



Late Season Rescue Thinning
With Ethephon
Win Cowgill
Wes Autio

IFTA Saturday Workshop
February 23, 2013
Strategies for Improving Production
Practices

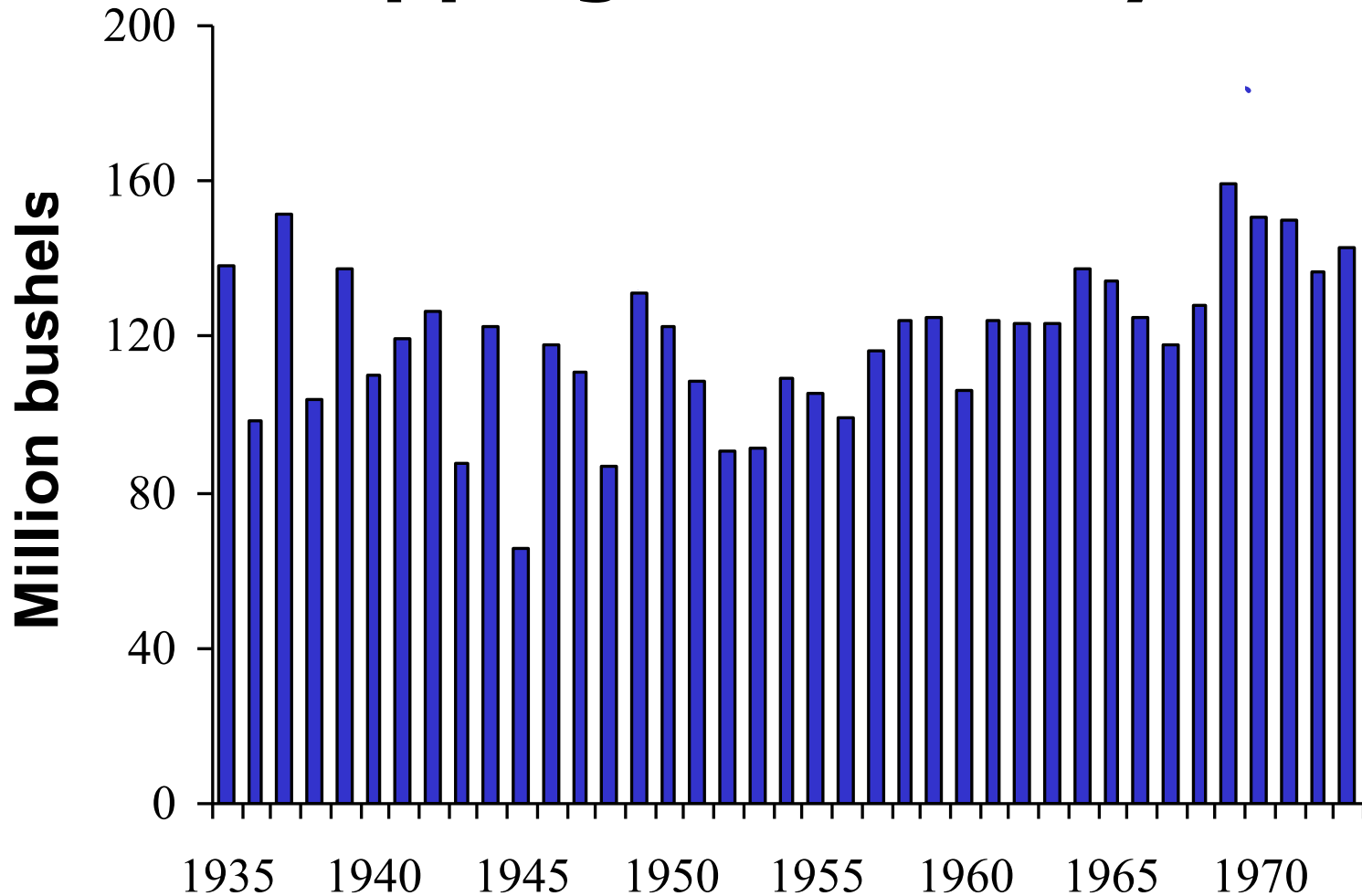
***Dr. Wes Autio, Professor and Director of the
Stockbridge School, UMASS-Amherst***

***Win Cowgill, Professor and Area Fruit Agent,
Rutgers Cooperative Extension, New Jersey
Agricultural Experiment Station***

Cooperators

- ***Rebecca Magron***, *Research Associate-RCE of Hunterdon County-NJAES*
- ***Megan Muelbauer***, *Student Intern- SEBS-Rutgers University*
- ***Suzanne Sollner-Figler***, *Research Assistant, Rutgers Snyder Farm-NJAES*
- ***Geoff Sliffer***, *Technician-Rutgers Snyder Farm-NJAES*
- ***Ed Dager***, *Supervisor-Rutgers Snyder Farm-NJAES*
- ***Jim Krupa***, *Technician- Cold Springs Orchard-UMASS*

Chemical thinners improve cropping consistency



US Apple Production (1935-73)

Thinning approaches?

- Blossom thinning
- Bloom/petal-fall thinning
- 8-15mm chemical thinning
- 20-25mm Rescue thinning
- Hand thinning

Rescue Thinning

- **The following talk is based on research by Dr. Ross Byer, VT**
- **Observations in NJ and the Mid- Atlantic Region**
- **Research in MA and NJ**

Rescue Thinning

- Used When other thinning treatments have not adequately thinned or could not be applied
- Remember it takes 7-9 days to see the results of your last thinning treatment
- This treatment is variable and variety dependant



Prepared by the University of Massachusetts Fruit Program

 cooperating with
RUTGERS
 New Jersey Agricultural
 Experiment Station

Late-season "Rescue" Thinning with Ethephon

Wesley R. Autio

Department of Plant, Soil, & Insect Sciences, University of Massachusetts

Winfred P. Cowgill, Jr.

Department of Agricultural and Resource Management Agents, Rutgers University

We all experience occasional failures during the normal apple thinning period from petal fall through the 12mm stage. Once fruit are larger than 12 mm, there are very few options for fruitlet removal. The most commonly utilized technique in New England is hand thinning. Hand thinning is usually performed in early July.

Because of this timing, it has very little effect on return bloom the following year, since most flower-bud formation occurs in June. So, it may be possible to gain some fruit size with hand thinning, but if the set is heavy before hand thinning, bloom may be light the next year and trees may even become biennial.

Another thinning option is to use a late-season (early to mid June) ethephon treatment. Ethephon works by breaking down to form ethylene in the plant tissues. It can be very effective as a "rescue" treatment, but we have had very little experience with ethephon thinning in New England. Below are some general guidelines based on five years of research in Massachusetts

and research and observations in the mid-Atlantic area. It is important to understand that Ethephon can be tricky. If conditions or concentration are wrong, then complete crop removal can occur, so be careful!

Recommendations for "Rescue" Thinning with Ethephon

Treat when temperatures are 70-80°F (day of treatment + 2 days).
 Do not treat when below 70°F or above 80°F (day of treatment + 2 days).
Determine the dilute gallonage requirement on a per-block basis relative to tree-row volume.

Fruit 15-25 mm diameter (0.8-1 inch)

Varietal recommendations based on Massachusetts research and observations (per 100 gallons dilute spray, with 0.5 lbs carbaryl a.i. and a surfactant):

McIntosh and Macoun 200-300 ppm (0.7 - 1 pint)

Varietal recommendations based on Mid-Atlantic research and observations (per 100 gallons dilute spray, with 0.5 lbs carbaryl a.i. and a surfactant):

Spur-type Delicious	300-375 ppm (1-1.25 pint)
Fuji	300-375 ppm (1-1.25 pint)
Golden Delicious	120 ppm (0.4 pints)
Rome Beauty	120 ppm (0.4 pints)
Gala	225 ppm (0.75 pints)
Cameo	225 ppm (0.75 pints)
Enterprise	150 ppm (0.5 pints)
Goldrush	225 ppm (0.75 pints)
Jonagold	150-225 ppm (0.5-0.75 pints)
August varieties	120 ppm (0.4 pints)

Cautions: Ethephon can defruit trees, particularly with high temperatures. Response may be less than ideal, particularly with low temperatures.

Benefits: Reduced or eliminated hand thinning
 Enhanced fruit size
 Increased return bloom – 30-50%

2008 Thinning Trial UMASS

Table 1. Effects of carbaryl and ethephon applied alone or in combination on June 10 (fruit at 21.8 mm diameter) on fruit set, fruit size, and fruit maturity in 2008.^z

Carbaryl (lbs.a.i./ 100 gallons)	Ethephon (ppm)	Initial set (no./ cm ² LCSA)	Final set (no./ cm ² LCSA)	Final set (%)	Fruit weight (g)	Internal ethylene conc. (ppm)	Climac- teric fruit (%) ^y	Flesh firmness (lbs.)	Soluble solids conc. (%)	Starch index value ^x
0	0	23.0	10.9	48	154	0.10	11	15.1	11.7	6.0
0	300	22.9	9.4	42	152	0.13	11	15.2	11.7	6.1
1	0	22.9	9.3	42	162	0.12	13	14.8	11.6	5.9
1	300	22.7	8.2	37	157	0.11	7	15.0	11.8	6.0
Carbaryl effect		ns	*	**	*	ns	ns	ns	ns	ns
Ethephon effect		ns	*	*	ns	ns	ns	ns	ns	ns
Interaction		ns	ns	ns	ns	ns	ns	ns	ns	ns

^z Carbaryl was applied as Sevin® 80S at 1.25 pounds of formulated product per 100 gallons (1 lb. a.i./100 gallons), and ethephon was applied as Ethephon 2 at 1 pint of formulated product per 100 gallons (300 ppm). All treatments included 0.1% Regulaid® as a surfactant.

^y Percent climacteric fruit refers to the proportion of the sample where the internal ethylene concentration was greater than 1 ppm, indicating that the fruit had begun to ripen.

^x Starch index values were determined with the Cornell Starch Chart: 1=complete staining, 8=no staining.

** , *, ns: Significantly different at odds of 99 to 1, 19 to 1, or nonsignificant, respectively.

NJ Treatments 2009

- Untreated control
- Ethephon @225 ppm (0.75 pints/100 gallons) + regulaid
- Sevin XLR @ 0.5lb ai or 1 pint/100 gallon + regulaid
- Ethephon @225 ppm (0.75 pints/100 gallons) + Sevin XLR @ 0.5lb ai or 1 pint/100 gallon + regulaid

Cultivar Enterprise

- - 32 trees- Blocked by fruit set,
- Selected 3 limbs per tree in center quad high to low
- measure as close to treatment date as possible final fruit set after June drop fruit yield by limb at harvest
- Apply treatments to center quad of tree with handgun
- measure fruit size and quality and harvest 30 total fruit per tree from center quadrant

Untreated Control



Ethephon + Regulaid



Ethephon + Sevin + Regulaid



2009 Ethephon Thinning Trial NJ

Ethephon	Carbaryl	Initial set	Final set	Yield (kg)	Average
		(no./cm ² LCA)	(no./cm ² LCA)		fruit weight (g)
0	0	9.5	2.7	76	275
0	1	9.8	2.9	67	279
1	0	10.1	1.8	43	276
1	1	10.2	1.8	42	286
Significance (Pr>F):					
Ethephon		0.136	0.116	<0.001	0.647
Carbaryl		0.709	0.639	0.338	0.575
Ethephon x Carbaryl		0.698	0.778	0.384	0.780

Other 2009 Observations

Fuji and Suncrisp

Ethephon @375 ppm (1.25 pints/100 gallons)
+ Sevin XLR @ 0.5lb ai or 1 pint/100 gallon
+ regulade



Prepared by the University of Massachusetts Fruit Program

Late-season "Rescue" Thinning with Ethephon

Wesley R. Autio

Department of Plant, Soil, & Insect Sciences, University of Massachusetts

Winfred P. Cowgill, Jr.

Department of Agricultural and Resource Management Agents, Rutgers University

We all experience occasional failures during the normal apple thinning period from petal fall through the 12mm stage. Once fruit are larger than 12 mm, there are very few options for fruitlet removal. The most commonly utilized technique in New England is hand thinning. Hand thinning is usually performed in early July. Because of this timing, it has very little effect on return bloom the following year, since most flower-bud formation occurs in June. So, it may be possible to gain some fruit size with hand thinning, but if the set is heavy before hand thinning, bloom may be light the next year and trees may even become biennial.

Another thinning option is to use a late-season (early to mid June) ethephon treatment. Ethephon works by breaking down to form ethylene in the plant tissues. It can be very effective as a "rescue" treatment, but we have had very little experience with ethephon thinning in New England. Below are some general guidelines based on five years of research in Massachusetts

and research and observations in the mid-Atlantic area. It is important to understand that Ethephon can be tricky. If conditions or concentration are wrong, then complete crop removal can occur, so be careful!

Recommendations for "Rescue" Thinning with Ethephon

Treat when temperatures are 70-80°F (day of treatment + 2 days).

Do not treat when below 70°F or above 80°F (day of treatment + 2 days).

Determine the dilute gallonage requirement on a per-block basis relative to tree-row volume.

Fruit 15-25 mm diameter (0.8-1 inch)

Varietal recommendations based on Massachusetts research and observations (per 100 gallons dilute spray, with 0.5 lbs carbaryl a.i. and a surfactant):

McIntosh and Macoun	200-300 ppm (0.7 - 1 pint)
---------------------	----------------------------

Varietal recommendations based on Mid-Atlantic research and observations (per 100 gallons dilute spray, with 0.5 lbs carbaryl a.i. and a surfactant):

Spur-type Delicious	300-375 ppm (1-1.25 pint)
Fuji	300-375 ppm (1-1.25 pint)
Golden Delicious	120 ppm (0.4 pints)
Rome Beauty	120 ppm (0.4 pints)
Gala	225 ppm (0.75 pints)
Cameo	225 ppm (0.75 pints)
Enterprise	150 ppm (0.5 pints)
Goldrush	225 ppm (0.75 pints)
Jonagold	150-225 ppm (0.5-0.75 pints)
August varieties	120 ppm (0.4 pints)

Cautions: Ethephon can defruit trees, particularly with high temperatures. Response may be less than ideal, particularly with low temperatures.

Benefits: Reduced or eliminated hand thinning
Enhanced fruit size
Increased return bloom – 30-50%

Varietal recommendations:

Spur-type Delicious	300-375 ppm	1-1.25 pts
---------------------	-------------	------------

Fuji

McIntosh	300 ppm	1 pt
----------	---------	------

Gala	225 ppm	0.75 pt
------	---------	---------

Cameo

Goldrush- Macoun

Jonagold	150-225 ppm	0.5-0.75 pt
----------	-------------	-------------

Enterprise	150 ppm	0.5 pt
------------	---------	--------

Golden Delicious	120 ppm	0.4 pt
------------------	---------	--------

Rome Beauty

August varieties

Recommendations

- Treat when temperatures are 70-80F (day of treatment + 2 days).
- Do not treat when below 70F or above 80F (day of treatment + 3 days).
- Determine the dilute gallonage requirement on a per-block basis relative to tree-row volume.

Ethephon Recommendations

- Tank mix
 - Ethephon at recommended rate/Cultivar
 - Sevin XLR (1 pt/100 gal)- Nova Source/TKI
 - Surfactant (0.125% Regulaid)
- 20-25 mm diameter (0.8-1 inch)
- Day of treatment and next day – 70-80°F
- Response may be more or less than desired
- Return bloom enhanced ~ 30-50%

Cautions

- *Ethephon can over thin trees, particularly with high temperatures 80 +*
- Response may be less than ideal, particularly with low temperatures.

