

Update and Review of the Use of Plant Growth Regulators in the Orchard

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Update Uses or New PGRs

- Preharvest drop with ReTain +/- NAA
- New formulations of Prohexadione-calcium
- New NAA formulations
- Transforming Cortland

Preharvest Drop

- Shift from wholesale to retail sales is occurring
- This shift has resulted in a need for better and longer control of preharvest drop.
- The weekends in September to mid October are critical to the economic success emphasizing the need to have fruit on the tree during these critical times.
- It is not uncommon to have 50% drop some years

When to Apply ReTain?

Label Suggestions

- 4 weeks prior to start of harvest
 - Maximizes delay in ripening
 - Drop control lost early
- 2 to 3 weeks prior to harvest
 - Minimal effect on ripening
 - Drop control extended late into the season

How Much ReTain Can you Apply?

- The ReTain label states that 333 g of ReTain I bag) per acre can be applied at one time.
- The only label restriction on amount is that you can't apply more than 333 g/acre per time of application.
- The number of applications is not stated so several applications may be made.

NAA as a Drop Control Compound

- NAA was known to retard fruit drop as early as the 1930s.
- Until the registration of Alar it was the only one available.
- NAA has its limitations:
 - Advance ripening and shorten storage life.
 - NAA is effective for 7 to 14 days.

ReTain Became Dominant

- After 1989 there was a drop control void.
- ReTain filled that void for many years but it is expensive.
- The need for better drop control for a longer time and the desire to reduce costs were the incentives to find improved drop control solutions.

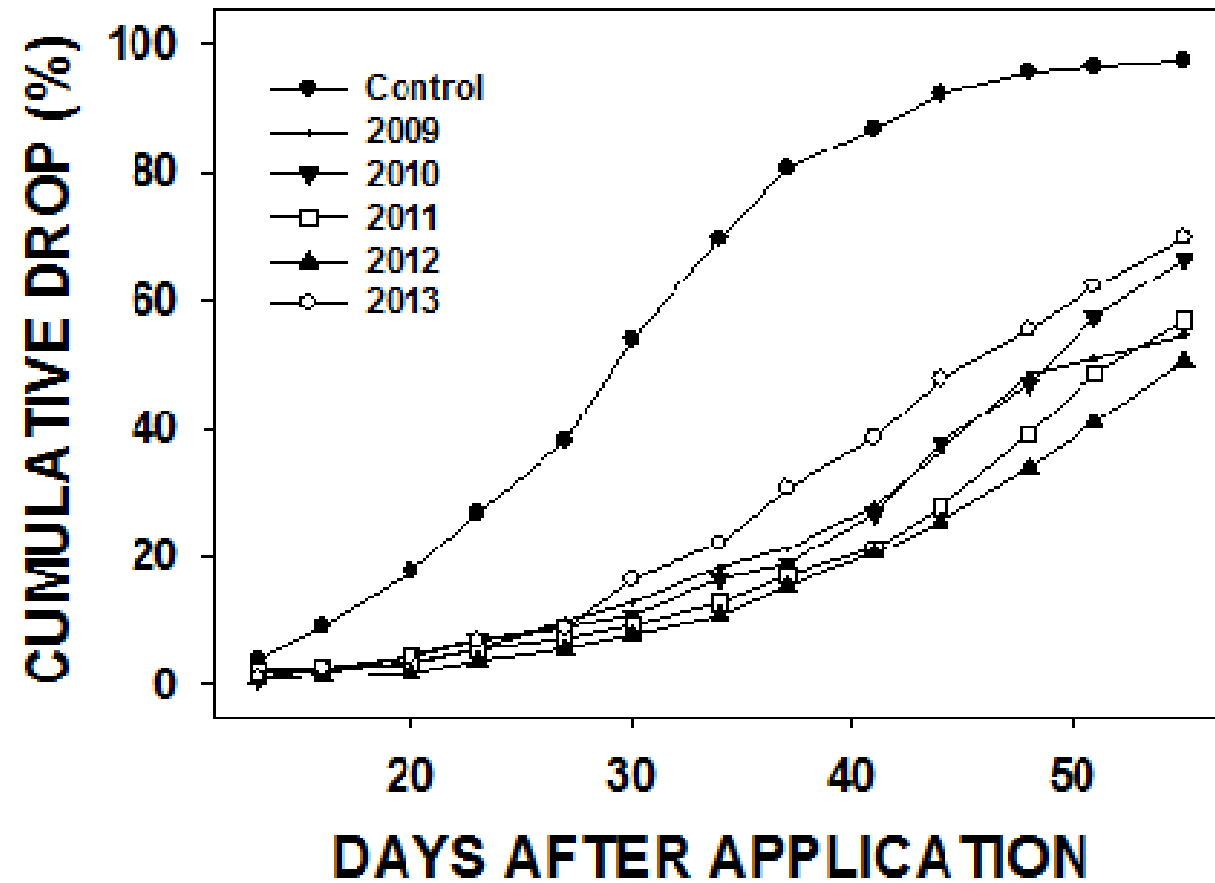
Approaches to Improve Drop Control

- Multiple applications of ReTain
 - Half rates
 - Full rates
- NAA
- Retain plus NAA
 - Many combinations tried
- Tree structure management

6 year Summary of Drop Control

- ReTain timing, number of applications and amount applied.
- ReTain combinations with NAA at different concentrations, number of applications and their time of application.

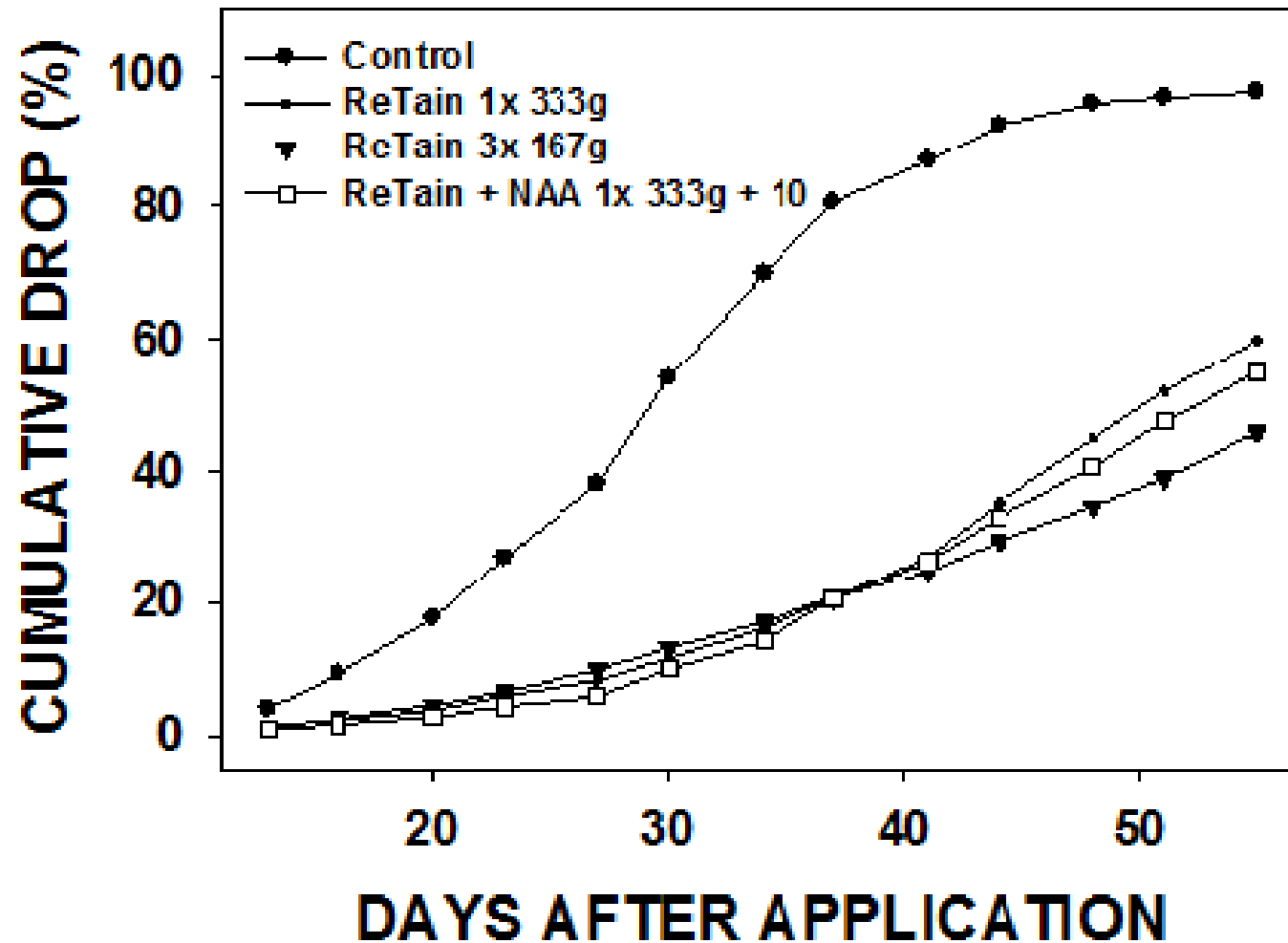
Cumulative Drop ReTain- 333g/acre



ReTain Standard Summary

- Standard is 333g/acre applied 3 weeks before anticipated harvest.
- ReTain restricted drop to under 20% from 32 to 40 days after application.
- After that period of time the rate of drop accelerated.

Drop Control Options with ReTain



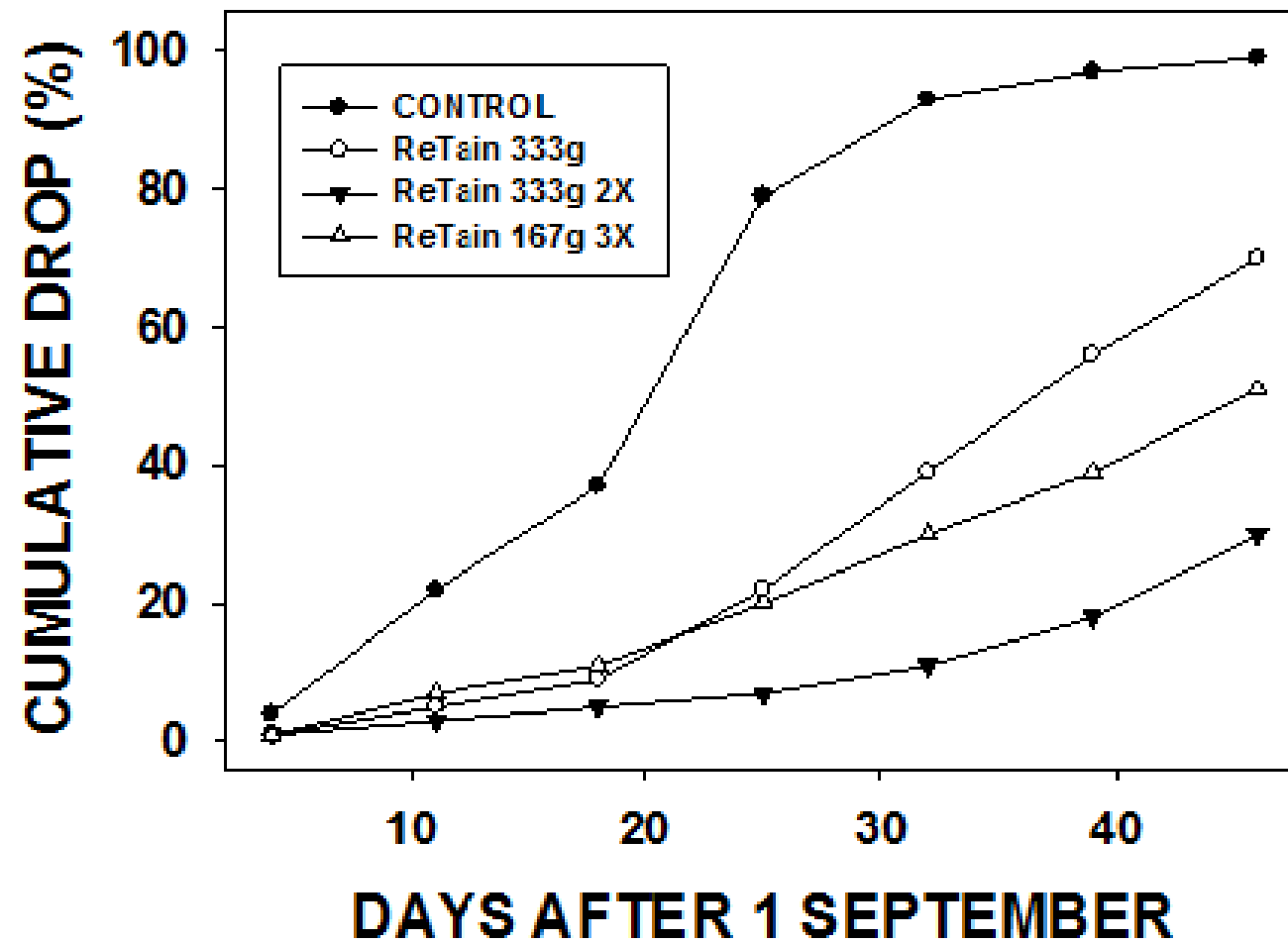
ReTain Plus NAA 5 Year Average

- ReTain 333g/acre or 333g/acre + 10 ppm NAA with 333g/acre ReTain resulted in near identical drop control.
- ReTain + NAA resulted in increased drop control in only one year.
- There were a few negative fruit effects when NAA was included with ReTain.

NAA Fruit Effects

- 10 ppm NAA did not affect most fruit quality parameters as long as at least $\frac{1}{2}$ rate of ReTain was used.
- Late in the season and also in storage a small percent of fruit (1-3%) cracked even when used with ReTain
- If too much NAA is used then fruit was induced to ripen early.
- The addition of NAA has questionable benefit for improving drop control.

RETAIN RATES



ReTain Summary

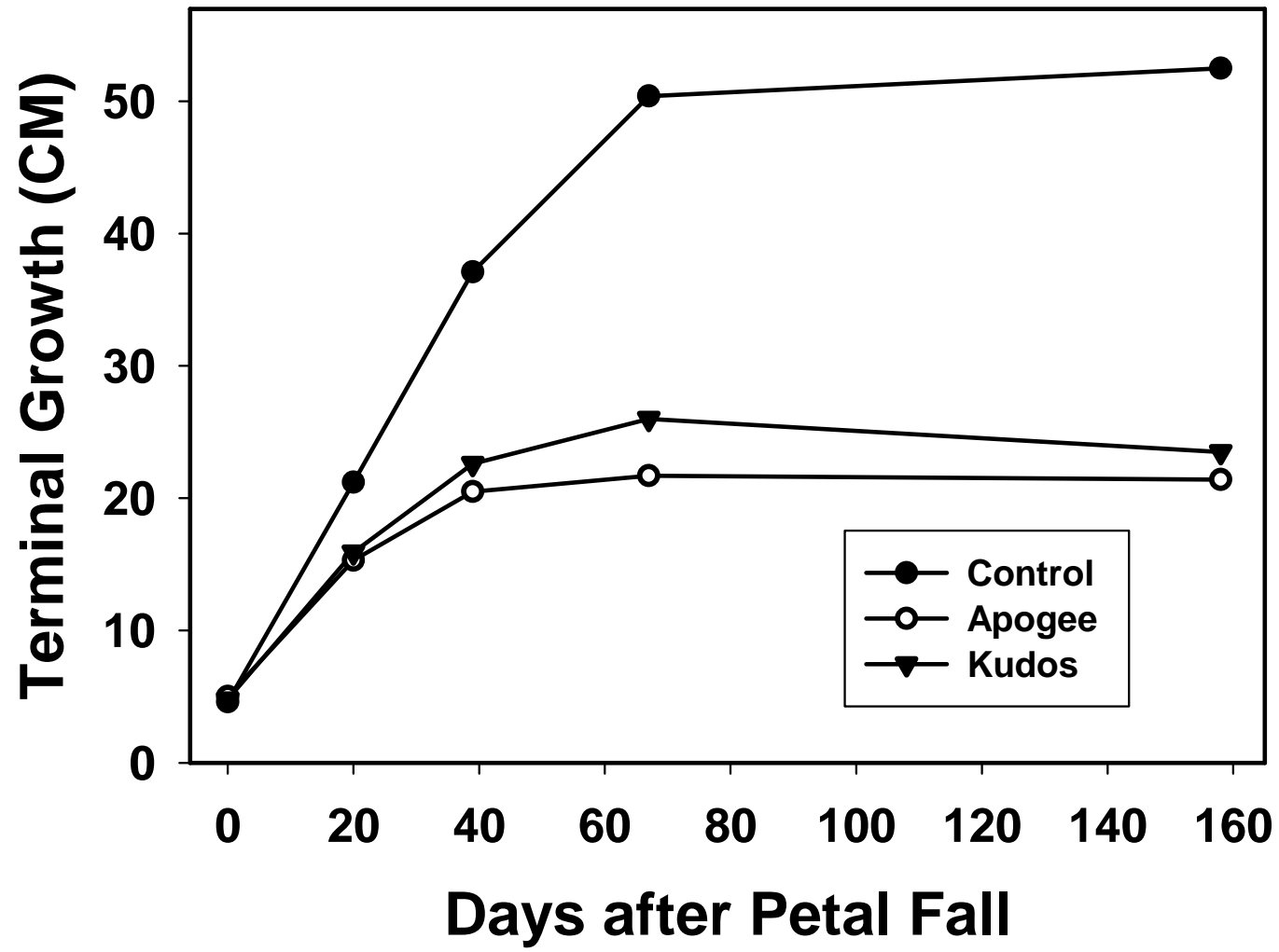
- The more ReTain you apply the better and longer the drop control.
- Two full rates of ReTain have controlled drop into early October.
- The earlier you apply ReTain the more delay in ripening you will see.
- The later you apply ReTain the longer into the season drop will be controlled.
- It require 10-14 days for ReTain to slow drop.
- Multiple applications are best.

Kudos- Prohexadione-Ca Formulation

- Fine Agrochemicals has introduced a new formulation of Prohexadione-Ca that is supposed to be the same as Apogee.
- This formulation was evaluated with Apogee last year to determine if the two products perform similarly.

Prohexadione-Ca Evaluation

- Mature Cortland/M.7 trees were selected for this experiment.
- Three treatments
- 3 oz/100 gal applied TRV dilute
- Times of application: 5-17, 6-6, 6-25 and 7-23

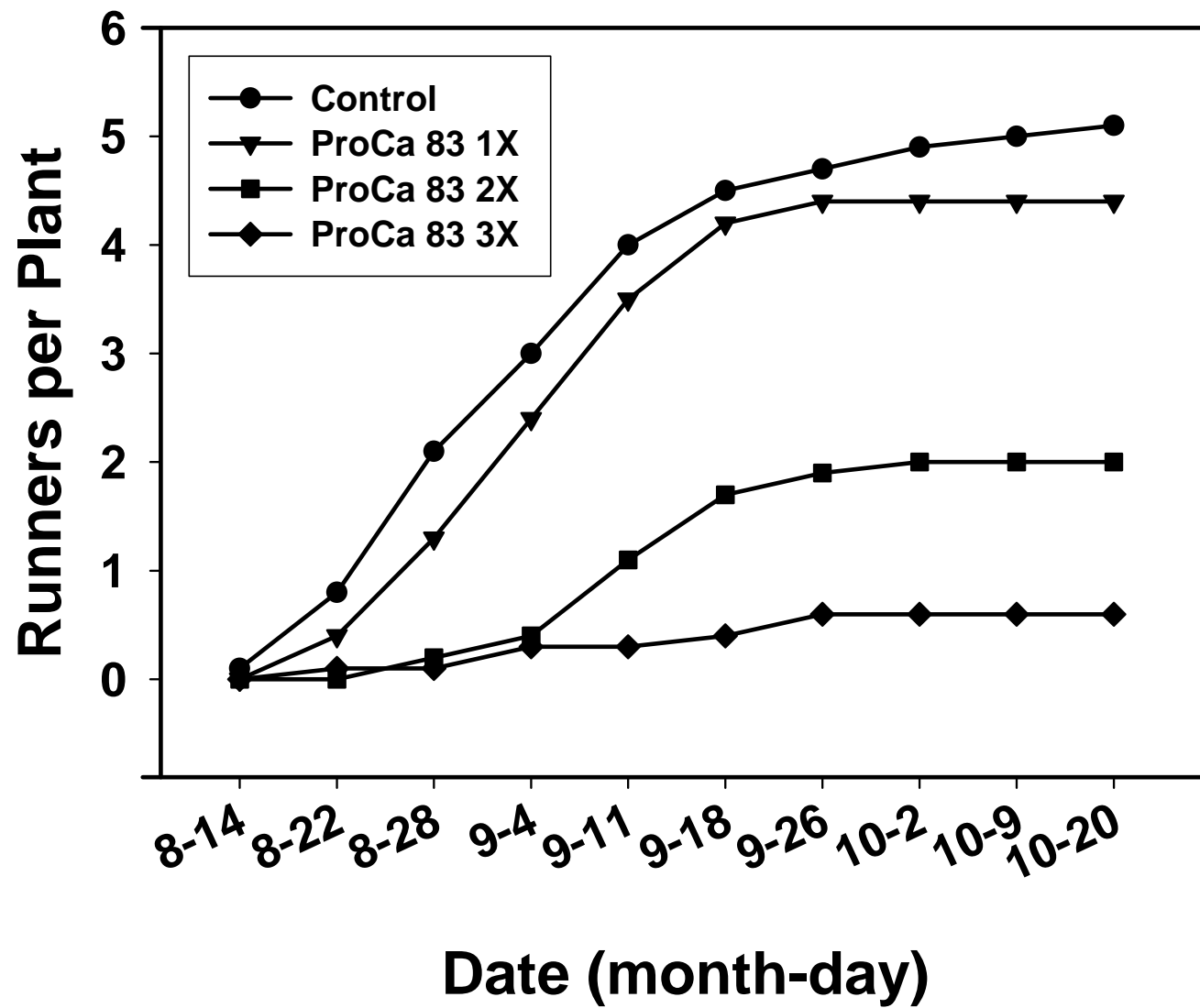


Influence of Kudos on Terminal Growth and Fruit Set of Fuji

- There is no information in the literature related to how long Pro-Ca remains active in tree before additional sprays are required.
- It is known that Pro-Ca can increase fruit set but no rate studies have been done on apple to quantify this.
- This project was done in an attempt to obtain more information on these.

Effect of Pro-Ca on Strawberry

- Pro-Ca can inhibit runner formation
- This is critical for the Hill System to be useful
- Strawberries were planted on July and Pro-Ca applied at 83 ppm on July 18
- One or 2 repeat applications were made at 3 week intervals depending on treatment.

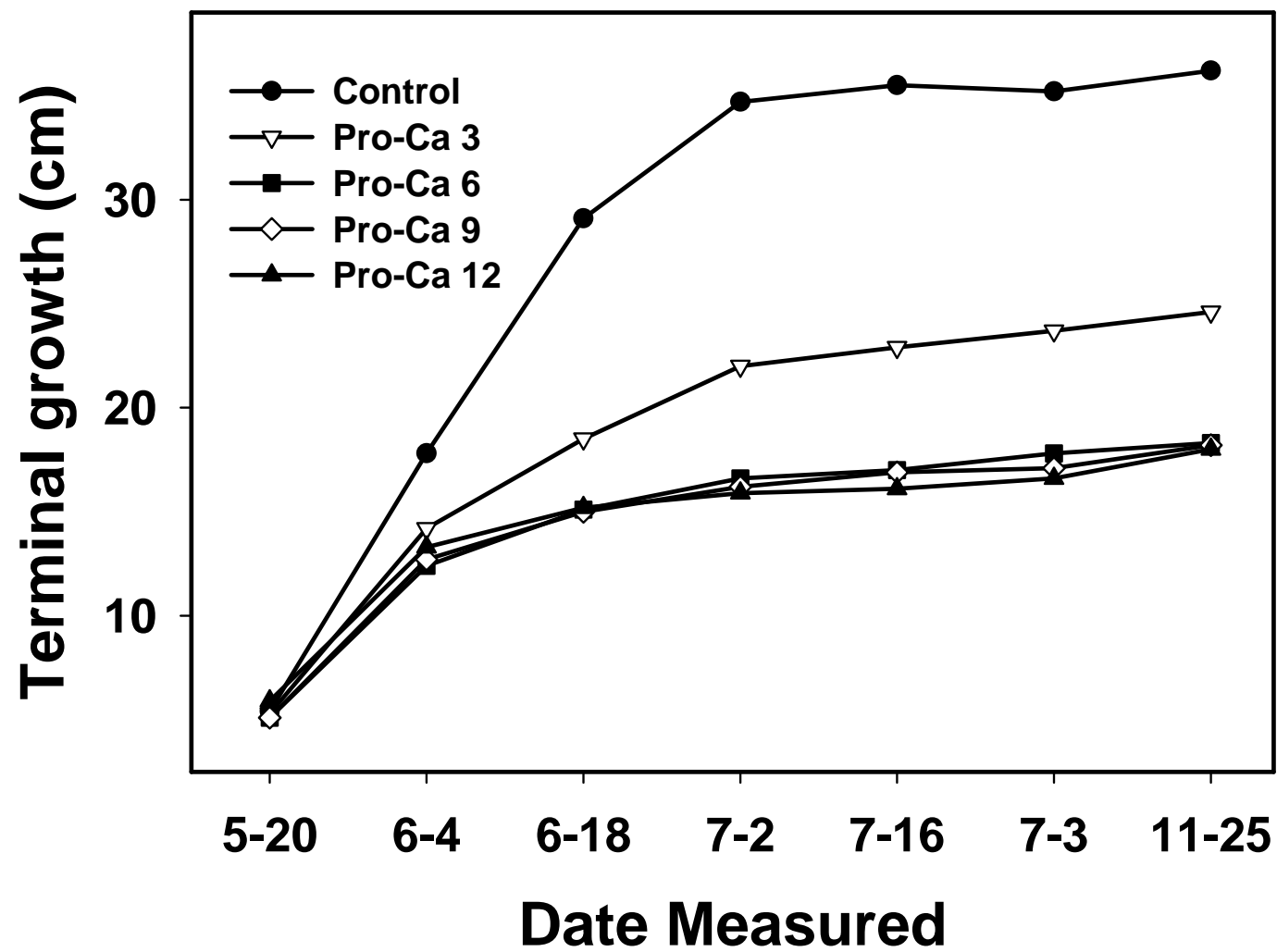


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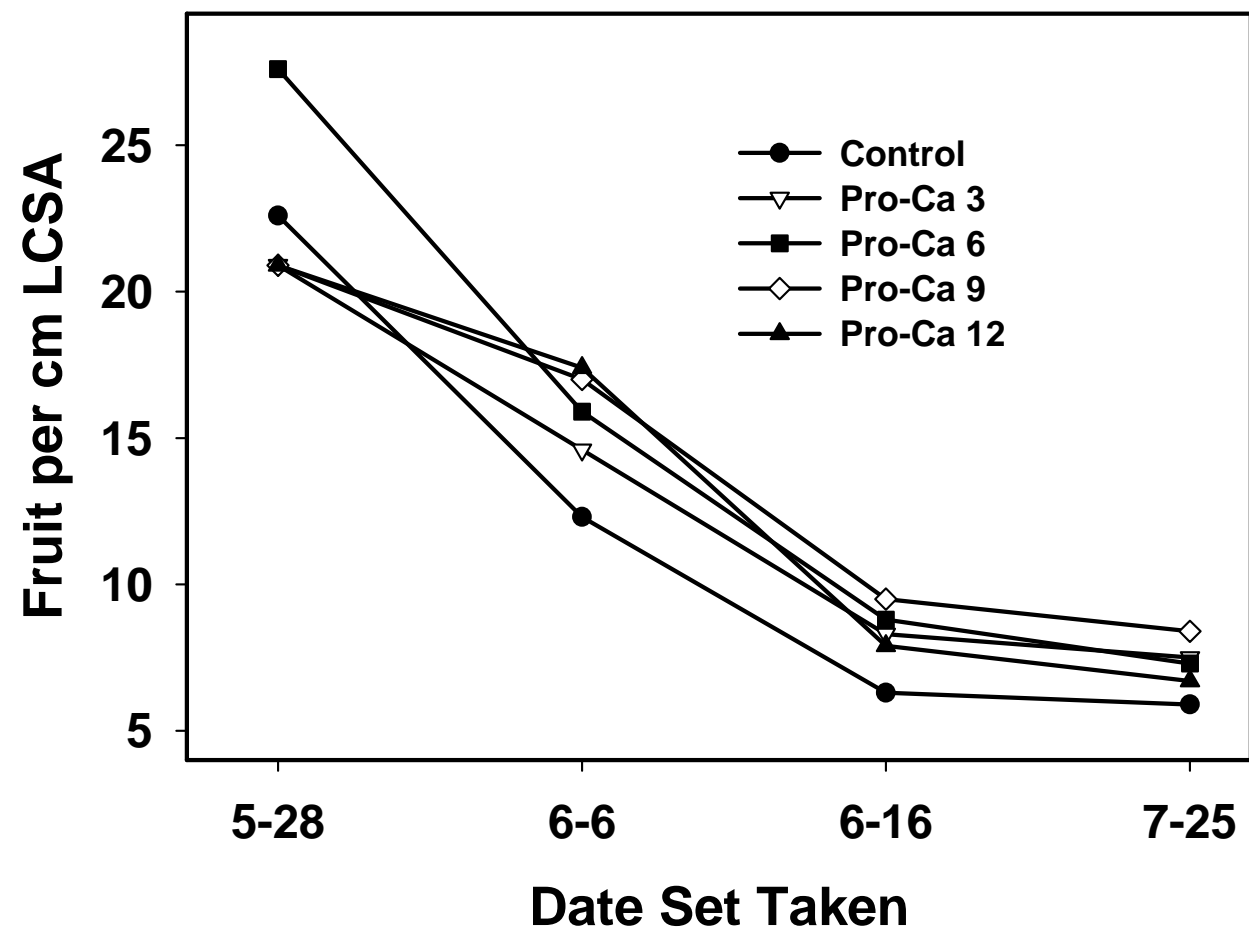
Concentration of Kudos on Fruit Set and Growth of Fuji Apples

- Mature Fuji/M. used
- Treatments applied at TRV dilute
- Rates: 3 oz, 6 oz, 9 oz and 12 oz /100 gal only once at petal fall on May 20



Effect of Kudos on Terminal Growth

- It required more than a week to measure growth reduction from treatments.
- Clearly the 3 oz rate stood out as being less effective than the other treatments.
- There was no evidence of regrowth which was unexpected.



Effect of Kudos on Fruit Set

- Fruit set was initially increased by all rates of Kudos.
- There was a marginal increase in set on treated trees.
- At the end of June drop set, there was no statistical difference among treatments although set differences appeared to be commercially significant.
- This warrants further evaluation.





Comparing NAA Formulations

- There are formulations of NAA that are or may be soon available for use in the orchard.
- Are they comparable products?
- Thinning trials were conducted in two years to compared efficacy.
- All three products were evaluated in 2014

NAA Formulations Trial

- Mature Macoun/M.9 trees were used.
- Treatments were applied with an airblast sprayer at a TRV dilute rate of 125 gal/acre.
- Carbaryl at 1 qt/100 gal applied to all trees except the Control at petal fall.
- All NAA treatments were applied on 28 May when fruit size averaged 9.9 mm.

Comparison of thinning efficacy of NAA formulations on Macoun/M.9.

Treatment (ppm)	Fruit/cm LCSA	Fruit set (%)
Control	12.0 a	69 a
Carbaryl 1qt/100 gal	13.4 a	77 a
FAL 840 5	9.2 bc	54 b
FAL 840 10	8.3 c	51 b
PoMaxa 5	11.5 ab	65 ab
PoMaxa 10	8.8 bc	52 b
Fruitone L 5	11.1 ab	66 ab
Fruitone L 10	8.2 c	51 b
Significance- Formulation	NS	NS

Improving Cortland

- Historically Cortland has been an important apple in New England.
- In the 1970s and 1980s harvest was often delayed until McIntosh were harvested.
- Too frequently apples were over mature at harvest, thus storage and taste were compromised.
- There are tools available to transform this apple into a very desirable variety.

Apogee Use on Cortland

- Cortland is a tip bearing apple resulting in drooping branches that results in shading.
- Apogee application can cause it look like a spur-type tree, especially if used for several years in a row.
- Apply 4-6 oz/100 gal as early as possible.
- Follow this with a second application 2.5 to 3 weeks later.
- A 3rd application may be appropriate.

ReTain Use on Cortland

- Cortland responds very well to ReTain.
- Apply when you make your application on McIntosh.
- Two applications of 333g/acre have worked well but you may wish to use a lesser amount
- Ripening is retarded, firmness is increased and red color will improve since these can be harvested later.
- I strongly suggest that you try this on a few trees.

Summary

- A number of suggestions have been made for effective use of Plant Growth Regulators in your orchard.
- These are expensive products but I feel strongly that their use will be beneficial and profitable.

Washington Grower Quote

“Don’t tell me how much is costs.
Just tell me how much money I am
going to make.”

He is a wealthy man!