Precision Chemical Thinning in 2021 for Gala and Honeycrisp

2021 Fruit Growth Rate Model Protocol

1 - Select a mature orchard of either Gala or Honeycrisp (or any other cultivar).

2 – Set up a Malusim account. To set up your Malusim.org account, you will need to create a username and a password to log in. You will then create a block by selecting "add a location". You will then need to enter in all the info required for the fruit growth rate model, which includes:

- Year
- Farm
- Variety

3 - From pink to petal fall, mark and tag 5 representative trees (Tree#1 - Tree#2 - Tree#3 - Tree#4 - Tree#5) and count the flower clusters on each tree (the earlier you count the better to see the clusters. **Count all flower clusters except the axillary flower buds on one year old wood (see the photo below).** You will then enter these cluster counts at malusim.org once you've set up your account.
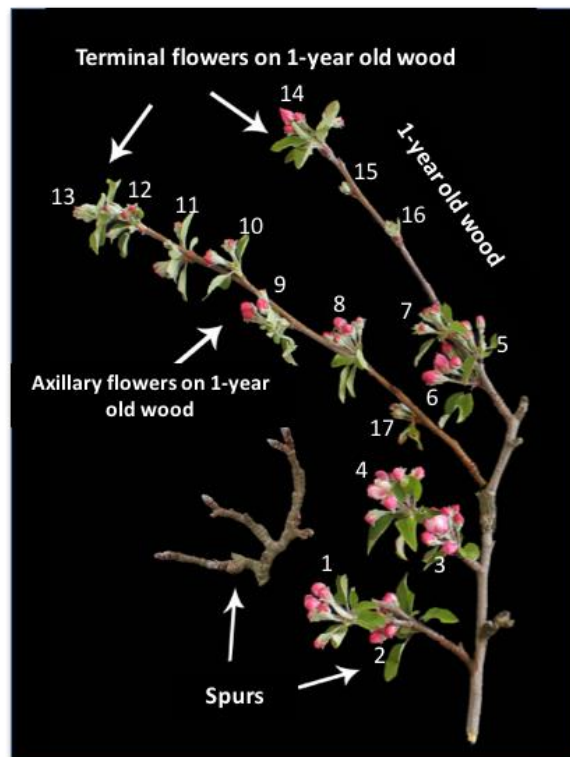
4 - Calculate target crop load for a high yield = desired number of fruit per tree.

5 - Click on the block name on Malusim.org, and select the fruit growth rate model. From there, you can then enter in your tree cluster counts, and your target fruit number per tree.

6 - Tag 15 spurs (flower clusters) per tree on each of 5 representative trees (75 total spurs) (preferable at pink, otherwise at bloom). **Make sure you do not mark clusters on terminal or axillary buds on 1-year wood.** Try to choose the 15 clusters according to the cluster distribution on the tree. For instance, if you have more flower clusters on the top part, mark more clusters there and so on.

7 – There is no need to number the individual fruitlets in each cluster, however each fruitlet has to be measured. Be careful when taking the measurements not to measure twice the same fruitlet within the cluster. Each cluster has to be numbered (1 to 15) and the measurements (fruit diameter) from that cluster have to be correspondent to that cluster. We recommend you to buy a caliper with a digital read-out in millimeters to take the measurements. Lowes sells them for about $15.

8 - Apply one of two spray protocols of thinning sprays from Terence's recommendation list (see below) or follow your own thinning program.

9 - Use the carbohydrate model to adjust rates up or down based on model recommendations and the amount of thinning to be done (http://newa.cornell.edu/index.php?page=apple-thin-new)

IF you decide not to apply a bloom and/or a petal fall thinning spray you still can follow the protocol and measure the fruitlets, however it is optional to you. In this case, the model will tell you the potential number of fruit per tree and how much thinning needs to be done at the later stages.

10 - Measure fruit diameters at **50DD Base 4°C** following the petal fall spray, and again at **120DD Base 4°C**. Repeat measurements at the same degree day intervals following the 10-12mm spray and following the 15-18mm spray if you end up putting them on. The number of times to measure will depend on when you reach your target number. You can view your degree day accumulations from the carbohydrate thinning model to help determine your timings for these measurements.

11 – Enter the data and all the information needed into your Malusim.org account for each block. This can be done by clicking the bock name, then clicking into the Fruit Growth Rate Model, and then clicking the green "+" sign to add measurements. Data can be entered when taking the measurements directly through the Malusim phone app, or you can write down measurements and enter them later on the computer at malusim.org. Once your measurements have been added, send an email within 24 hours after each 120DD measurement to Terence Robinson (tlr1@cornell.edu) copying your regional cooperative extension agent:

- Dan Donahue – Hudson Valley (djd13@cornell.edu)
- Mike Basedow – Champlain Valley (mrb254@cornell.edu)
- Mario Miranda Sazo – Lake Ontario (mrm67@cornell.edu)
- Craig J. Kahlke – Lake Ontario (cjk37@cornell.edu)

We will send you back an assessment within 24 hours of thinning progress. Based on the results you will be able to decide to spray again or not.

Please feel free to contact your extension specialist if you would like to more information or any assistance on training your farm employees to conduct fruit measurements this year.

Things you HAVE to pay attention at every time you take the measurements
– Take data "precisely":
- Make sure you are ALWAYS taking measurements from the right cluster. You might get confused if there are two clusters too close or if you used a long ribbon (flag) that can twist around nearby clusters. Try to avoid marking those too close clusters and do not use a too long ribbon.
- Fruit are not round so ALWAYS pick the largest OR the narrowest size of the fruit to measure. If you choose to measure the largest side, then all the subsequent measurements have to be taken from the largest side as well - at day 1, day 2 day 3 and so on.
- If you opt for not marking the fruitlets, please make sure you will not measure the same fruitlet twice at the same day.
- Make sure you are writing the measurements in the right position (tree and cluster) in the datasheet provided. However, fruitlets within each cluster do not need to be in order.
- If you find more than 5 fruitlets within the cluster just remove the weakest fruitlet. It will come off later anyways.
- If you break a cluster please remove all the previous measurements.

Spray and Timing Options for Precision Thinning of <u>MATURE Gala</u>:

Option 1	Option 2
Apply a Bloom Spray NAA (4oz/100 gal TRV dilute basis - see below for TRV)	
Apply a Petal Fall Spray (5mm) NAA (3oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis)	**Apply a Petal Fall Spray (5mm)** NAA (3oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis)
Apply a 12 mm Spray Maxcel (64oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis)	**Apply a 12 mm Spray** Maxcel (64oz/100=96oz/acre) + Sevin (1pt/100=2pt/acre)
Apply an 18 mm spray (if needed) Maxcel (64oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis) + Oil (1pt/100gal water) **don't concentrate oil** (directed to the upper part of the tree)	**Apply an 18 mm spray (if needed)** Maxcel (64oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis + Oil (1pt/100gal water **don't concentrate oil**) (directed to the upper part of the tree)

Spray and Timing Options for Precision Thinning of <u>MATURE Honeycrisp</u>:

Option 1	Option 2
Apply a Bloom Spray NAA (4oz/100 gal TRV dilute basis - see below for TRV)	
Apply a Petal Fall Spray (5mm) NAA (4oz/100 gal TRV dilute basis) +	**Apply a Petal Fall Spray (5mm)** NAA (4oz/100 gal TRV dilute basis) +

Sevin (1pt/100 gal TRV dilute basis)	Sevin (1pt/100 gal TRV dilute basis)
Apply a 12 mm Spray NAA (3oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis)	**Apply a 12 mm Spray** NAA (3oz/100 gal TRV dilute basis) + Sevin (1pt/100 gal TRV dilute basis)
Apply an 18 mm spray (if needed) Sevin (1pt/100= gal TRV dilute basis) + Oil (1pt/100gal water) **don't concentrate oil** (directed to the upper part of the tree)	**Apply an 18 mm spray (if needed)** Sevin (1pt/100 gal TRV dilute basis) + Oil (1pt/100gal water) **don't concentrate oil** (directed to the upper part of the tree)

*TRV = Tree row volume

Spray Mixing Instructions Considering Tree Row Volume - TRV
• Plant Growth Regulator response is a function of the amount of chemical deposited on the leaves of the tree. The amount of chemical that is sprayed per acre should consider tree size to not over-apply chemical to small trees and under-apply chemical to large trees.
• Tree size can be used to adjust the amount of chemical added to the spray tank by calculating the size of the tree canopy (tree row volume). The tree row volume of an orchard is defined as the volume of water to spray the trees to runoff, which is termed a full dilute spray.
• The amount of chemical can then be adjusted to the size of the trees with fully-grown trees receiving a full amount (100% dose) and smaller trees receiving an appropriate fraction of a full dose.
• The volume of water used to carry the chemical to the leave can be less than the full dilute volume but if less than the full dilute volume is used then the amount of chemical in the tank must be concentrated to allow the proper amount of chemical to be applied to each tree.
• The concentration factor is determined by dividing the full dilute volume of water (TRV) by the actual amount of water to be sprayed.

1. Calculate Tree Row Volume
  (Tree height X Tree width X 43,560 X 0.7) / (Between row spacing X 1000)

  • Example of a Tall Spindle Orchard
        For many mature Tall Spindle Orchards this is ~200 gallons/acre
            Example (11' X 7' X 43560 X 0.7) / (12' X1000) = 196 gallons/acre
2. Set sprayer up to spray ½ of Tree Row Volume (100 gallons/acre)
  This is a 2X application
3. Concentrate the chemicals in the tank 2X
  Add the rate/100 gallons X 2 of each chemical (except oil or surfactants)

Adjusting the Spray Pattern
• Often the bottoms of trees show over-thinning while the tops of trees show under-thinning.
• Our standard recommendation is to nozzle the sprayer so that 2/3 of the spray volume is directed to the top half of the tree and only 1/3 is directed to the bottom half of the tree.
• Recent studies have shown that this still gives 65% of the fruit in the top half of a tall spindle tree and only 35% of the fruit in the bottom half of the tree.
• Our new recommendation is that for the bloom and petal fall sprays that spray pattern direct 2/3 of the spray to the top of the tree and 1/3 to the bottom of the tree. However, for a third spray at

10-12mm spray or a fourth spray at 18mm that all of the spray be directed to the top half of the tree and no spray be directed to the bottom half of the tree.

• Please note that when you shut off the nozzles you need to adjust up the rate per acre. We still want to keep the same rate per acre, even though you are spraying only the top of the trees. The bottom part of the trees will get some drift and no need to be directly sprayed. More chemical has to go in the tank to account to the factor you shut off nozzles, because now one sprayer instead off covering five acres goes ten acres. For instance, if your sprayer is going to cover 4 acres, you have to put the normal amount per acre four times in there. The reason for that is because the upper part of the tree gets so much light and produces much more carbohydrate, so those fruit have much greater carbohydrate supply than fruit from the bottom of the tree where you have more shade.