

Improving Yield and Canopy Production on Underperforming Shiraz Vines through Applications of Transit Amino Boost 840®

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Abstract

Underperforming vines can significantly affect not only the yield, fruit quality and income generated from the vineyard but can also damage the vines themselves as there could be an underlying issue affecting the vines, such as nutrition, water availability and quality, biotic and abiotic stresses and soil structure and texture. It is also essential to ensure adequate canopy cover on the vines as it is crucial for photosynthesis and the creation of energy for the vines. Still, it also provides beneficial shade to protect the developing grape bunches from the elements, such as harsh sun. When there is inadequate canopy cover or low vigour, the developing grapes can be damaged by the sun, causing them to shrivel, discolour, or crack. Furthermore, these damaged grapes can become an attraction for fungal diseases and pests, causing more complications to the biosecurity of the vineyard. Developments to increase the canopy have been explored, particularly researching the benefits of applying amino acids to boost foliar growth and increase bunch weights in Shiraz vines.

Keywords: Underperforming vines, fruit quality, canopy cover, amino acids, Shiraz vines

1. Introduction

Increasing canopy production and bunch weight improves the productivity of vines, resulting in more income and better vine health. Applying amino acids to underperforming vines has been shown to improve their health status by supplying essential amino acids directly to the plant. The vines don't need to expel extra energy synthesising amino acids by supplying amino acids directly. Providing plants with amino acids, they can be used in the photosynthetic reaction, help increase nutrient absorption, reduce stress-related issues that the vine may be experiencing, support plant growth hormone production, improve the microbial activity in the soil and also provide plants with beneficial amino acid nitrogen which can be utilised to make proteins and new growth.

Dual Chelate Fertilizer Pty Ltd has formulated an amino acid-rich fertilizer called Amino Boost 840®. This product contains 85% amino acids, 16% nitrogen (amino nitrogen), and 2% biologically activated organic molecules. Amino Boost 840® is applied through foliar or fertigated applications, which assists plants in stress management. It promotes chlorophyll formation for improved photosynthesis, improves stress tolerance, increases the uptake of other fertilizers and promotes the formation of new growth. This study was conducted on an underperforming block of Shiraz vines to improve the vines by boosting the production of adequate canopy and improving bunch weight and berry quality.

2. Objectives

The specific objectives of this trial were to:

- To assess the performance of Amino Boost 840 in increasing canopy growth in Shiraz vines.
- Improve berry production and increase bunch weight through the application of foliar and fertigated applications of Amino Boost 840

3. Materials and Methods

A block with old Shiraz vines in Mudgee, NSW, was selected to receive applications for Amino Boost 840 due to the farm managers' concerns about underperformance. After examining the block, it was identified that the Shiraz vines had low canopy production and low bunch weights. It was noted that there were no disease issues present in the block.

Amino Boost 840 was applied thrice to the vine's foliar and fertilised during the early growing season. Table 1 shows the application rates and timings of Amino Boost 840.

Table 1: Application rates and timings of Amino Boost 840 on underperforming Shiraz vines.

Treatment	Application Rate	Application Time
Amino Boost 840	3 kg/ha (Fertigated)	Inflorescence visible (E-L 12)
	1.5 kg/ha (Foliar)	Inflorescence swelling (E-L 17)
	1.5 kg/ha (Foliar)	Pea-size berries (E-L 31)

During and after the application of Amino Boost 840, the block was regularly inspected to monitor its progress. Photos were taken to measure the visual improvements.

4. Results



Figure 1: Image of a vine during the application of Amino Boost 840



Figure 2: Image of a vine after the application of Amino Boost 840



Figure 3: Image of a vine after the application of Amino Boost 840

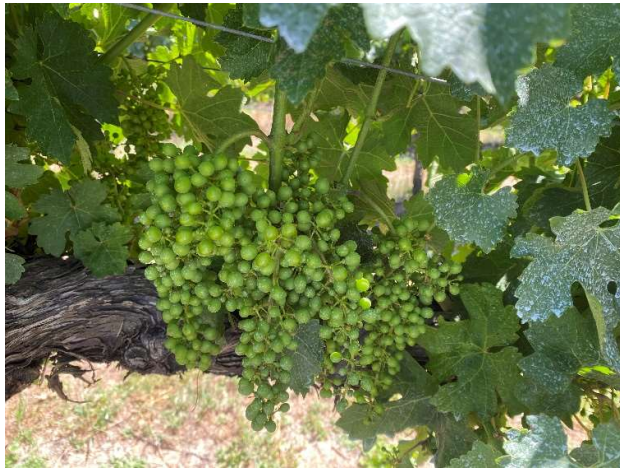


Figure 4: Image of Shiraz grape bunches after Amino Boost 840 treatment

5. Discussion

Amino Boost 840® is an amino acid-rich fertilizer high in nitrogen-based organic compounds and bio-stimulants. This formulation assists in improving plant stress tolerance, increasing the photosynthetic pathway, enhancing the uptake of other foliar-applied fertilisers, and aiding in producing plant hormones such as Auxin, which is necessary for new growth.

This study was conducted on Shiraz grape vines, which have been shown to have poor vigour and, hence, low canopy growth. As mentioned, canopy cover is critical to successfully producing and protecting table grapes. However, vine canopy cover can be influenced by many factors that can induce plant stress. Hence, Amino Boost 840® was applied to study the beneficial effects of increasing canopy cover and maintaining good berry growth while exposed to stressful growth.

Figure 1 shows a section of vine during applications of Amino Boost 840. It can be seen that there is very minimal and uneven canopy cover. At this time in the vines' growth cycle, it is essential to have good leaf production to maximise photosynthesis to ensure enough sugar and energy production is required to promote the production of flowers and good pollination. Good canopy cover protects these emerging flowers from the elements that otherwise may cause poor fruit production.

Figures 2 and 3 show images of the vines after the applications of Amino Boost 840. It can be seen that there is a noticeable increase in the canopy cover with more lateral shoot growth as a result of increased apical meristem production. This reduced the severity of the unevenness in the canopy. This sudden growth boost was assisted by the 17 different amino acids in Amino Boost 840®, mainly facilitated through the amino acid Serine. Serine is an amino acid that enables the production of plant growth regulators such as auxin, which are known for their role in new shoot development and cell elongation.

After Amino Boost 840 applications, the leaves were also noted to be greener, meaning that chlorophyll concentrations in the leaves increased because of the Amino Boost 840. This increase in leaf greenness comes from the plant relocating the amino acid nitrogen provided by Amino Boost 840 into the production of new chlorophyll protein complexes.

During berry formation, it was also noted that bunch elongation had also improved in the vines treated with Amino Boost 840. Bunch elongation occurs naturally by producing the plant growth regulator Gibberellic acid. However, applying a foliar application of Gibberellic acid directly to the bunches before flowering is common practice to ensure that bunch stretch is optimal to prevent yield losses through disease and fungal damage. Gibberellic acid is formed within new cells of plants and consists of 8 different forms, which not only help with bunch elongation in grapes but also assist in the elongation of new plant tissue cells found in shoots, young leaves, and flowers. It is also found in seeds and promotes the germination of the first shoots and roots by weakening the seed coats because gene expression regulates the production of Gibberellic acids.

The pathways, signals, and receptors associated with Gibberellic acid production and movement have not been thoroughly researched. However, recent research shows that a growth receptor called DELLA and other various proteins are naturally involved in producing Gibberellic acids. DELLA is a growth-inhibiting protein that is often seen in new cells. Gibberellic acid has been

proven to have an integral role in binding and destroying these DELLA growth repressors by actively binding and destroying the compound, thus promoting the elongation and development of new cells. When there are more DELLA growth repressor proteins, the plant's production of Gibberellic acid increases as it is a pathway for increased growth (Harberd, Belfield and Yasumura, 2009). This mechanism is known as the GA-GID1-DELLA mechanism, and untimely induces the breakdown of DELLA growth repressors through the upregulation of Gibberellic acids.

Amino Boost 840 assists in promoting the production of DELLA proteins, increasing the concentration of Gibberellic acids. It contains 85% naturally derived amino acids, which consist of 17 different forms. These amino acids can be used to make proteins that promote the influx of Gibberellic acids.

The farm manager also noted a significant increase in yield production at harvest. 3 times the average yield, approximately an increase from previous years. This increase in yields comes from the amino acids contained in Amino Boost 840, which supply plants with enhanced processes such as photosynthesis and stomata activity are significantly increased as the plants do not need to spend time and energy on creating these amino acids to be used in proteins and other reaction. With more readily available amino acids, plant processes such as the photosynthetic reaction and stomata regulation are working more efficiently, producing more available energy, which the plant can use to promote the growth of more berries. These organically derived amino acids are also precursors to several key plant-regulating hormones (such as auxin) and speed up enzymatic reactions, increasing plant growth.

6. Conclusions

In conclusion, using Amino Boost 840 will significantly increase the production of underperforming vines. It was observed that using fertigated and foliar applications of Amino Boost 840 improved the chlorophyll density, shoot production, canopy growth,

bunch stretching, and yielded Shiraz grapes. Amino Boost 840 promotes a healthy soil for roots and microbes, increases the plant energy efficiency usage through added amino acids, promotes abiotic stress tolerance, naturally chelating nutrients in the soil through amino acids and BAOM and also increases the mobility of nutrients through the plant system and directing nutrients to where they are in highest demand.

7. References

Harberd, N., Belfield, E. and Yasumura, Y., 2009. The Angiosperm Gibberellin-GID1-DELLA Growth Regulatory Mechanism: How an "Inhibitor of an Inhibitor" Enables Flexible Response to Fluctuating Environments. *The Plant Cell*, 21(5), pp.1328-1339