



SULPHITE RESIDUE LEVELS ON TABLE GRAPES

WHAT ARE SULPHITES?

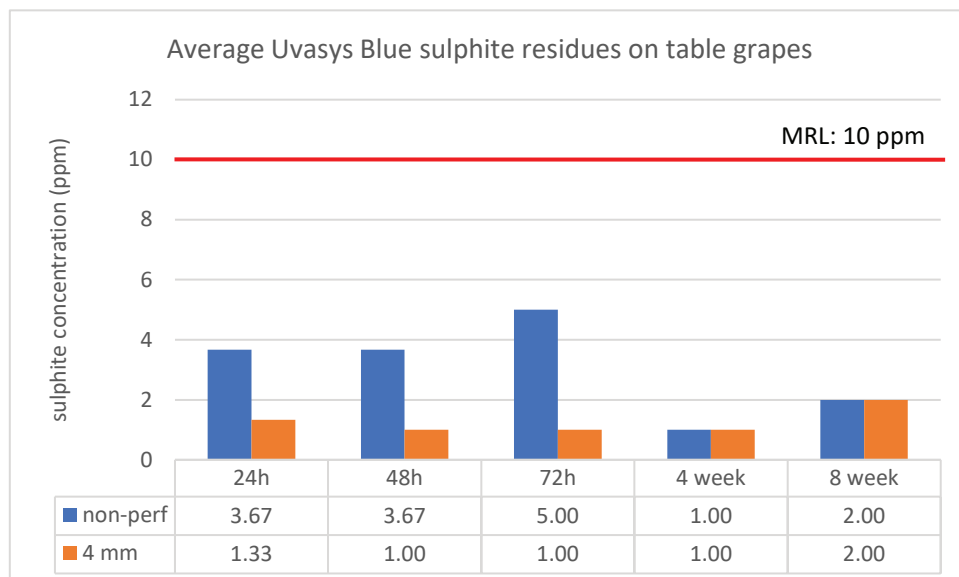
Sulphites is a collective term used to describe sulphur containing compounds which releases sulphur dioxide (SO₂) gas. These compounds include sulphur dioxide, sodium metabisulphite, potassium metabisulphite and calcium sulphite, among others. These sulphites are included on food labels as E-numbers ranging from E220 to E228 and has been used for centuries to prevent food spoilage and discolouration. Sulphites have many useful properties such as being effective antimicrobials, sanitising agents, bleaching agents, oxygen scavengers, and enzyme inhibitors, which makes it useful to the food, pharmaceutical and cosmetics industries.

In table grape production, sulphites, applied as SO₂, are used as a post-harvest treatment to prevent *Botrytis* decay during storage and transport. It is applied through chamber fumigation or SO₂ generating sheets placed inside table grape cartons. The active ingredient of the SO₂ generating sheets is sodium metabisulphite, which release SO₂ gas upon contact with water vapour. Sulphite deposits (residues) may then be absorbed by the table grape berries and may also be left on the surface of the

fruit. Excessive use of sulphur dioxide may also cause off-flavours.

Due to certain people displaying hypersensitivity to sulphites in food, cosmetics and pharmaceuticals, the decision was made to regulate the use of sulphites in various products including table grapes and other fruit. Hypersensitivity or allergic reactions to sulphites manifest as asthma, urticaria, anaphylactic reactions, dermatitis, abdominal pain, and diarrhoea. In the United States of America, the Environmental Protection Agency, the European Union, and the United Kingdom has set the maximum residue level of sulphites on imported table grapes at 10 ppm or mg/kg, a quantity it considers safe to consume. A table grape consignment with a sulphite residue level above 10 ppm may be rejected at the ports of the aforementioned countries.

South Africa has set the maximum residue levels for sulphites on imported table grapes to 30 ppm in accordance with the Codex Alimentarius International Food Standards, a joint initiative of the Food and Agriculture Organization of the United Nation and the World Health Organisation.



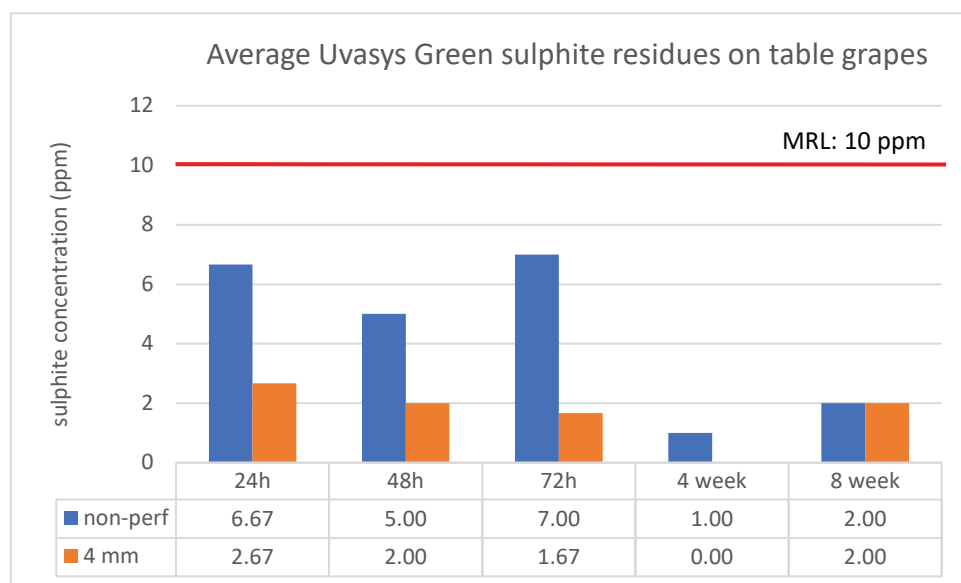
A graphical representation of the average sulphite residues on 'Crimson Seedless' table grapes. The table grapes were packed in 4 mm x 36 perforated and non-perforated liners and treated with Uvasys Blue Dual Release, followed by cold storage at -0.5 °C for 24, 48 and 72 hours, 4 and 8 weeks. Three reps were included for each treatment. The red line represents the maximum residue limit of 10 ppm for sulphite residues on table grapes.

HOW DOES UVASYS DUAL RELEASE AFFECT THE SULPHITE RESIDUE LEVELS ON TABLE GRAPES?

Trials were conducted in the 2020/2021 table grape season. The objective of the trials was to determine the sulphite residue levels on 'Crimson Seedless' after the use of Uvasys Blue and Green Dual Release. The table grapes were packed loose in 4.5 kg cartons and exposed to Uvasys sheets, in either 4mm x 36 perforation liners or non-perforated liners, for 24, 48, 72 hours, 4 and 8 weeks. The cartons were then stored at -0.5 °C for these aforementioned exposure periods after which the table grapes were transported in a refrigerated truck to a local SANAS accredited testing laboratory where the total sulphite residues (as SO₂) were determined using the optimised Monier-Williams method.

Results indicate that throughout the exposure trials, in both perforated and non-perforated liners, the sulphite residue limit of 10 ppm was neither reached nor exceeded (Figures 1 & 2). The use of non-perforated liners caused the residue levels on the table grapes to increase in the first 72 hours for both Uvasys Blue and Green. However, sulphite residues in non-perforated liners remained way below the 10 ppm level.

Regardless of the residue levels, caution should be exercised by individuals who are prone to allergies or are sensitive to sulphites when handling or consuming fruit that has been treated with SO₂.



A graphical representation of the average sulphite residues on 'Crimson Seedless' table grapes. The table grapes were packed in 4 mm x 36 perforated and non-perforated liners and treated with Uvasys Green Dual Release, followed by cold storage at -0.5 °C for 24, 48 and 72 hours, 4 and 8 weeks. Three reps were included for each treatment. The red line represents the maximum residue limit of 10 ppm for sulphite residues on table grapes.

REFERENCES

Considine, M. J., & Foyer, C. H. 2015. Metabolic responses to sulfur dioxide in grapevine (*Vitis vinifera* L.): photosynthetic tissues and berries. *Frontiers in Plant Science* 6: 60.

Garcia-Fuentes, A. R., Wirtz, S., Vos, E., & Verhagen, H. 2015. Short review of sulphites as food additives. *European Journal of Nutrition and Food Safety* 5(2): 113-120.



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