Early Vineyard Establishment by Assessing Physiology of Young Vines Treated with Amino Boost Transit Max (ABTM)®

Dual Chelate Fertilizer Pty Ltd.
PO Box 963, 162 New Guinea Road Robinvale VIC 3549, Australia
Correspondence: Research and Development Division,
Email: info@dualchelate.com

The healthy establishment of newly planted vines is an important measure to encourage early production. Stimulating shoot growth and root development is vital in the first year of planting, and can be done in several ways. These include providing plant nutrients to increase growth, increasing the tolerance to stresses that young vines experience when replanting occurs, and facilitating the environment to grow young vines.

Key words: New vines, stimulating shoot and root growth, increased stress tolerance

Introduction

Amino Boost Transit Max (ABTM®) acts as a soil lubricant, facilitates absorption of stress, acts as a solvent for insoluble plants nutrients, stimulates plant growth and assists in the uptake and translocation of nutrients in plants. In this study, the effects of ABTM® on the growth of young grapevines will be assessed

ABTM® is a plant biological stimulant which boosts the synthesis of plant growth regulators. ABTM® is applied with the aim of heightening the growth performance of plants in stressful situations and increasing plant nutrient transport. It contains 17 organically derived amino acids (10%), kelp (6%), fulvic acid (4%) and biologically active organic molecules (2%, patented product).

Objectives

The specific objectives of this study are:

1. To evaluate how fertigation of ABTM® influences plant height and trunk diameter.
2. To analyze the root growth of newly planted vines when exposed to ABTM® applications.
3. To measure the concentration of plant nutrients and nutrient uptake in newly planted vines treated with ABTM®

Materials and Methods

Site Selection and Trial Design

Newly planted vineyards in the Piangil region were selected to test the application of ABTM®. One vineyard contained Ruby Red vines and the other contained Zeweigelt vines.

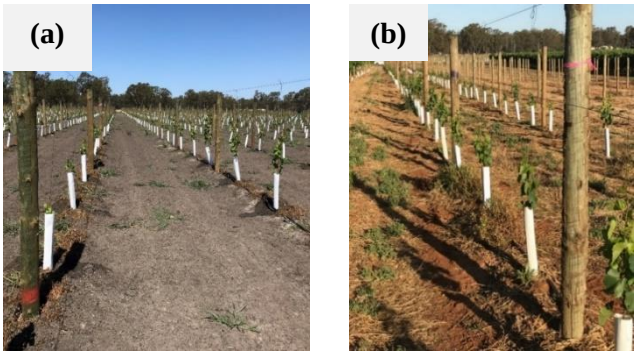

Figure 1: Trial sites of young plants, Ruby Red (a) and Zeweigelt (b), in Piangil.

Application Rates

Treatment	Application rate	Application date
ABTM®	25L/ha	13th of October 2019

Table 1: Application rates of ABTM® on newly planted vines

Sampling Method

Thirty (6x5) young control and ABTM® treated plants were separately selected from Ruby Red and Zeweigelt vines, and plant height and trunk diameter were measured (at 50 cm from the ground) at monthly intervals from point of application to 5 months. Leaf tissue, soil analysis and root growth assessment were conducted at the end of 5 months.

Results

Ruby Red Vine Results – Vine Height

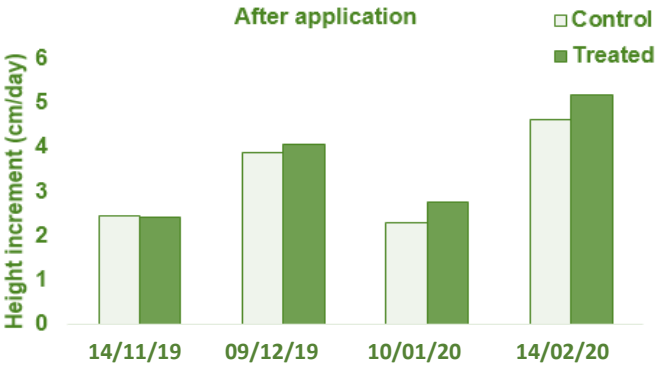

Figure 2: Increment rate of height after application of ABTM® during the trial period.

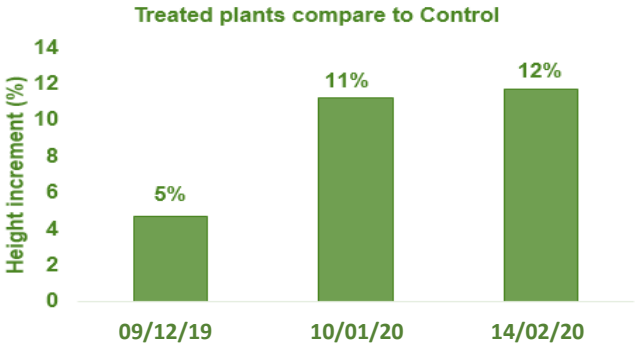

Figure 3: The height increment percentage of ABTM® treated plants after application compared to control plants during the trial period.

Ruby Red Vine Results – Vine Diameter

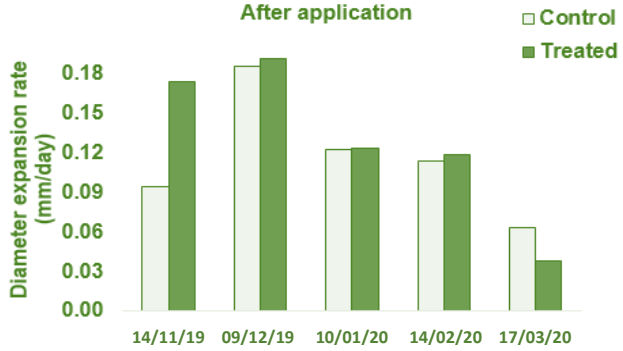

Figure 4: Rate of diameter expansion after application of ABTM® during the trial period.

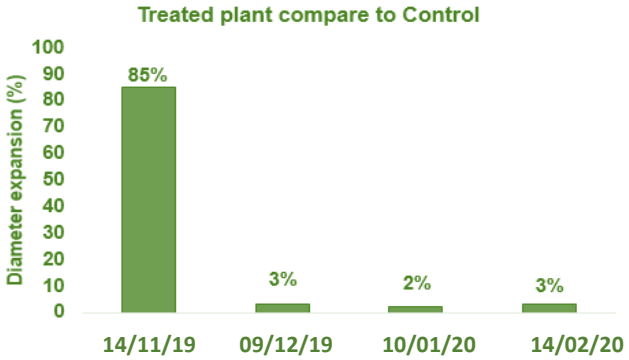

Figure 5: The diameter increment percentage of ABTM® treated plants after application compared to control during the trial period.

Zeweigelt Vine Results – Vine Height

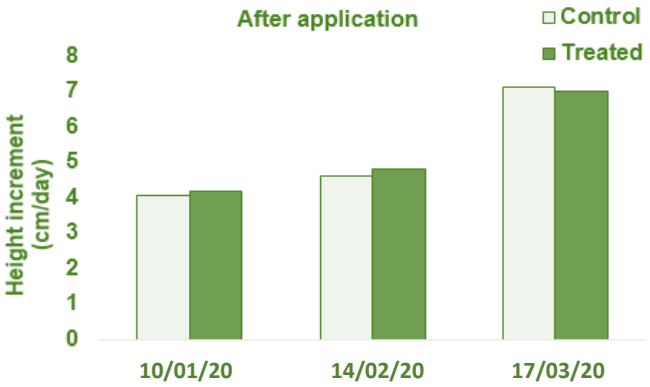

Figure 6: Increment rate of height after application of ABTM® during the trial period.

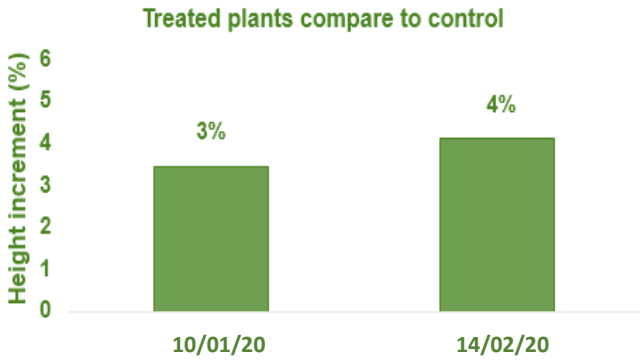

Figure 7: The height increment percentage of ABTM® treated plants after application compared to control during the trial period.

Zeweigelt Vine Results – Vine Diameter

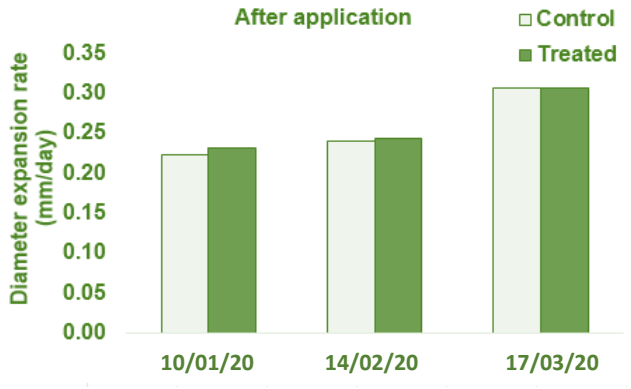

Figure 8: Expansion rate of diameter after application of ABTM® during the trial period.

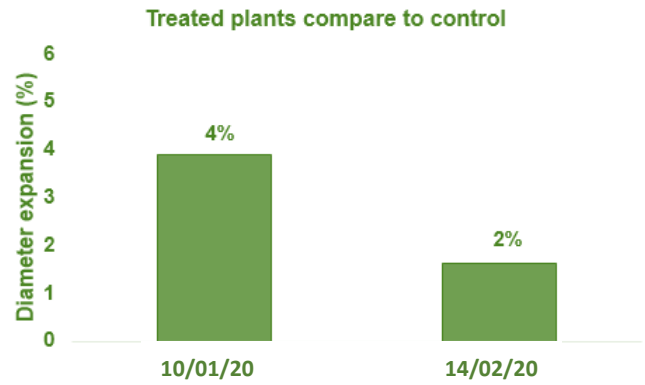

Figure 9: The height increment percentage of ABTM® treated plants after application compared to control during the trial period.

Nutrient Content in Leaves – Ruby Red Vines

Table 2: Nutrient availability of ABTM® treated leaves compared to control in Ruby Red vines

Nutrient	Efficiency enhancement
Nitrogen (N)	4%
Phosphorus (P)	3%
Calcium (Ca)	40%
Magnesium (Mg)	17%
Sulphur (S)	4%
Manganese (Mn)	10%
Iron (Fe)	4%
Zinc (Zn)	11%

Nutrient Content in Leaves – Zeweigelt Vines

Table 3: Nutrient availability of ABTM® treated leaves compared to control in Zeweigelt vines.

Nutrient	Efficiency enhancement
Nitrate (NO_3^-)	44%
Potassium (K)	12%
Calcium (Ca)	16%
Magnesium (Mg)	23%
Manganese (Mn)	36%
Boron (B)	58%
Copper (Cu)	185%
Iron (Fe)	9%

The concentration of N, P, Ca, Mg, S, Mn, Fe and Zn in the leaves of treated Ruby Red increased by 4%, 3%, 40%, 17%, 4%, 10%, 4% and 11% respectively compared to the control leaves. In the treated Zeweigelt leaves NO_3^- N, K, Ca, Mg, Mn, B, Cu and Fe increased by 44%, 12%, 16%, 23%, 36%, 58%, 185% and 9% respectively compared to the control leaves.

During the replanting of young vines, N is important for the emergence of leaves and formation of a dense canopy, which facilitates higher plant growth. In both varieties, higher N concentration was reported in treated leaves as compared to the control. Additionally, Ca is important for enzyme activity and for strengthening cell wall membranes which are vital for the establishment of young vines. Ca was higher in treated leaves compared to control in both varieties. Furthermore, the Mg, Fe and Mn content of treated leaves was higher than the control leaves which is important for higher plant growth and sugar formation via chlorophyll formation in young vines. Also, the higher Cu content in treated Zeweigelt leaves stimulates N metabolism in young vines. According to the results, young ABTM® treated vines showed higher content of the above nutrients in leaves than the control, resulting in the earlier establishment of the young vines in the field.

Root Growth with ABTM®

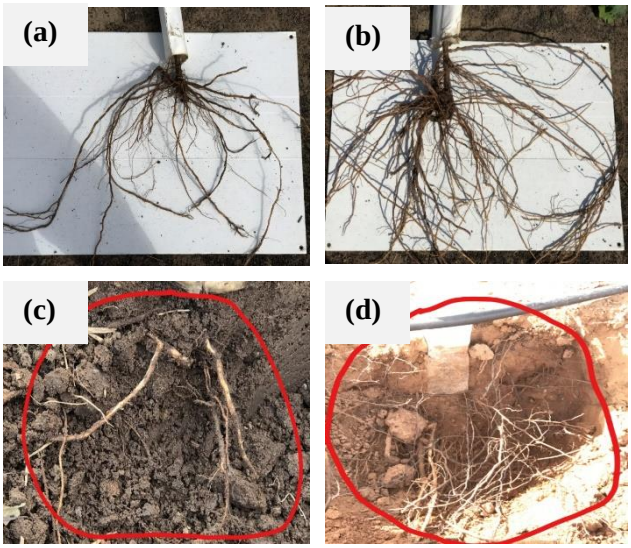

Figure 10: Root system development of control (a) and ABTM® treated (b) Ruby Red vines and control (c) and ABTM® treated (d) Zeweigelt vines.

Figure 17 (a), (b), (c) and (d) shows the root development differences between control and ABTM® treated Ruby Red and Zeweigelt vines, with a higher root density (larger number of lateral roots) in the treated vines as compared to that of the control plants. When replanting young vines, root system development is important for the absorption of nutrients and to promote early establishment of young vines.

Discussion

During the trial period, the height of Ruby Red treated plants increased by a range of 50 to 97% after the ABTM® application. This represents a 5 to 12% increase compared to the range of height increases in the control plants. Furthermore, height increment rates of treated plants were 2.4 - 5.2cm of growth/day after the application of ABTM®. The diameter of treated vines expanded by a range of 2 to 73% after application, which was a 2 to 85% compared to the range within the control plants. The average diameter expansion rates were 0.03 to 0.2 mm/day after application.

In treated Zeweigelt vines, height increased by a range of 29 to 37% after the application of ABTM® during the trial period, a 3 to 4% increase compared to the height increase range within the control plants. Height increment rate of the treated young vines ranged between 4.2 to 7.0 cm of growth/day after application. The diameter of treated vines expanded by 12 to 50% after ABTM® application, an increase of 2 to 4 % compared to control. Furthermore, diameter expansion rates varied between 0.22 - 0.30 mm/day after application.

Conclusion

ABTM® treated vines showed higher early growth (in terms of height and diameter increment) and denser root growth development than the control vines for both test varieties. This indicates that ABTM® is an important addition to the vineyard planting regime for healthy establishment of young vines.