

**PLANT GROWTH REGULATORS (&
CHEMICAL THINNING RESULTS DURING 2003**

By

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Note: The following is a recap of plant growth regulator research performed by, and observations made during the growing season of 2003. There is also a synopsis of the chemical thinning season with what worked, what didn't, along with observations and opinions as to why.

FRUIT SIZE ENHANCEMENT IN GALA: Promalin or Accel

During the last 10+ years the author has recommended the use of a series of 'low level' Promalin sprays to enhance the size of Gala apples. When Promalin is applied at 1 pint per 100 gallons of solution at petal fall, and under favorable temperature conditions the fruit will be 'elongated' and will be approximately 10% larger at harvest. To achieve these effects the temperature at the time of application and for 3 to 5 days following must be above 70 degrees F.

Because the temperature is often below this 'optimal' level during the early growing season we began to use 'split applications' of ½ pint of Promalin per acre, in 100 gallons of solution, at 7 to 10 intervals (a total of 2 – 4 applications were made). This approach provided greater probability that one or more of the applications would take place during a time when temperatures would be favorable for the required stimulation of cell division. If temperatures were in the mid-70's we found that the maximum effect was obtained with 2 applications. When temperatures were less favorable a 3rd and/or 4th application was made. (Note that all of these applications were made with spray solutions buffered to a pH of 6.0 to 6.2 and with Regulaid or another non-ionic spreader. The effect is enhanced by a boron source such as B-17 which does not raise the pH of the solution.)

During the spring of 2003 we applied a limited number of 'tests' in which, a portion of a block of Gala were treated with Promalin in our 'standard' manner, and a portion of the block was treated with Accel. The fruit size and shape were compared at harvest time, but "lot" size measurement comparisons were not made. The use of Accel has enough promise that during 2004 we will treat "lot" sized quantities and compare them to untreated and Promalin treated "lots".

From 'in-field' measurements and observations it was apparent that both Promalin and Accel increased fruit size during 2003, but the shape of the fruit was different. The Promalin treated fruit had more prominent calyx lobes and the elongated fruit shape typical of successful Promalin applications. The Accel treated fruits were larger when diameter was measured on the equatorial plane, but the calyx lobes were less pronounced and the L/D ratio tended to be 1 or less, while in the Promalin treated fruits the L/D ratio was 1.0 to 1.05.

Use of Accel to increase fruit size is nearly universal on Gala in the Washington industry because of the large price premium for 72-88 sizes. This material, like Promalin acts by stimulating cell division, so temperature conditions following application will have a significant effect on the success of the application. Both of these treatments work when weather conditions are favorable, but additional comparative studies need to be done to determine the most cost effective program.

RETAIN: Again, this year a number of growers used Retain applied 4 to 5 weeks pre-harvest for 'stop-drop', 'delayed maturity', and color enhancement. The summer of 2003 was one of the hottest on record, particularly during August and September. Conditions for coloring 'red' and bi-color varieties were very unfavorable. During past seasons when extended heat slowed coloring, we have found that untreated trees tended to exhibit accelerated maturity which increases the detrimental affect of the hot temperatures. Also, during seasons when pre-harvest temperatures are significantly higher than normal, premature fruit drop tends to be a significant, and at times, a severe problem.

During 2003 the maturity of apples on Retain treated trees was delayed from 5 – 7 days. Color continued to develop, even under unfavorable temperature conditions and the final result was better colored fruit to pick, with good internal condition in spite of the 'weather'. Under 'hot' conditions Retain is not magic but it does have significant benefit. Again, it should be noted that all applications of Retain were made at ½ the recommended rate, which gives more uniform and predictable results.

PRO-GIBB ON TART CHERRIES: Pro-Gibb has been used for a number of years to limit the formation of flower buds on young trees, which in turn tends to enhance vegetative growth. This material has also proven very helpful in overcoming the symptoms of 'cherry yellows' by stimulating the formation of fruit spurs and buds on what would otherwise be 'blind' wood, with flower buds only at the terminals of last seasons' growth. In sweet cherries the active ingredient in Pro-Gibb has proven to delay fruit maturity, enhance fruit firmness, and increase fruit size.

Increased fruit size in tart cherries would be beneficial because of the importance of the role of fruit size in yield, and processing yield and speed. In addition, a treatment that would increase fruit firmness, particularly during the 2nd, 3rd, and 4th weeks of the processing season would be a tremendous help because firm fruit is easier to pit.

During 2003 tart cherry trees were treated with Pro-Gibb following the same range of procedures that are used in treating sweet cherries. Fruit growth rate, fruit size, maturity and individual fruit 'dry weight' was measured. Our original objective was to determine if we could increase individual fruit 'dry weight', hence finished product yield, and also to explore the possibility of extending the 'optimal' harvest window by slowing the maturity of treated fruits. In determining the 'dry weight' of the cherry flesh, individual fruits were pitted using a hand held pitter prior to the drying process. It was noted that at least one of the treatments resulted in fruits that were easier to pit, i.e. a higher percentage

of the pits were removed on the first attempt with the 'plunger type' hand pitter, and there was less 'cherry flesh' on the pits removed.

The results of experiments conducted during the 2003 growing season indicates that individual tart cherry fruit size and the dry weight of the fruit flesh can be increased by the application of Pro-Gibb (net increase in size = 6%, increase in dry weight = 6.5%). Application timing in these experiments was at the 'straw color' stage of development (Treatment #1) and 2 applications at 'straw color' and 14 days latter (Treatment #2).

During 2004 we intend to further test the effects of Pro-Gibb on fruit size, dry weight, and ease of pitting. There are several cultural interactions that must be defined and the best way to deal with these interactions needs to be determined. For example, how does the use of Pro-Gibb interact with Etherl applications made to loosen the fruit for mechanical harvesting? If timing of Etherl applications is optimized, will a second application of Pro-Gibb have additional benefits? Because pitting problems become more severe as fruit maturity advances past an 'optimal level' will it be possible to combine Pro-Gibb and other factors to delay fruit softening into, or beyond the 3rd week of harvest? During the 2004 growing season we intend to expand and intensify this research effort.

CHEMICAL THINNING RESULTS DURING 2003

The chemical thinning of Apple trees is a very challenging proposition in any year, but morphological development, pollination, and temperature extremes made 2003 one of the most challenging years experienced in the 35+ years I have been involved. The up-side of a challenging thinning year is that there are a number of things to learn and/or relearn from the experience. The following is a very long 'summary' of the experience and the things we should learn.

"Bloom Density" and Chemical Thinning:

It is important that we remember why we 'chemical thin'. Dr. Max Williams of the Wenatchee USDA research team (he passes along his greetings from the Malaga Golf Course) emphasizes that we thin to: 1. Assure return bloom for the next season, and, 2. Maximize fruit size. There are many things we can do to maximize fruit size throughout the growing season, **but**, we have very few chances to assure, or increase our probability of having a chance for a crop next year.

"Bloom Density": or the percentage of potential flower bud locations within a tree that are actually occupied with flower buds, is one of the primary determinants of whether or not there will be bloom on the tree next year, and if so how many. For most of our commercial varieties, as the percentage of potential flower bud sites that are actually occupied with a composite (flower) bud increases beyond 30%, the potential for flower

bud formation for next season decreases. The more precocious the variety, the stronger this relationship. For example, an old 'standard' Red Delicious variety such as 'Red King' would generally bloom year after year if bloom density was 60% or less. The spur variety 'Starkrimson' tends to be very biannual if 35% to 40% of the potential sites are blooming.

In many instances, timely thinning to reduce the number of fruit can effectively reduce the adverse effects of high bloom densities. There are some varieties, however, that when they bloom heavily (snowball bloom = 80% of potential sites blooming) will have little or no bloom the following year, no matter how much of the fruit is removed following bloom.

In the late 1970's I began to work with Seckel pears. To solve the bi-annual bearing habit of these trees we began by experimenting with chemical thinners as well as manual bloom thinning. We found 2 treatments that would reduce fruit numbers during the heavy bloom year, if applied at first petal fall, to the point that no hand thinning was required (slight over-thinning). We found, however, that there was no influence of these treatments on return bloom. In another experiment during the heavy bloom year we hand thinned and spaced individual king blooms to approximately 8" – 12" at 'loose cluster' and at 'first bloom' and still did not improve return bloom. We found that the only way to assure return bloom on this pear variety was to reduce the bloom density by applying GA₃ at 2 to 4 weeks post bloom, to reduce the numbers of flower buds formed for the following season.

So what does Seckel pear thinning have to do with apple thinning? Some of our 'new' varieties exhibit a significant degree of the same phenomena. Fuji and Cameo apples that are allowed to bloom at a 'moderate level' will tend to have little or no bloom the next year, no matter how successful and early the chemical and/or hand thinning program is. With these varieties, we need to adjust (decrease) the number of bloom clusters before the pink stage of development and follow that with aggressive and early chemical thinning. **Variety and growth pattern are important factors in determining the 'best' chemical thinning program.**

BLOOM THINNERS:

From the late 1940's to the early 1990's excessive bloom was widely thinned by using the chemical Elgetol. This material was very effective and had been used widely over a long period of time so we understood most of the important factors that determined successful thinning, or that represented dangers. When this material was 'withdrawn' from use, it left a vacuum that has taken a long time to fill (we are still working on it). At the present time we have several major alternatives and several 'prospective' materials. The 3 most 'predictable' materials for this purpose are 1-Wilthin, 2-ATS, and 3-'Fish Oil + Lime Sulfur'. A number of other materials are being 'investigated' but they are not ready for general use at this time.

Wilthin: This material has been available for over a decade, but has not ‘caught on’ and is not widely used. Use patterns are so low that its continued availability is in question. The material is very acidic and probably acts to burn the stigma and style of open blooms so they are not receptive to pollination and pollen tube growth. When this material is applied to trees on which a sufficient number of flowers have opened, pollinated and pollen tube growth is progressing, it burns the more recently opened flowers rendering them unable to ‘set’ while leaving the more advanced fruit.

The main factors that have limited use of Wilthin are: 1. Because of its acidity, it is a significant wear factor on equipment and proactive measures are required to limit the physical damage done to tractors and sprayers. 2. During the early years of its use there were significant and unpredictable cases of fruit marking (light, net-like russet). In the mid 1990’s we found that use of moderate rates of Regulaid (1/2 pint per 100 gallons of solution) eliminated the risk of fruit marking, but the reputation of the material was ‘set’ in the mind of growers and fieldmen.

Wilthin is expensive (\$40 - \$60 per acre material cost) but when used with the proper timing (essentially the same as Elgetol) and precautions is an effective bloom thinner. Willthin, applied side by side with ATS, and ‘Crockers’ oil + Lime Sulfur has shown greater return bloom stimulation in many instances on varieties such as Fuji, Golden, and Cameo.

If growers have heavy to snow-ball bloom they should consider using this material. The proper timing, assuming no frost damage to early blooms, is when a limb, when struck with the side of the fist (or a padded ‘beating stick’), sheds significant numbers of petals (10 -12 petals). To be most effective the material must be applied within 4 to 8 hours of this initial ‘petal shed’. The amount of material used should be ½ pint per 100 gal. for easily thinned varieties such as non-spur ‘Reds’ or Ginger Gold and 1 pint per 100 gal. for harder to thin varieties such as Fuji, Golden, and Gala. Include the mentioned Regulaid and apply sufficient solution to wet the trees (200 to 300 gallons per acre) to the ‘drip point’.

In situations where obtaining return bloom is going to be difficult, the author prefers this material. The cost is insignificant, if the alternative is decreased or no bloom the following year. When this material is used, don’t let it ‘sit in the tank’, wash the sprayer thoroughly following each use, or day of use, and neutralize the acidity by following the water washing with 100 gallons of water and 1 pound of sodium bicarbonate mixed in the tank and ‘sprayed’ through the lines and nozzles.

ATS (ammonia thiosulfate): This material has been widely used for chemical thinning, but has only recently been ‘labeled’ for this use. We do not fully understand its mode of action, but it probably has a caustic effect on the stigma and style of the flower, thus limiting or preventing pollination. Normally solutions of 0.75% to 1.5% of this material

are used, with the lower concentrations being used for easy to thin varieties or situations. Solutions of 1% are normally used on varieties such as Gala with 1.25%-1.5% solutions being used on Golden and Fuji.

At present, this material is the most widely used 'bloom thinner' in the Washington apple industry because it is inexpensive, easier on equipment, and seldom, if ever 'marks' fruit that remain on the trees. Its main 'limitations' are: 1. Sources of labeled material are limited, and 2. Where heavy return bloom stimulus is needed it will often 'thin more' than it 'stimulates return bloom'. Because of these factors many growers use 2 applications, the first at the beginning of petal shed and the second 2 or 3 days latter, depending of temperature.

When using this material it is important to 'thoroughly wet' the trees and blooms. On full grown trees this will require 200 gallons per acre with moderate bloom, and 300 gallons per acre for heavy bloom. Where 'bloom densities' are light to moderate, and the risk of 'bi-annual' bearing is low, the author likes this material but for only 1 application. It can be used to begin to 'single down' the flower clusters. Where the risk of bi-annual bearing is significant the author would recommend the use of 1 application of Wilthin instead of 2 applications of ATS. Frequently the second application of ATS results in heavy leaf damage, and while one can expect heavy thinning when this occurs, the delay in establishment of an effective leaf surface seems to diminish the return bloom stimulus.

'Crocker's' Oil + Lime Sulfur: During the winter and spring of 2003 there was a considerable amount of interest in the use of this combination of materials as a 'bloom thinning agent'. This interest resulted from a number of factors and led to rather widespread use of this combination in the state of Washington and elsewhere. In Utah County, limited areas (small tests) were treated with this combination. The result in many situations was significant over-thinning. For the past 7 years the author has used this combination of materials as 'the' chemical thinning agent in significant 'organic' acreage in Washington and Utah. While it does 'thin' apples, the results and side effects tend to be highly variable. Because there are no effective materials for thinning that can be used in the post-bloom period (in an organic orchard) we have used 1 ½% or 2% solutions of Crocker's Oil + 2% Lime Sulfur in single and multiple (up to 3) applications. Generally, the first application is applied at the 'first significant petal shed' and any subsequent applications are applied on 2 to 3 day intervals.

One of the major problems with this program is that it is more unpredictable, often resulting in marginal over-thinning and at times significant over-thinning. As we approached the 2003 growing season, I had noticed a 'lag' in the development of the floral parts in most flower buds examined in Washington and Utah. Normally, by mid January and often by early December, examination of the flower buds will reveal highly developed bloom structures with the 'floral cup' fully closed. During the spring of 2003 very few buds had reached this stage by the end of January, and most had not reached this stage by the first of March.

This 'morphological' abnormality suggested to me that the chemical thinning process would be more unpredictable in 2003 than in the 'average' year. As we entered the 'thinning season' I recommended this combination only on a limited 'test' basis, and we decreased the concentration on our organic acreage to 1 ½% and applied only 1 application 1 day later than normal. We also applied 'tests' of the material in 5 locations throughout the Arrowhead property as well as treating the organic acreage. In every case there, and in both test sites in Utah the 1 application resulted in over-thinning and crop reductions of 33% to 50%.

Our normal experience, over the past 7 years, has been more favorable than the 2003 growing season, probably because of an interaction with the material combination and 'slowed flower bud development' or what ever factor caused this morphological abnormality. One thing we have observed consistently (in all 7 years) has been that even though we attained 'good' to 'excessive' chemical thinning each year, the effect on return bloom was less than we expected, absent, or even negative.

We can only speculate as to the cause of the limited or negative affect on return bloom of 'Crockers Oil + Lime Sulfur', but we have found that 2 applications in one year will appear to have a negative effect on return bloom, and use of a 3rd application consistently reduces return bloom to near zero. The over-all vigor of the trees is decreased by repeated use of this material combination, particularly if 2 and/or 3 applications are used in subsequent years.

Over the last 7 years we have tested a number of different 'mineral oils' and 'fish oils' with and without Lime Sulfur, and Lime Sulfur alone in 4% to 8% solutions. We have also tested 3 combinations of Calcium and Magnesium salts. All of these tests were repeated in at least 2 years and on 2 to 4 acres per treatment. In the authors opinion the use of these programs expose the grower to unacceptable risks, given our current level of understanding and usages.

PETAL-FALL THINNERS:

Sevin: This material has been used for 30+ years as a chemical thinning agent, with a gradual increase in our understanding of its mode of action, and what factors influence the degree and speed of thinning achieved. We know that this material acts by causing 'abortion' of the embryo and the 'death' of the seeds in a fruit. The degree of this effect is dependant upon the concentrations of the solution, the degree of wetting of the tree, foliage, and fruits, and the temperature at the time of application and during the following 3 to 5 days.

Dr. Max Williams maintained (and still does) that the mode of action of Sevin in the thinning process is to stimulate the production of ethylene, which in turn causes the embryo to abort. The developing seed is the source of gibberellic acid which prevents the formation of the abscission layer at the end of the stem, so when the embryos are aborted the GA supply is interrupted and the fruitlet drops.

Given the mode of action of Sevin it is evident that factors such as drying time, degree of wetness of the tree, and the concentration of the solution will have the potential to increase uptake of the material, and hence the degree of thinning. Another 'fact' that flows from the mode of action of this material is that the higher the temperature when the material is applied, and during the period of its metabolism, the more rapid will be the 'metabolic processes' it stimulates, which in turn will lead to higher internal ethylene levels and greater thinning.

Experience has taught us that if daily high temperatures of 70⁰ F occur over 3 to 5 days following application, this material can be very effective as a thinner. When temperatures are cooler than this, application of Sevin will result in very little thinning. In some areas, or years, if high temperatures exceed 90⁰ F within 5 days of application this material can result in significant over-thinning. It is extremely important to use this material during a period when extremes of temperature are unlikely, so the results can be predictable. If weather forecasts predict temperatures higher or lower than the 70⁰ F to 90⁰ F range, delay application, or adjust the application rate accordingly. Combinations of this material with other thinning agents such as Amid, NAA and/or Etherl can accentuate these temperature driven processes.

One advantage of this material is that the thinning achieved can be determined within 12 to 14 days of application. Therefore, if the material is used at petal fall a second application can be made at the 9 to 12 mm stage of growth to promote additional thinning. Under some conditions, the author has used an 3rd application of this material when fruits were in the 18 to 25 mm range with good success. Caution: Because the fruits reach this growth stage latter in the season, the likelihood that sudden temperature shifts can result in higher than desired temperatures with the risk of over-thinning is increased.

The optimum concentration of Sevin varies widely with temperatures, variety, and whether or not it is used in combination with other thinning agents. (Assuming 200 gallons per acre applied) Some varieties such as Ginger Gold and Granny Smith respond very well to 8 to 12 ounces per 100 gallons when temperatures are in the 70's or 80's. Other varieties such as Gala and Cameo respond well to concentrations of 16 to 24 ounces per 100 gallons, while Golden Delicious and Fuji require concentrations of 24 to 32 ounces per 100.

Under conditions of light or moderate bloom the use of petal-fall applications of Sevin can be used to reduce the number of fruits set per cluster. An additional application made at 12mm fruit size can be used to further reduce fruit numbers to lessen hand thinning costs and increase the likelihood of achieving adequate return bloom. Because each application brings about the production of some ethylene I prefer to use this material, because it gives the maximum return bloom stimulus at any given level of thinning.

In any situation that involves use of Sevin in the orchard when bees are present the grower must consider the potential for significant bee kill. New formulations such as Sevin XLR are not as dangerous as Sevin WP but do not spray when bees are active. It is preferable to move the bees out of the orchard before using Sevin.

Amid + Sevin Mixes: Mixes of Amid Thin and Sevin have been used extensively for 25 years in hard to thin varieties such as Golden Delicious. This mix is a key element of any thinning program for Golden Delicious, Gala, Fuji, Cameo and other varieties that combine difficult thinning and return bloom challenges. In these varieties, if 50% of the potential fruiting sites are occupied by 3 or more 'good blooms' this combination should be applied at petal fall (when the speed sprayer removes 75% of the petals from the tree as it passes). In the late 1970's we found that moving the application timing from the then recommended 10 days after petal fall up to petal fall resulted in greater return bloom stimulus, with the same degree of thinning.

Under normal temperature ranges (highs of 70⁰ – 90⁰), rates of Amid should be at 25 ppm (4 ounces/100 gal) for Golden Delicious, Gala, Cameo and other difficult varieties except for Fuji where 36 ppm (6 ounces/100 gal) is much better for removing 'non-terminal' bloom on last seasons growth. This non terminal bloom on last seasons growth normally produces inferior fruit and has severe negative effects on return bloom. If frost has removed 1 or 2 of the 5 flowers per cluster, or if temperatures between 85⁰ and 95⁰ are likely within 5 days of application, reduce the concentration to 17 ppm (3 ounces/100 gal). If there is any possibility of temperatures of 95⁰+ in the first 5 days following bloom, do not use Amid.

When mixing Sevin with Amid consider using:

- A. On Golden Delicious use 16 ounces to 24 ounces depending on extent of bloom and predicted temperatures. If there is a good chance that temperatures will reach the 80's within 7 days, and/or if you do not need to 'clean a lot of clusters' use 16 ounces.
- B. On Gala use 16 ounces or 20 ounces depending on extent of bloom and predicted temperatures. If there is a good chance that temperatures will reach the 80's within 7 days, and/or if you do not need to 'clean a lot of clusters' use 16 ounces.
- C. On Fuji use 20 or 24 ounces depending on extent of bloom and predicted temperatures. I would maintain the higher rate unless there was a high probability that high temperatures were going above 90⁰.
- D. On Fuji that are blooming heavily consider adding ½ pint of Etherl per 100 gallons of spray solution (assuming you are spraying at 200 gpa).

Dr. Max Williams recommends; and I agree that if there is a probability that the daily high temperature will exceed 80⁰ rely on Sevin alone on Goldens and Gala. The threshold for Fuji is 95⁰.

During the bloom and post bloom period in 2003 temperatures tended to be cool with high temperatures mostly in the upper 50's and 60's with occasional periods of 1 or 2 days in the low 70's. This pattern continued until May 20, when temperatures warmed rapidly to the point that by May 24 temperatures were over 100⁰ F. These conditions resulted in the most difficult 'thinning conditions' I have observed since 1986 when we experienced a similar pattern.

In 2003, most growers had moderate to heavy bloom and used 1 application of ATS at 'first petal shed'. The results of this application were less than desired, though significant thinning did occur. On easy to thin varieties such as Ginger Gold the "normal" application of petal fall Sevin + Amid gave adequate thinning. On Goldens, Golden Supreme, Gala and Fuji the application of Sevin + Amid resulted in essentially no thinning or indication of thinning for 14 to 21 days. This resulted in high fruit numbers still on the trees in mid May and a real need "to do something". During this period I stated to several growers that I had never applied this mix and then not seen 3/8ths inch or larger fruit on the ground 2 to 3 weeks later. Because of the cool weather the thinning from this mix was delayed, but with the heat following May 20 considerable thinning attributable to this application occurred.

Between May 14 and May 16 many blocks of Goldens, Gala, Cameo and Fuji were treated with another 'chemical thinner' application. In many of these blocks 2 or 3 ppm of NAA were included because it tends to increase thinning under cool conditions. Most Fuji blocks received a mixture of Sevin, NAA, and Etherl. Many Red Delicious blocks received either, Sevin or Sevin plus 1 or 2 ppm of NAA. Blocks treated in this "window" generally responded very well as temperatures began to slowly increase on May 16 and rose rapidly following May 20. Many blocks were thinned to 'spaced singles' leaving very little hand thinning to do.

As an illustration of how sensitive the chemical thinning process is to temperature, and timing of application in relation to temperature changes, a block of Fuji was treated on the 16th with Sevin, NAA and Etherl. A second block in the same area, but on a site that had bloomed later was treated with the same solution and gallonage on the 19th (these blocks had been treated with Amid + Sevin+ Etherl at petal fall). Following the applications temperatures rose much more than predicted reaching 104 in on May 24th. The result was that the block sprayed on the 16th had an 'ideal' thinning job, and the block sprayed on the 19th had the crop reduced to 1/3rd of a full crop.

Finally, during the 2003 'thinning season' we again observed that shaded portions of the tree canopy (where it is either too big or too thick) tends to thin more easily than portions of the canopy with adequate light. One group of large 'Golden' trees were sprayed with Amid + Sevin and the shaded interior portions of the trees were over-thinned and the tops were under-thinned. In these blocks it is important to 'open the canopy' to adequate sunlight.

SOME KEY “RULES” IN CHEMICAL THINNING:

- #1. Never combine chemical thinners with other ‘spray applications’ the results are often unpredictable. Do not add surfactants to chemical thinning solutions (except Regulaid to Wilthin); results are too variable.
- #2. Obtain the best possible weather forecast. The weather conditions at the time of application are important; but the temperatures over the 5 to 7 days following the application will determine the result – nothing – some thinning – over-thinning.
- #3. At any concentration of thinning materials, the wetter the trees, the greater the thinning effect. Lower application rates tend to single fruits in clusters, higher application rates tend to ‘clean clusters’.
- #4. NAA is the only material that will thin significantly when daily highs are between 60⁰ & 70⁰ F.
- #5. Between 70⁰ F and 90⁰ F the thinning action of NAA, Amid Thin, Sevin, Etherl and/or combinations of these materials will increase significantly, though not dramatically.
- #6. Between 90⁰ F and 105⁰ F the thinning action of NAA, Amid Thin, Sevin, Etherl and/or combinations of these materials will increase dramatically. If “normal rates” of these materials are applied and temperatures reach these levels within 5 days over-thinning will occur.
- #7. Consider the quality and ‘state’ of the flowers when you determine what material and concentration to use. A. If King Bloom stems are significantly shorter than side bloom stems there is a good chance they will not set. B. If frost has reduced King Bloom delay timing to allow the first good side bloom to ‘set’. C. In the absence of frost, deformed petals or other parts of the flowers would suggest heavy reliance on thinning sprays at 5 mm, 9 mm, and/or 12 mm growth stages. D. If a petal fall thinning spray using a combination of Amid & Sevin (at 25ppm and 12 oz or more) has been applied, you will eventually see significant thinning. The first discernable sign of which fruit will drop is a sudden change in the relative size of fruits in the cluster.
- #8. Except where the risk of poor return is high avoid application of “the next” thinning spray until you can see ‘some action’ of ‘the last’ spray.
- #9. Under-thinning to the point that you do not have return bloom is nearly as bad as severe over-thinning.
- #10. **Because so many variables are involved in the chemical thinning process (we once identified 63) there are no warranties or guarantees.**