Effects of Foliar Application of Calcium on Improving Fruit Quality Characteristics in Pink Lady® Apples

1. Introduction

The Australian apple industry is one of the most important fruit industries in Australia. Fruit quality is based on several parameters including color, flavor, firmness, hardness, crispiness, etc. Calcium plays a crucial role in fruit quality and numerous studies have found that the foliar application of Calcium improved the fruit quality in apples. In this study, Pink Lady® Ruby apple trees were treated with Dual Force Calcium and Transit Calcium. Four foliar applications of Dual Force Calcium and Transit Calcium were done during the growing season and the effects each treatment on improving fruit quality in apples were assessed.

2. Project aim

To evaluate the effects of foliar application of Dual Force Calcium and Transit Calcium on improving fruit quality characteristics in Pink Lady® Apples.

2.1. Project objectives

To assess the yield quality parameters of treated and control plants:

a) Evaluation of fruit weight and diameter
b) Evaluation of fruit firmness and Brix
c) Analysis of the Calcium levels in fruits

3. Material and Methods

Site Selection and Trial Design

The trial was conducted in Three Bridges, Victoria. Treatment application was done four times during the growing season. There were three treatments and four replicates in this trial. Foliar application of Dual Force Calcium and Transit Calcium was done by using a knapsack sprayer. Fruit samples were randomly collected from the control and treated trees. Laboratory analysis was done by sending the fruit samples to an independent laboratory in Australia called Analytical Laboratories & Technical Services Australia (ALTSA). Statistical data analysis was done by using GraphPad Prism software.

Table 1: Treatments and application rates of each Calcium product.

Treatment	Rate (L/ha)
Control (Grower's Practice)	Calcium Chloride 25kg/ha
Transit Calcium + Grower's Practice	2kg/ha
Dual Force Calcium + Grower's Practice	2kg/ha

4. Observations

Fruit Weight and Diameter

During the commercial harvesting time, apples were collected randomly from each treatment. Individual fruit weight was recorded and then average fruit weight was calculated.

Fruit diameter was recorded by using Vernier Calliper. Individual fruit diameter was recorded and then average fruit diameter was calculated.

Fruit Firmness and Brix

Apple samples were picked randomly from each treatment during the commercial harvesting time. The firmness of individual fruit was recorded by using a penetrometer and average firmness was calculated.

Brix levels of the apples were measured by using the Refractometer and average Brix values were calculated.

Nutritional Analysis of Fruits

Apple samples were randomly collected from each treatment during the commercial harvesting time to check the nutritional status of fruits. Samples were then analysed by sending them to an independent laboratory in Australia called Analytical Laboratories & Technical Services Australia (ALTSA).

5. Results

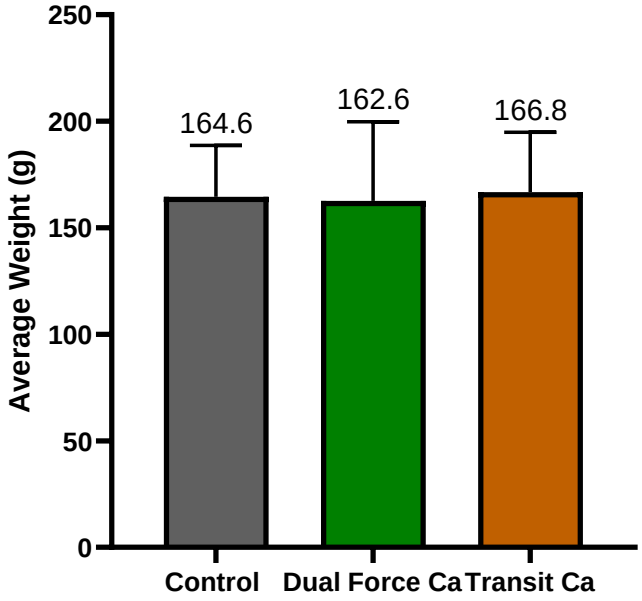

Figure 2: Average weight of apples collected from control and treated trees at commercial harvesting time.

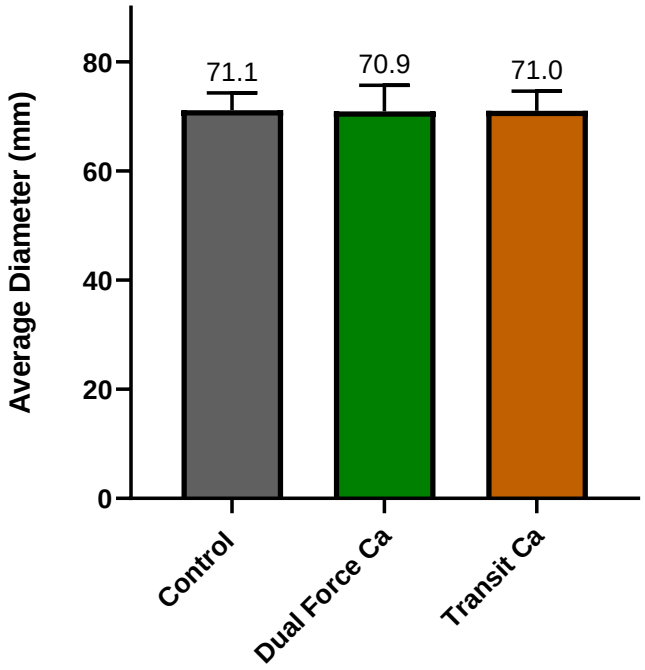

Figure 3: Average diameter of apples collected from control and treated trees at commercial harvesting time.

After treatment application, the average weight of apples treated with Transit Calcium was increased by 1.3%. However, Dual Force Calcium treated apples had slightly low average weight compared to the control (Figure 2). The average fruit diameter was measured by using Vernier Calliper. It was observed that all treatments including the control had approximately similar average diameters (Figure 3).

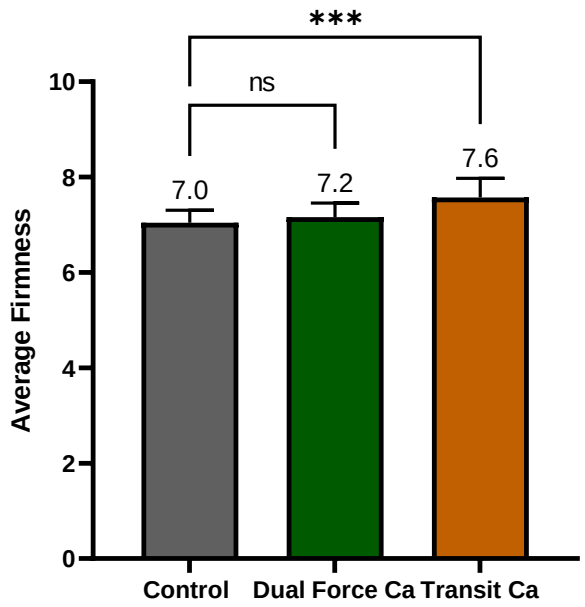

Figure 4: Average firmness of apples collected from control and treated trees at commercial harvesting time.

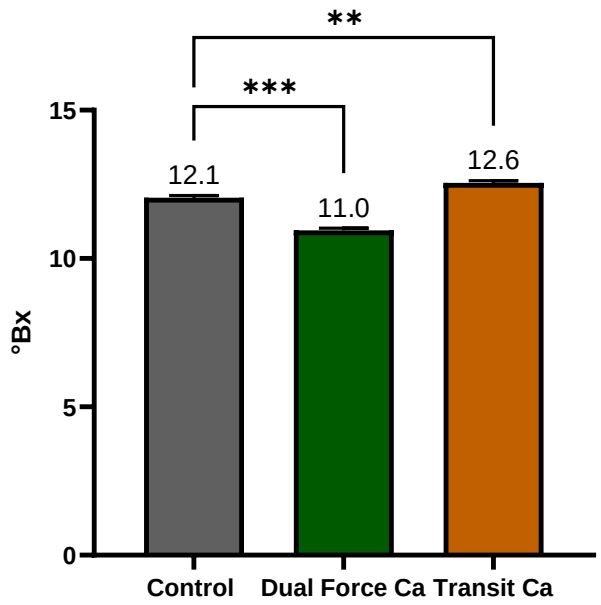

Figure 5: Average Brix Values of fruits collected from control and treated trees at commercial harvesting time.

Fruit firmness was measured by using a penetrometer. Results showed that the application of Transit Calcium significantly increased the average firmness by 9%. Also, Dual Force Calcium-treated apples had slightly higher firmness compared to the control (Figure 4). Brix levels of the apples were checked by using a refractometer. According to the results, Transit Calcium significantly increased the average Brix levels in apples by 4%, however, Dual Force Calcium treated apples had significantly lower Brix values compared to the control (Figure 5).

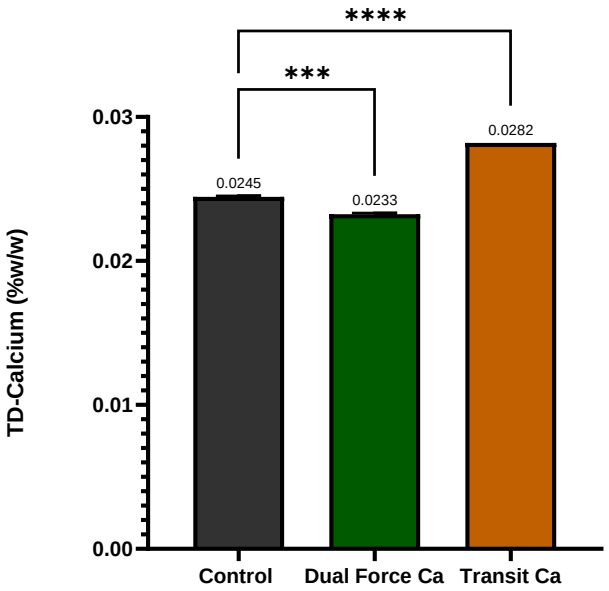

Figure 6: Comparison of Calcium levels in apples collected from control and treated trees at commercial harvesting time.

Fruits were tested to assess the impact of treatments on improving Calcium levels in fruits. According the results, Transit Calcium significantly increased the Calcium levels in fruits by 15%. However, there was no increment observed in Dual Force Calcium treated fruits (Figure 6).

6. Conclusion

The foliar application of Transit Calcium increased the average fruit weight in Pink Lady® apples. Also, Transit Calcium significantly increased the fruit firmness and fruit Brix levels compared to all other treatments. In addition, Transit Calcium significantly increased the Calcium levels in fruits. Therefore, it can be concluded that the foliar application of Transit Calcium is beneficial in improving fruit weight, Brix levels, and Calcium levels in fruits and thereby improve fruit quality in Pink Lady® apples.