

**Nachurs Rhyzo-Link & Triple Option Trial 2015**  
**By Oregon State University**  
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**Introduction**

Triple Option and Rhyzo-Link are fertilizer products developed and sold by Nachurs Alpine Solutions. Besides nutrients, Rhyzo-Link contains bacteria that are active in the rhizosphere. Trials were conducted in Wasco County Oregon in commercial orchards near The Dalles. The objectives of this studies were two-fold:

1. Determine the influence of Nachurs Rhyzo-Link and Triple Option on 'Early Robin' sweet cherry fruit set and tree vigor.
2. Determine the influence of Nachurs Rhyzo-Link and Triple Option on 'Early Robin' sweet cherry fruit quality. The following fruit quality parameters were evaluated at harvest and following two weeks of cold storage.
  - a. Fruit size
  - b. Fruit firmness
  - c. Total soluble solids (TSS)
  - d. Pedicel-fruit retention force (PFRF)
  - e. Fruit blush
  - f. Pitting susceptibility
  - g. Stem color at harvest versus after 14 days of cold storage

**Materials and Methods**

Pollination and fertilization study

Methods:

The pollination and fertilization study contained six replications laid out in a randomized pattern with single tree replications.

Two limbs per tree were flagged for flower counts. Fruit counts, for determining fruit set (as a % of available flowers) were made near harvest on the same limbs. In addition, fruit quality was analyzed for fruit size, firmness and TSS.

Applications were made at the following growth stages and dates:

| <b>Developmental Stage</b> | <b>Application Date</b> | <b>Product &amp; Rate</b> |
|----------------------------|-------------------------|---------------------------|
| Side Green                 | 3/20/2015               | 4 treatments as listed    |
| 10% Bloom                  | 3/24/2015               | 4 treatments as listed    |
| 50% Bloom                  | 3/27/2015               | 4 treatments as listed    |
| Full Bloom                 | 4/2/2015                | 4 treatments as listed    |
| Full leaf                  | 4/16/2015               | Triple Option 2.5 g/A     |
| Full leaf                  | 4/30/2015               | Triple Option 2.5 g/A     |
| Full leaf                  | 5/14/2015               | Triple Option 2.5 g/A     |
| Harvest samples            | 5/28/2015               |                           |

Treatment application products and rates:

1. Water treated control
2. Rhyzo-Link applied at 2 gal./A
3. Triple Option applied at 1.5 gal./A
4. Triple Option applied at 2.5 gal./A

Tree vigor and fruit quality study

Each treatment consisted of six replications laid out in a randomized pattern with 6 trees per replication. Each treatment was protected by buffer rows on each side.

Treatment dates:

| <b>Developmental Stage</b>   | <b>Application Date</b> |
|------------------------------|-------------------------|
| Full leaf                    | 4/16/2015               |
| Full leaf                    | 4/29/2015               |
| Full leaf                    | 5/13/2015               |
| Harvest samples for analysis | 5/29/2015               |

The following treatments were made:

1. Unsprayed control
2. Rhyzo-Link applied at 2 g/A
3. Triple Option applied at 1.5 g/A
4. Triple Option applied at 2.5 g/A

Control consisted of the grower's normal nutrient program, both ground and foliar feed.

### Tree Vigor

Six branches were randomly chosen from each replication from each side of the tree row. Thus each replication had twelve branches flagged to determine new shoot growth. Selected branches were similar caliper and aspect. When new shoot growth was approximately 5 cm long, branches were flagged to indicate the beginning of shoot growth for the current year. These were single, unheaded shoots. Shoot growth was measured at the end of the season.

### Harvest and fruit quality measurements

Fruit in both trials were harvested one day prior to commercial harvest. One hundred fruit were harvested per replication by picking 25 fruit off each of the four trees in a replication. Fruit were picked randomly at waist height and above. 50 cherries per replication were individually measured immediately after harvest for fruit size and firmness (2 a, b). Twenty-five fruit per replication were evaluated for quality parameters in 2 c-f above. In addition, 25 fruit per replication were stored under typical commercial conditions (at or near 0 C) for 14 days and evaluated for the same quality factors. Stored fruit were analyzed for pitting susceptibility and stem color (2 f-g).

Fruit size and firmness were determined with a Firm Tech 2 instrument from BioWorks of Wamego, Kansas. Pedicel-fruit retention force was measured with a Shimpo FGV-5x force gauge.

The incidence of pitting (percentage of fruit with moderate and severe levels of depression) was determined by impacting cherries, stored at room temperature, with a pitting instrument. This instrument consists of a circular metal rod, 2.4 mm in diameter and 225 mm long. The tip protrudes from the metal housing by 1.5 mm. The center weight is 1.8 g and with the screw it weighs 2.6 g. The main metal housing unit is 15 cm long and the length of the rod drop is 59 mm. Pitting is induced when the weighted rounded tipped rod is dropped 59 mm onto the surface of the cherry so that the tip of the rod, which protrudes 1.5 mm, contacts the epidermis of the cherry (Fig. 1). Cherries are then stored in typical commercial storage for two weeks and the depression caused by the instrument is evaluated and graded according to the chart in Fig. 2.

Fig. 1. Instrument used to create pitting damage on fruit

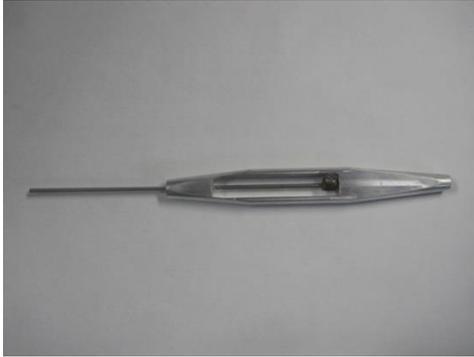
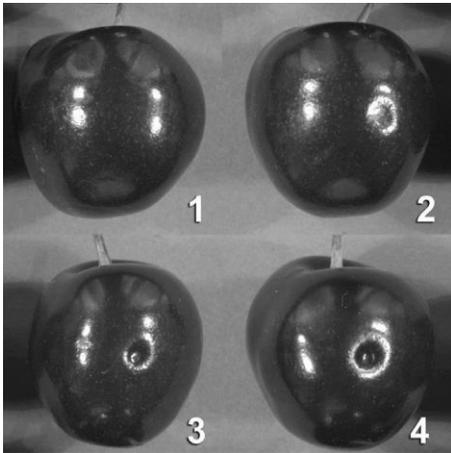


Fig. 2. Chart used to determine pitting damage.



## Results

### Pollination and Fertilization Study

#### Flower to fruit ratio

When all application times are combined there was no significant difference from any of the treatments (Fig. 3). However, when Rhyzo-Link was sprayed at 50% bloom there was higher fruit set with the Rhyzo-Link treatment than the control (Fig. 4).

Fig. 3. Flower to fruit ratio.

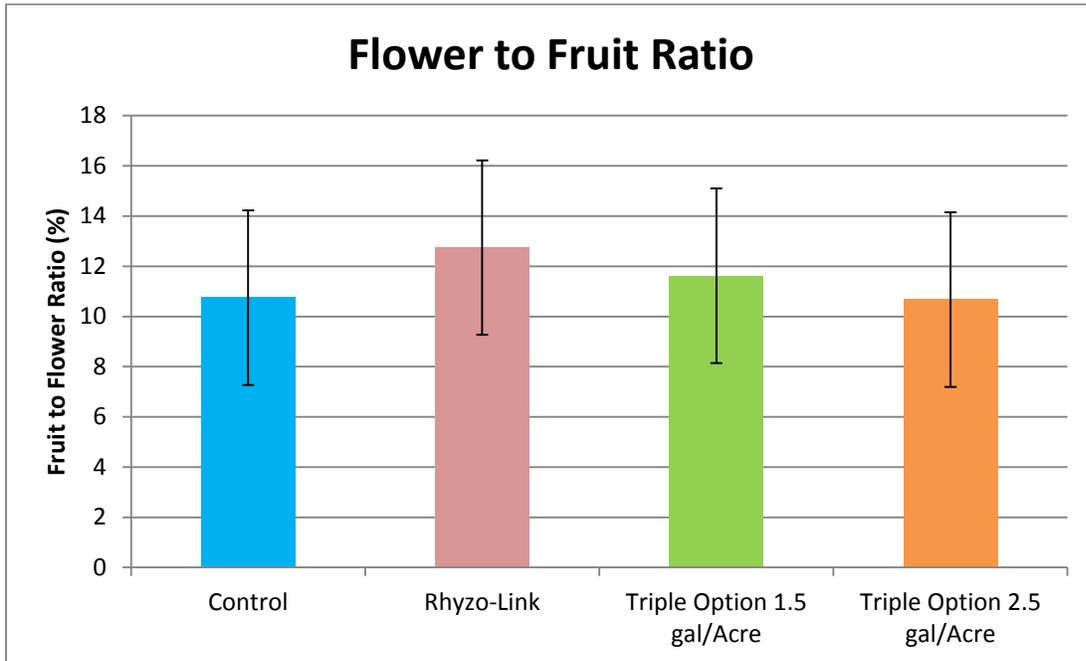
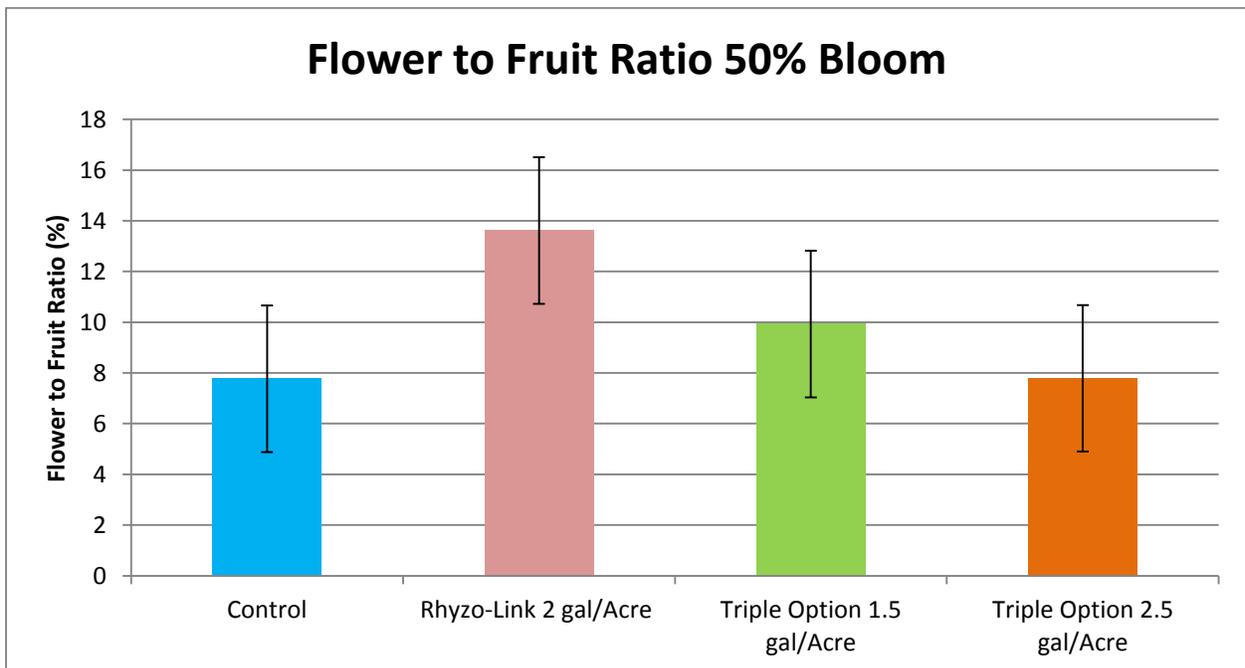


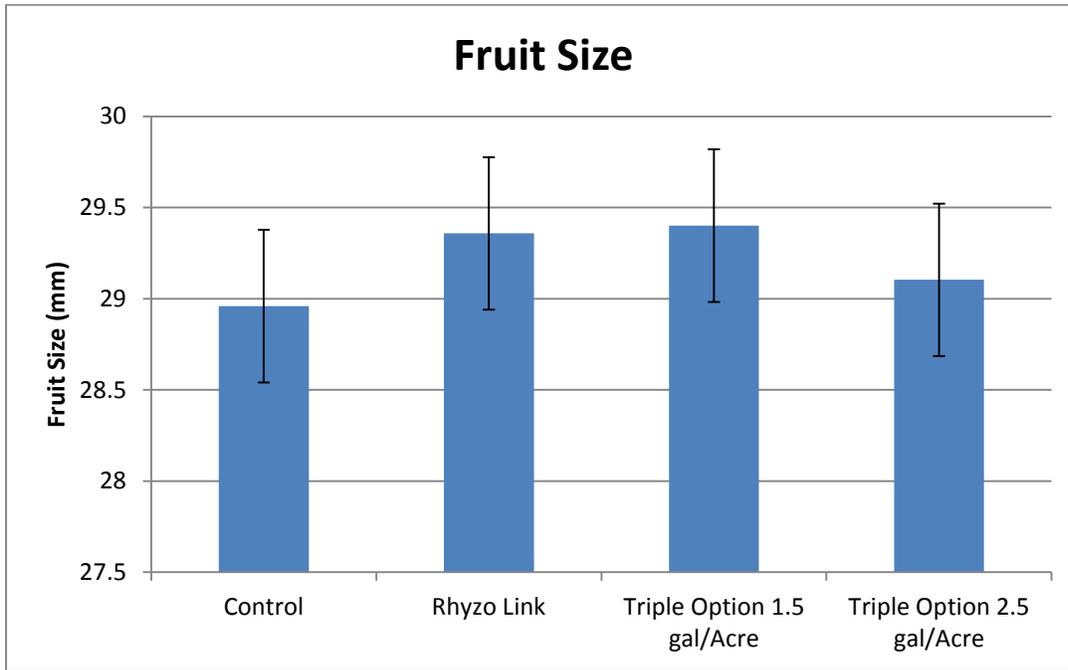
Fig. 4. Application at 50% bloom. Flower to fruit ratio.



## Fruit Size

When trees were sprayed at bloom and through the growing season, there was no significant difference in fruit size between treatments (Fig. 5). This was true, even though there was a higher fruit set on the Rhyzo-Link treated trees.

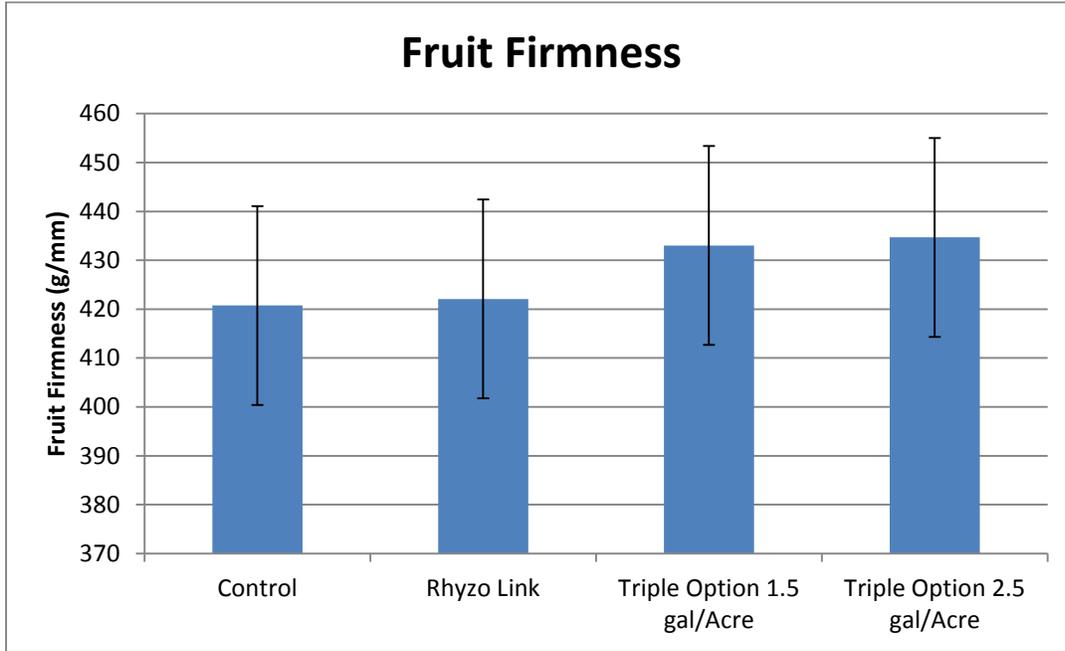
Fig. 5. Fruit size



## Fruit firmness

When trees were sprayed at bloom and through the growing season, there was no significant difference in fruit firmness between treatments (Fig. 6).

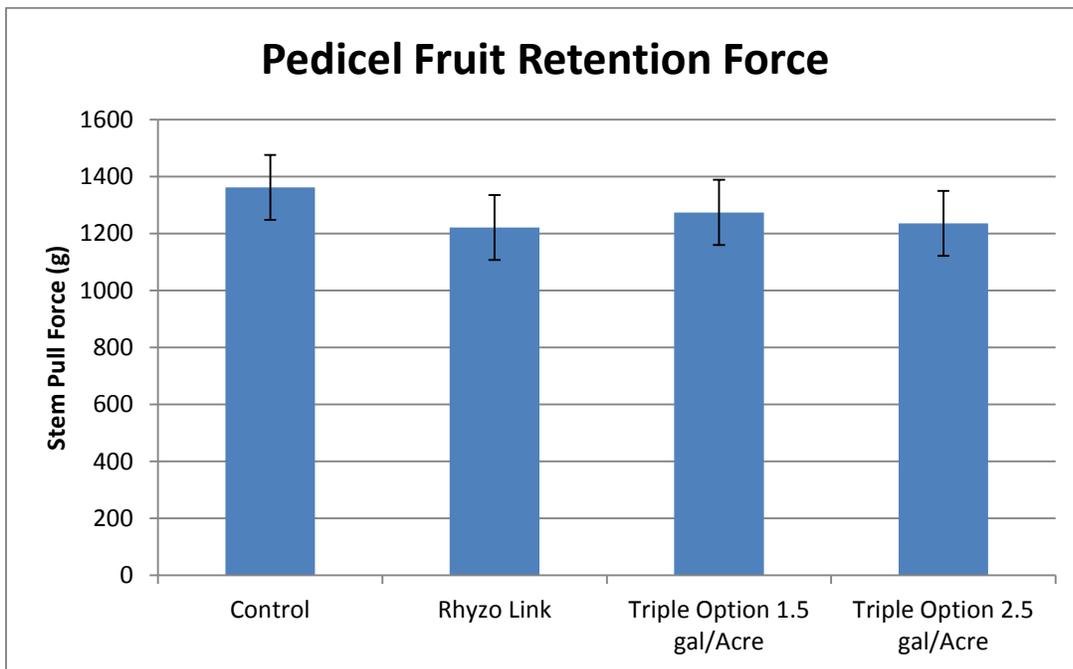
Fig. 6. Fruit firmness



PFRF

When trees were sprayed at bloom and through the growing season, there was no significant difference in PFRF between treatments (Fig. 7).

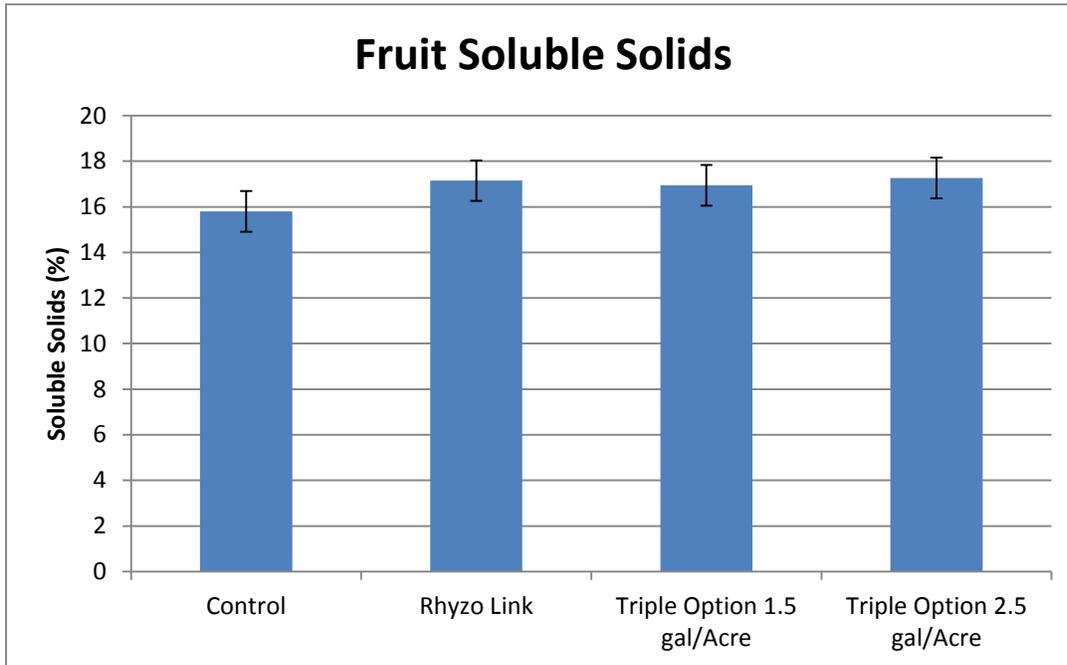
Fig. 7. PFRF



## Total soluble solids

When trees were sprayed at bloom and through the growing season, there was no significant difference in TSS between treatments.

Fig. 6. TSS

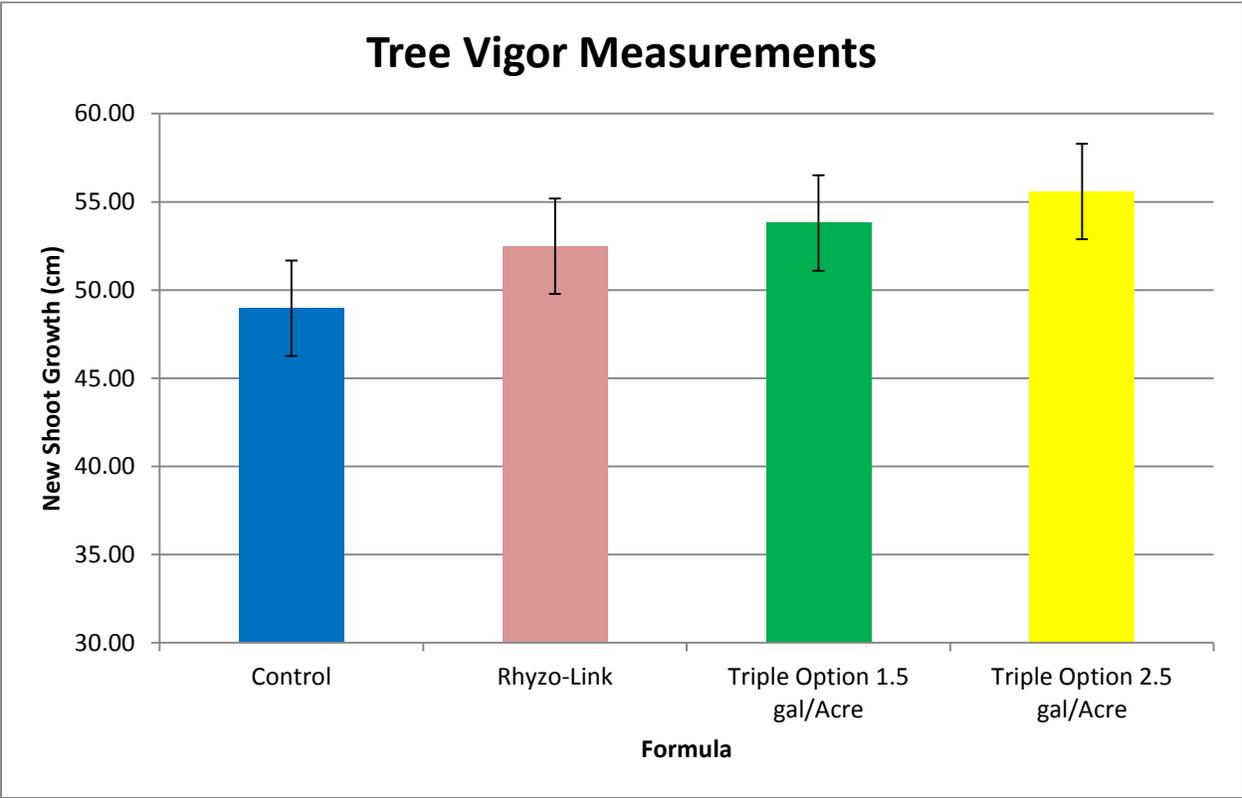


## **Tree Vigor and Fruit Quality Study**

### Tree vigor

Tree vigor as determined by measuring new shoot growth, was statistically greater with the Triple Option treatments at 2.5 g/A. The Triple Option at 1.5 g/A and the Rhyzo-Link treatments were not statistically significant compared to the control but there was a trend for greater vigor with both applications (Fig. 8).

Fig. 8 Tree vigor.



Fruit Size

There was no statistical difference in fruit size, but the Triple Option 1.5 g/A rate showed a trend towards larger fruit both at harvest and after two weeks of cold storage (Figs. 9 and 10).

Fig. 9. Fruit size at harvest

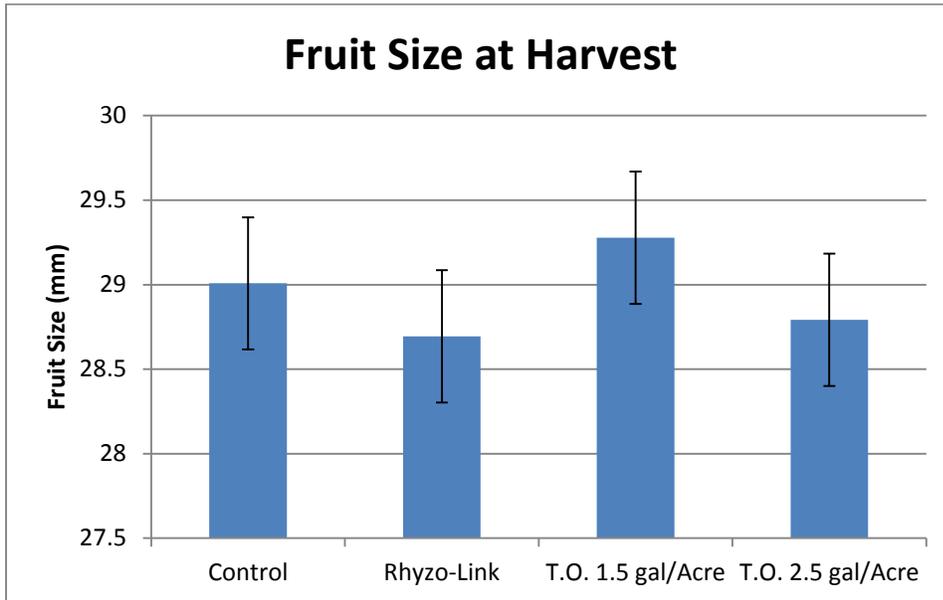
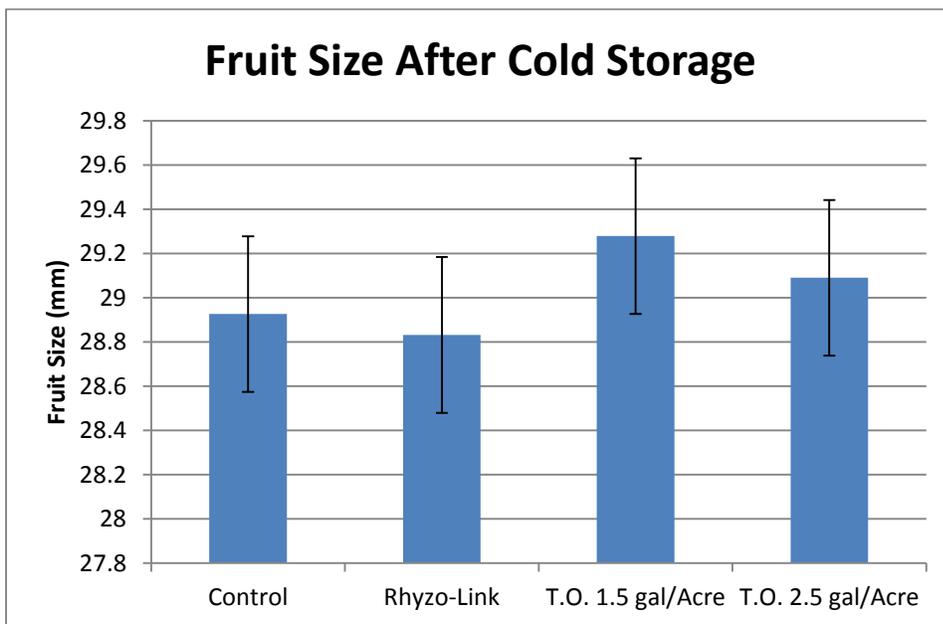


Fig. 10. Fruit size after two weeks of cold storage



### Fruit Firmness

There was no difference seen in cherry firmness either at harvest or two weeks after cold storage (Figs. 11 and 12).

Fig. 11. Fruit firmness at harvest.

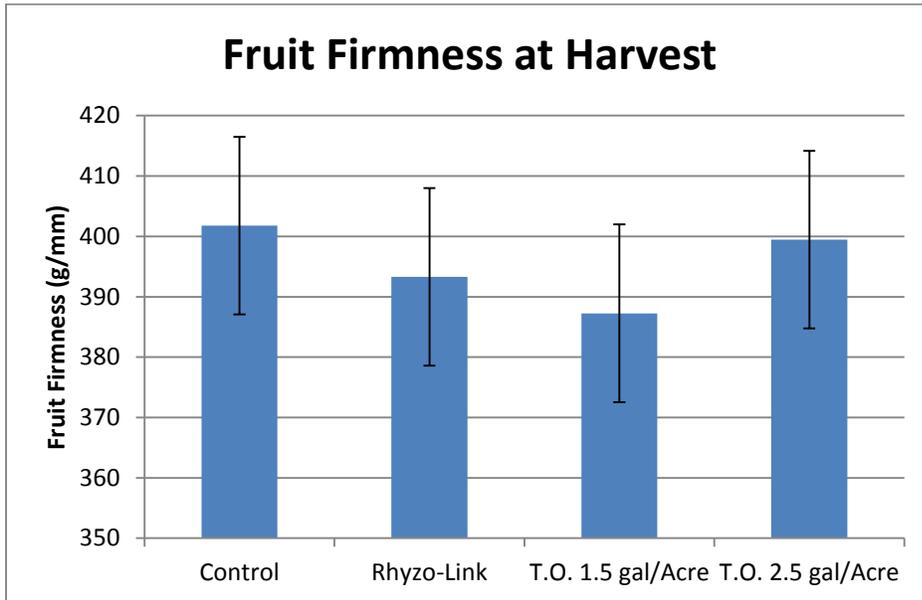
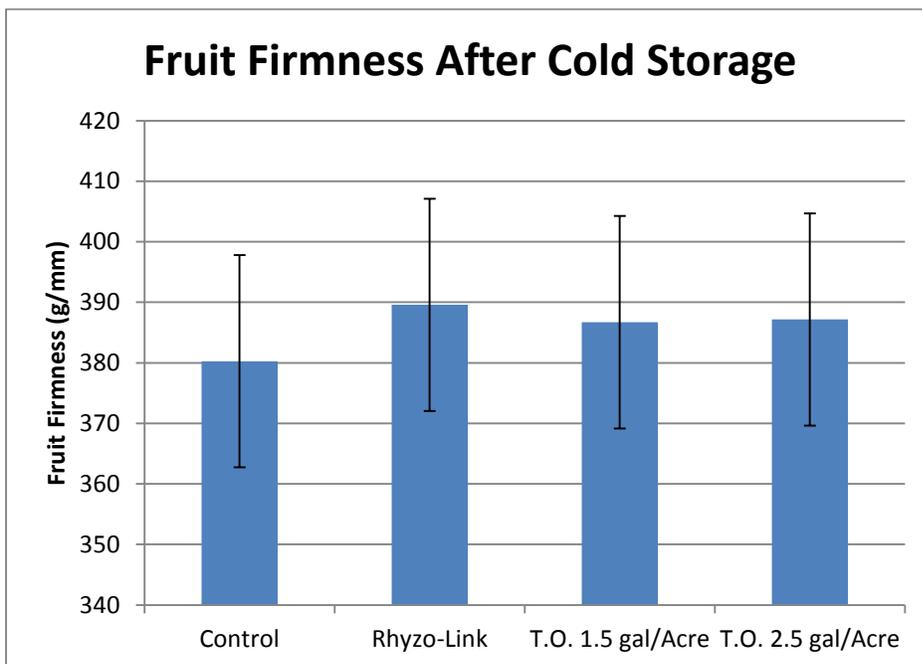


Fig. 12. Fruit firmness two weeks after cold storage.



PFRF

There was no statistical difference noted in the pedicel fruit retention force between any of the treatments (Figs. 13 and 14).

Fig. 13. PFRF at harvest

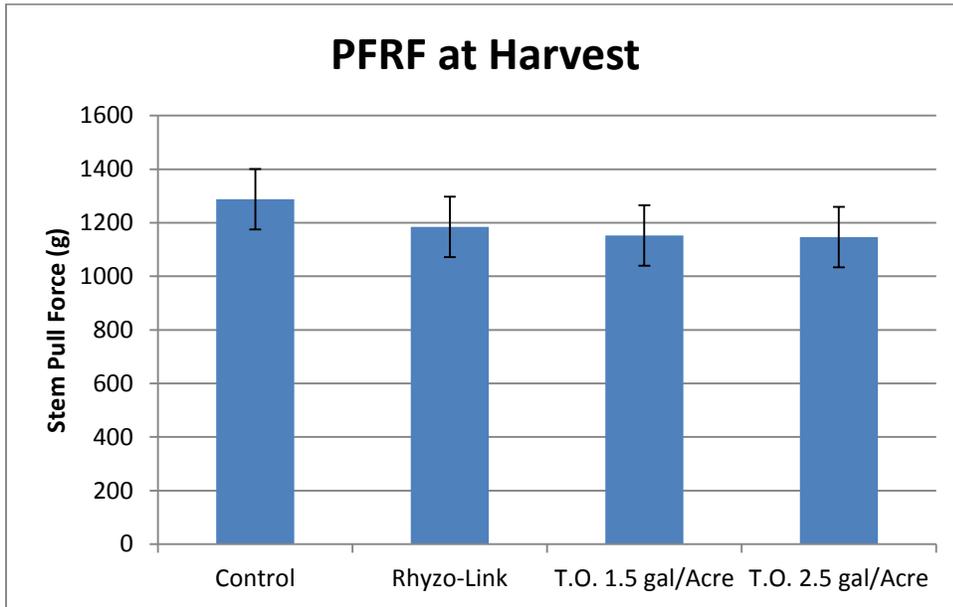
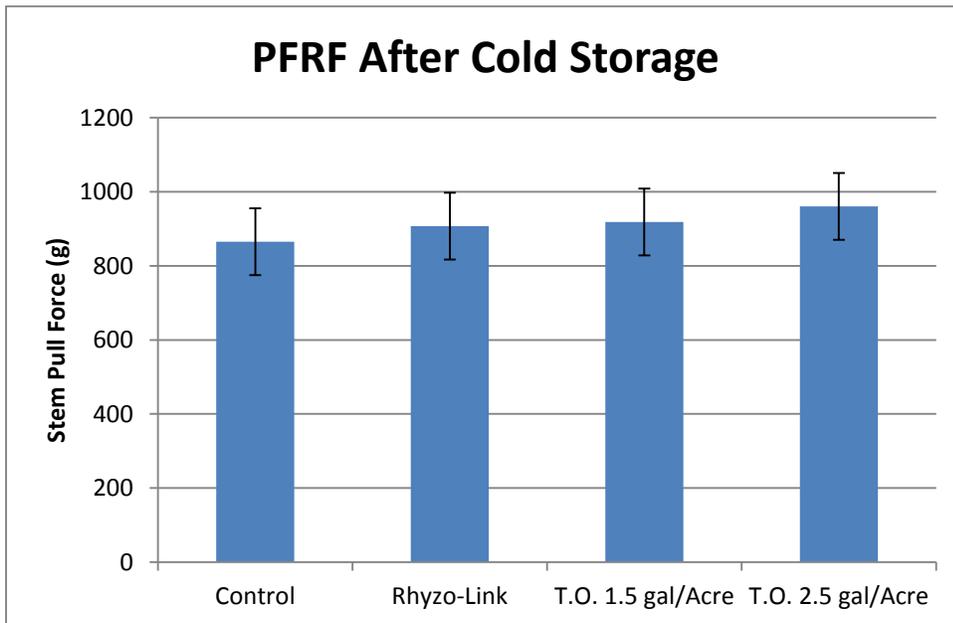


Fig. 14. PFRF after two weeks of cold storage



### TSS

Although there was no statistical difference between total soluble solids at harvest or after two weeks of cold storage, the Triple Option, 1.5 g/A rate showed a trend towards higher sugars at harvest and after two weeks in cold storage (Figs 15 and 16).

Fig. 15. TSS at harvest

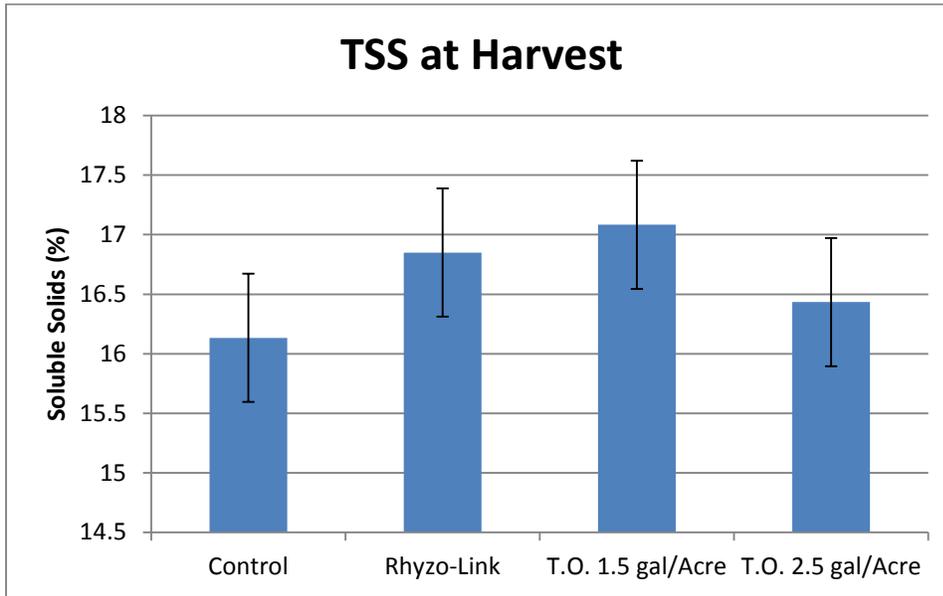
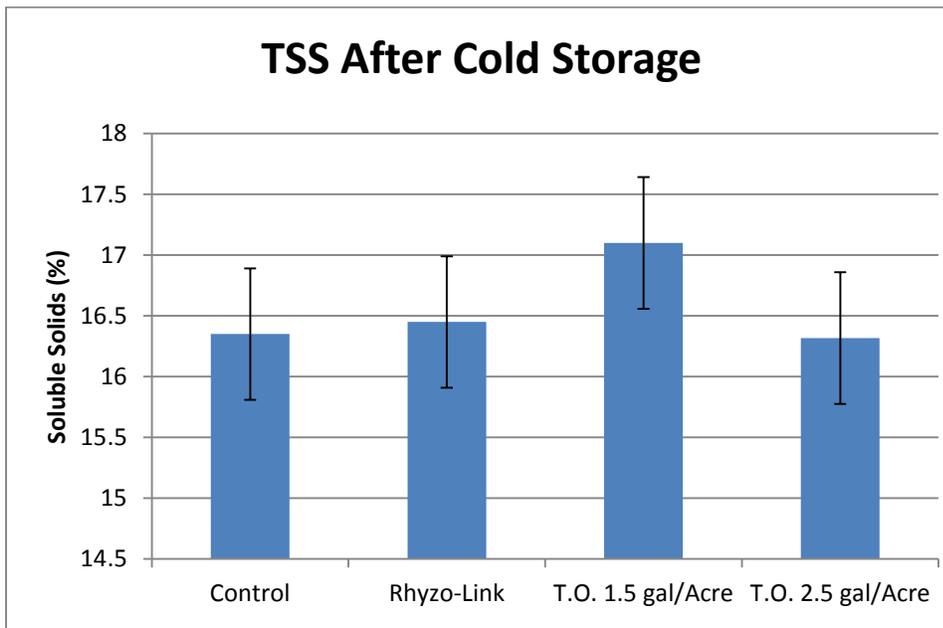


Fig. 16. TSS after two weeks of cold storage



### Percentage of Blush

Both rates of Triple Option provided significantly more blush than the control at harvest (Fig. 17). Although still trending towards greater blush, by the end of two weeks of storage there was no longer statistical difference between the treatments and control (Fig. 18).

Fig. 17. Percentage of blush at harvest

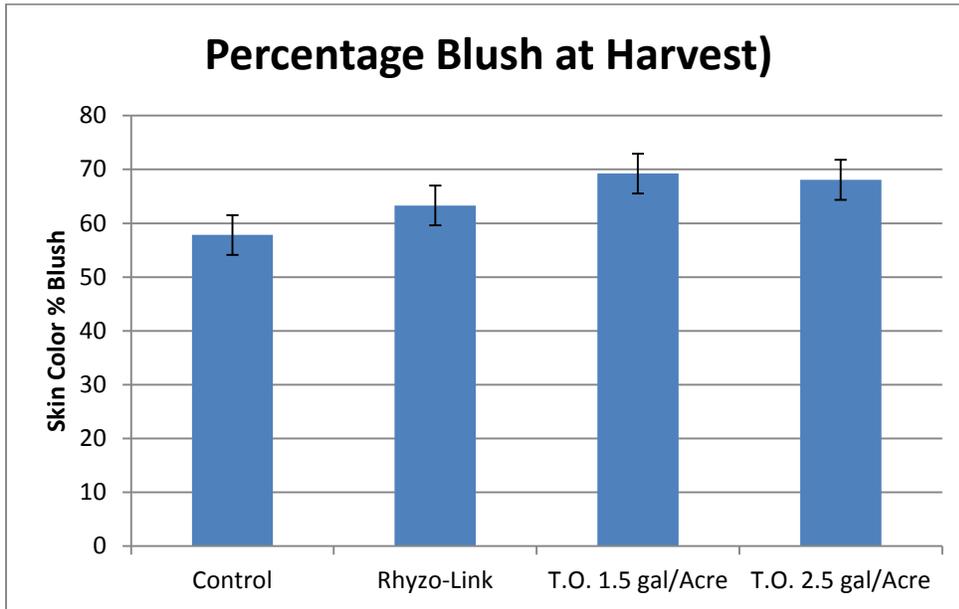
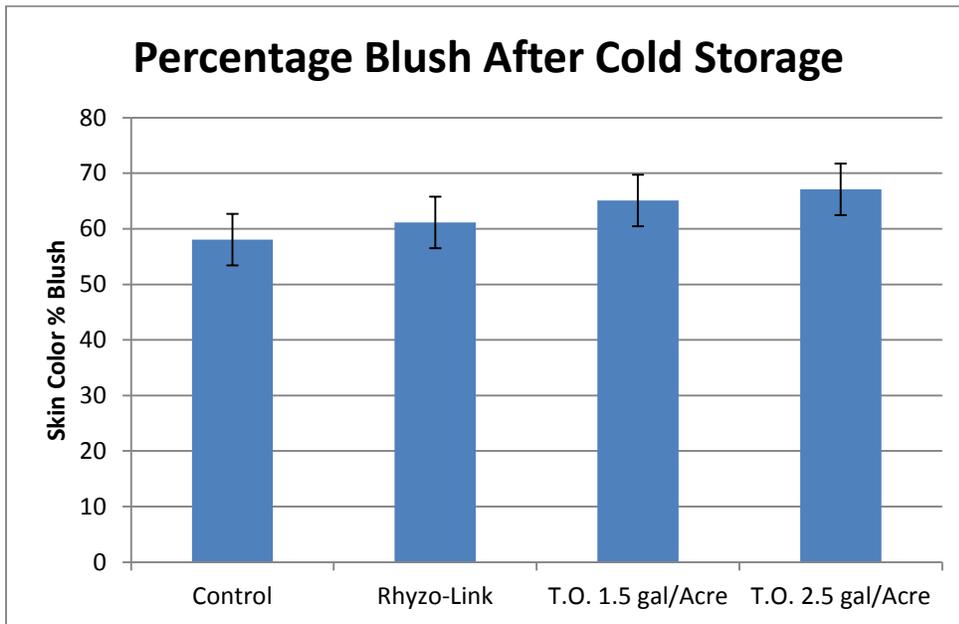


Fig. 18. Percentage blush after two weeks of cold storage



Pedice Color

Triple Option at the 2.5 g/A rate showed an improvement in stem color with more pedicels remaining green after two weeks of cold storage (Figs. 20 and 22).

Fig. 20. Pedicel color at harvest

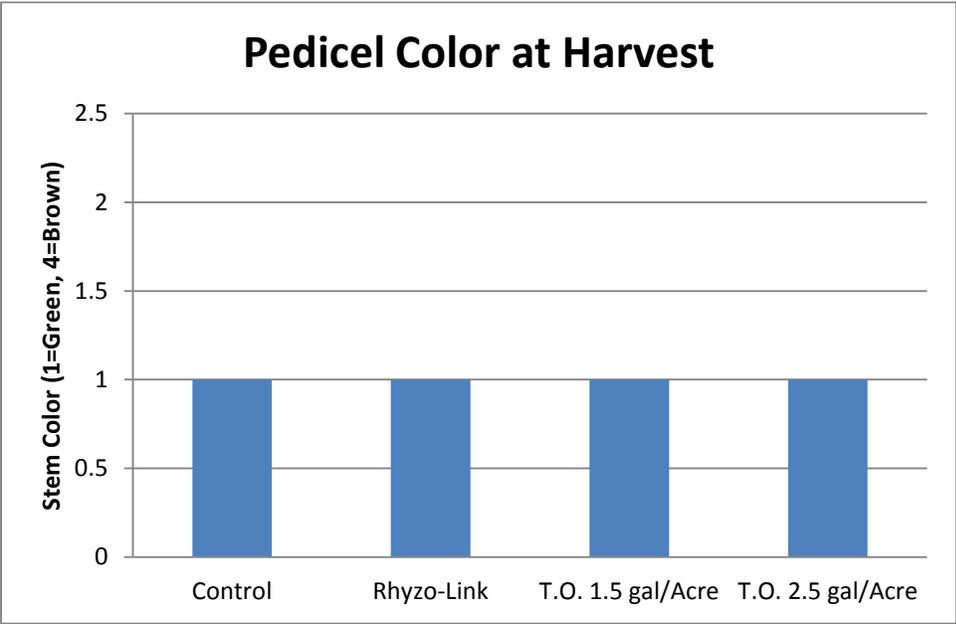
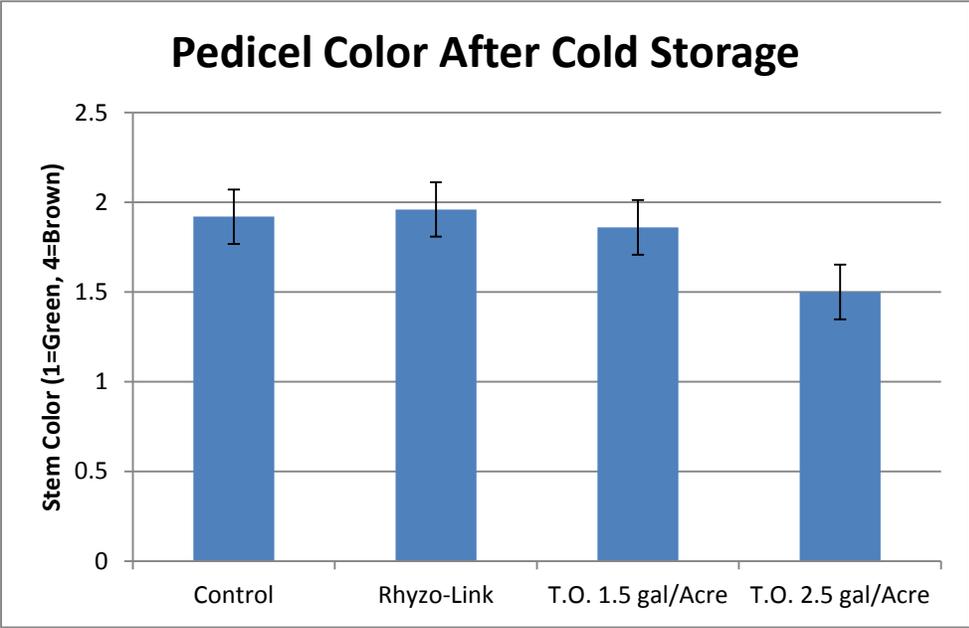


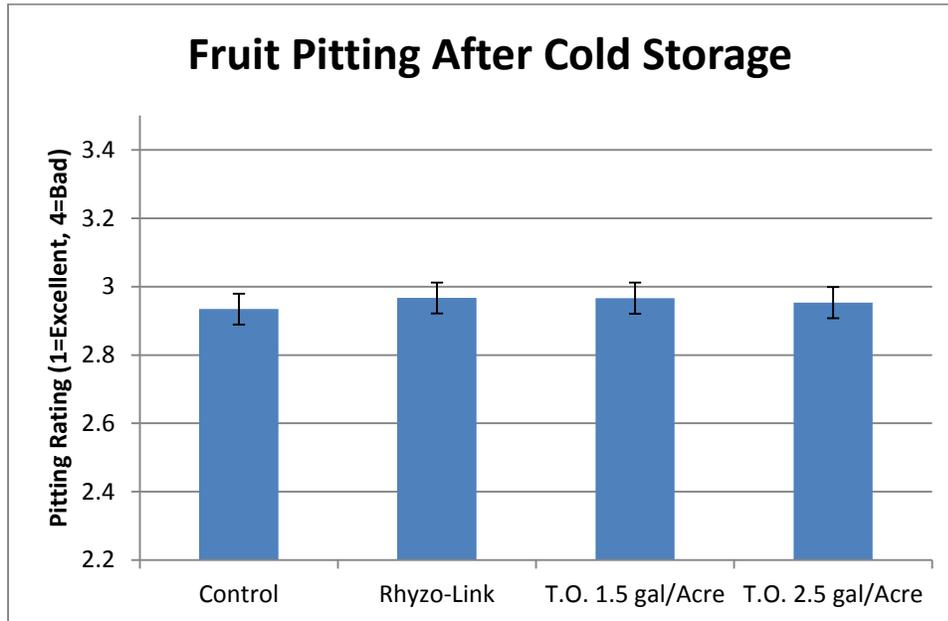
Fig. 21. Pedicel color after two weeks of cold storage



Pitting

There was no difference in pitting in any of the treatments after two weeks of cold storage (Fig. 23).

Fig. 23. Pitting after two weeks of cold storage.



## Discussion

### **Pollination and Fertilization Study**

This study looked at the potential for two rates of Triple Option and one rate of Rhyzo-Link to improve fruit set when applications were made just before (side green) or during bloom (10%, 50% and full bloom). In addition, we determined to evaluate the quality of fruit resulting from these treatments to make sure that higher yields did not detrimentally affect fruit quality. This was deemed necessary because in cherries, fruit size and other quality traits are inversely linked to yield.

The study revealed that Rhyzo-Link, sprayed at 50% bloom, resulted in higher yields than the other treatments or the control (Fig. 4). It also showed that fruit size and other quality factors were not negatively affected by the higher yields.

### **Tree Vigor and Fruit Quality Study**

With a blush variety, stronger shoot growth as seen with the Triple Option treatments at 2.5g/A may or may not be advantageous as more vigor could detrimentally affect blush (Fig. 8). However, it is also possible that stronger shoot growth will lead to increased fruit size. There may be a trend towards larger fruit at both harvest and after two weeks of cold storage, but there was no statistical difference in fruit size with any of the treatments compared to the control (Figs. 9 and 10). As previously stated, the down side to stronger shoot growth in a blush variety is that it may interfere with the development of the blush, since sunlight is needed for

blush to form. However, both rates of Triple Option improved the blush significantly when the fruit was evaluated at harvest (Fig. 17). Since growers are paid by the grade at harvest, increased blush at that time can be an advantage.

TSS is an important part of the flavor experience of a cherry. Higher fruit sugars will often lead to a more satisfying sensory experience by the consumer, potentially encouraging additional sales. Although there were no statistical differences in TSS between any of the treatments, Triple Option at 1.5 g/A at harvest and 2 weeks after cold storage trended higher (Figs. 15 and 16). The other important component of the taste experience with sweet cherries is titratable acidity. Generally, increased sugars and increased acid levels mean a stronger, more satisfying sensory experience. Since we have some indication that Triple Option may increase TSS I would recommend that next year we evaluate the titratable acidity level as well.

Many consumers judge the freshness of sweet cherries by the greenness of their pedicels. The fact that cherries, treated with Triple Option at 2.5 g/A, had pedicels that remained greener than the control is encouraging. Although growers won't benefit directly from greener pedicels it may help to sell more cherries and increase overall demand.

There were a number of encouraging results revealed by the studies. In the pollination and fertilization study Rhyzo-Link provided higher fruit set at the 50% bloom stage. In the tree vigor and fruit quality study, we saw an increase in blush with both rates of Triple Option. We also saw a higher percentage of green pedicels at the 2.5 g/A rate and a trend towards higher sugar with the 1.5 g/A rate of Triple Option. It would be useful to repeat these studies on the same trees next year to confirm these findings.

All statistics were based on ANOVA at the 5% level.