



## Northern NY Agricultural Development Program 2024 Project Report

### Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions: Year 2

#### Project Leader

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#### Collaborators

- Dr. Terence Robinson, Cornell University, Geneva, NY
- Chazy Orchards, Chazy, NY: Year 1 and 2
- Forrence Orchards, Peru, NY: Year 1 and 2
- Gunnison Lakeshore Orchards, Crown Point, NY: Year 1 and 2

#### Background

Apple crop load management is the single most important management practice affecting an orchard’s crop value. Growers must balance between reducing crop load (yield) sufficiently to achieve optimum fruit size and return bloom in the following year. For each variety, there is an optimum number of fruit per tree where yield, fruit size, and fruit quality are balanced to bring the greatest economic return to the grower.

In Northern New York (NNY), most crop load management is performed by thinning trees when fruit are between 10-12mm in size following the petal fall period. Thinning at this timing relies primarily on the use of hormone-based plant growth regulator materials, such as NAA and 6-BA, and carbaryl, an insecticide that also acts as a mild fruit thinner. Once fruit grow larger than 15mm, their response to these chemical thinners becomes greatly reduced. Thinning at the 12mm timing is particularly challenging in Northern New York, as hormone thinners’ level of activity is heavily driven by the temperature. Thinners tend to work poorly under cool, sunny conditions, which are common conditions in northern New York.

Where orchards require more thinning after the 12mm application, there have generally been only two options available. The first was to apply 6-BA and carbaryl along with oil. The oil helps the plants take up more of the thinning materials. Many northern New York growers do not like to use this approach as oil applications interfere with the fungicide materials that they are also using at the same time of year. The other option has been Ethephon, which is an ethylene based thinning material. Few Northern New York growers use this product for thinning, because it is also extremely temperature sensitive. If the weather is too warm at the time of application, growers are at great risk of removing all the fruit from their trees.

Once fruit grow larger than 24mm, fruit become unresponsive to chemical thinners. Where additional thinning is still necessary, growers will send crews through to hand thin the crop. However, hand thinning fruit takes a great deal of hand labor time, and high labor costs in NY make it prohibitively expensive for some growers to send crews through to do much hand thinning.

Recently, Valent Biosciences released a new thinning material called Accede. Accede's active ingredient is 1-Aminocyclopropane 1-Carboxylic Acid (ACC), which is the direct precursor of the plant hormone ethylene. It has a similar mode of action as Ethephon, but its efficacy is reported to be less sensitive to temperature swings, which should make it a more reliable material to use during the 15-20mm "rescue thinning" window.

Having a feasible rescue thinning material would be particularly valuable in Northern New York apple production, as growers across the region had poor thinning results with some hormone-based thinners in 2018, 2019, 2020, and 2022. This caused small fruit size in some varieties like Gala, and led to poor return bloom in 2019 and 2021 on their Honeycrisp trees, one of Northern New York's most valuable apple varieties.

Our first year of trials in 2023 suggested Accede applied at 20mm was a very mild thinner on Honeycrisp, and a moderate thinner of Gala and Macoun. However, one year of data is not enough to understand how a thinner will work under varying climate conditions, and was further complicated by a late spring freeze event in May that likely killed some flower buds, stressed the trees, and complicated our thinning efforts. This necessitated continuing trials into 2024.

Accede has been field-tested in other regions but only on a small trial basis, and until this NNYADP-funded trial initiated in 2023 had not yet been evaluated in Northern New York. As previously mentioned, Northern New York often has cooler temperatures during the thinning windows relative to other regions of New York, making it therefore critical to evaluate this material in NNY orchards, even on a small-scale basis, before we recommend its use to growers at a commercial scale.

Having an effective late season "rescue" thinning material will bolster the opportunity for profitability for Northern NY apple growers by allowing fruit growers to achieve optimum crop loads to maximize their fruit yield and quality, while reducing the amount of labor needed to hand thin the crop.

## **Methods**

We established four replicated field trials in commercial orchards in Northern New York: (1) a Gala trial at Chazy Orchards, (2) a Honeycrisp trial at Forrence Orchards, (3) a NY-1 trial (also known as SnapDragon) at Forrence Orchards, and (4) a NY-1 trial at Chazy Orchards. We also ran an unreplicated Gala demonstration at Gunnison's Lakeshore Orchard. These three varieties are widely planted across Northern New York and are difficult to thin. Honeycrisp is the most economically valuable variety grown in Northern New York. This project also assessed the efficacy of Year 1 treatments for return bloom in spring 2024 (see Results).

### **Chazy Orchards: Gala Variety Trial**

Our Gala experiment consisted of a block of Buckeye Gala on M.9-337, initially planted in 2013 at 3x14-foot spacing. Working with the grower, we determined the target crop load for the block was 125 fruit per tree.

We selected 10 trees in April 2024 (five replications of two trees) within the orchard to receive one of four thinning treatments beginning at bloom (Table 1).

Treatment	Bloom Whole Tree	Petal fall Whole tree	10-12mm 75% top of tree	20mm 80% to upper 2/3 of tree
1	10ppm NAA	100ppm 6-BA + 1 pt Carbaryl /100	100ppm 6-BA + 1 pt Carbaryl /100	
2	10ppm NAA	100ppm 6-BA + 1 pt Carbaryl /100		400ppm Accede + 1 pt Regulaid /100
3	10ppm NAA		100ppm 6-BA + 1 pt Carbaryl /100	400ppm Accede + 1 pt Regulaid /100
4	10ppm NAA	100ppm 6-BA + 1 pt Carbaryl /100	100ppm 6-BA + 1 pt Carbaryl /100	400ppm Accede + 1 pt Regulaid /100

**Table 1. Thinning treatments, Gala trial, Chazy Orchards, Chazy NY; NNYADP Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

On May 18, 2024, all treatments received a full bloom application of PoMaxa® (an NAA plant growth product) at the rate of 4 fl oz. per 100 gallons dilute tree row volume (TRV).

On May 26, Treatments 1, 2, and 4 received a petal fall application of MaxCel® (a 6-BA plant growth hormone product) at the rate of 64 fl oz per 100 gallons dilute TRV and 1 pt of Sevin per 100 gallons.

On June 3, Treatments 1, 3, and 4 received a 12mm application of MaxCel at the rate of 64 fl oz per 100 gallons dilute TRV and 1 pt of Carbaryl (a carbamate insecticide that also promotes thinning) per 100 gallons.

On June 5, Treatments 2, 3, and 4 received a 20mm application of Accede® at the rate of 13.4 oz Accede and 16 fl oz Regulaid® (a surfactant) per 100 gallons.

The bloom, petal fall, and 12mm thinner applications were applied with the grower’s over-the-row sprayer calibrated to deliver 50 GPA. We estimated TRV at 106 gallons per acre (GPA), using a concentration factor of 2.1. We concentrated thinners for the bloom, petal fall, and 12mm applications. The 20mm application was applied with the grower’s airblast sprayer, calibrated to apply at 100GPA. This application was not concentrated.

Fruit were harvested according to red color development on September 19 and October 1, 2024. As fruit were harvested, we recorded the total fruit count and fruit weight per tree. From these measurements, average fruit size per tree was also tabulated. A subsample of 40 fruit per treatment was shipped to Dr. Terence Robinson at Cornell AgriTech in Geneva, New York, and was sorted over a color and size grader. These data were used to tabulate % red color, % russet, and total crop value per acre of each treatment.

Return bloom data will be assessed in May of 2025.

### **Forrence Orchards: Honeycrisp Trial**

Our Honeycrisp experiment consisted of a block of Honeycrisp on M.9 EMLA rootstock, initially planted in 2012 at 3x14-foot spacing. Working with the grower, we determined the target crop load for the block was 120 fruit per tree.

We selected 10 trees in April 2024 (five replications of two trees) within the orchard to receive one of four thinning treatments beginning at bloom (Table 2).

Treatment	Bloom Whole tree	Petal fall Whole tree	10-12mm 75% top of tree	20mm 80% to upper 2/3 of tree
1	2 x 2.5% ATS			
2	2 x 2.5% ATS	35ppm NAD		
3	2 x 2.5% ATS		7.5ppm NAA + 1 pt Carbaryl / 100	
4	2 x 2.5% ATS			400ppm Accede + 1 pt Regulaid/100

**Table 2. Thinning treatments, Honeycrisp trial, Forrence Orchards, Peru NY; NNYADP Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

On May 16, 2024, all treatments received a bloom application of ammonium thiosulfate (ATS, a common nitrogen and sulfur fertilizer) at the rate of 2.5 gallons per 100 gallons of water. A second application was applied on May 18.

On May 22, treatment 2 received a petal fall application of Amid-Thin® (a plant growth regulator) at the rate of 9 oz per 100 gallons.

On May 28, treatment 3 received a 12mm application of PoMaxa at the rate of 5 oz per 100 gallons and carbaryl at the rate of 1 pt per 100 gallons.

On June 3, treatment 4 received a 20mm application of Accede at the rate of 13.4 oz Accede and 16 fl oz Regulaid per 100 gallons. This application was applied at 100 gallons per acre of water to the acre.

All thinner applications were applied with the grower’s airblast sprayer, calibrated to deliver 83 GPA. We estimated TRV at 135 GPA, using a concentration factor of 1.6.

Fruit were harvested according to red color development over the following dates: September 12, September 20, September 27, and October 9. As fruit were harvested, we recorded the total fruit count and fruit weight per tree. From these measurements, average fruit size per tree was also tabulated. A subsample of 40 fruit per treatment was shipped to Dr. Terence Robinson at Cornell AgriTech in Geneva, New York, and were sorted over a color and size grader. Fruit were also rated for the percent of russeted fruit. These data were used to tabulate % red color, % russet, and total crop value per acre of each treatment.

Return bloom data will be assessed in May of 2025.

### **Forrence Orchards: NY-1 Trial**

Our NY-1 experiment consisted of a block of NY-1 on G.935 rootstock, initially planted in 2022 at 4x12-foot spacing. Working with the grower, we determined the target crop load for the block was 60 fruit per tree.

We selected 10 trees in April 2024 (five replications of two trees) within the orchard to receive one of four thinning treatments beginning at bloom (Table 3).

Treatment	Bloom Whole tree	Petal fall Whole tree	10-12mm 75% top of tree	20mm 80% to upper 2/3
1	2 x 2.5% ATS			
2	2 x 2.5% ATS	25ppm NAD		
3	2 x 2.5% ATS		50ppm 6-BA + 1 pt Carbaryl / 100	
4	2 x 2.5% ATS			200ppm Accede + 1 pt Regulaid/100

**Table 3. Thinning treatments, NY-1 trial, Forrence Orchards, Peru NY; NNYADP Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

On May 16, 2024, all treatments received a bloom application of ATS at the rate of 2.5 gallons per 100 gallons of water. A second application was applied on May 18.

On May 26, treatment 2 received a petal fall application of Amid-Thin at the rate of 5 oz per 100 gallons.

On May 31, treatment 3 received a 12mm application of 6-BA at the rate of 38 oz MaxCel per 100 gallons, and carbaryl at the rate of 1 pt per 100 gallons.

On June 4, treatment 4 received a 20mm application of Accede at the rate of 6.7 oz Accede and 16 fl oz Regulaid per 100 gallons. This application was applied at 100 gallons per acre of water.

All thinner applications besides June 4 were applied with the grower’s airblast sprayer, calibrated to deliver 80 GPA. We estimated tree TRV at 105 GPA, using a concentration factor of 1.2.

Fruit were harvested on September 24. As fruit were harvested, we recorded the total fruit count and fruit weight per tree. From these measurements, average fruit size per tree was also tabulated. A subsample of 40 fruit per treatment was shipped to Dr. Terence Robinson at Cornell AgriTech in Geneva, New York, and were sorted over a color and size grader. Fruit were also rated for the percent of russeted fruit. These data were then used to tabulate % red color, % russet, and total crop value per acre of each treatment.

Return bloom data will be assessed in May of 2025.

### **Chazy Orchards: NY-1 Trial**

This trial consisted of a block of NY-1 on M.26 rootstock, initially planted in 2013 at 3x14-foot spacing. Working with the grower, we determined the target crop load for the block was 120 fruit per tree.

We selected 10 trees in April 2024 (five replications of two trees) within the orchard to receive one of two thinning treatments beginning at petal fall (Table 4).

Treatment	Petal Fall 75% top of tree	20mm 80% to upper 2/3 of tree
1	10ppm NAA + 1 pt Carbaryl /100	
2	10ppm NAA + 1 pt Carbaryl /100	200ppm Accede + 1 pt LI 700/100

**Table 4. Thinning treatments, NY-1 trial, Chazy Orchards, Chazy NY; NNYADP Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

On May 28, treatment 1 and 2 received a petal fall application of Refine™ (a plant growth regulator) at the rate of 9 oz per 100 gallons and 1 pt carbaryl per 100 gallons. This application was applied with the grower’s three row sprayer, calibrated to deliver 50 GPA. We estimated tree TRV at 105 GPA, using a concentration factor of 2.1.

On June 5, treatment 2 received a 20mm application of Accede at the rate of 13.4 oz Accede and 16 fl oz LI-700 per 100 gallons. This application was applied at 100 gallons per acre of water to the acre with the grower’s airblast sprayer. We did not concentrate this application.

Fruit were harvested on October 1. As fruit were harvested, we recorded the total fruit count and fruit weight per tree. From these measurements, average fruit size per tree was also tabulated. A subsample of 40 fruit per treatment was shipped to Dr. Terence Robinson at Cornell AgriTech in Geneva, New York, and were sorted over a color and size grader. Fruit were also rated for the percent of russeted fruit. These data were then used to tabulate % red color, % russet, and total crop value per acre of each treatment.

Return bloom data will be assessed in May of 2025.

#### **Gunnison Orchards: Gala Demonstration Trial**

In addition to our replicated trials, on May 3, 2024, a demonstration trial was set up on a mature block of Gala at Gunnison’s Orchard in Crown Point, New York. This block is planted on M.9 rootstock. This Gala block was topworked in 2018 and is planted at 6x12 foot spacing. Working with the grower, we determined the ideal crop load for the block was 120 fruit per tree. We selected 10 trees in April 2024 (one replication of five trees) within the orchard to receive one of two thinning treatments (Table 5).

On May 13 2024, treatments 1 and 2 received a bloom application of Refine at the rate of 8 oz per 100 gallons. This application was applied with the grower’s airblast sprayer, calibrated to deliver 75 GPA. We estimated tree TRV at 150 GPA, using a concentration factor of 2.

On May 23, treatments 1 and 2 received a 12mm application of MaxCel at the rate of 128 oz per 100 gallons and 1 pt Carbaryl per 100 gallons. This application was applied with the grower’s airblast sprayer, calibrated to deliver 75 GPA. We estimated tree TRV at 150 GPA, using a concentration factor of 2.

On June 6, treatment 2 received a 20mm application of Accede at the rate of 13.4 oz Accede and 16 fl oz LI-700 per 100 gallons. This application was applied at 75 gallons of water to the acre.

Treatment	Bloom Whole tree	Petal Fall 75% top of tree	20mm 80% to upper 2/3 of tree
1	10ppm NAA	100ppm 6-BA + 1 pt Carbaryl/100	
2	10ppm NAA	100ppm 6-BA + 1 pt Carbaryl/100	400ppm Accede + 1 pt LI-700/100

**Table 5. Thinning treatments, Gala trial, Gunnison Orchards, Crown Point NY; NNYADP Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

Fruit were harvested according to red color development on September 5 and September 17, 2024. As fruit were harvested, we recorded the total fruit count and fruit weight per tree. From these measurements, average fruit size per tree was also tabulated. A subsample of 40 fruit per treatment was shipped to Dr. Terence Robinson at Cornell AgriTech in Geneva, New York, and was sorted over a color and size grader. These data were used to tabulate % red color, % russet, and total crop value per acre of each treatment.

Return bloom data will be assessed in May of 2025.

### **Statistical Analysis**

Treatment differences in number of fruit per tree, yield per tree (kg), fruit size (kg), russetting, fruit color, and crop value were analyzed in SAS statistical software using the Generalized Linear Model (GLM) procedure. Where the model determined significant treatment differences, differences between individual treatments were assessed using Duncan’s Multiple Range Test in SAS statistical software.

Means are reported for the Gunnison’s Gala trial. Statistics are not reported, as this trial was not replicated.

### **Results**

#### **2023 Trial Return Bloom**

Thinning applications in apple orchards not only impact fruit production in the application year. They also influence the opportunity for optimal return bloom in the orchard the following year. In the spring of 2024, return bloom from the 2023 thinning trials with the Macoun variety of apple was assessed as follows.

We observed differences in return bloom by treatment in the spring of 2024 in our 2023 Macoun trial (p-value = 0.0471). Data is reported in Table 6. Both treatments receiving Accede at 20mm had greater return bloom than those that did not. We saw no return bloom differences in our 2023 Gala (p-value = 0.3880) or Honeycrisp trial (p-value = 0.6075).

<b>Macoun Thinning 2023 Return Bloom</b>		
<b>Treatment</b>	<b>Applications</b>	<b>% Return Bloom</b>
1	Bloom	74 B
2	Bloom, 20mm	92 A
3	Bloom, 12mm	75 B
4	Bloom, 12mm, 20mm	90 A
<b>P-Value</b>		<b>0.0471</b>

**Table 6. 2024 Macoun trial return bloom by treatment. Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

### **Chazy Orchards: Gala**

We observed significant differences in total fruit per tree at harvest between treatments ( $p=0.0193$ ). While our target crop load for this block was 120 fruit per tree:

- Treatment 1 averaged 238 fruit per tree,
- Treatment 2 averaged 184 fruit per tree,
- Treatment 3 averaged 161 fruit per tree, and
- Treatment 4 averaged 148 fruit per tree.

Yield per tree did not differ significantly between treatments ( $p=0.375$ ). Yield per tree averaged:

- 26.2 kg in Treatment 1,
- 24.7 kg in Treatment 2,
- 22.6 kg in Treatment 3, and
- 20.6 kg in Treatment 4.

Average fruit size differed significantly between treatments ( $p=0.0358$ ). Fruit size averaged:

- 0.11 kg in Treatment 1,
- 0.14 kg in Treatment 2,
- 0.15 kg in Treatment 3, and
- 0.14 kg in Treatment 4.

Fruit % red color did not significantly differ between treatments ( $p=0.4592$ ). Fruit percent color averaged:

- 87% in Treatment 1,
- 82% in Treatment 2,
- 87% in treatment 3, and
- 89% in Treatment 4.

We observed very little russeting in our samples, and there was no impact on crop value in any treatment.

Crop values did not significantly differ between bloom thinning treatments ( $p=0.1546$ ). Taking into account the yield, fruit quality, and russeting data, we estimated the value of the crop in:

- Treatment 1 as \$4,694 per acre,
- Treatment 2 as \$10,810 per acre,
- Treatment 3 as \$12,527 per acre, and
- Treatment 4 as \$12,094 per acre (*see Economics section*).



Chazy Gala Thinning 2024							
Treatment	Applications	Total Fruit	Yield (kg)	Fruit Size (kg)	% Red Color	% Fruit Russet	Crop Value Per Acre (\$)
1	Bloom, PF, 12mm	238 A	26.2	0.11 B	87	0	4694
2	Bloom, PF, 20mm	184 AB	24.7	0.14 A	82	0	10810
3	Bloom, 12mm, 20mm	161 B	22.6	0.15 A	87	0	12527
4	Bloom, PF, 12mm, 20mm	148 B	20.6	0.14 A	89	0	12094
P-Value		<b>0.0193</b>	0.3755	<b>0.0358</b>	0.4592	n/a	0.1546

**Table 7. Harvest data from the Chazy Orchards Gala trial. Differing letters show statistically significant differences between treatments at p value < 0.05; Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

### Forrence Orchards: Honeycrisp

We did not observe any significant differences in total fruit per tree at harvest ( $p=0.5916$ ). While our target crop load for this block was 120 fruit per tree:

- Treatment 1 averaged 209 fruit per tree,
- Treatment 2 averaged 219 fruit per tree,
- Treatment 3 averaged 232 fruit per tree, and
- Treatment 4 averaged 207 fruit per tree.

Yield per tree did not significantly differ in our trial ( $p=0.4458$ ). Yield per tree averaged:

- 32.8 kg in Treatment 1,
- 34.1 kg in Treatment 2,
- 36.3 kg in Treatment 3, and
- 31.6 kg in Treatment 4.

Average fruit size did not significantly differ in our trial ( $p=0.9597$ ). Fruit size per tree averaged:

- 0.16 kg in Treatment 1,
- 0.16 kg in Treatment 2,
- 0.16 kg in Treatment 3, and
- 0.15 kg in Treatment 4.

Fruit color did not differ between treatments ( $p=0.3340$ ). Fruit percent red color averaged:

- 53% in Treatment 1,
- 57% in Treatment 2,
- 54% in treatment 3, and
- 56% in Treatment 4.

We observed no differences in fruit russetting between treatments ( $p=0.4262$ ), and expect this had very little impact on final crop value.

Crop values did not significantly differ between bloom thinning treatments ( $p=0.4477$ ) Taking into account the yield, fruit quality, and russetting data, we estimated the value of the crop in:

- Treatment 1 as \$26,833 per acre,
- Treatment 2 as \$29,297 per acre,
- Treatment 3 as \$29,166 per acre, and
- Treatment 4 as \$25,555 per acre.

Forrence Honeycrisp Thinning 2024							
Treatment	Applications	# Fruit	Yield (kg)	Fruit Size (kg)	% Red Color	% Fruit Russet	Crop Value Per Acre (\$)
1	Bloom	209	32.8	0.16	53	0	26833
2	Bloom + PF	219	34.1	0.16	57	3	29297
3	Bloom + 12mm	232	36.3	0.16	54	0	29166
4	Bloom + 20mm	207	31.6	0.15	56	0	25555
<b>P-Value</b>		0.5903	0.4670	0.8523	0.3340	0.4262	0.8600

**Table 8. Harvest and crop value data from the Forrence Orchards Honeycrisp trial. Differing letters show statistically significant differences between treatments at p value < 0.05; Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

### Forrence Orchards: NY-1

We observed no significant differences in total fruit per tree at harvest ( $p=0.3294$ ). While our target crop load for this block was 60 fruit per tree:

- Treatment 1 averaged 118 fruit per tree,
- Treatment 2 averaged 110 fruit per tree,
- Treatment 3 averaged 98 fruit per tree, and
- Treatment 4 averaged 84 fruit per tree.

Yield per tree was not significantly different in our trial ( $p=0.1754$ ). Yield per tree averaged:

- 16.9 kg in Treatment 1,
- 16.1 kg in Treatment 2,
- 16.6 kg in Treatment 3, and
- 13.1 kg in Treatment 4.

Average fruit size did not significantly differ in our trial ( $p=0.1604$ ). Fruit size per tree averaged:

- 0.16 kg in Treatment 1,
- 0.15 kg in Treatment 2,
- 0.17 kg in Treatment 3, and
- 0.16 kg in Treatment 4.

Fruit color did not differ significantly between treatments ( $p=0.3567$ ). Fruit percent red color averaged:

- 81% in Treatment 1,
- 87% in Treatment 2,
- 83% in treatment 3, and
- 84% in Treatment 4.

Fruit russetting was minimal in this trial, and did not differ between treatments ( $p=0.4262$ ) with little impact on overall fruit value.

Crop values did not significantly differ between bloom thinning treatments ( $p=0.0667$ ). Taking into account the yield, fruit quality, and russetting data, we estimated the value of the crop in:

- Treatment 1 as \$8,983 per acre,
- Treatment 2 as \$9,214 per acre,
- Treatment 3 as \$13,200 per acre, and
- Treatment 4 as \$7,801 per acre.

Forrence NY-1 Thinning 2024							
Treatment	Applications	# Fruit	Yield (kg)	Fruit Size (kg)	% Red Color	% Fruit Russet	Crop Value Per Acre (\$)
1	Bloom	118	16.9	0.16	81	1.3	8983
2	Bloom + PF	110	16.1	0.15	87	0	9214
3	Bloom + 12mm	98	16.6	0.17	83	0	13200
4	Bloom + 20mm	90	13.1	0.16	84	0	7801
P-Value		0.3294	0.1754	0.1604	0.3567	0.4262	0.0667

**Table 9. Harvest and crop value data from the Forrence Orchards NY-1 trial. Differing letters show statistically significant differences between treatments at p value < 0.05; Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

**Chazy Orchards: NY-1**

We observed no significant differences in total fruit per tree at harvest (p=0.4447). While our target crop load for this block was 120 fruit per tree:

- Treatment 1 averaged 171 fruit per tree, and
- Treatment 2 averaged 127 fruit per tree.
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Yield per tree was not significantly different in our trial (p=0.4927). Yield per tree averaged:

- 22.4 kg in Treatment 1, and
- 18.3 kg in Treatment 2.

Average fruit size did not significantly differ in our trial (p=0.9337). Fruit size per tree averaged:

- 0.14 kg in Treatment 1, and
- 0.14 kg in Treatment 2.

Fruit color did not differ significantly between treatments (p=0.8209). Fruit percent red color averaged:

- 91% in Treatment 1,
- 95% in Treatment 2,

Russeting was minimal, and was not evaluated in this trial.

Crop values did not significantly differ between bloom thinning treatments (p=0.8209). Taking into account the yield, fruit quality, we estimated the value of the crop in:

- Treatment 1 as \$10,646 per acre, and
- Treatment 2 as \$11,373 per acre.

Chazy NY-1 Thinning 2024							
Treatment	Applications	# Fruit	Yield (kg)	Fruit Size (kg)	% Fruit Set	% Red Color	Crop Value Per Acre (\$)
1	PF	171	22.44	0.14	25	91	10646
2	PF, 20mm	127	18.28	0.14	21	95	11373
P-Value		0.561	0.575	0.940	0.266	0.318	0.821

**Table 10. Harvest and crop value data from the Chazy Orchards NY-1 trial. Differing letters show statistically significant differences between treatments at p value < 0.05; Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

## Gunnison’s Orchards: Gala Demonstration Trial

Means of the number of fruit per tree, yield per tree, fruit size, red color, and crop value per acre are reported below.

Gunnisons Gala Thinning 2024						
Treatment	Applications	# Fruit	Yield (kg)	Fruit Size (kg)	% Red Color	Crop Value Per Acre (\$)
1	Bloom, PF	122	21.7	0.18	92	12800
2	Bloom, PF, 20mm	106	17.0	0.16	87	8477

**Table 11. Harvest and crop value data from the Gunnison Orchards Gala trial. Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2024.**

### Discussion

In our Chazy Gala trial, treatments with Accede gave as good or better levels of thinning than the grower standard thinning treatment. This suggests the application of Accede at 20mm may be helpful in Gala to remove additional fruit from the trees where inadequate levels of thinning were achieved by the standard thinning timings of petal fall and 12mm. This additional thinning significantly increased fruit size as well in all treatments receiving Accede. While not statistically significant, crop values were numerically higher in the treatments that were treated with Accede. These findings suggest that Accede at 20mm provided similar levels of thinning efficacy as the grower’s standard petal fall and 12mm applications of 100-ppm 6-BA and 1 pint carbaryl. Our data suggest Accede at 400ppm may help growers reduce their crop load further if they had poor application weather or thinning conditions at the petal fall or 12mm thinning windows. These findings are in general agreement with our 2023 Gala study, which found that 20mm applications of Accede appear to give similar levels of thinning as applications of traditional thinner combinations at petal fall and 12mm. While we were unable to run statistics on the Gunnison trial, we saw a very slight decrease in the number of fruit per tree, suggesting our treatments were less efficacious in this study.

A trial in Idaho (Fallahi and McArtney, 2021) found Buckeye Gala treated with 350ppm Accede had a lower fruit set and improved fruit size over an un-thinned control in two separate study years and an Ethephon treatment in one of two years. A 2015 study in Ontario, Canada, found 300ppm and 450ppm applications of Accede were effective at reducing crop load of Gala when applied at 17mm, and 400ppm was ineffective when applied at 22 and 25mm (Cline J, personal communication). Our study differs somewhat from these previous studies, as we were applying Accede at 20mm, complementing other hormone-based thinner applications made at petal fall, 12mm, or a combination of the two.

In our Honeycrisp trial, we saw no significant differences between thinning treatments. We had little additional thinning from any of our post-bloom thinning materials compared to bloom thinning alone. It is possible that we either had good thinning from our bloom thinner, or that fruit set was relatively poor in this block to begin with. Our findings suggest Accede at 400ppm was a very mild thinning product on Honeycrisp this season. This is in general agreement with our 2023 findings, where we had relatively little efficacy in Honeycrisp.

In our Forrence NY-1 trial, the various thinning treatments did not lead to any significant differences in the metrics we evaluated. Similar to our Honeycrisp trial, we had little additional thinning from any of our post-bloom thinning materials compared to bloom thinning alone. Once again, it is possible that we either had good thinning from our bloom thinner, or that fruit set was relatively poor in this block to begin with. Our Chazy NY-1 trial also had no significant

differences between treatments. Due to the lack of additional significant thinning in either of these two trials, Accede appears to be a very mild thinner on NY-1 as well.

We are eager to see how return bloom will be impacted by these Year 2 thinning treatments. Data will be collected and evaluated in the spring of 2025.

### **Economics**

The thinning received from Accede applications may somewhat help reduce the amount of hand thinning required in these varieties. However, growers will need to carefully consider if the amount of additional thinning received from Accede will justify the expense of its application.

We estimate Accede costs approximately \$260 per acre to apply. This includes the costs of Accede, the surfactant, and the labor. Though we did not see statistically significant differences in crop value in any of our studies this season, we did see an increase in the average crop value in our Chazy Gala trial in treatments where Accede was used. We also saw a slight increase in the crop value in the Chazy NY-1 trial. Crop value was slightly lower in the other three trials, so it is perhaps unlikely that the use of Accede at 20mm will provide consistent increases in crop value.

Hand thinning is labor-intensive, and labor costs are one of the largest expenses in managing an orchard in northern New York. If Accede can be used to get the trees closer to the target crop load without hand thinning, we believe there could be significant cost savings from utilizing Accede in some years where there was insufficient thinning from the bloom, petal fall, and 12mm applications. However, we are yet to observe this in our data to date.

### **Weather Impacts**

As in most years, the Northern New York weather must always be taken into consideration when we investigate thinning efficacy with any material. Conditions were relatively good for bloom thinning in 2024. Weather forecasts were dry and temperatures were favorable, allowing growers the opportunity to bloom thin at the ideal timing. Weather conditions were conducive to mild thinning at the petal fall, 12mm, and 20mm thinning windows in 2023. Two sites were rated as good thinning during petal fall. The carbohydrate balance was growing more negative by 20mm, so overall we suspect thinning conditions were best at the petal fall and 20mm windows between the three timings.

The Accede applications were applied on favorable days, as daily highs were in the mid-80°Fs, and carbohydrate balances were running negative.

Accede is believed to also work well under cooler temperatures. The manufacturer has also suggested (Clarke G, personal communication) that Accede efficacy appears to be maximized when it is applied under slower drying conditions to maximize leaf uptake. Most of our applications were made in the early or late in the day to maximize its efficacy. However, when large commercial growers need to thin hundreds of acres, it is unlikely they are going to be able to spray all their acreage at the perfect timing.

Petal Fall Thinning Conditions				
Trial	Date	Daily High Temp (°F)	6-Day Weighted Carb Status Average (g/day)	Carbohydrate Model Predicted Thinning Conditions
Chazy Gala	26-May	80	5.85	Mild Thinning
Honeycrisp	22-May	86	-2.78	Good Thinning
Forrence NY-1	26-May	75	-4.00	Good Thinning
Chazy NY-1	28-May	72	13.44	Mild Thinning

**Table 12. Summary of petal fall thinning conditions. Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2023.**

12mm Thinning Conditions				
Trial	Date	Daily High Temp (°F)	6-Day Weighted Carb Status Average (g/day)	Carbohydrate Model Predicted Thinning Conditions
Chazy Gala	3-June	90	-8.43	Mild Thinning
Honeycrisp	28-May	71	23.99	Mild Thinning
Forrence NY-1	31-May	74	38.3	Mild Thinning
Gunnison Gala	23-May	81	-36.72	Good thinning

**Table 13. Summary of 12mm thinning conditions. Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2023.**

20mm Thinning Conditions				
Trial	Date	Daily High Temp (°F)	6-Day Weighted Carb Status Average (g/day)	Carbohydrate Model Predicted Thinning Conditions
Chazy Gala	5-June	85	-17.39	Mild Thinning
Honeycrisp	3-June	83	-3.29	Mild Thinning
Forrence NY-1	4-June	86	-7.62	Mild Thinning
Chazy NY-1	5-June	85	-17.39	Mild Thinning
Gunnison Gala	6-June	78	-38.4	Mild Thinning

**Table 14. Summary of 20mm thinning conditions. Evaluating the New Apple Thinning Material “Accede” Under Northern New York Thinning Conditions, 2023.**

### **Conclusions**

Accede has shown some efficacy as an apple thinner at the 20mm fruit size, though efficacy appears to be somewhat variety dependent. Like other thinning materials, its efficacy will also be impacted by such as factors as weather conditions before and after application, tree stress, etc. Our data currently suggest Accede, when applied under current label recommendations, is likely a relatively mild thinner on Gala, and a very mild thinner on Honeycrisp and NY-1. Growers may be able to use these materials at 20mm to remove some additional fruit off their trees, potentially decreasing the amount of hand thinning needed on their farm.

Additional work is required to fully understand how we can best incorporate this new thinning material into our crop load management toolbox. We plan to repeat these trials in 2025.

### **Education and Outreach**

- 2024 Statewide Pink Webinar, April 22, 2024, virtual; Dr. Terence Robinson discussed thinning strategies for the 2024 thinning season. Participants: 78. Video on [Lake Ontario Fruit Program YouTube](#) , 318 views as of January 30 2025.
- Thinning Meetings, May-June 2024, online for Northern New York growers. Dr. Robinson and project leader Mike Basedow discussed thinning conditions at petal fall and 12mm. Weekly attendance: 12-24 growers. Recordings and summaries of these meetings are available on the [ENYCHP Blog page](#).
- E-mail Alerts: following each thinning meeting, growers were emailed a recap of the discussed thinning recommendations, along with additional details from model outputs from test sites in Peru, NY, reaching 678 Northeastern NNY/Eastern NY fruit growers.
- One-on-One Outreach: growers participating in the thinning projects received frequent personalized emails, text messages, phone calls, and farm visits to discuss the models, and were given thinning advice based on these model recommendations.

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### **For More Information:**

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- [NNYADP Apple/Precision Orchard Research Reports \(2013-2021\)](#): <https://nnyagdev.org/index.php/horticulture/nnny-horticultural-research>

### **References**

Fallahi, E., McCartney, S.J. 2022. Impacts of 1-aminocyclopropane-1-carboxylic acid as a late post-bloom thinner on fruit set, yield, and fruit quality in “Gala” and “Fuji” apples. American Journal of Plant Science. 13:481-493.

### **Photos**



Left: Treatment 1, Chazy Gala trial, prior to harvest, 2024. Photo: Michael Basedow

Center: Fruit on two Treatment 4 trees prior to first harvest of Honeycrisp trial, Forrence Orchards, 2024. Photo: Michael Basedow

Right: Fruit on Treatment 4 tree prior to harvest of NY-1 trial at Forrence Orchards, 2024. Photo: Michael Basedow