Volume 14, 2006

UMassAmherst EXTENSION

Healthy Fruit

Prepared by the University of Massachusetts Fruit Program

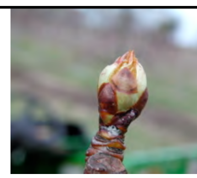
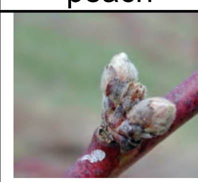
Healthy Fruit, Issue 2, April 11, 2006

http://www.umass.edu/fruitadvisor/

Current DD accumulations

Location	Base 43F	Base 50F
Belchertown, UMass CSO observed (01/01/06 – 04/10/06)	131	45
Belchertown, UMass CSO SkyBit (01/01/06 – 04/10/06)	122	NA

Current bud stages

Location	McIntosh apple	Honeycrisp apple	Pear	Redhaven peach	Cavalier sweet cherry
Belchertown, UMass CSO (04/010/06)	 green tip	 early green tip	 swollen bud+	 swollen bud+	 swollen bud

Upcoming meetings/events

Date	Meeting/ event	Location	Time	Information
April 12	Fruit Team Twilight Meeting*	Mack's Apples of Moose Hill Orchards, 230 Mammoth Road, Londonderry, NH	5:15 PM	George Hamilton 603-641-6060
April 13	Fruit Team Twilight Meeting**	Dame Farm 94 Brown Avenue, Johnston, RI	5:30 PM	Heather Faubert 508-865-6706

Two pesticide re-certification credits offered at each Fruit Team Twilight meeting. Please be on time to receive credit

* In cooperation with New Hampshire Fruit Growers' Assoc.

** In cooperation with Rhode Island Fruit Growers' Assoc.

Orchard radar – gone temporarily for 2006

Some of you may have become familiar with Glen Koehler's Orchard Radar (http://pmo.umext.maine.edu/apple/) in past years. Unfortunately, for 2006, Glen was unable to obtain funding to run the Orchard Radar sites in three Massachusetts sites. (And other New England states besides Maine.) If you miss Orchard Radar, you may want to consider subscribing to SkyBit E-Weather Service (http://www.skybit.com, 800-454-2266). SkyBit gives you a detailed 48-hour forecast, a 1-7 forecast, and an 8-10 day outlook in their FORECAST & SUMMARY product for $50/month. (Also includes frost advisories/warnings.) You can additionally buy APPLE DISEASE and APPLE IPM INSECT products for $20/month which give you degree days, % hatch, and pest or or infection wait/watch/warning information. All the products are tailored to your site. You can start or stop the subscription anytime, hence you could buy for just 3-4 months of critical growing season when you are making pest management and spray decisions. All SkyBit products can be delivered via daily e-mail or FAX.

Healthy Fruit Disease Elements – D Cooley

Reviewing the Mill's Table. So far scab is not an issue in Massachusetts, but this may be the week. This past week, the rain started to come, but without green tissue, the scab season didn't start. It's getting close, and reports from the Hudson Valley in New York indicate that the very first ascospores have matured there. Not surprisingly, the McIntosh there are at late silver tip, and by the end of the week may be as far as half-inch green.

In Massachusetts the big question is whether there will be green tissue by Thursday, when showers are predicted. And if there is, will the rain amount to an infection period? Temperatures are predicted to be around 70, so using the revised Mill's Table, it will take 6 hours of wet leaves to get infection. So, if it starts to rain, start timing from the start and see whether it keeps raining for 6 hours. Simple, right?

Well, yes, but there are complications. If the rain comes as showers, as predicted, what happens if the rain stops for awhile, then starts again, but it never rains for 6 hours? The answer according to Bill MacHardy is that if the intervening dry period is less than 24 hours, then the two wetting periods should be considered a single wetting period. So, if it rains for 3 hours, stops raining for 3 hours, then rains for 4 hours, then that's 3 + 4 = 7 hours of wetting. At 70ºF, that's an infection period.

The start of an infection period also depends on daylight. About 95% of all ascospores are released only in daylight. That means that in low inoculum orchards, the realistic start of an infection period at this time of year has to be timed from the start of daylight. If rain starts in the day, there's no confusion. But if it starts at night, the realistic infection period starts with the start of daylight, about 6 AM.

Remember, with protectant fungicides, applications need to be made BEFORE the infection period starts to be optimally effective. As rain and green tip approach, be ready and watch the weather reports.

Organic Apples. In introductory plant pathology classes, I show a picture of a non-sprayed McIntosh tree in August, largely defoliated with a few gnarled fruit visible, and tell the students that this is an organic apple tree. The point is not to show them that organic apples cannot be produced here, but to tell them it takes a lot of effort because otherwise things go badly quickly.

Revised Mill's Table		
Temp ºF	Wetting hrs.	Incubation for symptoms
79	11.3	---
77	8	---
75	6.1	---
73-63	6	9-10
61	6.1	9-10
59-57	7	12-13
55	8	14
54	8.3	14
52	9	15
50	11	16
48	12.2	17
46	13.4	17
44	15.4	17
43	18	17
40	21.2	---
39	27.8	---
37	29.6	---
35	34.7	---
34	40.5	---

Having been part of the SARE project that looked at the potential for building organic production around disease resistant apple cultivars, I've seen how difficult organic production can be, even when you don't have to worry about scab. For non-resistant cultivars, it's tougher.

One thing that is critical to both organic and conventional systems is what plant pathologists call "cultural practices". That is, doing things that will decrease disease pressure whether or not fungicides are used. Last week in *Healthy Fruit*, I talked about the importance of reducing initial scab inoculum with urea and/or leaf shredding. In organic or low-spray orchards, inoculum reduction is critical. One of the reasons the apple tree in my picture looks so bad is that nothing has been done culturally to control disease.

Good pruning is also critical. It removes diseased wood, and it opens the tree up so that the fungicides that are sprayed will cover. Of course, as anyone who is serious about organic apple production knows, some sort of fungicide that is approved under organic standards will be needed. These fungicides are various forms of copper and sulfur. With these fungicides, good coverage is very important, and so a well-pruned orchard is important.

Can these copper and sulfur fungicides, applied frequently and thoroughly, control scab and other diseases? A number of people have been looking at this recently, with some interesting results. Just considering scab, with care, good results are possible. The key difference between copper and sulfur fungicides compared to protectants such as captan or the EBDC's is in flexibility. Copper and sulfur generally provide only 3 to 7 days of protection.

To give some idea of this, look at a test last year from Virginia. It's important to keep in mind that this test was run starting at half-inch green, after heavy infection periods had started an epidemic in the test orchards. After that, applications were made at roughly 5 to 7 day intervals. This shows how effective these materials are when used late and applied on a schedule with which most commercial growers are familiar.

Test of Fungicides in Virginia, 2005			
Treatment (100 gal. dilute)	**Scab**		
	Delicious	Golden Del.	Rome
No fungicide	96%	93%	88%
JMS Stylet oil 2 gal	55%	54%	55%
Sulfur 90W 6 lb.	53%	43%	32%
Cuprofix 20DF 12 oz.	19%	2%	35%
Captan 50W 12 oz. – 1.5 lb.	1%	3%	3%

Another down side to the copper and sulfur applications is fruit russet. From an appearance perspective, these fungicides are tougher on the fruit.

Other tests have shown that sarting an organic schedule early, just before or at green tip, and tightening the frequency of applications to intervals of about 3 to 5 days, will do a much better job of reducing disease. However, russet, and in some cases minor leaf damage, remain problems with these fungicides.

More tests are being done, and hopefully over the next couple of years, better options will reduce phytotoxicity problems, and improve disease control.

Update on Plum Curculio/ Apple Maggot Regional Project 2004-2005 – A Tuttle

Project Title: Refinement and Delivery of Bio-based Approaches to Reducing Insecticide Against Two Key Apple Pests

Project Goals: Our intent is to optimize a pesticide-treated sphere (PTS) approach for managing apple maggot(AM) and a trap tree approach for managing plum curculio (PC). These methods combine the biological tools of pheromones, host-plant attractants, visual attraction, scouting methods, and the reduced use of relatively safe insecticides. The ultimate goal is to demonstrate efficacy and economic viability of these methods over two years in blocks of apple trees throughout New England and New York.

Introduction: Orchards using conventional spray programs typically target 6 out of their 7 annual insecticide sprays against these 2 pests. By far the most commonly used sprays are the broad-spectrum organophosphates, phosmet and azinphosmethyl. These materials are high-risk for worker exposure, toxicity to non-targets and fruit residues. Azinphosmethyl has a relatively new 14-day re-entry interval and may be restricted further under FQPA. For these reasons and for concerns over pesticide drift beyond orchard boundaries, growers are asking for reduced-pesticide programs and biologically based alternatives to pesticides. This study represents the culmination of over 20 years of research by Ronald Prokopy and his associates to develop advanced IPM reduced-risk approaches to manage AM and PC. 2005 was the 2nd year of the 2-year demonstration phase of the study.

Objectives: For **plum curculio,** we tested the effectiveness of an optimal trap tree approach to determine need and timing of insecticide use against PC in comparison with existing approaches based on calendar-driven sprays or heat-unit-accumulation models in 25 blocks of apple trees in 2004 and 21 blocks in 2005. *The trap tree approach proved effective in the vast majority of the sites over 2 year. In* *those few cases where fruit injury was above 1 or 2 %, the cause could be attributed to missing an insecticide spray, to having intense PC pressure coming from within the orchard block, or to a planting arrangement of very small apple trees. In both years there was a significant reduction in pesticide use in the advanced IPM treatment.*

For **apple maggot,** we tested the effectiveness of an orchard-architecture-based ranking system for deploying odor-baited pesticide-treated spheres for direct control of AM in comparison with existing approaches to AM control based on calendar-driven sprays or monitoring-trap-capture–driven sprays in the same blocks. *The pesticide-treated sphere approach proved very effective in all but 3 of the 24 sites in 2004 and in all of the 21 sites in 2005. The 3 instances of inadequate control were due to over-wintering populations within the orchard block. This would not have occurred if the orchard blocks had been under IPM management in 2003. Pesticide reduction was significant in the IPM blocks.*

Approach: In 2005 we worked in 21 commercial blocks of apple trees adjacent to woods. There were 11 in MA, 2 each in NH, VT, NY, and RI, and 1 each in in CT and ME. Each orchard block was divided into 3 plots of about 1 acre each. For **plum curculio**, Plot A (calendar sprays) received 3 whole-plot applications of insecticide (at petal fall + 2 covers). Plot B (heat-unit–accumulation) received a whole-plot spray at petal fall, followed by a whole-plot cover spray which was dependent upon a degree-day model (developed by H. Reissig in NY), in which the last spray has residual activity until 308 degree days (base 50°F) have accumulated since petal fall. In Plot C, a perimeter-row trap tree was baited with 1 dispenser of grandisoic acid (pheromone) plus 4 dispersers of benzaldehyde (host-plant attractant) at the time of petal fall, and a whole-plot spray was applied to kill any PC that had over-wintered in the plot or had immigrated early from the woods. A week later, 25 fruit were tagged and numbered and for 6 weeks fruit were examined every 3.5 days for fresh PC egg-laying scars. While immigrating from woods into the orchard, PC were lured into the trap tree and arrested there and in neighboring trees. One new scar indicated the need for a perimeter spray (outer 2 rows). The combined bait resulted in 20 times more damage by PC to fruit on a trap tree than on un-baited trees, thereby greatly reducing the time needed to sample for this key pest. The effectiveness of the trap tree approach was compared with the 2 other approaches. Efficacy of each method was assessed by sampling 10 fruit at random from each of 10 trees in each of 9 rows in each plot. Assessments were made both during early July and also 1 week before harvest.

For **apple maggot** (AM), an improved pesticide treated sphere (see Pest Management Innovations, LLC in the Looking Forward section) and a new method for calculating how many spheres to place on the perimeter of a block of trees were successfully tested. The placement method used an index developed from 4 variables: size of orchard trees, quality of pruning, susceptibility of cultivar composition and nature of bordering habitat. In 2003, this approach reduced the number of spheres needed by 40 % from previous methods. All plots received 4 un-baited sticky spheres to estimate penetration of AM adults into the block. These spheres were inspected weekly. Management of AM in Plot A consisted of 3 calendar-driven applications of insecticide to entire plot (mid-July, early-August, mid-August). Insecticide application in plot B (basic IPM) to entire plot was driven by accumulation of AM on the 4 unbaited sticky red monitoring traps (threshold: 8 AM/4 traps). For direct trap-out control of AM in Plot C (advanced-level IPM plot) odor-baited pesticide-treated spheres were deployed on perimeter trees of all 4 sides. The new Pesticide-Treated Sphere (PTS) was composed of a contoured compressed top cap bearing sugar (as feeding stimulant), spinosad (Entrust), and paraffin wax coupled to a hollow plastic sphere. Using the new placement system, an average of 22 PTS, each baited with attractive odor (a 5-component blend), were deployed per plot. There were no insecticide sprays in plot C after the plum curculio season was over (early July). At harvest, 900 fruit per plot were sampled for AM injury.

Results and progress: In 2004, **plum curculio** injury was not significantly higher in trap tree plots (Plot C) compared to the other 2 management tactics (0.8-1.5 % injury), demonstraing the efficacy we were hoping for. A 35% reduction in insecticide use was achieved in Plot C for PC compared to Plot A (calendar sprays). In 2005, the average % fruit injured was below 1% for all 3 types of plots in the early July count and in the harvest count. We are presently analyzing the pesticide data for 2005 in a different way so that we can report the costs of pesticides for the 3 different types of plots. We have converted the spray events to dosage equivalents (DE) (dividing the actual rate used by the manufacturer's recommended field rate) (MRFR) to adjust for the wide range of field rates in the real world. For the data analyzed so far, the total PC insecticide dosage equivalents are 44.5 for Plot A (calendar spray) (or an average of 3.2 DE per orchard site), 40.45 for Plot B (heat-unit-accumulation) (average of 2.9 DE per site), and 30.97 for Plot C (trap tree approach) (ave. of 2.2 DE per site). These results are preliminary, but it certainly looks like the advanced IPM methods significantly reduced the amount of insecticide used in the trap tree plots.

In 2004, **apple maggot** injury was again low in all 3 types of plots (0.2 to 0.9 % fruit injured), indicating the relative effectiveness of the IPM methods. The injury in Plot C was higher (0.9 %) than in Plot A (0.23), but being below 1 %, this was not a concern.. In 2005, the maggot injury was even lower (0.09-0.23 % fruit injured) and again Plot C had more injury than Plot A, but the level is economically insignificant. For the spray records analyzed so far, the total dosage equivalents are: 21.4 for Plot A (ave. of 1.5 per site) (calendar sprays), 11.2 for Plot B (ave. of 0.8 per site) (sprays based on interior sticky trap captures), and 1.4 for Plot C (ave. of 0.1 per site) (pesticide-treated spheres). If compliance with the protocol in Plot C had been perfect the amount would have been zero. Again these results are preliminary, but look very promising.

Looking Forward: During the last few months of the project, we plan to finish the pesticide use analysis, compare the economic viability of the 3 levels of management (advanced IPM, basic IPM, and calendar-based sprays), look at grower compliance issues, and continue the outreach component of the project. We are reasonably confident that the advanced IPM strategies are efficacious from a biological standpoint, but we have less information about the cost-effectiveness of the methods. These techniques require more IPM labor than conventional practices (but hopefully less spray labor) and the more specific or reduced-risk pesticides are usually more expensive than conventional materials. The last analyses should provide valuable information to help with the comparisons.

For those of you interested in using the pesticide treated spheres, they can be obtained from Pest Management Innovations, LLC, http://www.bugtrappers.com, Harper's Ferry, WV. This company is run by Starker Wright, who many of you will remember from his years as Ron Prokopy's research technician. In addition to producing the PTS (now called Curveball™), Starker's company is researching improvements for the system.

The Trap Tree Approach for PC is not quite as developed and commercialized as the PTS approach for the maggot, but it will continue to be researched. Jaime Pinero and Tracy Lesky, former graduate students of Ron Prokopy's who work primarily outside New England, will conduct experiments this summer with Starker Wright. We will report results as they become available.

Acknowledgements: We would like to acknowledge the granting agency, Northeast Regional IPM Grants Program, the group of supportive growers, Jaime Pinero and Isabel Jacome (who carried the work forward in MA after Ron Prokopy's death), and the scientists who conducted the work in blocks outside of MA (Heather Faubert in RI, Lorraine Los in CT, Art Agnello in NY, NEFCON and Polaris Orchard Management in VT and NH, and Glen Koehler in ME.