



Great Lakes Fruit, Vegetable & Farm Market EXPO Michigan Greenhouse Growers EXPO

December 5-7, 2017

DeVos Place Convention Center, Grand Rapids, MI



Apple II

Where: Ballroom D

MI Recertification credits: 2 (1C, COMM CORE, PRIV CORE)

OH Recertification credits: 0.5 (presentations as marked)

CCA Credits: PM(1.0) CM(1.0)

Moderator: Brett Anderson, MSHS Board, Sparta, MI

- 2:00 pm Michigan Tree Fruit Commission Update
- Amy Irish-Brown, Tree Fruit IPM Educator, MSU Extension, Grand Rapids, MI
 - Phil Schwallier, District Horticulture and Marketing Educator, MSU Extension, Clarksville, MI
- 2:10 pm Alternative (Non-Fumigant) Practices for the Management of Apple Replant Disease
- Mark Mazzola, USDA-ARS, Wenatchee, WA
- 2:35 pm MSU Apple Replant Project
- Julianna Wilson, Tree Fruit IPM Outreach Specialist, Entomology Dept., MSU
- 2:45 pm Apple Thinning and Predicting Fruit Set Models (OH: 2B, 0.5 hr)
- Duane Greene, Extension Fruit Program, Univ. of Massachusetts
- 3:15 pm Managing Fire Blight in Young High Density Plantings
- George Sundin, Plant, Soil and Microbial Sciences Dept., MSU
- 3:45 pm The Ins and Outs of Container Culture of Tree Fruit
- Todd Einhorn, Horticulture Dept., MSU
- 4:00 pm Session Ends

Chemical Thinning in Challenging Times

Duane W. Greene
Stockbridge School of Agriculture
University of Massachusetts
Amherst, MA

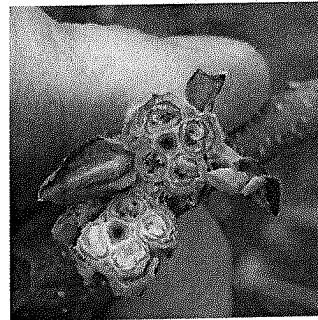
Challenging Times

- In the last few years we have experienced erratic weather which appears to be the product of global warming
- Prospects for returning to a more predictable weather do not look promising.
- I would like to explore some possibilities that may make it easier to navigate successfully through the chemical thinning season.

Damage Before Bloom- Fruit

- All too frequently flowers are damaged and there is very little we can do.
- If damaged flowers are exposed to low levels of stress, frequently they will set.
- Usually we recommend no action until initial set can be established, 6 mm size.
- Stimulation of set is possible with Promalin if applied after freeze damage to stimulate parthenocarpic fruit development. Todd will provide details tomorrow.

Flowers Damaged or Killed



Damage before Bloom-Leaves

- Spur leaves are essential for good fruit set.
- Impairment of photosynthetic ability limits a leaf's ability to provide the energy required for successful fruit set.
- If spurs are exposed to low levels of stress (cool temp, sunny days) often fruit set is adequate.
- If spurs are stressed with warm temp and cloudy weather- expect set to be poorer.

Damage to Spur Leaves



Damage Before Bloom- Leaves

- The use of thinners on trees with damaged leaves is frequently delayed until initial set can be established.
- If cool sunny conditions continue do not wait to thin, it may be difficult.

Do the Computer Models Recently Developed Help?

- Sometimes
- These models were developed to be applied to fully functional spurs.

The Carbon Balance Model.

Developed by Alan Lakso over a 20-year period Using Empire /M9 trees in New York

It is based upon the 20 year average of temperature and light and the CHO status is calculated from these data.

It is a continuous flow system that is started when trees develop to the bud break stage.

Alan is aware of some shortcomings and is working hard to come up with revisions that will start to address these conditions.

The Carbon Balance Model

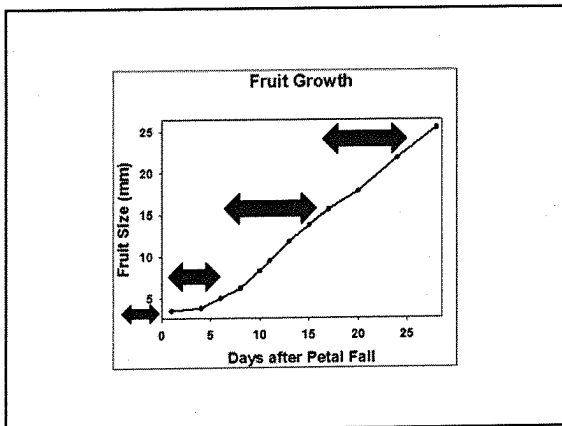
- Limited use for Massachusetts in 2016 and 2017
 - In 2017 it turned very cold for almost 3 weeks after bud break slowing bud development substantially-but the model did not know that.
 - In 2016 there was substantial spur leaf damage which by all accounts should reduce PS, but how much? As far as I know we did not have the appropriate information to plug in to allow calculation of the proper CHO status in the tree.

The Fruit Growth Model

- This model is based upon the growth response of fruit to current conditions and not on data collected in the past.
- In order for this model to work properly, the growth determinations must start when fruit are 5-6 mm.
- Suggestions for successful use of this model will be presented tomorrow morning.

A Model is Needed to Assess Cold Damage

- One of the biggest impediments to making informed thinning decisions early (bloom and petal fall) is not knowing the extent of tissue damage.
 - What is the extent of damage to fruit/flowers?
 - How impaired are the spur leaves?
- Answers to these questions would allow you to make informed decisions early.



Thinning Suggestiosn

- Thinning suggestions must be given in relation to the growth or physiological stage.

Opportunities to Thin

- The erratic weather has made it more difficult to thin during the traditional thinning period.
- We should look at all possibilities and times to achieve an acceptable crop load that is profitable and will be favorable for return bloom.
- Changes may be appropriate.

Dormant Pruning

- A recently added opportunity to thin.
- Thinning during the dormant period has advantages since reduction in crop load potential is not weather dependent.
- It will make thinning during the regular thinning period much easier since it is less likely to require aggressive thinning action to achieve the proper crop load.

Precision Dormant Pruning

- Reduce flower bud numbers down to a predetermined number of buds that has been calculated.
- It is most useful on tall spindle trees, although it can be useful on larger trees as well.
- The number of buds to leave depends on the desired yield, fruit size and risk that a grower is willing to accept.

Precision Dormant Pruning- Example

- Density- 1000 trees per acre
- Yield per acre- 1000 bu/acre
- Yield per tree- 100 apples (100 apples/bu)
- Leave- 150 buds (1.5 buds/apple)
- Count flower buds on 5 representative trees
- Average the number of bud on the 5 trees
 $300 + 250 + 225 + 280 + 210 = 249$
- $249 - 150 =$ prune off 100 buds per tree

Example

- Remove 1-3 of largest limbs, simplify branches and cut pendant branches back until 150 flower bud remain.
- It will be necessary to periodically check to assure that the tree number of bud is present when the tree has been pruned.
- Practice is required to identify flower buds in the middle of winter.

Bloom

- This is the stage when some growers consider starting the thinning program,
- However, few growers in the East take advantage of this opportunity.
 - Crop potential unknown
 - Frost is still a possibility
 - Poor pollination weather may occur
 - Just too risky

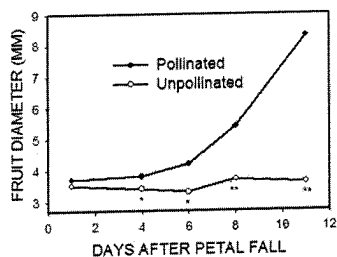
Blossom Thinning

- Bloom is the physiological stage where temperature has the least effect thinning.
- This may be the best opportunity to thin and avoid the complicating factor of temperature later.
- It is not as risky as you may think.

Thinning recommendations-Bloom*

- NAA-10-15 ppm
- Amid-Thin- 8 oz/100 gal
- Ethrel 1 pt/100 gal.
- ATS 2-3 gal/100 gal.
- Oil and lime sulfur
- * Blossom thinners rarely over thin.

Petal Fall



Petal Fall

- During this period of time, growth of a fruit is slow and deliberate.
- Demand for carbohydrate is generally not strong.
- Thinning is possible at this time but unless environmental conditions are abnormal, thinning potential is moderate.
- This thinning opportunity should not be lost.
- Over thinning is very unlikely.

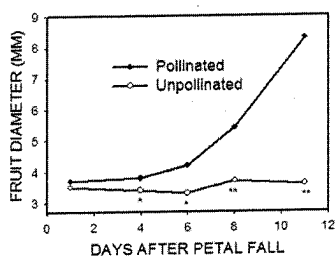
Petal Fall

- Fear of over-thinning often fogs good judgment. Thinners are generally only half as effective here as at the 10 mm stage.
- This is a stage where significant thinning can be done, and it can be done safely.

Thinning Recommendations- Petal Fall

- 10-15 ppm NAA
 - Plus or minus carbaryl
- 8 oz Amid-Thin + 1 qt carbaryl/100 gal
- MaxCel 2 qt/100 + Carbaryl 1 qt
- Carbaryl 1 qt/100 gal.

Petal Fall



7-14 mm Stage

- Fruit is entering a rapid fruit growth phase where there is large demand for CHO.
- The Carbon Balance Model is important in providing guidance for thinning
 - Should you thin?
 - How aggressively should you thin?
- This is the stage where fruit can be thinned most easily and thinner have a maximum response at this stage.



Thinning Recommendations 7-14 mm Stage

- NAA 5-15 ppm
- NAA + carbaryl
- MaxCel 1-2 qt/100 gal
- MaxCel 1-2 qts/100 gal + carbaryl 1qt/100
- Carbaryl 1 qt/100 gal

7-14 mm Stage

- This is the most difficult stage to make recommendations for.
- It is very easy to over thin or under thin.
- If the fruit growth model is used here, thinning results will not be available for 7 days.
- The thinning window of opportunity getting smaller.????

15-20 mm Stage

- This is a period where it is becoming increasingly difficult to thin.
- This may be due to development of a more favorable CHO status within the spur:
 - Some fruit abscise
 - Increased leaf area
- This may also be due to changing physiology of the tree, e.g. sensitivity to thinners.

Thinning Recommendations 15-20 mm

- MaxCel 2 qt/100 gal + 1 qt/100 carbaryl
- Carbaryl 1 qt/100 gal
- NAA* + carbaryl 1 qt/100 gal.
- Ethrel* 1 pt/100 gal

20 mm to 25 mm

- This is a period that is frequently referred to as a Rescue Treatment or a "Hail Mary".
- This is a time when it is very difficult to thin apples reliably.
- Few thinner are effective at this time: Ethrel (ACC, and metamitron (Brevis)) not registered at this time.

Conclusion

- Use of thinning models will provide growers with important information that allows for more informed decision-making.
- It is important for growers to remain engaged, gain as much information as possible and then make informed decisions.