TABLE GRAPE CONFERENCE 2026

Connecting ideas | Cultivating success

5-6 AUGUST @ ALLÉE BLEUE, FRANSCHHOEK

Abstract Book

SASEV
South African Society for Enology & Viticulture

HOSTED IN COLLABORATION

SATI
South African Table Grape Industry

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TABLE GRAPE CONFERENCE 2026
Connecting ideas | Cultivating success

A | Keynote Presenters

Marius Boshoff

| VILLA CROP PROTECTION

K1

“Agrochemicals: Where are we heading?”

5 August 2026 (09:15)

He is a respected leader in South Africa's crop protection industry with more than 30 years of experience. His expertise includes product stewardship, regulatory engagement and industry collaboration. He played a key role in the evolution of CropLife South Africa from AVCASA into a national industry body and continues to champion science-based crop protection as MD of Villa Crop Production.

Mecia Petersen

| SOUTH AFRICAN TABLE GRAPE INDUSTRY (SATI)

K2

“Strengthening resilience: Chartering the next chapter for the South African grape sector”

5 August 2026 (10:35)

She has served as Chief Executive Officer of SATI since July 2024, after joining the organisation in 2022 as Communication and Market Development Manager. She holds an MBA from Nottingham University Business School and is committed to advancing the competitiveness and sustainability of the South African table grape industry through research, innovation and collaboration.

Oscar “Coco” Salgado

| AGROFRESH GROUP

K3

“What’s in the postharvest toolbox? Tools for maintaining table grape condition”

5 August 2026 (14:00)

He is an agricultural engineer (PUCV) with an MBA from Cambridge and more than 35 years of international experience in the fruit industry, specialising in table grapes. He leads global technical support for Infruta Chile and Proteku Spain (AgroFresh Group), driving innovation and commercial development. He is a former Associate Professor of Viticulture at PUCV and a founding board member of UVANOVA.

Prof Albert Strever

| STELLENBOSCH UNIVERSITY

K4

“South-African grape industries into the future: Training, innovation and entrepreneurship as a partnership between industry and academia”

6 August 2026 (10:15)

He is Associate Professor and Chair of the Department of Viticulture and Oenology at Stellenbosch University. He leads innovation and entrepreneurship in the Faculty of AgriSciences and specialises in entrepreneurship and artificial intelligence. His work focuses on Fourth Industrial Revolution technologies, innovation and collaboration between academia and industry.

B | Industry Presentations

NUMBER	DAY & TIME	PRESENTATION
I1	**5 Aug** 08:45	**Opening Address by Associate Partner** Western Cape Department of Agriculture
I2	**5 Aug** 10:20	Platinum Sponsor Address **Biologiese produkte & grondgesondheid** Trix Quixley | NEXUSAG
I3	**5 Aug** 11:05	**Perceived quality vs actual quality** Morné Bester | TOPFRUIT
I4	**5 Aug** 11:20	**Sun World Global Technical Services (GTS) – Insights** Tharien Hansen and Robert Oosthuizen | SUN WORLD INTERNATIONAL
I5	**5 Aug** 11:35	**Sweet Globe™ and disease resistance genetics.** JT Nel | BLOOMFRESH
I6	**5 Aug** 12:10	Panel Discussion Sponsor Address **Drip vs micro-sprinkler: An economic comparison for table grape irrigation** Christo van der Westhuizen | NETAFIM
I7	**5 Aug** 16:30	Cocktail Sponsor Address: HaifaStim Force **The perfect supplement for uniform development of vines** Filippo Correddu | HAIFA GROUP - ITALY
I8	**6 Aug** 08:00	Platinum Sponsor Address **FliPPER** André van Schalkwyk | BAYER
I9	**6 Aug** 10:00	Presenting Partner Address **Why Villa Crop Protection is investing in climate intelligence** Gabrielle Redlinghuis | VILLA CROP
I10	**6 Aug** 14:30	Panel Discussion Sponsor Address: **Anti-rain coverings: A tool to compete in the global market** Giuseppe Borracci and Giacomo Mastrosimini | Serroplast
I11	**6 Aug** 14:45	Sponsored presentation: **OASIS SecondSky™: Turning greenhouse covers into a tool for better grape performance** Nico Augsburger | YRIS
I12	**6 Aug** 15:00	Sponsored presentation: **Daios Plastics: Safe D soft fruit protection films** Dimitris Daios | DAIOS PLASTICS Brendan Kelly | RHINO PLASTICS

C | Panel Discussions

P1 | 5 Aug (12:25)

Managing Water, Optimising Quality

(Sponsored by Netafim)

Brings together industry and climate experts to discuss how grape growers can navigate water constraints and weather variability, while using irrigation strategies and weather information to optimise vineyard performance and grape quality.

Panel Moderator

Dr Ilse Trautmann holds a PhD in Plant Physiology from Stellenbosch University and is a respected leader in agricultural research, innovation and climate change adaptation. She led the development of the acclaimed SmartAgri plan, served as Deputy Director General at the Western Cape Department of Agriculture, and was the first female President and now Honorary President of SASEV. She continues to support the agricultural sector through her consultancy, Action4Agri.

Panellists

Danie Kritzinger | Stephany Midgley | Philip Myburgh | Andre Roux

P2 | 6 Aug (12:20)
Table Grape Graduate of the Future

Brings together industry leaders, educators, and emerging professionals to explore the skills, experiences, and attributes that will be needed to succeed and lead in the table grape industry of the future.

Panel Moderator

Mecia Petersen has served as Chief Executive Officer of SATI since July 2024, after joining the organisation in 2022 as Communication and Market Development Manager. She holds an MBA from Nottingham University Business School and is committed to advancing the competitiveness and sustainability of the South African table grape industry through research, innovation and collaboration.

Panellists

Albert Strever | Keboneilwe Toolo | Piet Karsten Snr | Brenton Maarman

P3 | 6 Aug (15:50)

Overhead Plastic Protection in Table Grapes

(Sponsored by Serroplast)

Explore the science, practical experiences, and management considerations of table grape production under overhead plastic, and discuss the opportunities and challenges associated with the transition.

Panel Moderator

Sean Walsh has over 35 years of leadership experience across the beverage, retail and agricultural sectors. After beginning his career at SAB, he held senior executive roles in South Africa and Botswana before serving as CEO of the KAL Group and Chairperson of Agbiz. Renowned for his vision and leadership, he has made a significant contribution to South African agriculture and agribusiness, leaving a legacy following his retirement in 2026.

Panellists

Alwyn Dippenaar | Reynecke Viljoen | Eunice Avenant

D | Abstracts

SESSION 1: 5 AUGUST

Our Industry: Local Overview and Global Perspectives

O1. Long-term multi-environment assessment of rootstock performance for commercial table grape production in South Africa

Keboneilwe Toolo[1]*, Graeme Matthews[1], Mardé Booyse[2], Iwan Labuschagné[1]

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[2]*Biometry Unit, Agricultural Research Council (ARC), Infruitec-Nietvoorbij, Private Bag X5026, Stellenbosch, 7599, South Africa*

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Rootstock selection strongly influences vine adaptability, yield, and overall profitability. This six-year multi-environment trial (MET), established in 2019 across five locations, evaluated the adaptability and stability of eight rootstocks – 'Harmony', 'Paulsen 1103', 'Ramsey', 'Richter 110', 'RS-3', 'RS-9', 'Ruggeri 140', and 'SO4' – grafted with five scion genotypes. Vine phenology, vegetative growth and yield were analysed using MET ANOVA, with AMMI and GGE biplot analyses applied where significant genotype-by-environment (GEI) and season-by-genotype-by-environment (SGEI) interactions occurred. Significant GEI and SGEI interactions confirmed that rootstock performance was highly site- and season-specific. 'Ramsey' excelled in vegetative growth and vigour across most localities, making it ideal for rapid vineyard establishment. 'SO4' demonstrated yield stability and superior reproductive performance, while 'RS-9' consistently ranked as the weakest performer. At Begin Boerdery, where 'Sweet Celebration™' was used as scion, 'Ramsey' was the top-performing rootstock, while 'SO4' showed strong yield-related performance. 'RS-3' performed well at Denau with 'Crimson Seedless', while the balanced conditions at KVNB with 'AUTUMNCRISP ®' favoured 'Harmony', 'SO4' and 'Ramsey', offering nematode suppression. These findings highlight the importance of multi-environment trials in viticulture. Rootstock selection should be tailored to the specific scion genotype, local soil and climatic conditions, nematode pressure and production objectives. Further investigation of 'SO4' as a high-yielding table grape rootstock is recommended.

Keywords: Adaptability, multi-environment trial, genotype-environment interaction, AMMI, GGE

F1. Do seed traces matter? Crop-load effects on consumer acceptance of Crimson Seedless grapes

Janéne Strydom[1]*, Marieta van der Rijst[2], Isabella van Huyssteen[3], Kobus Hunter[4]

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Most commercial seedless table grapes are stenospermocarpic, meaning seed development stops early, leaving seed traces. Seed traces are often identified as negative drivers of consumer liking compared to attributes such as sweetness, which are considered positive. Although seed trace formation is primarily genetically determined, factors such as temperature during flowering and early berry set, the use of plant bioregulators, and other environmental stressors all contribute to the prevalence of seed traces. Cultivation practices, such as crop-load allocation, affect assimilate supply and impact embryo abortion, leading to variations in the occurrence of seed traces. The aim of the study was to determine how crop-load allocation can shape consumer perception via seed trace expression. Bud-and crop-load treatments were applied in a commercial Crimson Seedless/Ramsey vineyard. The experiment was laid out as a randomised factorial complete block design with three bud-load levels (applied at pruning), each combined with three crop-load levels, and applied at two early berry development stages. Bud-load treatments included 144 (Control), 120 and 192 buds/vine, and crop-load treatments included 36 (Control), 40 and 28 bunches/vine. Development stages for crop-load allocation were BBCH 75 (9-10 mm berry diameter) and BBCH 79 (13-14 mm berry diameter). Grape quality variables were determined analytically, instrumentally, and by means of sensory evaluation. Data sets were statistically analysed, and the association between the sensory quality variables and the likelihood of buying the grapes was determined. The effects of crop-load treatments on key quality variables will be presented, with particular emphasis on how vineyard management practices affect eating quality and market perception. By linking production decisions to sensory outcomes, the study highlights the critical role of vineyard management in optimising perceived fruit quality and the extent to which even minor physical attributes, such as seed traces, can drive perceptual responses by consumers.

Keywords: Management practices, eating quality, consumer perception

D | Abstracts

SESSION 2: 5 AUGUST

Delivering Quality Products: Postharvest Management & Packaging

O2. Effect of the use of plastic pallet covers on table grapes weight loss during cold storage

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[2]*Dept. of Innovation and Sustainability, Bombero G. Lima 1417, Santiago, San Ramón, Chile Tres Castillos SpA, Chile*
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The rachis browning of table grapes during cold storage and marketing is strongly correlated to weight loss. The use of perforated plastic liner bags is the standard tool for prevention. However, due to the high dehydration rate of newly planted varieties, the problem of dark rachis persists, even with liners of low ventilated area. Since dehydration is a cumulative effect, the use of low-ventilated plastic pallet covers during harvesting has been recommended, but no studies have reported their use in refrigerated storage. To validate the use of pallet covers in refrigerated storage and verify their impact on weight loss, two varieties were studied: 'Sweet Globe' and 'Red Globe'. Fruit were packed with three types of perforated bags (0.3%, 0.9%, and 1.8% ventilated area), combined with pallet covers of 0.1% and 0.3% ventilated area, and stored at 0°C for 70 and 49 days, respectively. Compared to the standard packaging of 0.9% ventilated area without cover, fruit with pallet covers showed a two- to three-fold reduction in weekly weight loss rate in both varieties. The combination of 0.3% ventilated bags with 0.1% or 0.3% ventilated pallet covers reduced weight loss by 3 to 4 times after 70 days in 'Sweet Globe'. In 'Red Globe', the combination of 0.3% ventilated bags and 0.1% ventilated pallet cover reduced weight loss by 2 to 3 times after 49 days. In conclusion, the use of pallet covers during refrigerated storage is recommended as an effective complementary tool to reduce dehydration.

Keywords: Table grapes, rachis, pallet cover

O3. CFD-based virtual prototyping for enhanced understanding and optimisation of commercial table grape export packaging

Thalente Mpanza[1], Robert Lufu[2,3], Buhle Maphosa[2], Corné Coetzee[1], Alemayehu Tsige[2]*

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[2]*Department of Horticultural Science, Packaging and Cold Chain Research Group, Africa Institute for Postharvest Technology, Faculty of AgriSciences, Stellenbosch University, Private Bag X1, Stellenbosch, 7599, South Africa*
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The South African table grape industry employs advanced postharvest handling and cold chain systems to maintain fruit quality during export. Within these systems, commercial packaging configurations comprising ventilated cartons, perforated liners, punnets, SO_2 pads, moisture absorbers, and protective covers influence airflow distribution and cooling behaviour during forced-air precooling and cold storage. However, the interactions between packaging architecture, airflow resistance, and temperature distribution remain difficult to quantify experimentally under commercial conditions. Computational fluid dynamics (CFD)-based virtual prototyping provides an opportunity to investigate these interactions in a more systematic and mechanistic manner. This study developed a three-dimensional CFD virtual prototyping framework to evaluate airflow distribution and cooling performance within commercial table grape export packaging. Airflow resistance characteristics were initially evaluated across multiple commercial carton configurations, after which two commercially relevant corrugated fibreboard packaging systems with contrasting vent geometries were selected for detailed experimental and CFD analysis. The selected systems were investigated in combination with perforated liners containing either 96 or 120 perforations of 5 mm diameter using ‘Crimson Seedless’, ‘Sweet Globe’, and ‘Autumn Crisp’ table grapes. Airflow resistance characteristics of progressively assembled packaging components were experimentally quantified and incorporated into the CFD model. Cooling and warming behaviour were quantified, and CFD predictions were validated against measured temperature profiles. Results showed that cooling and warming responses were influenced by different components of the packaging–cold chain system. Cooling was significantly affected by cultivar and room position, while liner perforation showed a near-significant effect. In contrast, warming was significantly affected by carton design, with a significant liner × room position interaction. The findings demonstrate that packaging performance depends not only on carton vent area, but also on the interaction between carton geometry, liner configuration, cultivar, and spatial exposure conditions.

Keywords: Computational fluid dynamics (CFD), virtual prototyping, table grape packaging, airflow resistance, forced-air precooling

O4. Influence of packaging configuration on postharvest quality and physiological responses of table grapes during cold storage and shelf life

Sinothando Feni[1], Buhle Maphosa[1], Elke Crouch[1], Alemayehu Tsige[1]*

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The South African table grape export chain depends on integrated packaging systems to maintain fruit quality across extended cold-chain durations. This study examined the effects of carton ventilation design (moderate vs. enhanced airflow), perforated plastic liner (96 vs. 120 perforations, 5 mm), and storage duration on the postharvest quality of *Vitis vinifera* L. cultivars 'Sweet Globe', 'Crimson Seedless', and 'Autumn Crisp'. Grapes were stored at 0 ± 0.5°C and 90–95% relative humidity for up to 42 days, followed by a 7-day shelf-life simulation at 25 ± 4°C. Quality attributes, including berry firmness, decay incidence, berry shatter, rachis browning, colour (CIELAB), total soluble solids (TSS), and titratable acidity (TA), were assessed at seven intervals (days 0, 14, 28, 42, 44, 47, and 49). Storage duration and cultivar were the primary determinants of quality variation. Firmness declined significantly from a mean of 11.07 N at packing to 3.179 N by day 0–49 ($p < 0.001$), while rachis browning progressed monotonically across all cultivars ($F = 196,2$, $p < 0.001$), with the most marked deterioration occurring after day 42. Decay incidence and berry shatter remained near zero through day 42 but increased sharply thereafter, identifying shelf life as the critical quality threshold under the conditions tested. Cultivar responses differed markedly ($p < 0.001$ for firmness, TSS, and respiration rate). 'Crimson Seedless' exhibited the lowest decay incidence (mean 0.337%) and the least berry shatter (0.850%), while 'Autumn Crisp' recorded the highest decay by day 49 (15.92%). 'Autumn Crisp' showed the greatest susceptibility to berry shatter (mean 0.268; up to 69.70% at day 49), rendering it commercially unacceptable beyond day 44. Neither carton ventilation design nor liner perforation density significantly affected any measured quality attribute ($p > 0.10$ for all), indicating that, within the configurations tested, cultivar physiology and storage duration govern quality outcomes more strongly than packaging design variables alone.

Keywords: Table grapes, postharvest quality, packaging design, liner perforation, cold chain

O5. From experimental measurement to virtual prototyping: Multiphysics modelling of SO_2 dynamics in commercial table grape packaging

Thalente Mpanza[1], Buhle Maphosa[2], Sinothando Feni[2], Robert Lufu[2], Corné Coetzee[1], Elke Crouch[2], **Alemayehu Tsige**[2]*

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Sulphur dioxide (SO_2) release pads are widely used in table grape cold chain packaging to suppress *Botrytis cinerea* development during storage and export. Effective SO_2 management depends on the concentration profile achieved inside the package, yet the relative contributions of packaging configuration, storage room spatial variability, and component-level SO_2 absorption to the in-package SO_2 environment remain poorly characterised. This study combined experimental measurement with computational fluid dynamics (CFD) modelling to investigate SO_2 dynamics across spatial and temporal scales in a commercial cold storage system. In-package SO_2 concentration was recorded at 12 time points over 48 hours across 24 experimental units, representing a fully crossed design of two box types, two perforated plastic liner types (96 vs. 120 perforations, 5 mm), two cultivars ('Autumn Crisp' and 'Crimson Seedless'), and three sampling positions within the pilot cold storage room (left, middle, and right), yielding 288 observations in total. Concentration–time summary metrics, including maximum concentration (Cmax), time to peak (Tmax), area under the concentration–time curve (AUC), and initial rate of SO_2 increase (Slopeinit), were derived per unit to characterise the in-package SO_2 release profile. Packaging treatment significantly affected Cmax (p = 0.007), while AUC, Tmax, and Slopeinit were not significantly influenced by treatment. Room position strongly governed the overall SO_2 concentration–time profile ($p < 0.001$), whereas cultivar had no detectable effect ($p = 0.814$). In parallel, a component-level SO_2 mass balance was developed, partitioning the total SO_2 inventory over time among berries, rachis, and non-target packaging materials including corrugated cardboard, water absorption pads, and SO_2 guard sheets. The experimentally derived absorption data were used to parametrise a CFD model applied to simulate detailed SO_2 spatial distribution within the packaging system under virtual prototyping conditions. This data-informed multiphysics framework enables systematic *in silico* evaluation of packaging configurations and pad placement strategies, offering a powerful tool for evidence-based packaging design in the South African table grape industry.

Keywords: Sulphur dioxide, dual-release pad, cold chain, computational fluid dynamics, mass balance, packaging design, postharvest

O6. Linking crop-load, storage potential and sensory quality of Crimson Seedless

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While storage conditions are key to preserving postharvest grape quality, quality maintenance begins in the vineyard through management practices such as bud-load (BL) and crop-load (CL) allocation. This study evaluated the effect of BL and CL on storage and sensory quality of Crimson Seedless grapes from the Hex River Valley (2025/2026). Treatments were applied in a Crimson Seedless/Ramsey vineyard in a randomised complete block as a 3×3×2 factorial. Bud-load levels allocated during pruning included BL_{144}, BL_{120} and BL_{192}, corresponding to 144 (control), 120 and 192 buds/vine, respectively. Each BL was combined with CL_{36}, CL_{28} and CL_{40}, corresponding to 36 (control), 28 and 40 bunches/vine, respectively. Crop-load treatments were each applied at two stages (9-10 mm, 13-14 mm berry diameter). Grapes were harvested at two ripeness levels (R), corresponding to 18 and 19 °Brix. For each R, one carton of grapes per treatment per replicate was stored for four weeks at −0.5°C followed by one week at 7.5°C, while another carton was stored for eight weeks at −0.5°C followed by one week at 7.5°C. After storage, grapes were assessed for defects. Berry size, total soluble solids (TSS), firmness, and colour were measured. Visual and taste variables were assessed through sensory evaluation. Data were statistically analysed. The BL_{120}×CL_{36} treatment tended to increase berry size and TSS compared to BL_{144}×CL_{36} (control). Regardless of CL, grapes from BL_{120} tended to be darker than the control. The BL_{120}×CL_{28} treatment tended to produce firmer berries than the control treatment. Timing of CL reduction did not consistently affect TSS across harvest dates. Berry splitting contributed most to storage defects and was attributed to the heavy rainfall during February. Across all BL×CL interactions, the percentage of decay increased with storage duration. Taste attributes were the primary drivers for consumer liking. The results indicate that BL and CL may influence berry size, TSS, colour and firmness, while storage defects were largely dominated by environmentally induced berry splitting. Observed trends require validation across additional seasons.

Keywords: Berry firmness, postharvest defects, grape ripeness

D | Abstracts

SESSION 3: 5 & 6 AUGUST

Plant Health: Towards a Healthier Future

O7. Cell wall chemotyping for predicting table grape berry firmness

John P. Moore[1]*, Terri-Lynne Naidoo[1], Miguel Henriques[1], Eugene Badenhorst[1], Bodil Jørgensen[2], Talitha Venter[1]

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Texture is a critical quality attribute in table grapes, strongly influencing consumer acceptance and market value. Berry firmness varies among cultivars and is affected by harvest stage and vineyard performance. Cell wall composition and architecture are key determinants of berry texture, particularly pericarp firmness and structural integrity during harvest and postharvest handling. Currently, producers primarily rely on visual assessment of cross-sectioned berries to evaluate firmness prior to harvest. However, these qualitative approaches are often subjective and inconsistent, while rapid, quantitative, and high-throughput methods for assessing berry cell wall properties remain limited. This study explores the integration of immunochemical, biochemical, and spectroscopic approaches to characterise table grape cell wall composition and develop predictive tools for berry texture assessment. Carbohydrate microarray profiling targeting specific cell wall polymers was combined with conventional biochemical analyses and rapid infrared spectroscopy to generate “chemotypic” fingerprints of grape berry cell walls at different stages of ripeness. Immunochemical datasets were compiled from more than fifteen cultivars, including well-characterised cultivars such as Crimson Seedless and Prime, as well as less-studied cultivars, including Autumn Crisp and Sugar Crisp. The integration of these datasets enables comparative analysis of cultivar-specific cell wall characteristics and their relationship with berry firmness. Infrared spectroscopy offers a rapid and non-destructive platform for identifying cell wall-associated biochemical signatures linked to texture development. The resulting chemotypes and potential predictive models will be discussed and correlated with firmness analyses conducted across cultivars and ripening stages. The study aims to improve understanding of the structural and biochemical basis of table grape texture while supporting the development of infrared sensing technologies capable of predicting berry firmness and softening potential. Such approaches may provide producers with rapid and objective tools for monitoring grape quality, optimising harvest timing, and improving postharvest management of table grape cultivars.

Keywords: Table grapes, cell wall chemotyping, berry firmness, infrared spectroscopy, texture prediction

O8. Optimum irrigation of table grape vineyards in South Africa in the context of climate change

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Water is a scarce resource, and agriculture competes with urban and industrial needs for water. Although there has been good winter rainfall in the Western Cape since 2019, it is certainly inevitable that climate change will put limited water resources under even more pressure in the foreseeable future. Therefore, it is increasingly important that table grape growers use their available water more efficiently by means of sound irrigation scheduling practices. Over the past four decades, researchers at Agricultural Research Council (ARC) Infruitec-Nietvoorbij have focused on developing irrigation scheduling practices for table grape vineyards. In this regard, growers need to irrigate their vineyards for maximum production whilst maintaining grape quality so that table grape production is profitable in a highly competitive export market. This means that growers must make important decisions about what irrigation scheduling practices they should apply in their vineyards. To do this, the following critical questions must be answered: (i) What irrigation strategy should be followed for newly planted grapevines?, (ii) What is the ideal soil water depletion level that table grapes should be irrigated at throughout the season?, (iii) Using stem water potential to set the refill line for table grape irrigation?, (iv) How can irrigation of table grapes be adapted during ripening to improve grape quality?, (v) How should table grape vineyards be irrigated during the post-harvest period and winter? This paper will also give guidelines on vineyard and soil management practices for optimum irrigation of table grape vineyards during water shortages.

Keywords: Depletion level, strategies, water shortages

O9. The evaluation of the efficiency of an essential oil-infused biocontrol sheet against *Botrytis cinerea* during cold storage to protect table grapes

Nonkululeko Masikane[1], Rodney Hart[1]*, Valmary Van Breda[1], Nombasa Ntushelo[2], Bongani Ndimba[1], Ashwil Klein[3]

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The grey mould caused by *Botrytis cinerea* is one of the most economically significant necrotrophic pathogens, capable of infecting over 200 plant species during postharvest storage and transport. Table grapes are a non-climacteric fruit with moderately low physiological activity after harvest, making them susceptible to grey mould, caused by *Botrytis cinerea*. The industry mostly uses fungicides and sulphur dioxide (SO_2) generating sheets as chemical controls against fungi to extend the shelf life of table grapes. However, these SO_2 sheets cause damage to the grape skin, which is known as bleaching and reduces organoleptic quality. Moreover, SO_2 has been implicated in human allergies. Therefore, there is increasing interest in the use of biological control agents, and the Agricultural Research Council (ARC), in collaboration with the Centre for Science and Industrial Research (CSIR) and Technology Innovation Agency (TIA) co-developed a biocontrol sheet to address the drawbacks of the SO_2-generating sheets. These sheets use a blend of essential oils embedded in a plastic sheet that is non-phytotoxic and ecologically benign to effectively limit the growth of post-harvest fungus on table grapes. The study aims to evaluate the efficiency of an essential oil-infused sheet against the post-harvest pathogen, i.e. *Botrytis cinerea,* during cold storage on the Crimson Seedless table grape cultivar. Six treatments were evaluated in triplicate: two controls, two commercial SO_2 pads and two essential oil-infused sheets. Table grapes were stored at 0.5°C for up to eight weeks, followed by one week at 2.5°C, and evaluated for post-harvest defects and sensory characteristics. Results showed that essential oil-infused sheets show a promising antifungal activity, with no fungal growth after five weeks of cold storage, minor rot appeared at seven weeks, and SO_2 treatments showed significant bleaching, discolouration, and berry cracking. Sensory panel noted distinct essential oil-derived aromas. These results suggest that essential oil-infused sheets may serve as a promising organic alternative to SO_2 pads for post-harvest fungal control in table grapes, but further optimisation is required to minimise late-stage rot and manage the aroma intensity while maintaining the quality and shelf life.

Keywords: *Botrytis cinerea*, table grapes, essential oil, SO_2 sheets

O10. Assessing the impact of cover crop cultivation in a Sweet Globe™ vineyard in the Berg River Region, South Africa

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The annual cultivation of winter cover crops is almost standard practice in South African wine grape vineyards, with most of the research carried out in micro-sprinkler irrigated vineyards. Benefits of cultivating cover crops in these vineyards include reduced weed pressure, improved organic carbon content and a long-term reduction in overall production inputs. In addition, cover crops play an important role in regenerative agriculture and the improvement of soil health. Therefore, table grape growers are also becoming increasingly interested in cultivating cover crops. Consequently, using cover crops to ensure sustainable table grape production has been investigated in a Sweet Globe™ vineyard in the Noorder-Paarl area of the Berg River Valley region from the 2023/24 to 2025/26 season. Four main cover crop treatments are being applied and include: (T1) oats, (T2) yearly rotation of triticale and medics, (T3) grazing vetch, (T4) triticale and lupin mixture, as well as (T5) a control representing the grower's standard practice. Two cultivation practices are applied to treatments at the time of termination of their growth, namely chemical control and slashing, with the slashed plant material put on the grapevine row. Dry matter production (DMP) of oats has been consistently higher compared to most of the other cover crops. Triticale from the annual rotation of medics and triticale, as well as the mixture of lupins and triticale, also show good DMP. Weed DMP was substantially lower in the oats treatment compared to the other treatments. In the mid-term, *i.e.* after three years of cultivating cover crops, there were no substantial differences between treatments in soil organic carbon and inorganic nitrogen in the 0-30 cm and 30-60 cm soil layers. Cover crops are being cultivated for two more seasons to ascertain the longer-term effects of cultivating cover crops in table grape vineyards on selected soil and grapevine responses.

Keywords: Oats, soil, weeds

O11. CRISPR/Cas9-mediated genome editing of *VviDMR6* confers dual stress tolerance in grapevine

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Grapevine (*Vitis vinifera*) is one of the most economically important fruit crops globally, with South Africa's table grape industry forming a significant part of its agricultural export economy. However, increasing pressure from a wide range of biotic and abiotic stress factors poses a serious threat to grapevine production and fruit quality. Targeting a single gene to confer multiple stress tolerance represents a promising and efficient strategy for developing robust, climate-resilient grapevine cultivars. The targeted inactivation of the susceptibility gene *DOWNY MILDEW RESISTANT 6* (*DMR6*) has previously been reported in several important crops, including tomato, potato, citrus, and grapevine, resulting in broad-spectrum disease resistance. Beyond this, recent evidence has revealed that the inactivation of *DMR6* also confers improved abiotic tolerance in tomato and potato. In this study, *VviDMR6.1*-edited plants were obtained through CRISPR/Cas9-genome editing of the rootstock cultivar R110. The *Vvidmr6.1*-mutant lines demonstrated significantly reduced susceptibility to downy mildew. Interestingly, physiological and molecular analyses revealed that mutant lines adopt a distinct water-saving strategy and respond differently under water-limiting conditions. Taken together, these results establish *VviDMR6.1* as a promising target for engineering dual-stress tolerance in grapevine. Notably, this work represents the first successful application of CRISPR/Cas9 genome editing in a woody crop in Africa, marking a significant milestone for agricultural biotechnology and precision breeding on the continent.

Keywords: Grapevine, *DOWNY MILDEW RESISTANT 6*, CRISPR/Cas9, dual-stress resistance

O12. How fungicide pressure, sexual reproduction and fitness shape QoI and SDHI resistance dynamics in grapevine powdery mildew populations in South Africa

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Grapevine powdery mildew is a major pathogen in South African table grape production, where intensive and repeated fungicide treatments are required to control the disease. The aim was to investigate the sensitivity of powdery mildew to QoI and SDHI fungicides. Powdery mildew was sampled from 32 table and wine grape vineyards across production regions in South Africa. Twenty single colonies per vineyard were harvested, and DNA extracted. The G143A mutation (QoI) was detected using a qPCR assay. Mutant type (MT) isolates were dominant (65.47%), with 19 of the 32 populations MT-dominant. MT individuals occurred at higher frequencies in table grape vineyards (78.14%), of which six populations were MT dominant, and two populations had even ratios of WT:MT. Temporal monitoring in the two table grape vineyards demonstrated that MT frequencies increased after chasmothecia were observed. This could indicate strong and sustained selection pressure due to fungicide applications and sexual reproduction. The EC_{50} values were determined using spore germination assays for QoI's (azoxystrobin and pyraclostrobin: 22 isolates) and SDHI's (boscalid and fluopyram: 64 isolates) fungicides. Despite the high prevalence of MT individuals against QoI fungicides in field populations, all isolates cultured on leaf disks were WT, possibly suggesting a fitness penalty associated with MT. WT isolates exhibited greater sporulation and colonisation on leaf disks, which could indicate higher competitive fitness. Intensive spray programmes in table grape systems likely suppress WT populations more effectively. For SDHI fungicides, differing levels of sensitivity were observed, with 25.9% and 22% of isolates showing reduced sensitivity (>100 µg/mL) towards fluopyram and boscalid, respectively. Different levels of sensitivity were observed between the SDHI actives, indicating that cross-resistance is not likely. Additionally, no consistent association were observed between reduced sensitivity and known target-site mutations, suggesting possible non-target-site resistance mechanisms. Despite widespread resistance of the QoI MT, the majority of the populations are sensitive to SDHI fungicides, with resistance dynamics for QoI fungicides shifting throughout the season.

Keywords: Fungicide sensitivity, sexual reproduction, *Erysiphe necator*

F2. Assessing fungicides and biocontrol agents as pruning wound protectants on Richter 99 rootstock material against Grapevine Trunk Disease pathogens

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Rootstock canes are harvested from rootstock mother vines during the propagation of commercial grapevines. This process leads to large wounds that get infected by Grapevine Trunk Disease (GTD) pathogens. These pathogens can move systemically from the heads to the harvested canes, resulting in contaminated plant material. The study aimed to evaluate fungicide actives, as well as fungal and bacterial biological control agents (BCAs), alone and in combination with fungicides, against four GTD pathogens. A total of 121 fungal and 96 bacterial isolates were screened *in vitro* using secondary metabolite and competitive growth assays. Isolates with the most potential as BCAs *in vitro* were selected for further analysis. Six fungicides were assessed against five isolates of each pathogen, and all fungicides showed promise *in vitro*. In total, 16 fungal, eight bacterial, six fungicides, and five BCA-fungicide combination treatments were assessed against two GTD pathogens on Richter 99 in a detached rootstock shoot assay. Shoots were pruned, and wounds were inoculated with the BCA suspensions or fungicide. After 24 hours, the wounds were challenged with a spore suspension of the pathogen. After 30 days, fungal isolations were conducted, and the pathogen incidence and severity were determined. All fungicides (boscalid, DDAC, fluazinam, pyraclostrobin, tebuconazole, thiophanate-methyl) equally reduced the severity of *Phaeomoniella chlamydospora* and *Phaeoacremonium minimum*. All bacterial BCAs and the fungicide x bacteria BCA combinations caused no significant reduction against any GTD pathogen infection. All *Trichoderma* BCA treatments significantly reduced *Pm. minimum* infections, while six treatments did so for *Pa. chlamydospora*. The addition of fungicides to the *Trichoderma* BCA treatments did not further improve efficacy in this assay. Five fungicides, six fungal BCAs, and two fungal BCA x fungicide combination treatments showed promise as possible pruning wound protectants and will be evaluated on rootstock mother vines under field conditions to identify possible pruning wound protectants to extend the productive lifespan of grapevines in table grape production.

Keywords: Rootstock mother vines, propagation material, detached shoot assay, phytosanitary quality

F3. Impact of agrochemical formulation type on the epidermal integrity of table grapes: Microcracking and russeting

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The structural integrity of the grape berry epidermis is crucial for pre-harvest crop yield and post-harvest fruit quality in commercial table grape production. The outermost cuticular membrane functions as the berry's principal mechanical and hydrophobic barrier. When compromised, microcracks serve as the primary trigger for russeting and infection courts for fungal pathogens. Studies have reported that the application of specific agrochemical spray materials influences the mechanical properties of berry skin. While active molecules of most modern fungicides and insecticides are structurally neutral with respect to the grape cuticle, the formulation may not be. Emulsifiable Concentrate (EC) formulations rely on harsh organic solvents, compromising the cuticular barrier by stripping epicuticular waxes and making the berry susceptible to microcracking. This study quantified the impact of EC versus other formulations. A comparative field trial was conducted by TopFruit Pty (Ltd) over a single production season across three geographically distinct table grape production regions in South Africa, namely the Bergriver Valley, Hex River Valley and Northern Cape, using a single red seedless cultivar to control for genetic variability. Three distinct chemical spray programs were evaluated. The most significant differentiating variable among the programs was the exclusive use of EC formulations during the critical developmental stages of bloom, pea size, and veraison in one program; the other programs used different formulations. The results demonstrated a significant positive correlation between the application of EC formulations at critical developmental stages and an increased incidence of epicuticular microcracking and russeting, consistent with the established mechanism of organic solvents in EC formulations. These results underscore a critical and often overlooked principle in viticultural spray management: the formulation vehicle of an agrochemical can lead to structural failures, which the active ingredient is intended to prevent. Preliminary results clearly indicate that a second growth season of data collection is essential for drawing definitive conclusions.

Keywords: *Vitis vinifera*, microcracking, Emulsifiable Concentrates, epidermal integrity, table grape quality

F4. Biocontrol potential of non-*Saccharomyces* yeasts against *Botrytis cinerea*

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Table grapes are economically important crops worldwide and are highly valued for fresh consumption and export markets. *Botrytis cinerea* is a fungal pathogen that causes the disease known as grey mould or bunch rot. This pathogen infects grapes both pre- and postharvest, leading to decay, reduced fruit quality, shortened storage life, and considerable economic losses during storage and transportation. Using yeasts as biological control agents is a promising and environmentally friendly alternative to synthetic chemicals. This study evaluated the growth inhibition activity of four non-*Saccharomyces* yeasts against *B. cinerea*. Strains from four non-*Saccharomyces* yeast species (*Meyerozyma guilliermondii*, *Pichia kluyveri*, *Suhomyces pyralidae* and *Zygoascus helenicus*) were screened for growth inhibition activity against three *B. cinerea* isolates (B05.10, SAGWRI-FF1, PPRI 30807) on agar plates and table grapes. The yeasts displayed varying levels of growth inhibition against the *B. cinerea* isolates, indicating that inhibition varied depending on both yeast species and *B. cinerea* isolate. For the dual-culture plate assay, *S. pyralidae* showed the highest levels of growth inhibition, by 56%, 38%, and 35%, against *B. cinerea* B05.10, IWBT-FF1, and PPRI 30807, respectively. In the spore germination assay, *M. guilliermondii* and *P. kluyveri* achieved 100% inhibition against all three *B. cinerea* isolates. While *P. kluyveri* demonstrated the highest inhibition during the VOC assay, achieving 60%, 76%, and 100% inhibition against *B. cinerea* B05.10, IWBT-FF1, and PPRI 30807, respectively. These selected yeast strains demonstrated potential as biological control agents against *B. cinerea*, but further investigation is required.

Keywords: Growth inhibition, plant pathogens, pre- and post-harvest control, antibiosis

F5. Application of dsRNA as an antiviral strategy in grapevine

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Grapevine is one of the world's most economically important perennial crops, however, viral diseases continue to threaten sustainable viticulture. In South Africa, Grapevine leafroll disease (GLD) is the most economically significant viral disease, causing substantial reductions in fruit yield, berry quality, and vine vigour. GLD is frequently associated with mixed viral infections, particularly with grapevine virus A (GVA) alongside the main etiological agent: grapevine leafroll-associated virus 3 (GLRaV-3). Current management strategies, including rogueing infected vines, vector control, and usage of certified virus-free material, mainly limit disease spread rather than provide durable resistance. Spray-induced gene silencing (SIGS) has recently emerged as a promising disease management strategy. SIGS consists of the application of exogenous double-stranded RNA (dsRNA) to activate the endogenous RNA interference (RNAi) pathway as a strategy for inducing viral resistance. Due to the highly sequence-specific nature of RNAi, dsRNA-based approaches offer reduced off-target environmental impacts compared to conventional chemical pesticides. This study investigated the application of SIGS as a strategy to suppress GVA infection, serving as a proof-of-concept for the use of exogenous dsRNA-based antiviral treatments in grapevine. GVA was selected as the model virus because, unlike GLRaV-3, the virus is capable of infecting herbaceous model plants, facilitating controlled evaluation of SIGS efficacy. To induce RNAi, a dsRNA-producing construct targeting the GVA *coat protein* (*CP*) gene was developed to generate hairpin RNA (hpRNA), enabling the production of sequence-specific dsRNA. The purified dsRNA was subsequently applied via high-pressure spraying to *Nicotiana benthamiana* as initial proof of concept. Subsequently, the same treatment was used for grapevine plants. Notably, the application of dsRNA in both *N. benthamiana* and grapevine resulted in a significant decrease in viral titre for up to five days post-treatment. Ongoing research is focused on characterising the treatment threshold and evaluating the incorporation of nanoparticles to optimise dsRNA delivery and efficacy. Collectively, these findings demonstrate the potential of exogenous dsRNA application as a sustainable and field-deployable biopesticide strategy for antiviral protection in grapevine.

Keywords: RNAi, biopesticide, spray-induced-gene-silencing (SIGS), sustainability

F6. CRISPR-based-one-pot assay for the sensitive and specific detection of Grapevine leafroll-associated virus 3 (GLRaV-3).

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Early detection of viral pathogens in grapevine is essential for maintaining vineyard health and ensuring economic viability. Grapevine Leafroll Disease (GLD) is one of the most detrimental viral infections affecting grapevine cultivation, accounting for significant economic losses in South African vineyards. Within this disease complex, Grapevine-leafroll associated virus 3 (GLRaV-3) is the primary causal agent, but results in varying symptomatology across cultivars. Visual identification is often unreliable in certain cultivars, and symptoms often only appear during the berry-ripening phase, making early detection vital for management strategies. Current diagnostic methods, including PCR, RT-qPCR, and ELISA, are often time-consuming and require specialised lab infrastructure and trained personnel. Here, we present a crude sap-based reverse-transcription recombinase polymerase amplification (RT-RPA) coupled with CRISPR/Cas12a technology for the detection of GLRaV-3. The assay can be completed within an hour by employing a room-temperature RNA extraction protocol followed by a one-pot RT-RPA CRISPR/12a detection platform, which is effective at 40°C, including both a subsequent fluorescent and a lateral flow strip readout. This test provides specificity by being tailored for specific GLRaV-3 variant groups, and does not detect other grapevine viruses which may be present in a vine. Additionally, this test offers high sensitivity, with a detection limit of 250 copies per sample, making it suitable for detecting early infection. This assay was further validated by using field samples, and results were compared to outsourced commercial ELISA testing. Compared to other diagnostic methods, this platform serves as a more convenient approach to viral detection while still maintaining reliability and accuracy and supports the evidence in the potential of field-based rapid testing within agricultural settings. This research not only provides promising alternatives to GLRaV-3 detection but is also readily adaptable for the detection of many other viral pathogens, including cases of co-infection through multiplexing techniques.

Keywords: Rapid diagnostics, CRISPR/Cas12a, isothermal amplification, crude sap

F7. Multispecies microbial consortia from vineyards for controlling grapevine pathogens

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Fungi such as *Botrytis cinerea* and *Erysiphe necator*, as well as the oomycete *Plasmopara viticola*, are common disease-causative agents responsible for significant losses of grape production, including table grapes. This study aimed to construct multispecies consortia using vineyard-associated antagonistic bacterial and yeast strains and to elucidate their biocontrol properties against these pathogens. Initially, compatibility of bacterial and yeast strains was assessed by co-culturing them in malt extract broth, followed by enumeration of yeast and bacterial populations on nutrient agar and WL supplemented with the appropriate selective antimicrobial agents. Three bacterial strains, *Pantoea agglomerans* B4020, *Bacillus nakamurai* B4022 and B4001, were found to be compatible with the yeast strains *Hanseniaspora pseudoburtonii* Y963 and *Wickerhamomyces anomalus* Y934. Based on these compatibility outcomes, two microbial consortia were constructed: Consortium 1 (*P. agglomerans* B4020, *B. nakamurai* B4022, and *W. anomalus* Y934) and Consortium 2 (*P. agglomerans* B4020, *B. nakamurai* B4001, and *H. pseudoburtonii* Y963). The antifungal efficacy of the consortia was first evaluated *in vitro* against multiple *Botrytis cinerea* strains, where both consortia exhibited strong mycelial growth inhibition comparable to the individual bacterial strains. Furthermore, consortium 2 showed greater efficacy by significantly reducing conidial germination and delaying mycelial colonisation and spreading of *Botrytis cinerea* on wounded grape barriers compared with consortium 1. The biocontrol potential of both consortia against obligate pathogens *E. necator* and *Pl. viticola* was subsequently assessed using grapevine leaf disc assays, in which both consortia strongly reduced pathogen sporulation. These multi-microbial consortia suppressed the grapevine pathogens through multiple mechanisms, demonstrating their application as potential broad-spectrum biocontrol agents for sustainable grapevine disease management.

Keywords: Biological control, microbial consortia, *Plasmopara viticola*, *Erysiphe necator*, *Botrytis cinerea, Pantoea agglomerans*, *Bacillus nakamurai*, *Wickerhamomyces anomalus*

D | Abstracts

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A Sustainable Table Grape Future: Innovation & New Insights

O13. Non-destructive estimation of table grape bunch mass using RGB-based morphological features and machine learning

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Yield in grapevines is primarily determined by the number of bunches per vine and the average bunch mass. While bunch numbers can be assessed relatively early in the season, accurate estimation of bunch mass remains challenging due to its dynamic nature and strong dependence on environmental conditions, vine water status, and management practices during berry development. In table grape production, bunch mass is not only a key driver of total yield but also a critical quality attribute influencing market value. There is increasing interest in the development of innovative and non-destructive approaches for yield prediction that can support optimised vineyard management decisions. This study investigated the potential of combining RGB image analysis with machine learning techniques to improve bunch mass estimation. Two table grape cultivars, Sugar Crisp™ and Crimson Seedless, were monitored over two growing seasons across multiple phenological stages. A cost-effective imaging strategy based on conventional 2D RGB images was implemented, from which 13 morphological bunch features were extracted using image processing techniques. Both Multiple Linear Regression (MLR) and Random Forest Regression (RFR) showed satisfactory performance in predicting bunch mass; however, RFR achieved higher predictive accuracy, with an R^2 of approximately 0.80. Prediction errors were higher for larger and more compact bunches, indicating limitations in capturing structural complexity and suggesting the need for further model refinement. Overall, the results demonstrate the potential of integrating RGB-derived morphological features with machine learning to enable scalable and non-destructive estimation of bunch mass, contributing to improved yield prediction and decision-making in table grape production systems.

Keywords: Precision viticulture, yield estimation, bunch morphology, image analysis, machine learning

O14. Plastic covers in vineyards: Effects on remotely sensed canopy spectral signals and physiological relationships

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Plastic covers are increasingly used in table grape vineyards to protect canopies and bunches from adverse weather conditions. However, they alter the spectral signals recorded by satellite sensors, limiting the direct application of remote sensing in precision viticulture. Although correction approaches have been proposed, they remain largely unvalidated and do not fully address current methodological and interpretative challenges. This study quantified the effects of different plastic covers on vineyard spectral responses and assessed their influence on the relationships between remotely sensed indicators and vine physiological traits. During the 2025–26 season, a randomised experimental design was established in which vineyard plots were either covered with different plastic films or left uncovered. Ground-based physiological and leaf measurements were integrated with satellite observations and vegetation indices. Results indicate that spectral reflectance in covered plots followed temporal patterns similar to those observed in uncovered vines; however, absolute values were systematically shifted according to cover type. Moreover, covered-to-uncovered band ratios were not stable over time, with coefficients of variation ranging from 5–10% in the visible region and 2–3% in the near-infrared. This variability reflects both the optical properties of the films and cover-induced changes in canopy physiology. Differences in leaf pigment-related traits were also detected after cover removal, together with marked differences in near-infrared reflectance. Despite these limitations, selected spectral regions, particularly the red-edge and near-infrared bands, maintained sufficient temporal coherence to support relative monitoring within consistently covered areas. Overall, these findings identify the main constraints of satellite-based monitoring under plastic covers while highlighting practical opportunities for using selected spectral bands in protected precision viticulture.

Keywords: Precision viticulture, protected cultivation, vegetation indices, remote sensing.

O15. Biochemical regulation of dormancy release in Crimson Seedless grapevines

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Insufficient winter chilling accumulation increasingly threatens uniform bud break and yield consistency in South African table grape production. Although hydrogen cyanamide (HC) remains the standard dormancy-breaking agent, concerns regarding its toxicity highlight the need for safer alternatives and a deeper understanding of the biochemical processes regulating dormancy release. This study investigates dormancy progression and bud break responses in *Vitis vinifera* L. cv. Crimson Seedless through two complementary approaches. The first aim examines the biochemical and physiological dynamics associated with natural dormancy progression and bud break induction, while also evaluating the influence of bud position along the cane. Bud break was induced under controlled forcing conditions using HC as a positive control and distilled water as a negative control. Metabolic profiling included GC-MS analysis of polar metabolites, HPLC quantification of sugars, organic acids, and phenolic compounds, UPLC analysis of amino acids, and HPLC-ESI-MS/MS determination of phytohormones. Cell wall modifications were characterised using Comprehensive Microarray Polymer Profiling (CoMPP) for glycan epitope analysis, complemented by ATR-FT-MIR spectroscopy to generate broad biochemical fingerprints. The second aim investigates whether artificial cold incubation (4 °C, darkness, 100–600 hours) reproduces the physiological state associated with naturally accumulated winter chilling. In addition, the efficacy of a seaweed-derived biostimulant was compared with HC and water control. Nine treatment groups were arranged in a fully randomised block design across two vineyard rows. Bud break percentage, uniformity, and progression through E-L stages 1–4 were evaluated, while vascular tissue development was assessed histologically using sequential cane sampling. Together, these studies aim to identify biochemical markers associated with dormancy depth and bud break competence in Crimson Seedless, while determining whether artificial chilling accurately mimics natural dormancy progression. The findings may support the development of safer HC alternatives and improved dormancy management strategies for warm-winter table grape regions.

Keywords: Bud dormancy, bud-break metabolism, artificial chilling, hydrogen cyanamide

O16. Optimisation of VNIR spectral indices using variable selection and ratio-based spectral analysis for predicting grape quality parameters

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Accurate monitoring of grape quality parameters is essential to achieve an optimal balance of cultivar-specific quality and flavour, assess spatial variability in ripening within vineyards, and determine the optimal harvest time. However, conventional analytical methods are destructive, labour-intensive, and often require complex sample preparation, hazardous reagents, and advanced laboratory instrumentation, with more robust techniques typically associated with higher operational costs. In response, visible–near-infrared (VNIR) spectroscopy has emerged as a cost-effective and non-destructive alternative for the rapid assessment of chemical attributes in agricultural products, particularly in precision viticulture. Nevertheless, VNIR-based approaches often exhibit variable predictive performance, largely influenced by instrument configuration and the chemometric strategies used for model calibration and optimisation. Therefore, this study aims to evaluate wavelength selection and ratio-based spectral analysis (via contour mapping) as optimisation strategies to identify robust VNIR spectral indices for predicting total soluble solids (TSS), total acidity (TA), and pH in Crimson Seedless and Sugar Crisp™ table grape cultivars. Grape quality parameters were determined using standard analytical methods from berries sampled over two consecutive growing seasons (2023/24 and 2024/25). VNIR reflectance spectra (200–1000 nm) were collected from the same samples under controlled laboratory conditions using a StellarNet Black-Comet spectrometer. Previous analyses using the full spectral range, without spectral index optimisation, achieved prediction accuracies exceeding 70%, with prediction errors of 7.0%, 15.6%, and 18.0% for pH, TSS, and TA, respectively. The proposed approaches aim to simplify and optimise spectral analysis by identifying the most informative wavelength regions and enabling the development of robust ratio-based spectral indices. These indices can be implemented in systems requiring a reduced number of wavelengths. Ultimately, this work can potentially support the development of simplified, cost-effective sensing systems for real-time, non-destructive monitoring of grape maturity. By reducing spectral dimensionality to key wavelengths, these methods facilitate the deployment of portable or embedded VNIR devices for rapid in-field assessment, supporting precision harvest decisions, improving fruit quality, and reducing reliance on time-consuming laboratory analyses.

Keywords: Precision viticulture, spectral modelling, contour maps, VNIR spectroscopy, grape quality

F8. Berry skin elasticity and cuticular wax composition as key drivers of cracking resistance in table grapes

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Grape berry cracking is a complex physiological disorder characterised by rupture of the fruit skin, resulting in visible splits that increase susceptibility to fungal infection, reduce marketability, and contribute to significant economic losses in table grape production. A hydrophobic extracellular layer that serves as the primary barrier against mechanical stress and pathogen ingress, known as the cuticle, plays a critical role in resistance to cracking, with cuticle disruption often preceding skin failure. Current mitigation strategies include applications of calcium and plant growth regulators (PGRs), which may alter berry skin cell wall properties and cuticle composition. However, cultivar-dependent variation in both susceptibility to cracking and treatment response suggests that cracking resistance is also under genetic control. This study aimed to identify quantitative trait loci (QTL) associated with cracking-related traits in a segregating grapevine mapping population, while also characterising phenotypic variation in cracking susceptibility, berry skin mechanical properties, and cuticle composition across multiple table grape cultivars. Berry skin strength and elasticity were measured using a texture analyser. Results demonstrated a consistent correlation between berry cracking susceptibility and skin elasticity, while skin strength showed less of an association. Furthermore, the skin strength and elasticity were measured in 218 table grape cultivars, which allowed for the creation of a berry cracking index. Cuticular wax composition was analysed using gas chromatography–mass spectrometry (GC-MS), and selected cultivars were treated with PGRs from 2023 to 2025 to evaluate their effectiveness in reducing cracking incidence. PGRs did not show a significant effect on cracking, while seasonal changes played a much more significant role. However, elasticity did show a moderate association with the accumulation of C20 and C22 cuticular wax compounds. These findings provide valuable insights for breeding and management strategies aimed at improving table grape cracking.

Keywords: Splitting, cuticle, PGRs

F9. Automated non-invasive detection and quantification of grapevine bunches using artificial intelligence

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The quantification of grape bunch number is a critical yet labour-intensive component of viticultural yield estimation, as it represents a major source of vineyard yield variability. Accurate assessment is essential for reliable production forecasting and informed management decisions; however, conventional approaches rely on manual counting, which is time-consuming, subjective, and often based on unrepresentative sampling. Artificial intelligence (AI) offers a promising non-destructive alternative for rapid and objective bunch quantification. The objective of this study was to evaluate an AI-based object detection algorithm for in-field grape bunch detection across two commercially important table grape cultivars, Crimson Seedless™ (red) and Sugar Crisp™ (white), under commercial vineyard conditions. Standard RGB images were used as model inputs, and different image acquisition protocols and model configurations were assessed. The best-performing model achieved excellent detection performance, with a mean average precision at 50% intersection over union (mAP50) of 0.979 and a high F1-score of 0.945, indicating a strong balance between precision and recall. These results demonstrate the potential of AI-based object detection to support accurate yield estimation in precision viticulture. When integrated with efficient field imaging systems, this approach could enable near real-time yield estimation throughout the growing season.

Keywords: Precision viticulture, object detection, yield estimation, artificial intelligence.

F10. Diploid genome assemblies enable QTL refinement and marker development for berry aroma traits in grapevine

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Understanding the genetic resources available to grapevine breeders is crucial for the improvement of fruit-quality traits that appeal to both the grower and consumer. Reference genomes provide a valuable tool for characterising genetic diversity. However, reliance on a single near-homozygous reference genome limits the detection of cultivar-specific sequence variation, structural variation, and copy number differences that may underlie breeding-relevant traits. Here, we present diploid genome assemblies for the cultivar 'Deckrot' ('Pinot gris' x 'Teinturier') and a table grape selection, G1-7720 ('Black Rose' x 'Muscat Seedless'), developed by the Agricultural Research Council (ARC) Nietvoorbij (Stellenbosch, South Africa). These two genotypes are the parents of a mapping population that segregates for berry aroma profile, a trait determined by the content and accumulation of volatile organic compounds (VOC). QTL mapping has identified genomic regions associated with VOC accumulation. In this study, we utilised the parental genome assemblies for a detailed investigation of these QTLs and identification of underlying candidate genes. Gene copy number variation, together with allele- and copy-specific expression, was found to determine *α*-terpineol and geraniol accumulation in grape berries. These compounds contribute lilac, pine, and citrus aroma notes and rose and fruity aroma notes, respectively. While caryophyllene accumulation was found to be associated with a single highly expressed allele, which contributed to spicy, woody, and peppery aroma formation in the progeny carrying this allele. Subsequently, genetic markers for the *α-terpineol synthase*, *geraniol synthase*, and *caryophyllene synthase* alleles of interest were developed, allowing for the determination of fruit aroma potential in seedlings. Together, these results demonstrate how parental genome assemblies can improve the interpretation of QTLs, reveal functional sequence variation, and support the development of markers for grapevine breeding.

Keywords: Genome sequencing, genomic variants, aromatic profiles

F11. Effects of cover crops and management practices on grapevine vigour, nutrient dynamics, and biochemical responses

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Grapevine (*Vitis vinifera*) is an important fruit crop globally. Vineyard health and soil quality are affected by climate change and commercial farming practices, and these reduce table grape growth, yield, and retard fruit development. Fruit quality and healthy grapevines depend on sustainable vineyard management and good soil health. Hence, cover crop cultivation is a key management practice that could enhance sustainable agricultural practices and improve soil quality in the vineyard. Therefore, a field study was conducted to elucidate the effects of cover crop cultivation and the management practices thereof (chemical control vs slashed) on Sweet Globe™ grapevine performance. The study was conducted at Laborans Farm located in Paarl, Western Cape province, South Africa. Five main cover crop treatments were applied, namely four suitable cover crop species (oats, medics, grazing vetch, mixture of triticale & lupins) and a control, which represents farmer standard practices. A randomised split-plot treatment replicated five times was used. Cover crops were cultivated for five months before applying two management practices. The response of grapevine to cover crops was determined by analysing vegetative growth, leaf blade and petiole nutrient content as well as the levels of hydrogen peroxide (H_2O_2), lipid peroxidation, and osmolytes. Results showed that there were no consistent trends with respect to cane mass regardless of cover crops or the termination method. There was a significant increase in H_2O_2 in the grapevine under the oats cover crop treatment, regardless of termination method, compared to the control. Oats induced H_2O_2 levels, which caused a slight lipid peroxidation as seen by 13% increase in malondialdehyde. Furthermore, calcium, potassium, and sodium levels in leaf blades and petioles of grapevine were higher under oats in both termination methods. These findings suggest that cover crops could contribute positively to sustainable agriculture by improving plant nutrient content and hence plant health.

Keywords: Plant health, slashed, Sweet Globe™

F12. Enhancing photosynthetic performance, nutrient-use efficiency and marketable yield in Autumn Crisp table grapes using an *Ecklonia maxima*-derived seaweed extract under semi-arid conditions

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Sustainable table grape production increasingly requires strategies that maintain marketable yield, fruit quality and physiological efficiency under variable semi-arid conditions. In production regions such as Upington, South Africa, vines are frequently exposed to high temperatures (> 40 °C), intense radiation, and water-limited conditions during berry development and ripening. These abiotic stressors can reduce photosynthetic performance, increase oxidative pressure, impair nutrient acquisition and partitioning, and negatively affect bunch development, berry size, firmness retention and marketable yield. A commercial field trial was conducted during 2024 on *Vitis vinifera* cv. Autumn Crisp near Upington to evaluate whether a season-long *Ecklonia maxima*-derived seaweed extract (SWE) biostimulant programme could improve vine performance, photosynthetic function, nutrient-use efficiency and postharvest quality under semi-arid production conditions. The programme consisted of eight foliar applications from early shoot growth through rachis extension, berry development and veraison. Treated vines were compared with untreated control vines. Assessments included chlorophyll fluorescence-based photosynthetic performance, bunch weight, berry size distribution, extrapolated yield, firmness retention during accelerated storage, leaf and fruit nutrient status, and nutrient-use efficiency indices for nitrogen, phosphorus and potassium. SWE-treated vines showed chlorophyll fluorescence responses consistent with improved photosynthetic electron transport, reduced excitation pressure and enhanced functional performance of the photosynthetic apparatus. These physiological responses were associated with a 24% increase in mean bunch weight, from 534 to 663 g, and a 24% increase in extrapolated yield. Berry size distribution shifted towards higher-value fruit, with the extra-large category increasing from 25.0% to 46.7%. Postharvest firmness was also better retained during 21 days of accelerated storage. Nutrient-use efficiency increased by 85% for nitrogen, 10% for phosphorus and 82% for potassium. These findings indicate that *Ecklonia maxima*-derived SWE programmes can support more sustainable table grape production by improving photosynthetic efficiency, nutrient-use efficiency, marketable yield and shelf-life resilience in semi-arid viticulture systems.

Keywords: Table grapes, sustainability, nutrient-use efficiency, photosynthesis, seaweed biostimulant

F13. Investigation of a low-browning variegated grapevine mutant cv. Bruce's Sport

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Enzymatic browning remains a major postharvest challenge in the table grape industry, negatively affecting berry appearance, shelf life and export quality. Polyphenol oxidase (PPO) enzymes are central drivers of this process, yet limited genetic resources are available to support the development of naturally low-browning grape cultivars. Bruce's Sport, a naturally occurring variegated mutant derived from Sultana, presents a unique opportunity to investigate this trait, as variegated tissues exhibit markedly reduced PPO activity and consequently decreased enzymatic browning. Bruce's Sport exhibits white-green leaf variegation arising from chimeric tissue patterning, which becomes apparent during the later stages of the growing season. Conversely, the flowers and berries display a stable variegated phenotype, appearing paler in colour, with green and white striping on the berry skin. The low browning potential of Bruce's Sport has direct relevance to the table grape industry, where post-harvest enzymatic browning driven by PPO activity represents a major challenge, particularly in export-driven markets. Despite the potential commercial importance, the genetic factors underlying the phenotype of Bruce's Sport remain poorly understood. This study aims to investigate the genetic basis of the Bruce's Sport phenotype with a particular focus on understanding the observable variegation and reduced PPO activity and its potential relevance for breeding low-browning table grapes. To this extent, a transcriptomic analysis was conducted comparing paler flower tissues of Bruce's Sport to the non-variegated flowers of Sultana. Differential gene expression analysis identified several candidate genes associated with chloroplast function, pigment development and oxidative metabolism, amongst others, that may contribute to both the variegated phenotype and altered PPO activity. These findings contribute towards the identification and characterisation of genes associated with PPO activity and variegation in grapevine, potentially uncovering candidates for future functional studies and breeding strategies aimed at improving postharvest quality and reducing browning.

Keywords: PPO, variegation, grapevine, enzymatic browning, transcriptomics

F14. Return fertility of *Vitis vinifera* L. as affected by GA3, GA4+7 and GA3 plus s-abscisic acid (ABA)

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Gibberellic acid (GA3), is the most widely used plant growth regulator in table grape production, applied for stretching, thinning, and berry sizing. GA3 applications involving direct bud contact through full-cover sprays have been linked to decreased fertility. To investigate this issue, two studies were conducted between 2015 and 2022, evaluating GA3 and potential alternatives. Study 1 (2015/16–2016/17, Hex River Valley, Sunred Seedless): This trial tested GA4+7 as an alternative thinning agent for cultivars with poor GA3 response. Treatments included GA3 (5 ppm) and GA4+7 (7.5–30 ppm) applied at 10% berry set (10%BS) and berry set (BS). One season after treatment application, actual fertility assessed in the vineyard (bunches per sprouted bud) was significantly lower in the 5 ppm GA3 (10%BS) and 15 ppm GA4+7 (10%BS) treatments compared to the control. The 7.5 ppm GA 4+7 (10%BS) and all BS treatments showed no significant fertility reduction. GA4+7 could be evaluated further as a thinning agent for table grapes. Study 2 (2018/19–2021/22, Orange River, Prime): This study investigated thinning with GA3 (1–5 g·ha^{-1}) and GA3 combined with abscisic acid (s-ABA), followed by GA3 sizing (40 g·ha^{-1}). Treatments included: Control (no thinning); GA3 (1 ppm) at 10% set + repeat after 3 days; GA3 (1 ppm) applied five times at 3-day intervals; and GA3 (1 ppm) + s-ABA (400 ppm) at 10% set, followed by GA3 (1 ppm) 3 days later. Sizing treatments were applied at 7–10 mm berry diameter, using dipping or spraying at varying volumes (90–500 L·ha^{-1}). After three consecutive seasons of treatment applications, actual fertility recorded in 2022 indicated that none of the thinning or sizing treatments negatively affected fertility. GA3 applied at recommended dosages for thinning and sizing did not reduce fertility. GA3 combined with s-ABA for thinning showed no negative impact on fertility.

Keywords: Alternatives for GA3, thinning, berry size improvement

D | Abstracts

SESSION 5: 6 AUGUST

Plastic Production Systems for Table Grapes: Research Technology and Practical Experience

O17-O18 and F15-F18 contributed to the oral presentation at 14:00

O17. The impact of overhead protection and irrigation level on fertility of *Vitis vinifera* L. 'Sultanina H5' in a semi-arid summer rainfall region of South Africa

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This six-season study (2019/20 to 2024/25) evaluated the effects of overhead protection and irrigation level on the fertility of table grape vines in the Orange River region of South Africa. The trial was conducted in a 20 ha commercial block of mature 'Sultanina H5' vines, established in 2015 and irrigated by micro-sprinklers. The study comprised three main treatments applied within three 2.5 ha sections (sites) within the 20 ha block: Open (uncovered), Netted, and Netted plus Plastic (Netted+Plastic). Treatments were applied, and data vines were randomly allocated in the central 13 rows of each 2.5 ha trial site, while instruments for measuring microclimate parameters were installed in the central row of each trial site. Netting was installed in 2016 and plastic for the Netted+Plastic main treatment in December 2019, while the remainder of the site was covered with plastic only. From the 2020/21 season onwards, the same irrigation sub-treatments were applied within each overhead protection treatment: the farm standard (T100), 20% less than T100 (T100-20), and 40% less than T100 (T100-40). By the end of the trial in 2025, fertility was significantly higher in the Open and Netted treatments and significantly lower under Plastic and Netted+Plastic treatments. In the Netted and Netted+Plastic treatments, T100 and T100-20 were associated with stronger vegetative growth, whereas fertility showed a declining trend under these irrigation levels. Photosynthetically active radiation (PAR) transmission was 91.6% under netting, 50.9% under plastic, and 60.0% under Netted+Plastic. These results indicate that overhead protection altered the radiation environment and vine growth responses, with consequent effects on fertility over time.

Keywords: Fertility over time, solar radiation, photosynthetic active radiation

O18. Impact of protective covers on vineyard microclimate in semi-arid summer rainfall and Mediterranean regions of South Africa

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Protective covers are used in table grape production to reduce damage caused by rain, hail, and wind, while modifying the vineyard microclimate. Previous research has identified both benefits and risks associated with overhead nets and plastic coverings, including negative effects on fertility and colour development, as well as excessively high temperatures beneath plastic. Most previous studies evaluated either nets or plastic individually and did not investigate the effects of cover implementation at different phenological stages. Two studies, initiated during the 2025/2026 season, aim to evaluate the impact of protective coverings on vineyard microclimate in semi-arid summer rainfall and Mediterranean regions of South Africa. Study 1 was conducted in the Lower Orange River region on IFG Ten. Treatments include uncovered control, permanent nets, combinations of nets and permanently installed overhead plastic, with cover implemented at different phenological stages, ranging from pre-bud break to véraison, as well as plastic on the canopy, installed at véraison. Study 2 is conducted in the Hex River Valley on Sugrathirtyfive and investigates uncovered control, permanent nets, permanently installed overhead plastic with covering implemented after set and at véraison, plastic on the canopy (installed at véraison), and bunch bags installed at véraison. Macroclimate data are obtained from automatic weather stations at trial sites. Microclimate data (logged continuously at 1-hour intervals), obtained from sensors installed above the canopy, as well as (where applicable) in the bunch zones of data vines/ beneath the canopy, include: photosynthetically active radiation (PAR) and net radiation; air temperature; relative humidity and wind speed. Additional PAR measurements are taken with a line quantum sensor to quantify the impact of applied covers on PAR transmission. Soil temperature and soil water content are being measured with sensors installed in the root zone of data vines. Results from the first season are currently being analysed and will be presented.

Keywords: Table grapes, temperature, relative humidity, windspeed, photosynthetically active radiation

F15. Impact of overhead covers (net and/or plastic) on bud break and set of IFG Ten in the Lower Orange River region

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Production of IFG Ten under protective covering is applied due to the cultivar's sensitivity to berry shatter, sunburn/sun blush, and berry cracking. Overhead nets are primarily used to modify the vineyard microclimate and to protect vines against hail, wind and bird damage. Plastic coverings applied over the canopy and bunch zone are mainly used to protect grapes against rain. Permanently installed overhead plastic is used for microclimate modification, protection against rain, and advancing or delaying harvest. This study, to be conducted over two seasons (2025/2026 and 2026/2027), aims to identify the most effective protective covering system(s) for maintaining table grape quality and provide recommendations regarding the optimal timing of cover implementation in the semi-arid Lower Orange River region. The combined effect of cover treatment and cover implementation timing on table grape quality at harvest and after post-harvest cold storage is being investigated in a 4 ha mature IFG Ten on Ramsey rootstock vineyard, established in 2018 in the Orange River region. The vines are spaced 3 m x 1.6 m and trained onto a gable trellis system, under micro sprinkler irrigation. The treatments, allocated in a fully randomised design, include: (T1) Control (uncovered); (T2) Netting permanently installed; (T3) Nets + Overhead plastic permanently installed, cover implemented before bud break, after hydrogen cyanamide application until harvest; (T4) Nets + Overhead plastic permanently installed, cover implemented after berry set until harvest; (T5) Nets + Overhead plastic permanently installed, cover implemented from véraison until harvest; and (T6) Nets+Plastic applied directly over the canopy from véraison until harvest. The preliminary focus is the impact of overhead covers applied in T2, T3 and T4 (netting and/or plastic) on bud break and berry set, as contributing factors to final yield and quality.

Keywords: Protective coverings, plastic over canopy, timing of cover implementation

Pre-recorded presentation available online on www.sasev.org

F16. Evaluating the potential of overhead plastic covering and bunch bags to delay ripening of *Vitis vinifera* L. cv. Sugrathirtyfive in the Hex River Valley

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The use of overhead protection systems is an important technique in table grape production, protecting against rain, hail, and wind damage while modifying vineyard microclimate. South African table grape producers require systems to reduce rain-related damage during ripening and harvest, while also enabling delayed harvests to target high-value late-season export markets during late April and early May. This study aims to identify the most cost-effective covering technique for delaying ripening while maintaining grape quality. The trial is being conducted over two production seasons (2025/2026 and 2026/2027) in a 4 ha mature Sugrathirtyfive vineyard grafted onto Ramsey rootstock in the Hex River Valley. Vines are spaced at 3.0 m × 1.6 m, trained onto a gable trellis system, and irrigated using drip irrigation. The experiment consists of three treatments allocated in a fully randomised design with four replicates: Control (uncovered), Overhead plastic permanently installed and implemented from after berry set until harvest, and Paper bags applied from véraison until harvest. To monitor ripening, 100 berries per replicate were sampled weekly from véraison to harvest to determine total soluble solids (TSS), titratable acidity (TA), and pH. At harvest, four 4.5 kg cartons per replicate were packed according to South African export protocols and stored at -0.5°C for six weeks. After storage, berry firmness, juice quality, and defects such as decay, stem condition, berry splitting, browning, SO_2 damage, and loose berries were assessed. Results indicate a trend of delayed ripening under overhead plastic, as shown by lower TSS and higher TA values compared with the Control and Paper Bag treatments. Protective benefits were confirmed, with decay-related waste of 24% in the Control compared with 8–18% under the protected treatments. Other preliminary results will include harvest quality parameters, post-cold storage quality, and the cost-effectiveness of coverings evaluated.

Keywords: Post-cold storage quality, microclimate

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F17. Impact of three protective covering techniques applied at two phenological stages on production and quality of *Vitis vinifera* L. cv. Sugrathirtyfive in the Hex River Valley

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Current research within the table grape industry focuses on improving/maintaining grape quality to meet market requirements. Producers require systems to protect grapes against rain-related damage, particularly during ripening and harvest, as damage could reduce pack-out, resulting in significant economic losses. This study, being conducted over two production seasons (2025/2026 and 2026/2027), aims to identify the most effective protective covering system(s) for maintaining table grape quality and provide recommendations regarding the optimal timing of cover implementation. The study is being conducted in a 4-ha mature Sugrathirtyfive vineyard grafted onto Ramsey rootstock in the Hex River Valley. Vines are spaced at 3.0 m × 1.6 m, trained onto a gable trellis system, and irrigated using drip irrigation. Five treatments, allocated in a randomised block design with four replicates, are being evaluated: (1) Uncovered control; (2) Permanently installed overhead plastic, with covering implemented from berry set to harvest; (3) Permanently installed overhead plastic, with covering implemented from véraison to harvest; (4) Plastic cover on the canopy implemented during ripening to harvest; and (5) Paper bunch bags implemented from véraison to harvest Yield and quality parameters assessed at harvest include berry cracking in the vineyard, total and export yield, bunch mass, berry size (mass and diameter), berry firmness, berry colour, and juice quality (TSS, TA, and pH).

Keywords: Overhead plastic, plastic on canopy, paper bags, cover implementation timing

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F18. Table grape quality at harvest and after post-harvest cold storage, evaluated over four consecutive harvest dates of *Vitis vinifera* L. cv. Sugrathirtyfive in the Hex River Valley

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In recent years, commercial table grape vineyards in South Africa have been increasingly exposed to unexpected rainfall near and during harvest. Table grape producers need techniques to protect grapes against damage associated with rain during the ripening/harvest period. This is especially significant considering current marketing opportunities for late-season table grapes when demand is high towards the end of the harvesting season (late April to May). In this study, being conducted over two seasons (2025/26 and 2026/27), the combined effect of cover treatment and harvest date on table grape quality at harvest and after post-harvest cold storage is investigated in a 4 ha mature Sugrathirtyfive on Ramsey rootstock vineyard, established in 2019 in the Hex River Valley. The vines are spaced 3 m x 1.6 m and trained onto a gable trellis system, under drip irrigation. The treatments, allocated in a split-plot design, include the following main-plot treatments: Control (uncovered), Overhead plastic covering (implemented after berry set) and Paper bags (implemented at véraison). Harvest date serves as the split-plot treatment. The first harvest took place once the minimum maturity standards had been reached, followed by additional harvests at 2, 4, and 6 weeks after the initial harvest date. At each harvest date, four 4.5 kg cartons per replicate were packed according to export packing protocols. After cold storage at -0.5°C for 6 weeks, berry firmness, juice quality, and defects (stem condition, decay, berry split, browning, SO_2 damage, loose berries) were assessed. The preliminary focus is quality at harvest – namely percentage berry cracking in the field, export percentage, bunch mass, berry size, berry firmness, and juice quality (TSS, TA and pH). Post-cold storage quality obtained with each covering treatment on the four harvest dates will also be presented.

Keywords: Overhead plastic covering, bags, delayed ripening

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