

4-Vita: a novel biostimulant for improved yield and quality



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Today's agriculture is called to face multiple challenges: to be more productive to cope with the rising food demand, to be more efficient to counter resource-scarcity, and to preserve soils, water and air as well as human health.

Plants for Plants (P4P) aims to improve resource efficiency of crops introducing a new group of biostimulants. In actual practice, biostimulants are often a useful destination for waste materials or by-products, so the discovery of functional active ingredients is rather casual. P4P reverses this approach: first the problem to be solved is identified (drought, stress, etc.), and then tailored compounds, based on specific Standardized Metabolites Phytocomplexes (SMPs) extracted from suitable organically grown plants, are produced and tested.

4-Vita is based on a synergistic combination of specific flavonoids and organic acids: its target is to increase resilience to abiotic stress, in particular by boosting the WUE (Water Use Efficiency), crop yield and quality. Trials were performed in grapevines and apples, thanks also to the co-funding of the EU's LIFE Program (LIFE18 ENV/NL/000043). The trial on grapevine was carried out by the University of Novi Sad on Muscat Hamburg. 4-Vita application increased both yield and quality of the grapes, by inducing higher anthocyanins content and, therefore, coloration. On apples, two trials were performed. The first trial was conducted in 2018 by the University of Novi Sad on Gala and Fuji. The results showed that 4-Vita dramatically increased colour coverage in both cv, firmness and TSS in Fuji. The second trial was performed by the University of Osijek on Gala, applying also a 30% reduction in irrigation. 4-Vita increased colour coverage both in stressed and comfort conditions and firmness as well.

To conclude, 4-Vita proved to be an effective biostimulant both in stressed and in so-called comfort environment, demonstrating that even plants grown in optimal conditions are far from exploiting their whole genetic potential.

Keywords: 4-Vita, apples, grapevines, biostimulant



Plants for Plants 4-Vita increases yield and quality of grape by increasing anthocyanins content

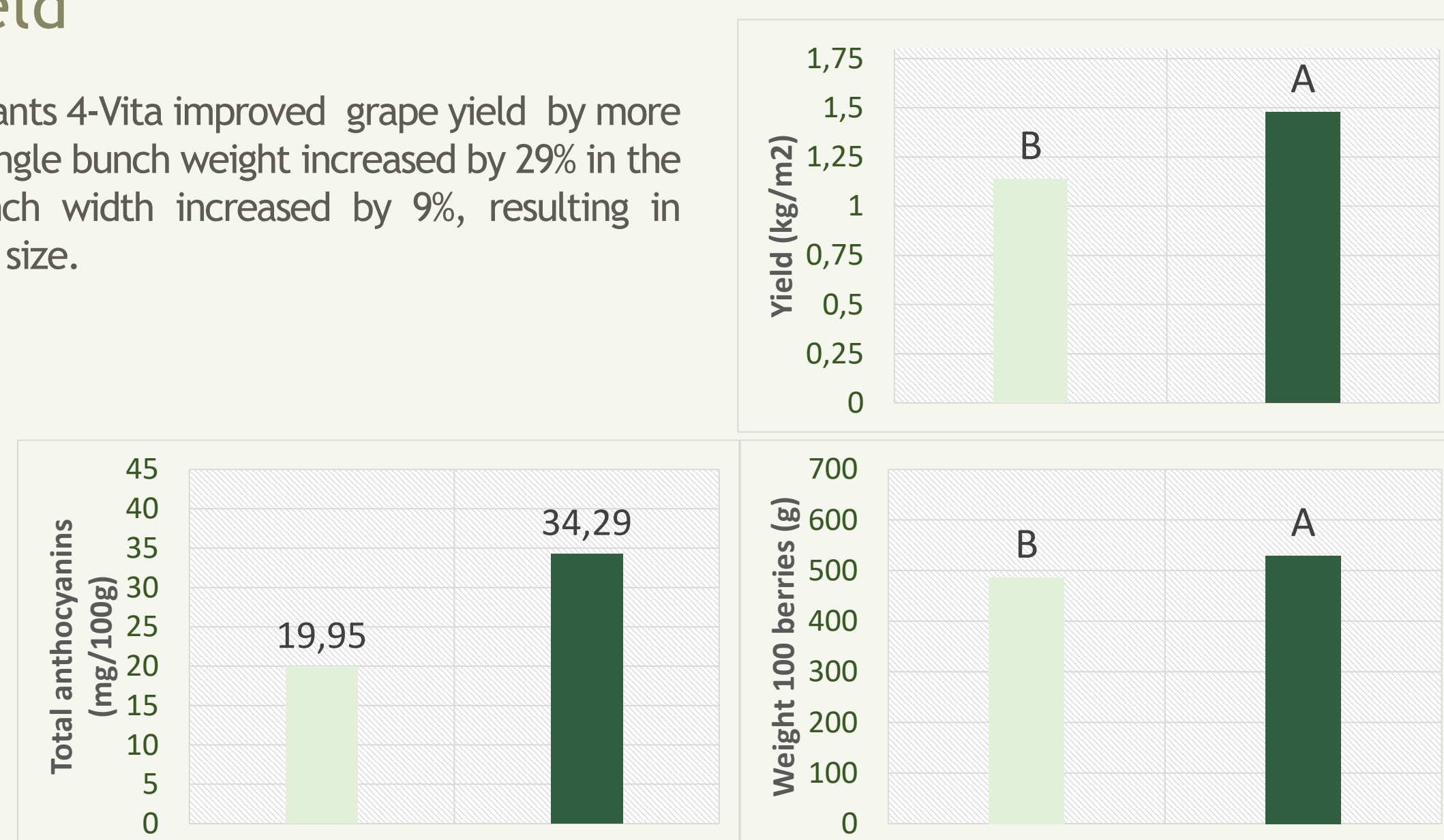
Control P4P 4-Vita

4-Vita was applied on grape (cv. Muscat Hamburg), in 3 times: beginning of flowering, 2 weeks after 1° application, 2 weeks after 2° application.

Effect on the yield

The application of Plants for Plants 4-Vita improved grape yield by more than 29%. As an average, the single bunch weight increased by 29% in the treated plants. Also, the bunch width increased by 9%, resulting in berries and bunches of a bigger size.

No differences were observed for the sugar nor acidity contents. However, the anthocyanins content increased by 72% in the treated bunches, which is required for an appealing color and antioxidant activity.



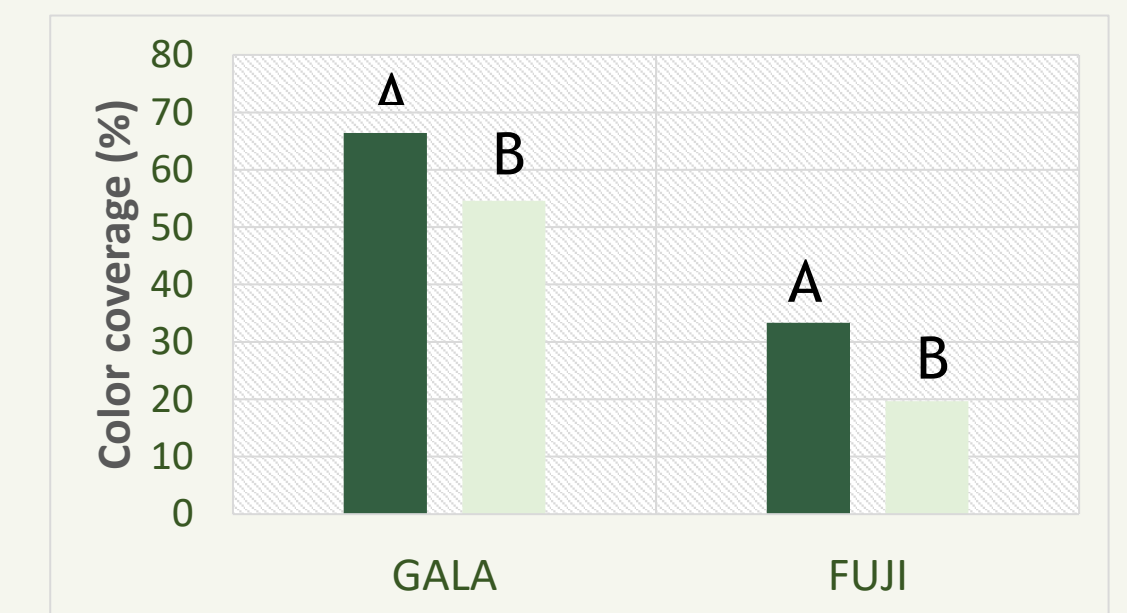
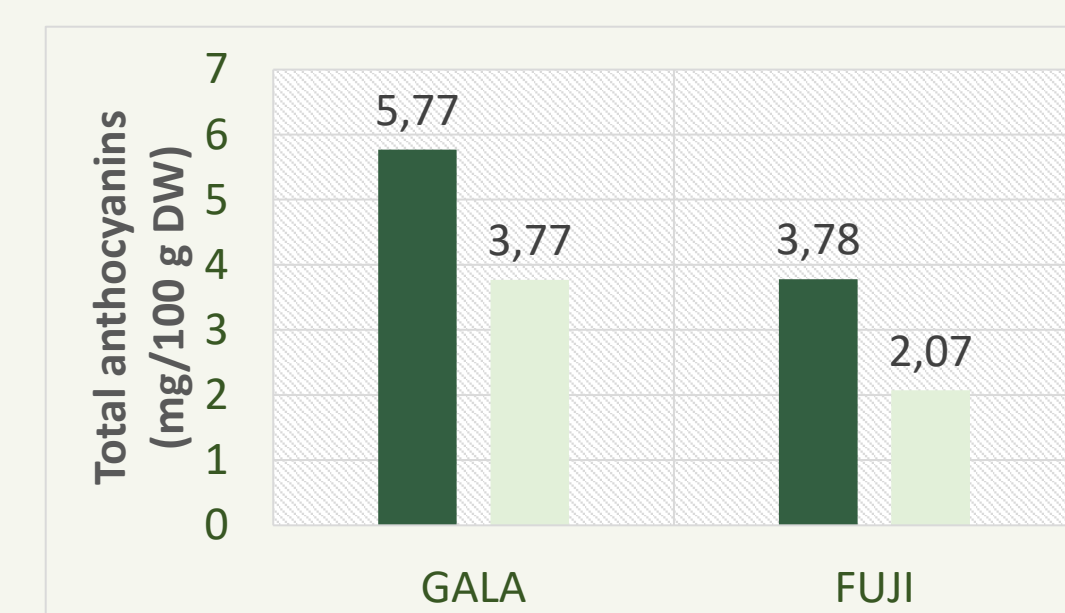
Plants for Plants 4-Vita increases quality parameters of apples

4-Vita was applied on apple (cv. Gala and Fuji), in 3 applications: when fruits were half-size, 2 weeks after the 1° application; when the fruits started to change color.

Treatments	GALA			FUJI		
	TSS (%)	TA (%)	Firmness (N)	TSS (%)	TA (%)	Firmness (N)
4-Vita	11,5 a	0,343 a	8,81 a	13,68 a	0,334 a	6,66 a
Control	10,55 a	0,353 a	9,69 a	12,23 b	0,276 a	6,3 b

As an average, the fruit weight was not influenced by the application of 4-Vita. Only the Fuji variety showed an increase of sugar content (TSS) and firmness with the application of 4-Vita.

The % of titrable acidity (TA) remained unchanged. However the application of 4-Vita increased the color coverage (%) for both variety, 12% more coverage for gala and 14% more for fuji.



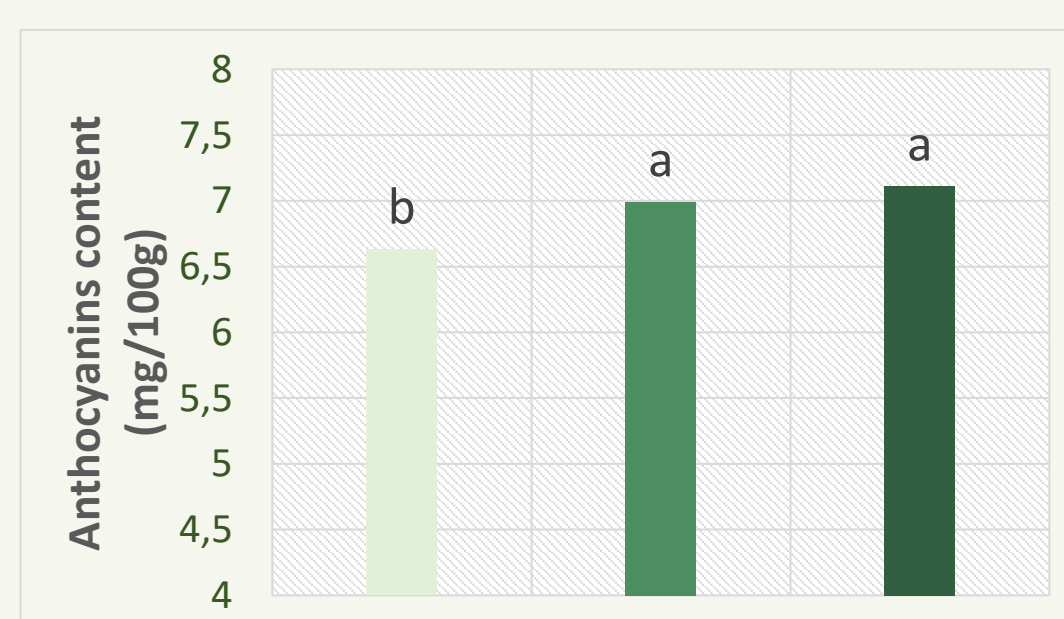
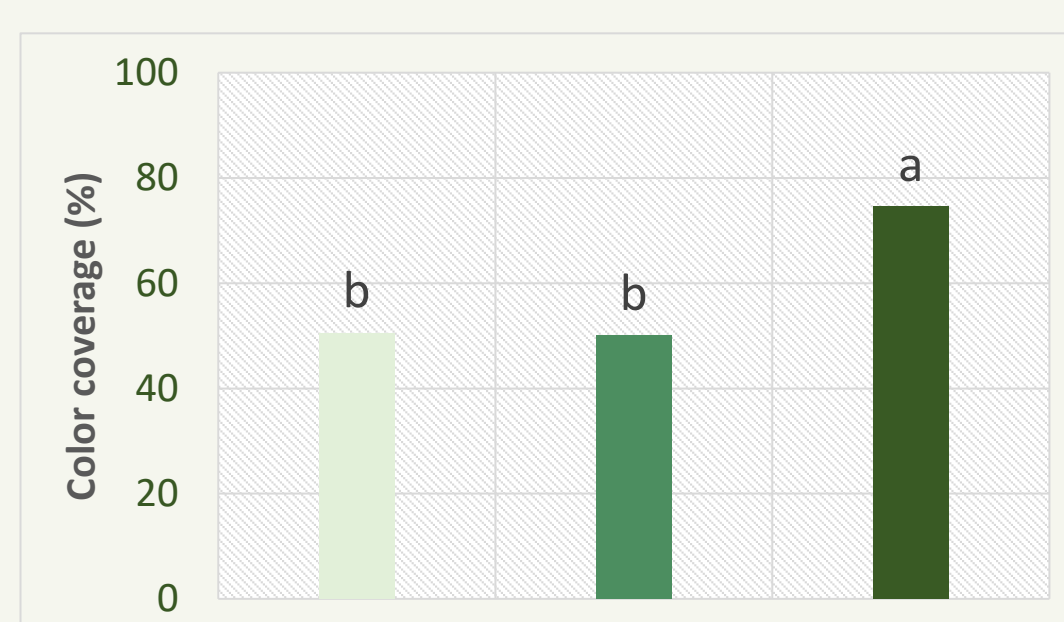
The anthocyanins content increased by 56% and 82% in the treated Gala and Fuji, respectively.



Plants for Plants 4-Vita increases quality parameters of apples in water comfort and stressed conditions

4-Vita was applied in two foliar applications before the start of the drought stress (reduced irrigation) with 10 days interval.

Comfort environment



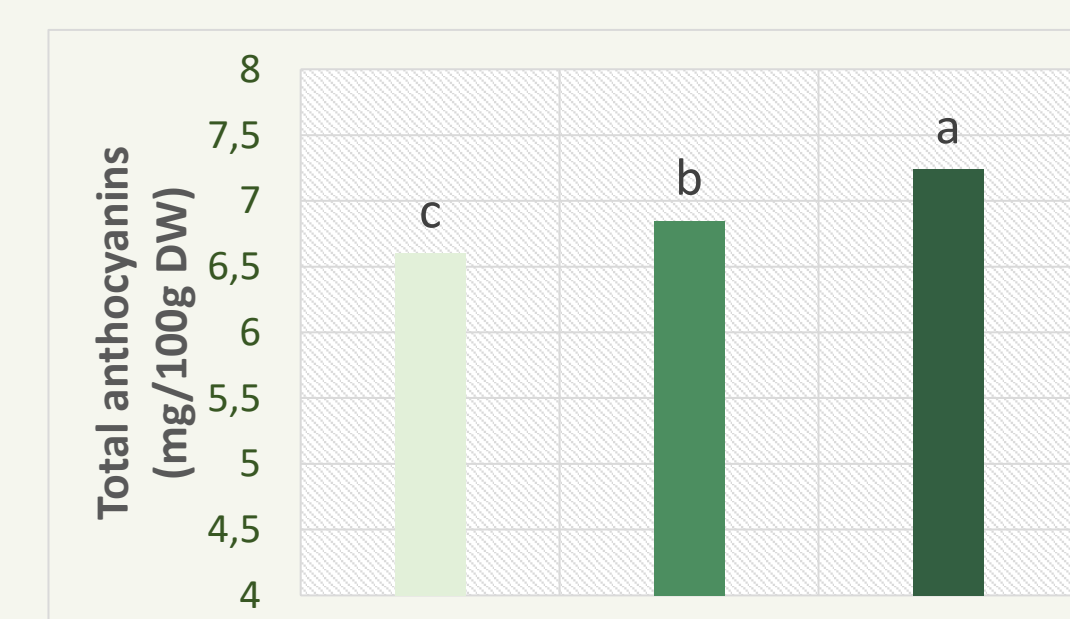
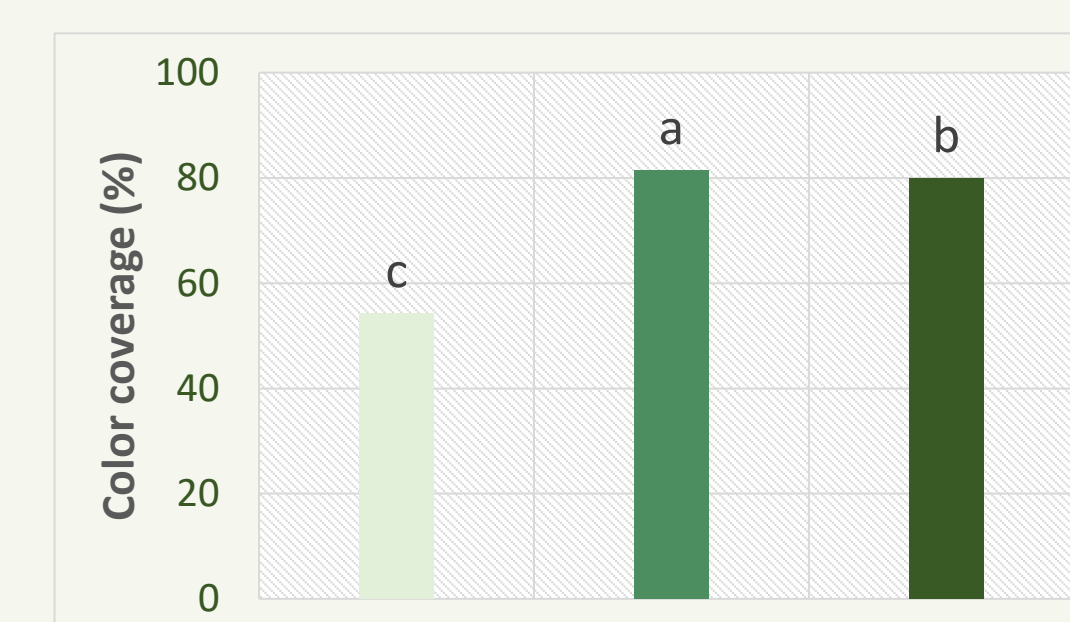
Control 4-Vita, dosage 1 4-Vita, dosage 2

Treatment	Firmness (N)	TSS (%)	Colour	Anthocyanins
UTC, -30%	8,34 d	11,95 a	54,3 d	6,6 d
4-Vita, dosage 1, -30%	8,4 d	11,01 b	81,5 a	6,85 c
4-Vita, dosage 2, -30%	8,79 b	10,64 cd	80 b	7,24 a
UTC, 100%	8,08 e	10,91 bc	50,5 e	6,63 d
4-Vita, dosage 1, 100%	9,25 a	10,63 cd	50 e	6,99 bc
4-Vita, dosage 2, 100%	8,5 c	10,45 d	74,5 c	7,11 ab

A dose effect was observed for different quality parameters. The application of the high dosage of 4-Vita in stressed condition, showed the same TSS than 4-Vita in comfort conditions.

Overall, the color coverage was higher in stress condition, with the application of 4-Vita.

Stressed environment, with -30% of irrigation



In a stressed environment, 4-Vita increased the color coverage by around 50%.

In a stressed environment, 4-Vita increased the content of anthocyanins, also showing a dose effect.

CONCLUSIONS: The application of 4-Vita, in both grape and 2 varieties of apples (for 2 different trials), increased significantly the content of anthocyanins in fruits and therefore their color. This effect was observed, for apples, both in comfort and stressed environments. When different dosages of 4-Vita were applied, a dose effect was observed, especially in the content of anthocyanins. The increase of those antioxidant compounds might be due to the trigger of specific biosynthetic pathways, induced by 4-Vita.

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