A Look at the Fruit Thinning Weather in 2010

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One of the most difficult challenges faced by apple growers is chemical thinning. Early fruitlet removal results in the best possible fruit size and good return bloom for the next season. Even with this goal in mind, growers can use the same material year after year, apply it at the same stage of development year after year, and get vastly different results. We have long understood some reasons for the varied response. Recom-

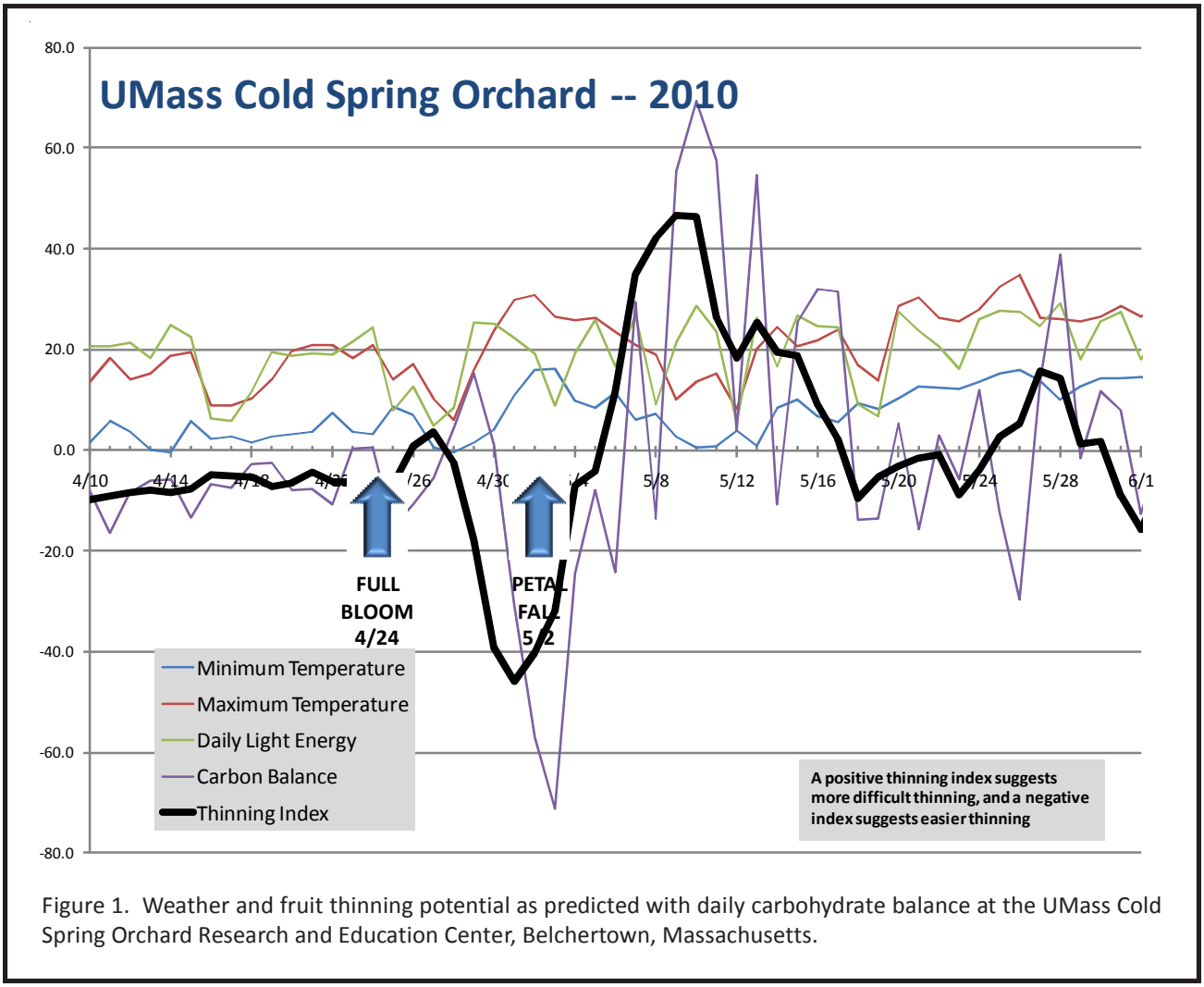

Figure 1. Weather and fruit thinning potential as predicted with daily carbohydrate balance at the UMass Cold Spring Orchard Research and Education Center, Belchertown, Massachusetts.

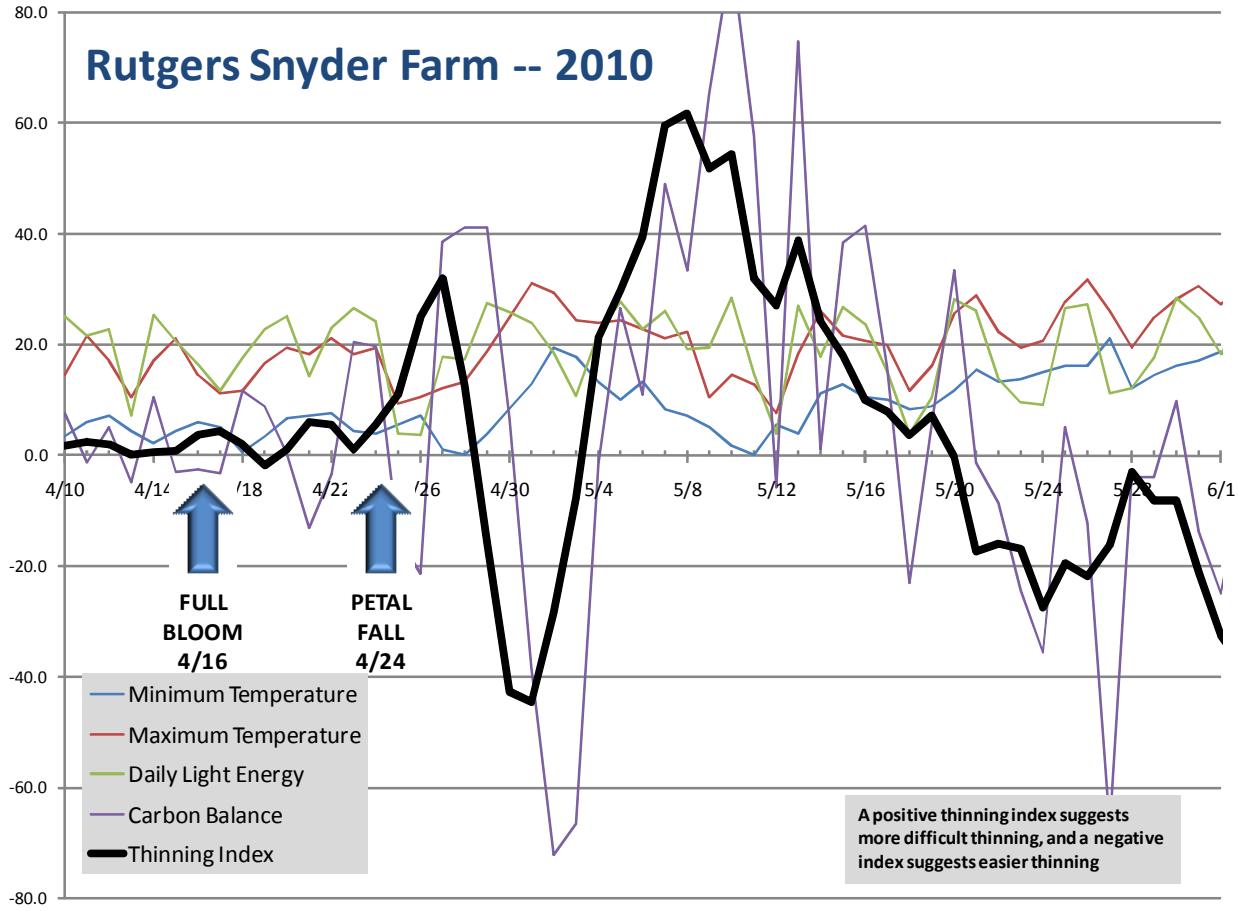

Figure 2. Weather and fruit thinning potential in 2010 as predicted with daily carbohydrate balance at the Rutgers Clifford E. and Melda C. Snyder Research and Extension Farm, Pittstown, New Jersey.

mendations have included waiting for thinner application until a few days of warm, sunny weather are predicted. Also, growers have been cautioned about thinning before multiple days of warm cloudy weather.

Alan Lakso, at Cornell University and the New York Agricultural Experiment Station in Geneva, led the development of a computer model which pulls many weather-based and physiological factors together to determine what the carbohydrate status of the tree is at any day of the season. Basically, warm weather increases the respiration rate and the use of carbohydrates, and cool weather reduces respiration rate and the use of carbohydrates. Sunny conditions result in more production of carbohydrates than cloudy conditions. Greater leaf surface area results in more carbohydrate production than lesser leaf surface area (as might be seen early in the growing season). Further, carbohydrates are stored throughout the tree and are available at changing levels as the season progresses.

It is understood that thinning occurs largely as the result of fruit-to-fruit competition, primarily for carbohydrates. As carbohydrate content of the tree increases, developing fruitlets are happy and are able to grow well. At low levels of carbohydrates, fruitlets are hungry and compete with each other, some fruit losing that competition and dropping from the tree.

Lakso's model predicts how much carbohydrate is being used and produced in the tree. When the tree has excess carbohydrate, fruit remain happy and are likely to thin poorly. Whereas, when the tree is deficient in carbohydrates, fruit are hungry and are likely to thin easily.

In 2010, we ran Lakso's mode at both the UMass Cold Spring Orchard Research and Education Center (Belchertown, MA) and at the Rutgers Clifford E. and Melda C. Snyder Research and Extension Farm

(Pittstown, NJ). Figure 1 (MA) and Figure 2 (NJ) plot the carbohydrate level, minimum and maximum temperature, and the amount of light energy for much of April and May 2010. The dark line represents the thinning index, which is the average of the carbohydrate level on that day and the next three days into the future (that is, the window of time when a chemical thinning can be impacted by the carbohydrate balance). Below zero suggests more thinning, and above zero suggests less thinning.

The first part of these graphs that is interesting is the similarity between Belchertown, Massachusetts and Pittstown, New Jersey (180 miles apart). There was a significant deficiency of carbohydrates around May 1 and a significant excess around May 8. Thinning near May 1 should have been effective in both locations (at about petal fall in Massachusetts and a week after petal fall in New Jersey). Most of the rest of the thinning season is expected to have yielded less thinning than average because of the excess carbohydrates. There was again an increase in sensitivity to thinners in the late-season thinning periods when fruit were about one inch in diameter.

This approach to predicting thinning will be interesting to watch in future years. If it predicts thinning well, it may be very useful for all of us.