CORNELL'S Hudson Valley LABORATORY

Cornell University Cooperative Extension

New England, New York, Canadian Fruit Pest Management Workshop 2012 Extension/Field Report

Location New York: Hudson Valley, NY
Person(s) Reporting: David Rosenberger, Peter Jentsch, Mike Fargione, Emily Cook, James O'Connell

Climate and Horticultural Issues:

The 2012 growing season followed an extremely mild winter and was the earliest growing season since the mid 1940's (Table 1). Degree-day accumulations were 40DD greater than the average with petal fall accumulations of 506 degree-day $base_{43}$. Conditions were generally dry during the pre-bloom period with near drought conditions in March and April (1.94 and 1.82" of rainfall respectively), followed by adequate rainfall during the remained of the summer. Sun injury to fruit was common in many blocks, probably as a result of hot, humid weather on 6/20-21 and 6/29-30.

Some crab apple pollinators reached green tip on March 12, and apricots and Japanese plums were at full bloom in some blocks by March 22. Conditions reverted to more normal temperatures starting around March 24, and orchards were subsequently exposed to multiple freeze and frost events through the end of April. NEWA stations located adjacent to regional orchards recorded between 1 and 8 mornings when temperatures dropped below the critical temperature where bud/fruit injury would be expected. Most events occurred between March 27-April 7 when apples were at tight cluster and pink bud stages, or in late April after apples reached petal fall. Growers practiced frost control efforts on up to 15 days using wind machines, helicopters (up to 20 "birds" were flown in the region on one weekend), orchard heaters and wood fires. One grower attempted to use overhead irrigation to prevent freeze injury to stone fruit with devastating losses when the sprinklers froze.

Frost damage was widespread but highly variable, even depending on micro-climatic factors within individual orchards. "Location, location, location was truly evident with the "best" sites having full crops. The predicted HV apple crop was expected to 3 million bushels (50% of "normal"). Unfortunately, some of the growers who saved their crop with frost control measures were later hit with severe hail, so the total fresh market crop was probably closer to 2 million bushels. Frost injury most commonly stopped fruit from forming or prevented them from setting, but some frost scarring and misshapen fruit were produced. Remaining fruit had few or no seeds in damaged blocks, but generally fruit size and shape were adequate to keep these in grade (particularly fruit with no seeds).

Fruit thinning was complicated by the frost injury and by predicted carbohydrate deficits shown by the Lakso-Robinson Carbohydrate Model (Figure 1). As a result many blocks were not thinned or thinned with low rates and some were overcropped.

Fruit harvest was 2-3 weeks earlier than "normal" for most apple, pear and stone fruit cultivars.

Disease Issues:

Hudson Valley growers had an easy early scab season with the first infection period occurring on 4/21 at about petal fall. However, multiple infection periods occurred after petal fall and many involved split wetting events over successive days (example – some rain fell on 17 of 20 days between 5/25 and 6/9). Although there were opportunities to recover orchards with fungicide during

these periods, a few growers relaxed their spray program after petal fall and some scab infections did develop. There was marked disagreement in the end of primary scab season between the predictive ascospore release model and observations made using traditional scab spore counts. By May 4th , NEWA station models predicted all ascospores were depleted, while a traditional spore count conducted that day found 54% of the scab spores still had not been released.

The blossom blight phase of fire blight was a concern when the EIP in Maryblyt exceeded 100 (as required to trigger an infection) on up to 4 days during bloom, but measurable rainfall only occurred on one of those days and many growers applied strep at least once during bloom. Additional potential infections were possible on newly planted trees that were in bloom after May 14 when EIP's again rose above 100. Shoot blight symptoms started to show up around June 1 and these infections may have occurred around May 27 (based on NEWA station predictions).

2012 was a banner year for powdery mildew on apples and rusty spot on peaches. High numbers of infections that occurred in 2011 (perhaps due to grower use of Inspire Super that year for scab control) survived due to the mild 2011-2012 winter. The extended periods with hot, humid weather during June and July favored continued development of this disease late into the growing season.

Bitter rot was again more prevalent on fruit than is usually seen most years. As in 2011, much of the decay that showed up in August resulted from infections of fruit that were damaged by heat injury during the extremely hot weather that we had on 6/20-21 and 6/29-30. Fruit damaged during these period of excessive heat (perhaps interacting with other factors, such as drought stress) may lack the normal plant defenses that provide significant protection against bitter rot and black rot.

Sooty blotch and flyspeck were not severe problems in commercial orchards. However, most growers did apply fungicide in September and some growers made more than one application in September.

Yellowing and leaf drop that showed up starting around August 24th on 'Golden Delicious', 'Pink Lady', 'Goldrush' and 'Pristine' was first thought to be symptoms of necrotic leaf blotch (NLB). After reading an alert from Dr. Keith Yoder in Virginia, and after isolations from leaf tissue were conducted, *Glomerella cingulata* was recovered from some of the leaf spots that had distinct light-dark zones in the lesions. Glomerella leaf spot (GLS) is a concern because in Brazil and North Carolina it has caused rapid defoliation of Gala and some other cultivars in mid-summer, and it also causes bitter rot on fruit. However, the leaf spot we noted in NY in 2012 did not damage Gala, and damage on the cultivars noted above was no more severe than expected from NLB on Golden Delicious. Rosenberger suspects that the GLS noted in NY developed in parallel with NLB and that *G. cingulata* invaded leaf tissue only because leaves were preconditioned for infection by the same factors that trigger NLS. Unless *G. cingulata* develops additional pathogenic capabilities, we doubt that the GLS we noted in 2012 will turn into a perennial problem or cause mid-season defoliation of Gala as it had done elsewhere.

We received a number of Red Delicious samples from long-term storages that were opened in May wherein the apples showed superficial necrotic sunken lesions with irregular borders. The lesions had some characteristics of DPA burn, but also the "pebbly" surface associated with CO_2 injury. However, some lesions had distinct corking in the flesh at the center of the more superficial lesions. Chris Watkins eventually decided that the disorder was most likely bitter pit (calcium deficiency) with lesions enlargement exacerbated by postharvest treatment with 1-MCP. The 15 inches of rain prior to harvest in 2011 may have exacerbated calcium-deficiency issues. This problem suggests that growers should use caution in applying 1-MCP to lots of fruit that have bitter pit.

Insect Issues:

The onset of bloom (16 April) saw temperatures near 90°F followed by 5 days of mean highs of 70°F to petal fall. However, extended cool temperatures prolonging bloom in many mid-late season apple varieties, prompting many growers to delay petal fall applications for managing plum curculio (PC) and tarnished plant bug (TPB). The cool temperatures pushed PC and TPB later into the season, damaging fruit between 1st and 2nd Cover. PC movement into orchards and oviposition was predicted to end on 27 May using predictive modeling of 308 DD_{50} from petal fall of McIntosh.

European apple sawfly activity occurred in very low numbers due to the early bloom this season with early varieties showing 1.5% injury in untreated Ginger Gold harvest evaluations. PC injury was also moderate with 18.0% and 30.5% injury in untreated Ginger Gold and McIntosh in early 'June drop' evaluations and 27.8% in untreated Ginger Gold harvest evaluations. TPB injury with 2.2 and 3.0% injury observed in Ginger Gold and McIntosh respectively on 19 June in untreated plots with increasing damage noted in these plots at harvest.

The 1st generation codling moth adult flight occurred on 6 May with larval emergence predicted for 21 May using 220 DD_{50}. The internal lepidopteran complex (OFM and CM) showed low levels of damage to apple, with CM frass appearing during mid-June through July. Relatively low levels of damage from the internal lepidopteran complex were observed with 2.8% and 3.4% damage from 1st generation evaluated on 19 June. However at harvest on Ginger Gold harvested on 27 July, we noted internal worm injury exceeding 15%.

San Jose scale (SJS) crawler emergence was predicted to occur on 21 May using the 1 March 500 DD_{50} model. However, first crawler was observed to occur 11 June, more than three weeks after the predicted date. Growers using Movento at the 10d post PF timing were successful at managing SJS. In general SJS scale levels were modest in infested trees with less than 5% injury observed in research plots.

Growers again monitored obliquebanded leafroller closely this season, managing the insect using primarily Delegate or Altacor in Hudson Valley orchards. Most applications were made using insect phenology predictions for early emergence, using 340 DD_{50} from 27th May to manage the 1st emergence of OBLR predicted to occur on 11 June. In general, high damage levels of external lepidopteran injury, including OBLR were observed this season. Trap captures were low for the 2nd generation of OBLR during August and September. Very high levels of RBLR were observed during the season and may have contributed significantly to the overall leafroller damage this season.

Apple maggot density was low to moderate throughout the region with significantly higher late emergence due to late season rainfall. Moderate populations of adults were noted in the mid-Hudson Valley with seasonal accumulation totals near 63 flies per trap (mean n=4) where rainfall provided ideal emergence conditions.

The brown marmorated stink (BMSB), *Halyomorpha halys,* has been observed throughout the southern Hudson Valley for the past 4 years with the first BMSB confirmation in December 2008. Since that time increasing populations have been documented in urban environments from specimens sent to the HVL using citizen science outreach. Brown marmorated stink bug was easily found from mid-season through harvest on pome fruit in lower mid-Hudson Valley with few observed north of Kingston, NY. It was also found reproducing in deciduous trees such as sugar maple, *Acer saccharum,* white ash, *Fraxinus americana*, Ttree of heaven, *Ailanthus altissima* in high numbers with lower numbers observed in staghorn sumac, *Rhus typhina,* and eastern black walnut *Juglans nigra* and wild grape, *V. vinifera.* Late season nymphs and adult trap captures of BMSB using Tedders traps employing traditional black light traps, the USDA #10 lure and the *Plaudi stali* aggregation pheromone lure, *methyl (E,E,Z)-2,4,6-decatrienoate,* was observed along the orchard edges in Warwick, NY throughout the season.

Fruit in research blocks this season showed relatively high SB feeding damage to Red Delicious and late season Pink Lady fruit that may have been caused by a complex of green stink bug and BMSB, as the insects were found in orchards from July through October. All three species including BMSB, brown stink bug, *Euschistus servus* (Say), and green stink bug, *Acrosternum hilare* have been noted on fruit. Late season commercial orchard blocks of Red Delicious, Pink Lady and Golden Delicious experienced as much as 57% injury in field run harvest evaluations in Campbell Hall, NY in Orange County and Milton, NY in Ulster County. Highest injury occurring the orchard edge.

Spotted wing drosophila (SWD), *Drosophila suzukii*, (Matsumura) (Diptera: Drosophilidae) were first observed in NY in late August, 2011. We monitored SWD throughout the lower to mid-Hudson Valley this season using apple cider vinegar baited traps in 10 locations. The first SWD trap captures were found in Highland on 31 July, Warwick, NY on 3 August followed by Tivoli on 6 August. Blackberry harvested on a commercial farm in Marlboro on 13 July had experienced 100% ovipositional injury with confirmed SWD adult emergence. By late August small fruit growers of Blackberry and Raspberry had abandoned berry patches as attempts to control the SWD were ineffective using commercial insecticide materials, rates and timings. Growers who harvested daily, keeping berries on a 5-7 day spray program were able to maintain % infestations levels to 18-20%. During weeks in which applications could not be made, levels of injury increased to over 50%.

Time	Apple Bud Stage					
Year	G. Tip	H.I.Green	T.Cluster	Pink	F. Bloom	P.Fall
2012	3/16*	3/18*	3/25*	4/8*	4/16**	4/21*
1980-2010 Year Average	4/4	4/12	4/21	4/27	5/3	5/13
Previous Earliest date	3/20	3/29	4/1	4/10	4/16	4/28
Previous Latest date	4/15	4/27	5/4	5/7	5/16/	5/24

Table 1. Comparison of 'McIntosh' bud phenology during the 2012 growing season to 32-year average for Highland, Ulster County New York (Source – Dept. of Entomology, Cornell Hudson Valley Lab, Highland, NY 12528). *=earliest date on record; ** = tied earliest recorded date.

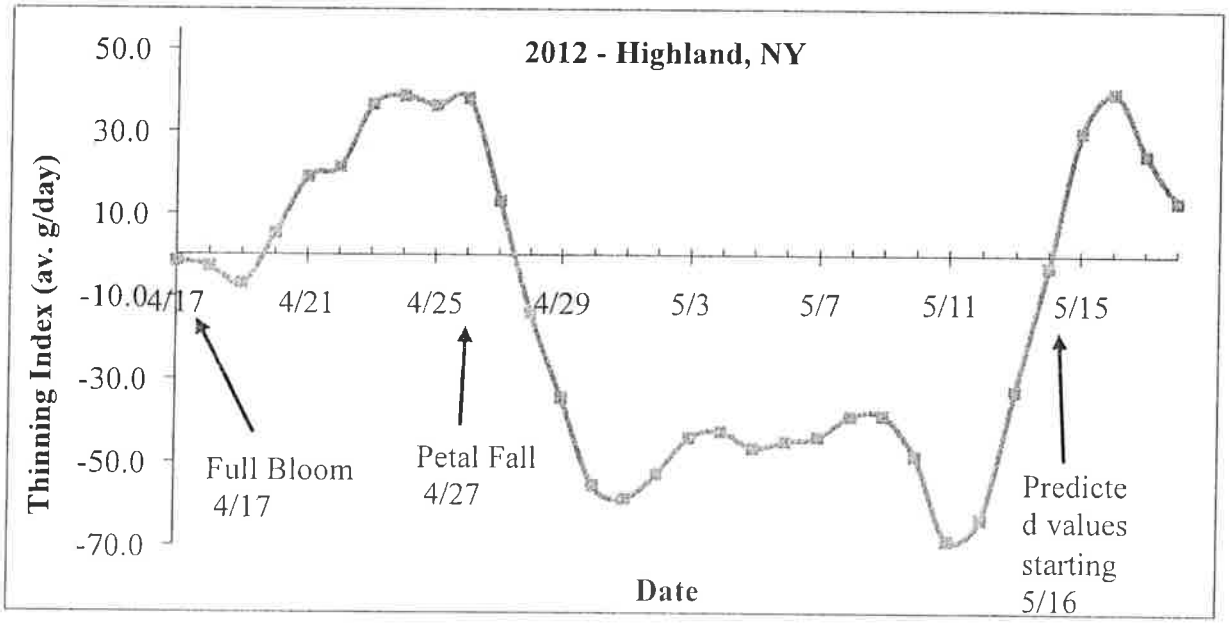

Figure 1. Thinning Index for 'Empire' Apple from Lakso-Robinson Carb Model for Highland, NY.