Evaluation of Berry Growth and Sugar Accumulation of Grapevines Treated with Complete Trace Plus (CTP®)

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The berry growth begins just after the fruit set and characterises with increasing berry weight, volume or diameter during the development. It typically follows a double sigmoid curve resulting from two consecutive stages of growth distinct by a phase of slow or no growth (Dokoozlian, 2000). In order to achieve heavier yields, plants need to be healthy with optimal macro and micro nutrients available to enhance production and outputs. Both these macro and micro elements are as equally as important, however are required in different concentrations. Trace element fertilisers are particularly important to provide plants with all the necessary micro nutrients to ensure optimal growth whilst also producing excellent yields. Complete Trace Plus® contains a mixture of macro and micro nutrients along with amino acids and Biologically Active Organic Molecules which was applied on Shiraz vines to assess differences in berry growth (berry diameter) and sugar accumulation (°Brix). It was concluded that there was no significant difference between the berry growth or °Brix levels in berries treated with CTP® and the control bunches.

Key Words: Berry growth, sugar accumulation, macro and micro nutrients, Shiraz, amino acids, Biologically Active Organic Molecules.

Introduction

Dual Chelate Fertilizer Pty Ltd has developed Complete Trace Plus® which is a premium liquid macro and micro nutrient fertiliser with added organically derived amino acids and Biologically Active Organic Molecules (BAOM). Complete Trace Plus® provides plants with a necessary dose of many key nutrients for improving the quality of produce, assisting in abiotic stress tolerance, enhancing plant growth through increased metabolism, enzymatic reaction, the creation of necessary compound molecules and also improving nutrient mobility within plants for increased nutrient efficiency. Together, these qualities can all improve the potential yield of crop through better plant health and increased plant nutrient status. Complete Trace Plus® is a foliar applied product which is dually chelated by 17 organically derived amino acids and BAOM. It contains chelated Iron (Fe), Zinc (Zn), Manganese (Mn), Boron (B), Copper (Cu), Molybdenum (Mo) and Cobalt (Co). Complete Trace Plus® is typically applied early into the season for wine grapes to supply the vines with enough trace elements for flowering and bunch development. Along with the associated benefits of each micro elements, for

each micro elements, amino acids and BAOM play crucial roles in ensuring a high yielding crop. Amino acids are used all throughout the plant for hundreds of different processes such as protein biosynthesis, photosynthesis, stomata activity, chelation and also have an influence on soil microbe activity. Applications of amino acids though Complete Trace Plus® reduces the energy consumption used to make amino acids and focuses the plants energy on growth and development which directly influences the yield. Kelp has many beneficial effects on plants due to the natural growth promoting hormones, polysaccharides and micro-nutrients.

BAOM are organically derived and are the patented technology used by Dual Chelate Fertilizer. These organic molecules contain highly plant-active compounds which are able to significantly increase the movement of nutrients within the plant, enhance root and shoot growth and helps plants increase their tolerance against abiotic stresses through increased gene expression and hormone activity.

In this study, the effect of a foliar application of Complete Trace Plus ® on Shiraz wine grapes is evaluated to observe the berry growth and sugar accumulation between control and treated grapes.

Objectives

The specific objectives of this study are to:

1. To evaluate the effect of Complete Trace Plus® on the berry growth through measuring berry diameters.
2. To assess the difference Complete Trace Plus® has on sugar accumulation in Shiraz wines grapes.

Materials and Methods

This trial was conducted on a Shiraz wine grape block located in Robinvale, VIC. A control and treated area were marked with samples and photos being taken from these areas separately.

One application of Complete Trace Plus was foliar applied just before E-L stage 9 (2 to 3 leaves separated; shoots 2-4cm long) at a rate of 5L/ha. Table 1 highlights the application details.

Table 1: Application rate and timing of CTP® on Shiraz wine grapes

Treatment	Application Rate	Application Time
CTP®	5 L/ha	E-L stage 9
Control	0 L/ha	E-L stage 9

Observations

Diameter of Berries (Berry Growth)

The diameter of berries was determined by selecting 75 berries from 25 bunches from the control and treated areas separately. A berry from the top, middle and bottom of each bunch was selected and monitored for growth continuously from pea size (E-L stage 31) to harvest.

Sugar accumulation (°Brix)

To determine the sugar accumulation, 75 berries were randomly selected from 15 rows separately from control and CTP® treated areas and squeezed on to the digital refractometer. Each berry was assessed for its sugar accumulation. The °Brix values were averaged for the final reading.

Results

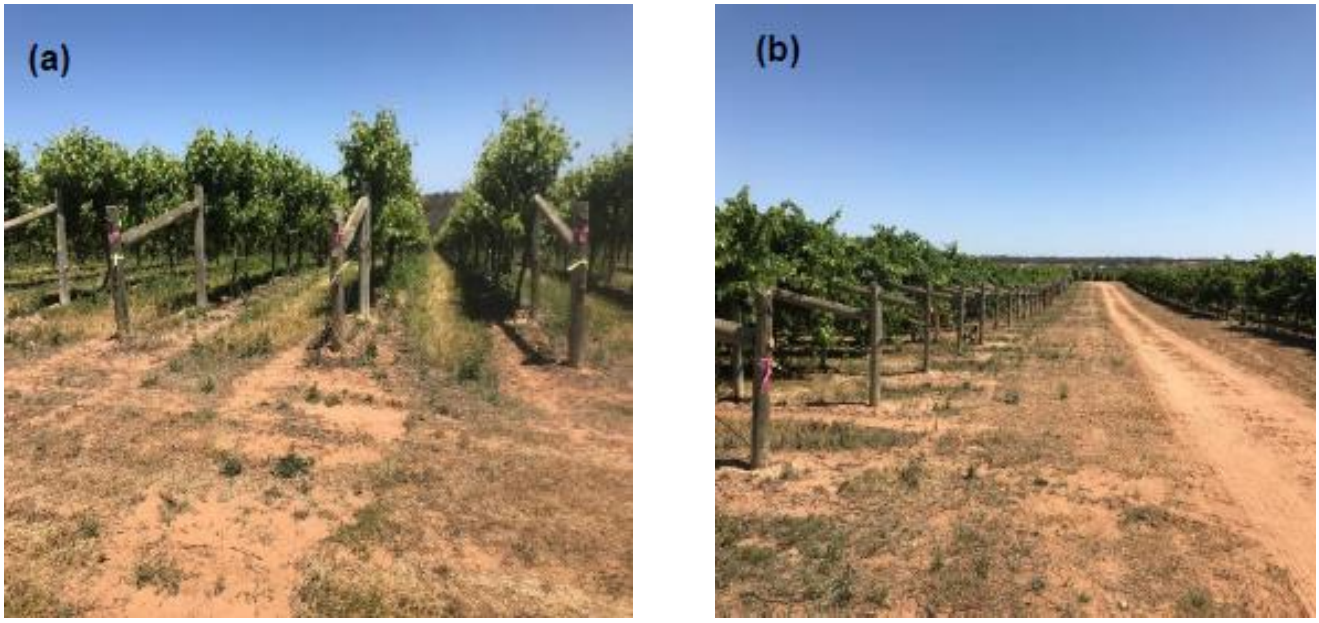

Figure 1: Control (A) and CTP® treated (B) Shiraz vines in the trial site in Robinvale, VIC.

Figure 2: Measuring berry growth in a selected bunch.

Figure 3: Digital refractor mete used to measure °Brix levels in control and treated grapes.

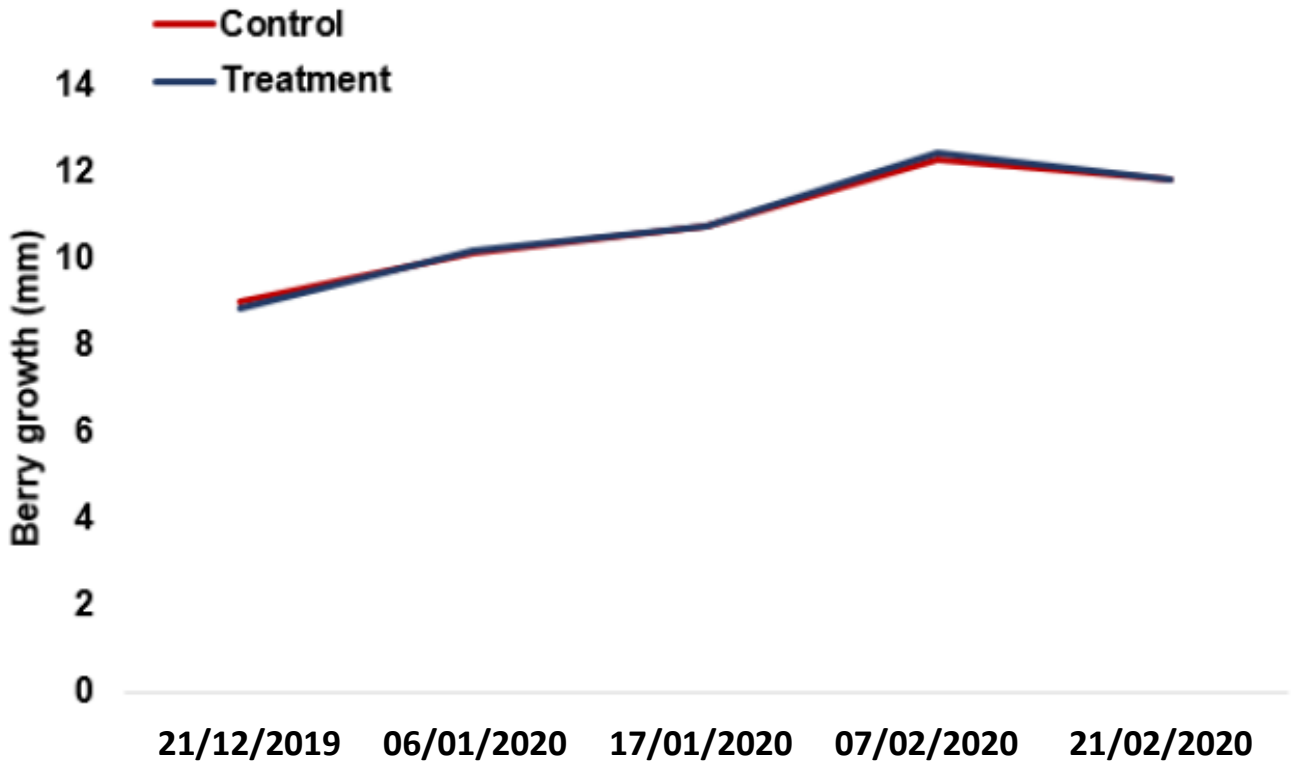

Figure 4: The average berry diameter (mm) of Shiraz wine grapes comparing CTP® treated grapes and control grapes. No significant difference.

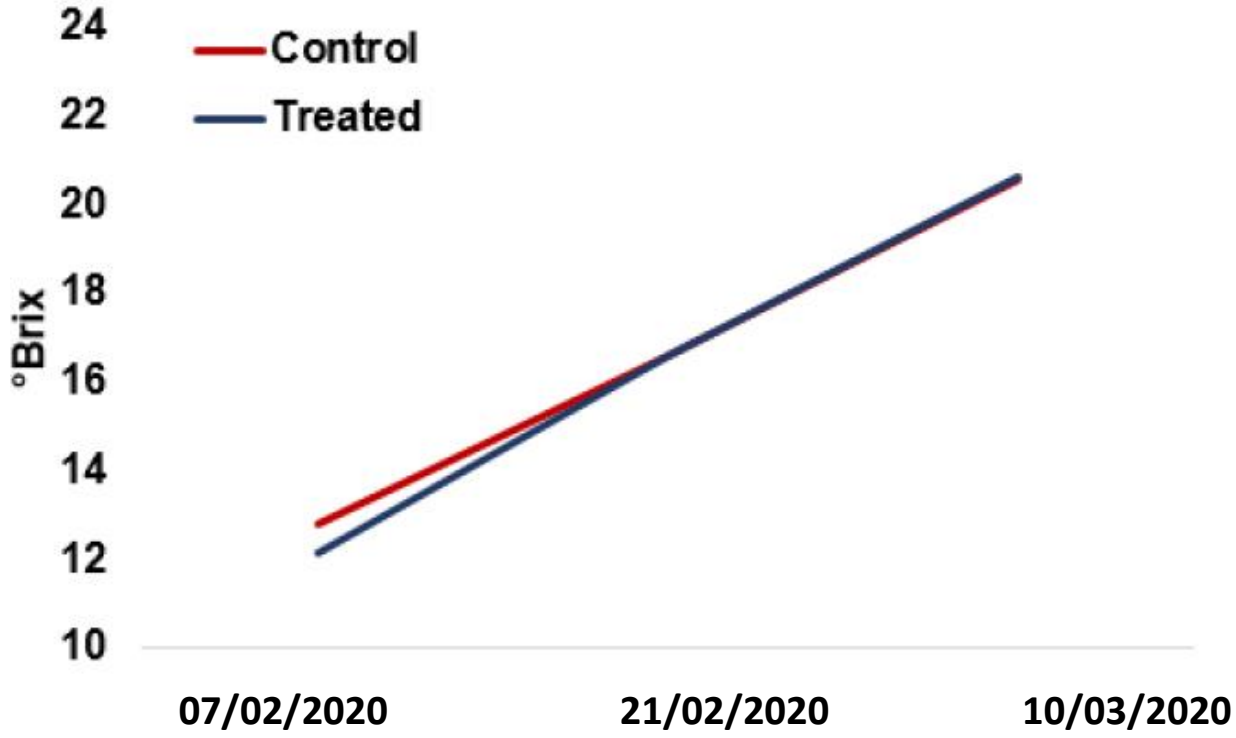

Figure 5: The °Brix levels of Shiraz grape bunches treated with CTP® compared to control bunches. No significant difference.

Discussion

When looking at both figures 4 and 5, it can be seen that there is no significant difference between the control and CTP® treated Shiraz wine grapes in neither the berry diameter (figure 4) or the °Brix levels (figure 5). Although there was no significant difference, a previous study done on the yield increases associated with CTP® on Shiraz wine grapes showed that there was a percentage increase of 22% in the average bunch weight of Shiraz bunches treated with CTP®.

The reason why there was no significant difference is possible due to the extra energy and sugars the plant needed to make as a result of a larger and heavier bunch with more berries. However, due to more berries, yield will be increased resulting in more income for the vineyard.

Conclusion

In conclusion, there was no significant difference between the control and treated (CTP®) Shiraz wine grapes. However, previous studies conducted on Shiraz vines with CTP® did show a significant increase in average bunch weight compared to the control. This insignificant difference displayed between berry growth and total sugar accumulation may have been a result of a dilution effect in sugar and biomass due to more berries on the bunches.