Apple "Mini" Precision Thinning Demonstrations in 2015 at UMass Cold Spring Orchard

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In 2015, two "mini-precision thinning" demonstrations were done at the UMass Cold Spring Orchard in Belchertown, MA: one in Honeycrisp (Figure 1), the other in DS-41 cv. (Pazazz®), both on B.9 rootstock.. For each variety, five representative trees were selected and five spurs were tagged (Figure 2) on each of the trees during bloom. Thus, a total of 25 flowering spurs were chosen in each variety (across five trees) for subsequent measurements of fruitlet growth for Predicting Fruit set as outlined here: http://apples.msu.edu/uploads/files/PredictingFruitset1-21-14.pdf.

Note that while the procedure described calls for selecting 15 flowering spurs per tree (75 total) for subsequent measurement, this demonstration used only five spurs per tree (for a total of 25, hence "mini") as an attempt to reduce the amount of time measuring fruitlets without sacrificing (too much) accuracy of fruit set prediction. (Another variation from the Predicting Fruit set protocol was the fact individual fruitlets were not numbered, there relative position was used for subsequent measurement. Somewhat dubious, but works if care is taken to make sure the same fruit is measured and documented correctly for growth rate.)

Chemical fruit thinning sprays were applied to both varieties in two applications at an app. 3X dilute TRV concentration when fruitlet size ranged from 5 to 10 mm (Figure 3):

Figure 1. Tenth-leaf Honeycrisp/B.9 trees at post-petal fall on May 24, 2015 used for Predicting Fruit set demonstration at UMass Cold Spring Orchard.

Figure 2. DS-41 fruiting spur tagged for subsequent measurement on May 25, 2015.

1. May 24: Carbaryl 4L(Drexel) @ 1 quart per acre plus Fruitone-L (AmVac) @ 4 ounces per acre
2. May 25: Maxcel (Valent Biosciences) @ 1.5 quart per acre

Note that this was an aggressive chemical thinning application (in retrospect, way too aggressive). In addition, the carbohydrate balance during the time of thinner application was significantly negative (Figure 4).

Fruitlet size measurements were made beginning May 25, very shortly after the chemical thinner applications. A subsequent measurement was made on May 29. All measurements were input into the Predicting Fruit set spreadsheet (see link above). Upon the second measurement, it was immediately visually clear that many fruitlets were already not growing. In fact, after just one measurement for both Honecyrisp and DS-41, upon running the Fruit set spreadsheet calculation, that the predicted number of fruit setting was below the target number of fruit setting. For Honeycrisp the predicted number of fruit setting on May 29 was 37 per tree, while the target number was 65 (Figure 5). For DS-41, the

Figure 3. Honeycrisp fruitlets at time of chemical thinner application on May 25, 2015.

predicted number of fruit setting was 27 vs. the target number of 65 per tree (Figure 6). Clearly, no additional chemical thinning was necessary, and in fact, it's very likely the trees would be under-cropped at harvest.

This was indeed confirmed at harvest, when all the fruit was counted on each of the five trees. For Honeycrisp (Figure 7), the number of fruit on each of the five trees was: 30, 51, 28, 25, and 28 for an average of 33, which is very close to the predicted set of 37 fruit (although half the number of desired fruit per tree). For DS-41, number of fruit on each of the five trees was: 15, 25, 24, 27, and 17, an average of 22 fruit per tree, close to the predicted fruit set of 27. The number of fruit per square centimeter of trunk area was calculated for each variety: Honeycrisp, 1.8 fruit at harvest per square centimeter trunk area; DS-41, 2.2 fruit at harvest per square centimeter trunk area. Note that a target number of fruit is typically 4 to 6 fruit per square centimeter trunk area, so the crop load for both varieties was quite low. (Expect good return bloom next year!)

In conclusion, using just five spurs on five trees may be an alternative to using more spurs (up to

Apple Carbohydrate Thinning Model for Belchertown

Change green tip and/or bloom date and click "Calculate" to recalculate results.

Green tip date	Bloom date	Calculate
04/19/2015	05/11/2015	

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/23	65	37	28.6	81.93	35.74	46.19	-11.73	Apply standard chemical thinner rate
5/24	81	45	26.4	76.96	68.27	8.69	-28.89	Decrease chemical thinner rate by 15%
5/25	82	56	13.0	39.20	83.64	-44.44	-30.37	Decrease chemical thinner rate by 15%
5/26	85	63	14.7	41.08	98.43	-57.35	-11.47	Apply standard chemical thinner rate
5/27	85	62	22.3	69.59	92.05	-22.45	9.78	Increase chemical thinner rate by 30%
5/28	82	60	22.4	80.09	77.33	2.77	12.54	Increase chemical thinner rate by 30%
5/29	83	54	24.3	95.32	64.16	31.16		
5/30	82	57	23.8	92.65	65.02	27.63		
5/31	73	48	7.2	34.94	46.33	-11.39		

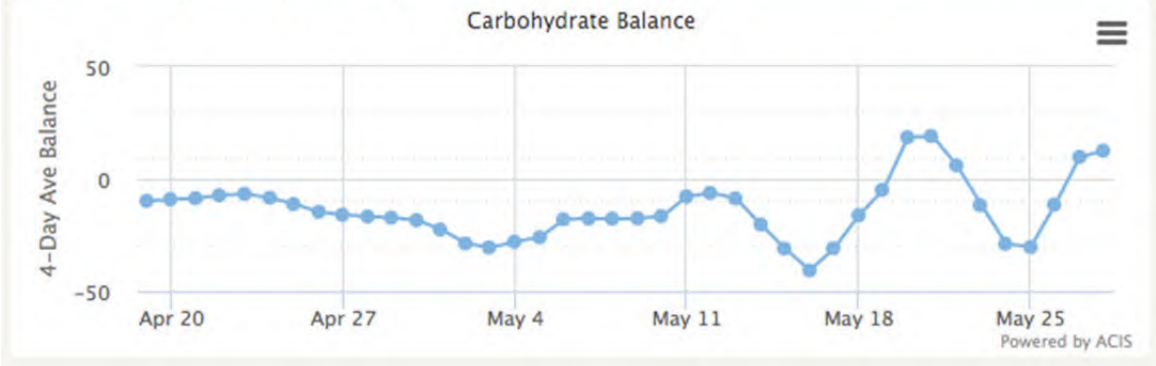

Figure 4. Apple Carbohydrate Thinning model on NEWA (newa.cornell.edu) for Belchertown, MA run on 25-May, 2015; note the call for decreased chemical thinner rate at the time chemical thinner applications were made, which was largely ignored (chemical thinner rates were actually increased, resulting in over-thinning)

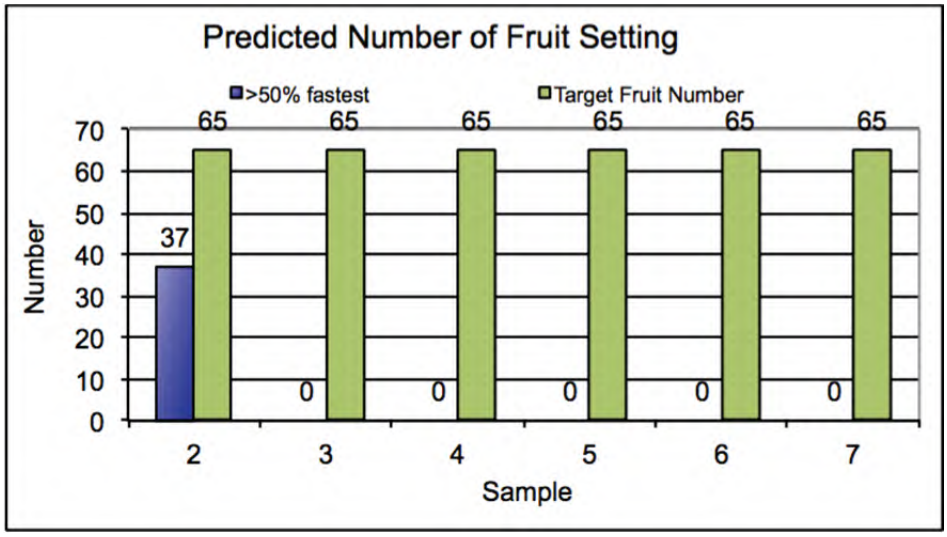

Figure 5. Honeycrisp Predicting Fruit set spreadsheet calculation. Note that 3-7 are non-measurement days, fruitlets were only measured on May 25 (not shown) and then on May 29 (2) when it was decided that no more measurements or thinning sprays would need to be made because predicted number of fruit setting (37) was already lower than the target number of fruit (65).

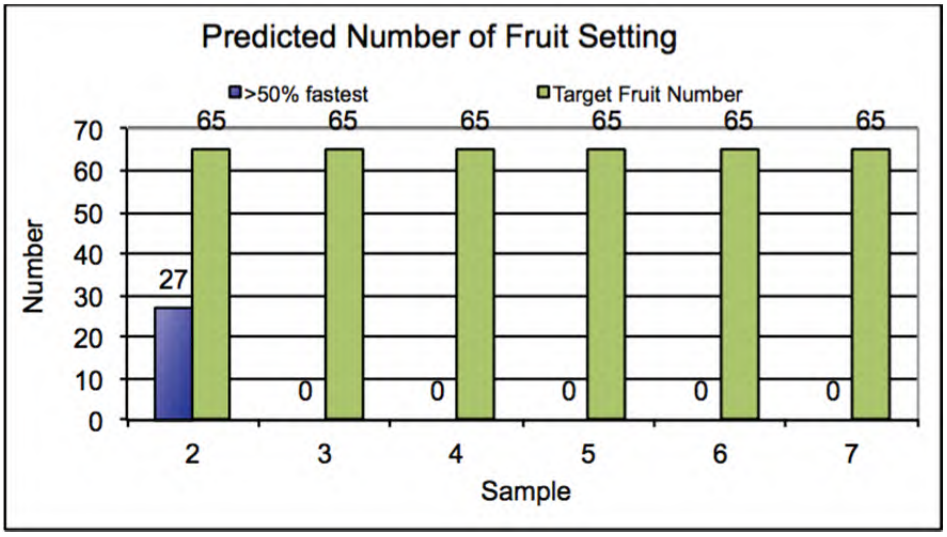

Figure 6. DS-41 Predicting Fruit set spreadsheet calculation. Note that 3-7 are non-measurement days, fruitlets were only measured on May 25 (not shown) and then on May 29 (2) when it was decided that no more measurements or thinning sprays would need to be made because predicted number of fruit setting (27) was already lower than the target number of fruit (65).

Figure 7. One of five Honeycrisp/B.9 trees on September 18, 2015 used for Predicting Fruit set at harvest. This tree had 30 fruit on it at harvest with 1.5 fruit per square centimeter trunk area. This is about half the target number of fruit; however, in retrospect, the crop load on this tree (given the size and height of the tree) maybe should only be about 45 fruit to insure return bloom the following year.

15 per the protocol) to save time in predicting fruit set because this time at least, it appears to have been accurate in predicting final fruit set. Still, using more spurs is likely to increase the accuracy of predicting fruit set. And the light fruit set could have been a result of either poor pollination or the chemical thinning treatments or a combination thereof. Here, it is likely a combination, with the chemical thinning treatment having a strong and immediate effect on fruitlet growth which was easily observed and measured. Following the Predicting Fruit set protocol, although somewhat time consuming, is highly recommended as a motivation to get out there and measure fruitlets to get a much better idea of how effective (or not) are your apple chemical thinning treatments.

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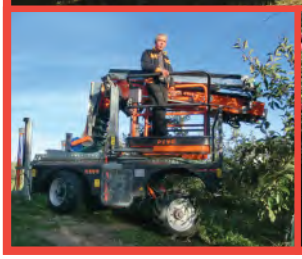

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