers be Hungry for This Year?** - Heather Mikulas, Penn State Extension

9:30 **Essentials of Developing a Marketing Plan** - Dr. Ferd Wirth, St. Joseph's Univ.

10:15 **How to Differentiate and Position Your Product and Brand** – Dr. Ferd Wirth, St. Joseph's Univ.

11:00 **Overview of Marketing Options for Fruits and Vegetables** – Dr. Ferd Wirth, St. Joseph's Univ.

11:30 **Picking Your Packaging for Pricing - What Your Product is in Says a Lot to the Consumer** - Heather Mikulas, Penn State Extension

520 Strawberries - Wild Rose Room

9:00 **An Update on the National Strawberry Sustainability Initiative** - Peter Nitzsche, Rutgers Univ.

9:30 *__Rhizoctonia fragariae in Strawberry Black Root Rot: Friend or Foe? -__ Emily Lavely, Penn State Univ.

10:15 **Table Grape Developments from the Univ. of Arkansas -** John Clark, Univ. of Arkansas

11:00 **Food Safety Considerations for Strawberries and Other Berries** - Luke LaBorde, Penn State Univ.

570 Tree Fruit - Nigerian Room

9:00 *__Update on Bacterial Peach Diseases__ - Dr. Kari Peter, Penn State Univ.

9:30 **Consumer Peach Purchasing Behavior and Preferences: Results from a Sensory Evaluation and Internet Survey** - Dr. Kathleen Kelley, Penn State Univ.

10:30 *__Interpreting Leaf and Soil Analyses__ - Dr. Robert Crassweller , Penn State Univ.

11:00 *__What Worm is Feeding on my Fruit?__ - Dean Polk, Rutgers Extension

11:30 **Flower Bud Formation and the Biennial Bearing Puzzle in Apple** - Dr. Steven J. McArtney, North Carolina State Univ.

Thursday Afternoon, January 30, 2014

610 Keeping Up with the Changes in Digital Marketing - Crystal Room

1:30 **Marketing to the Mobile Consumer** – Dr. Kathleen Kelley, Penn State Extension

2:00 **Beyond FaceBook** - Rachel VanDuzer, VanDuzer Design

2:30 **Digital Marketing at the Farm Level** – TBA

3:00 **Hardware and Devices for Digital Marketing** - Robert Goodling, Penn State Extension

3:45 **Tricks of the Trade** - Moderator, Shannon Dill, This session will be an open discussion to share suggestions and advice in using Digital Marketing for your farm business.

620 Blueberries - Wild Rose Room

1:00 **Diagnosing Blueberry Problems** – Dr. Gary Pavlis, Rutgers Univ.

1:30 **What Are You Looking For In a Blueberry Variety? New Choices and Some Time-Tested Ones** - Mark Ehlenfeldt, USDA-ARS

2:00 *__Blueberry Disease Control –__ Dr. Peter Oudemans, Rutgers Univ.

2:30 *__Integrated Management of Insect Pests in Blueberries__ – Dr. Cesar Rodriguez-Saona, Rutgers Univ.

3:00 *__Monitoring and Insecticide Programs in Light of Spotted Wing Drosophila__ - Dean Polk, Rutgers Univ.

3:30 *__Weed Control in Blueberries__ – Dr. Bradley Majek, Rutgers Univ.

680 Regulatory Issues for the Horticulture Industries - Nigerian Room

1:00 **The Current Status of Immigration and Labor Reform** - Diane Kurrle, US Apple Association

1:45 **Food Safety Regulations** - Mark Seetin, US Apple Association; Dr. Lydia Johnson, PA Dept of Agriculture

2:30 **Patient Protection and Affordable Care Act - An Overview of Effects on Small Business** - Dr. Louis DeEugenio Jr., FACP

3:00 **__Pesticide Recordkeeping: Pencil and PC (Mac if you must) Formats__ - Dr. Kerry H. Richards, Penn State Univ.

For registration details, see the conference website at http://www.mafvc.org/

Exceptional quality and flavor at attractive prices

Brought to you from the 4th generation family farm of Santo John Maccherone

- PLU Stickers Available Upon Request
- Low in Calories
- Nutritious and Delicious
- Exceptional Flavor

SANTO SAYS...

"Peaches from Circle M Farms just plain taste better. Their size and color are what your customers want, and their flavor is the icing on the cake.

That's because our orchards are tended with care and attention, and their fruit is left on the tree to ripen naturally until they reach their optimum sweetess. Then they are picked by hand, taste-tested by me to ensure quality, and packed gently into 25 lb. volume boxes for shipping. Single layer cartons are available upon request.

Circle M's 30 varieties of peaches and nectarines are known for their sweetness and their luscious color. They look as good as they taste.

Discriminating customers appreciate our white flesh peaches because of their lower acid levels and supremely sweet taste.

Add it all up: Peaches from Circle M Farms are fresher and sweeter, picked by hand when their time has come, and packed with care for a longer shelf life.

Yellow, white and donut peaches and yellow and white nectarines are available early July to late September."

Call us at 856 856 207-4542 or 609 381-6465. Fax your order to 856 878-0404

JERSEY FRESH
FROM THE GARDEN STATE

Available in 16 oz. and 64 oz. sizes

Made from fresh New Jersey Peaches

"Peach Cider Drink, Peach Salsa, Peach Preserves"

Santo John Maccherone

circlemfarmsllc@gmail.com

Circle M Farms

88 Sandy Ridge Road

Salem, N.J. 08079

Fruit Notes
University of Massachusetts Amherst
Stockbridge School of Agriculture
205 Bowditch Hall
Amherst, MA 01003-9294

104911