Evaluation of Yield of Grapevines Treated with Complete Trace Plus (CTP®)

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

Yield is one of the main parameters considered when evaluating crop productivity as it relates directly to the Return on Investment (ROI) of the farming organisation. In order to achieve maximum 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 increases in bunch weights for an analysis on yield estimates. It was concluded that there was a percentage increase of 22% in the weight of bunches treated with Complete Trace Plus® in comparison to the control.

Key Words: Yield, bunch weight, 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, 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 yield difference between control and treated grapes, specifically looking at the average bunch weight.

Objectives

1. To evaluate the effect of Complete Trace Plus® on the final bunch weight of Pinot gris wine grapes.
2. Determine if Complete Trace Plus® should be incorporated into fertiliser regimes in an effort to increase yields.

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

Bunch Weight Sampling

In order to evaluate yields, average bunch weights were recorded for CTP® treated Shiraz vines and control Shiraz vines. At harvest time, 80 bunches were randomly harvested from 80 vines from the CTP® treated area and the control areas separately. Each bunch from the treated and control vines were then subsequently weighed separately and then averages to achieve the average bunch weight.

A graph was made using Graph Pad Prism 7 to evaluate the percentage differences between the CTP® treated Shiraz vines and the control Shiraz vines.

Results

Figure 1: Shiraz vines in Robinvale, VIC. Pin tags highlight treated rows.

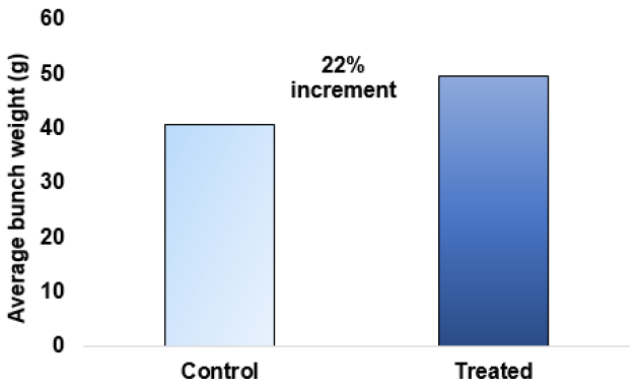

Figure 2: Average bunch weights of bunches collected off CTP® treated Shiraz vines and control Shiraz vines.

Discussion

When looking at the graph presented in figure 2, it can be seen that there is a difference between the average bunch weight of Shiraz bunches from vines treated with CTP® compared to the control vines which followed the farmers annual fertiliser program. CTP® vines produced bunches which weighed on average 50g and control bunches produced bunches which weighted on average 40g. This produced a percentage increase of approximately 22%. This concludes that grape vines treated with 2 L/ha of CTP® just before E-L stage 9 on average increased the average bunch weight by 22% when comparing this to the farmers standard fertiliser regime. This increase in average bunch has a direct correlation to an increase on the return on investment received. According to study on same Shiraz block analyzing berry growth using CTP®, there was no difference in berry growth between CTP® treated and control bunches. However, there was a 12% increase in fruit set in CTP® treated Shiraz bunches which resulted in a higher bunch weight. The higher bunch weight is an indication of higher yield as a result of the CTP® application.

This increase in average bunch weight seen in Shiraz vines treated with CTP® is a result of a number of factors related to the supplied micro nutrients, amino acids and BAOM.

Supplying a foliar application of CTP® provided the emerging buds with Boron which is a key element in ensuring high flower to berry conversion as boron acts as a receptor guiding pollen tube elongation down into the ovary of the flowers. This increases the fertilization rate and hence increases the number of berries on bunches. This increase in the number of berries has a direct correlation to the bunch weight and may be a reason why the average bunch weights for Shiraz treated with CTP® on average weighed more than the control. Along with Boron, Zinc also plays a major role in ensuring the development of new emerging leaves and buds. Zinc an element which is used to make the Plant Growth Regulator (PGR) Auxin. Auxin is responsible for the elongation of new shoots and roots and is also involved in the formation of chloroplasts. Auxin effects these chloroplasts via auxin signalling which can increase the expression and regulation of genes related to chloroplast development. These chloroplasts are the housing for the photosynthesis reaction which creates energy for the plant through sugars, carbohydrates and starches. These molecules are then used for reactions which promote normal leaf growth, pollen development and berry set. These are all important plant phycological developments which can increase overall plant health and also have an effect on bunch weights and yields.

Zinc as well as Copper, Iron, Boron and Molybdenum are also heavily involved in the activation of over 300 enzymes in the plant system. These enzymes assist in aiding and speeding up reactions to ensure proper plant health. Although not all these enzymes have a direct correlation to bunch growth, when overall plant health is increases, there are benefits which are associated to better bunch quality including increased sugar translocation, pollen formation and more available energy for optimal berry growth. Some of these enzymes include Copper-Zinc superoxide dismutase and nitrate-reductase, nitrogenase.

Conclusion

In conclusion, using CTP® will increase bunch weights in wine grapes through increasing the flower to fruit ratio by increasing the likelihood of fertilisation, promoting the development of pollen tubes and guiding them towards the ovaries in flowers, increasing the overall health of plants by providing a blanket of micro nutrients, encouraging the production of enzymes which can increase the quality of bunches and finally providing heightened sugars and carbohydrates to promote the formation of large berries and bunches which have direct influences on bunch weight and yields.