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

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Background

- **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 2018, climate change will put limited water resources under even more pressure in the future.**
- **In this regard, there was only 14.4 mm of rain in July 2026, the lowest at Cape Town International Airport since 1958.**
- **Taking above-mentioned into consideration, it is increasingly important that table grape growers use their available water more efficiently by means of sound irrigation scheduling practices.**

> **Several cold fronts moved over the Western Cape in July 2025, resulting in rainfall totals exceeding 100mm. By contrast, July 2026 was the driest on record for many stations in the south-western Cape.**

Quote from Venter (SAWS)



Background…

- Researchers at ARC Infruitec-Nietvoorbij have focused on vineyard irrigation research for the last four decades.
- Growers need to irrigate their vineyards for maximum production whilst maintaining grape quality so that table grape production is profitable in a highly competitive market.
- This means that growers must make important decisions about what irrigation scheduling practices they should apply in their vineyards.



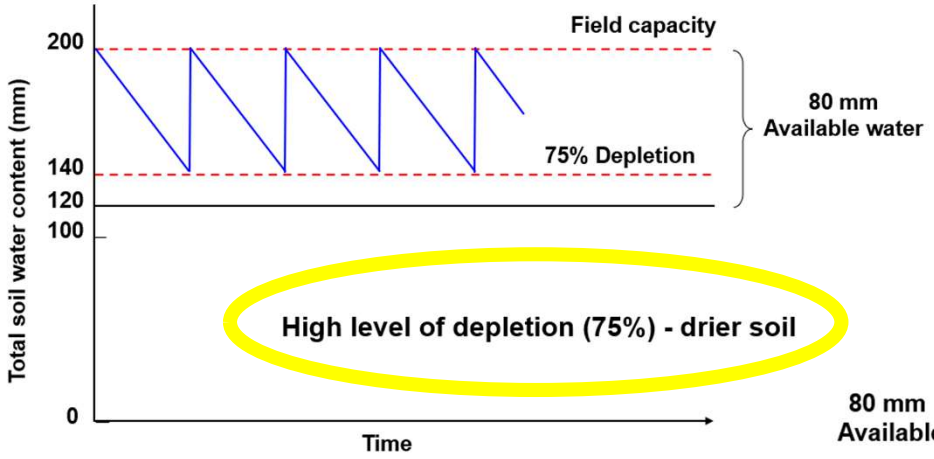




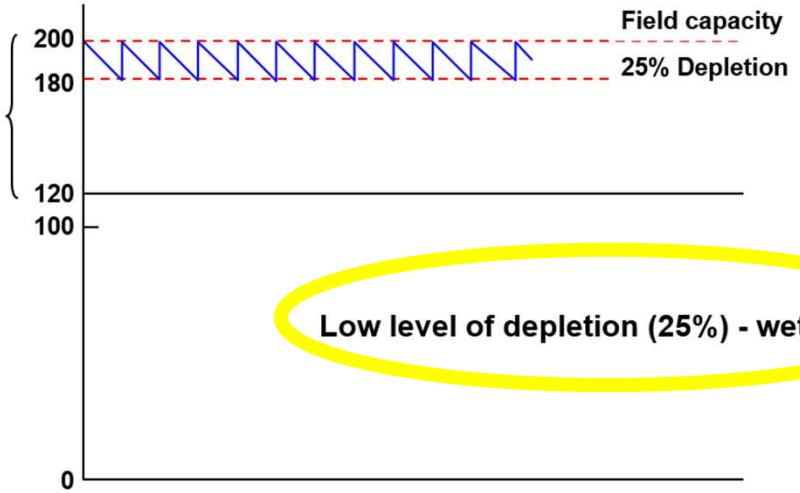
Aspects to consider

- What irrigation strategy should be followed for newly planted vineyards?
- What is the ideal soil water depletion level that table grapes should be irrigated at during the season?
- Using stem water potential to set the refill line for table grape irrigation.
- How can irrigation of table grapes be adapted during ripening to improve grape quality?
- How should table grapes be irrigated during the post-harvest period and winter?
- Guidelines on soil and vineyard management practices for optimum irrigation of table grape vineyards during water shortages.

Terminology



High level of depletion (75%) - drier soil



Low level of depletion (25%) - wetter soil





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What irrigation strategy should be followed for newly planted vineyards?

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Newly planted vineyards

- Mistakes made during establishment can reduce the grapevine lifespan and complicate future vineyard management (Myburgh, 2018).
- Experience has shown that grapevine roots will develop where the most water is available.
- Therefore, pampering young grapevines with frequent irrigation will induce shallow roots.
- Soils also re-compact naturally after soil preparation.
- For proper root development, newly planted grapevines should only receive frequent, shallow irrigations until all of them are growing.
- When shoots are 20-30 cm long, heavier irrigations with longer intervals are recommended. Roots will then be forced to grow into the subsoil.
- Watch the growth points.

70-80% PAW depletion, *i.e.* very dry, for young grapevines





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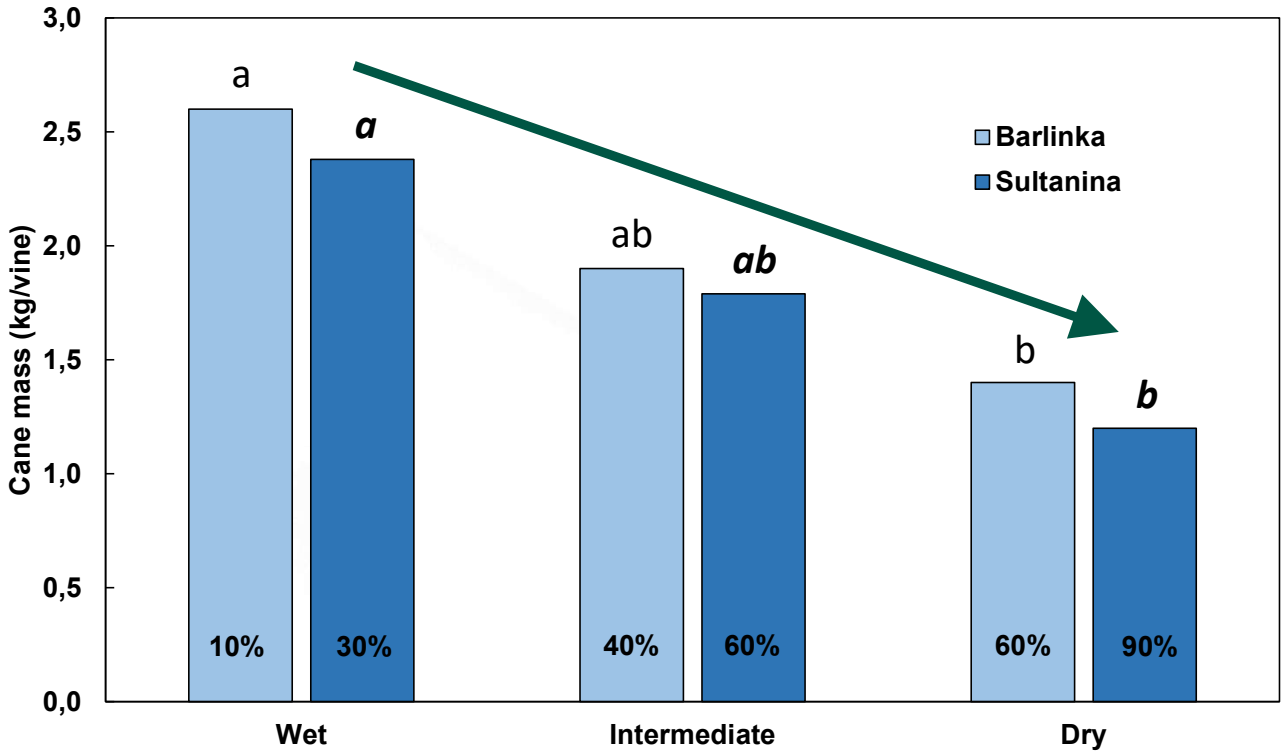
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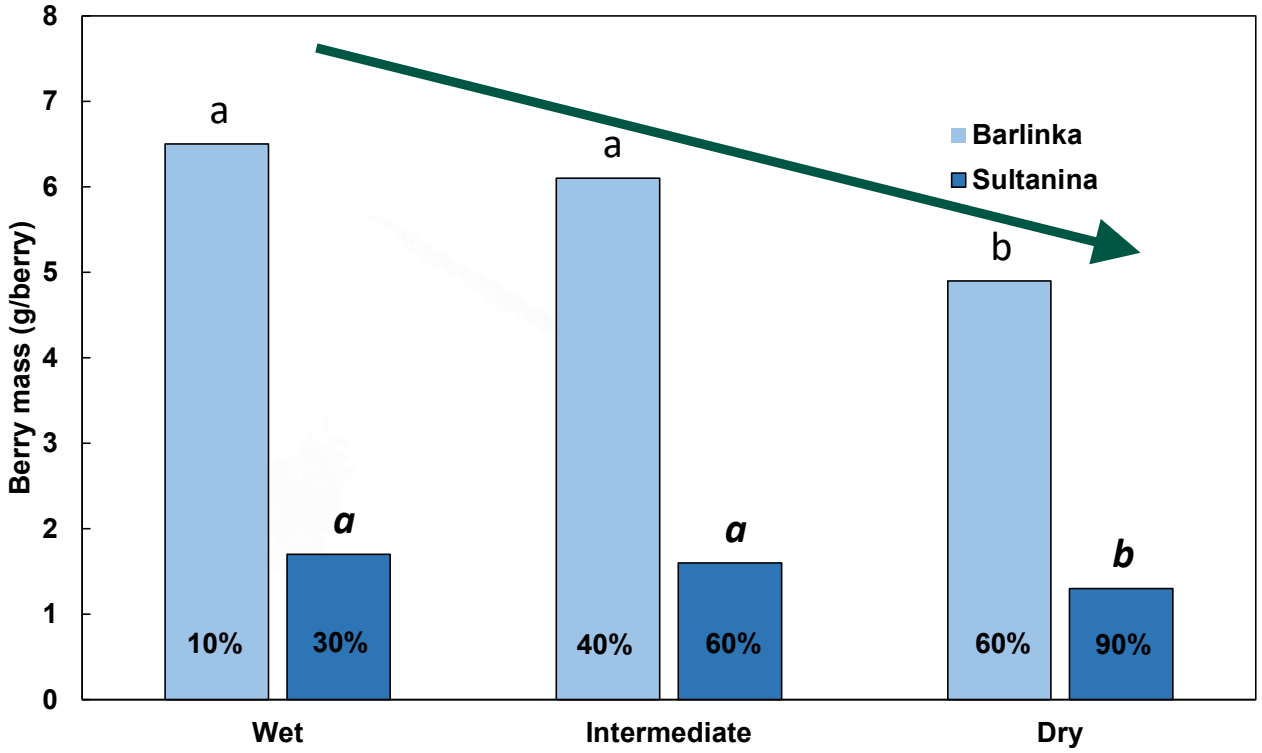
What is the ideal soil water depletion level that table grapes should be irrigated at during the season?

Constant depletion level from budbreak to harvest



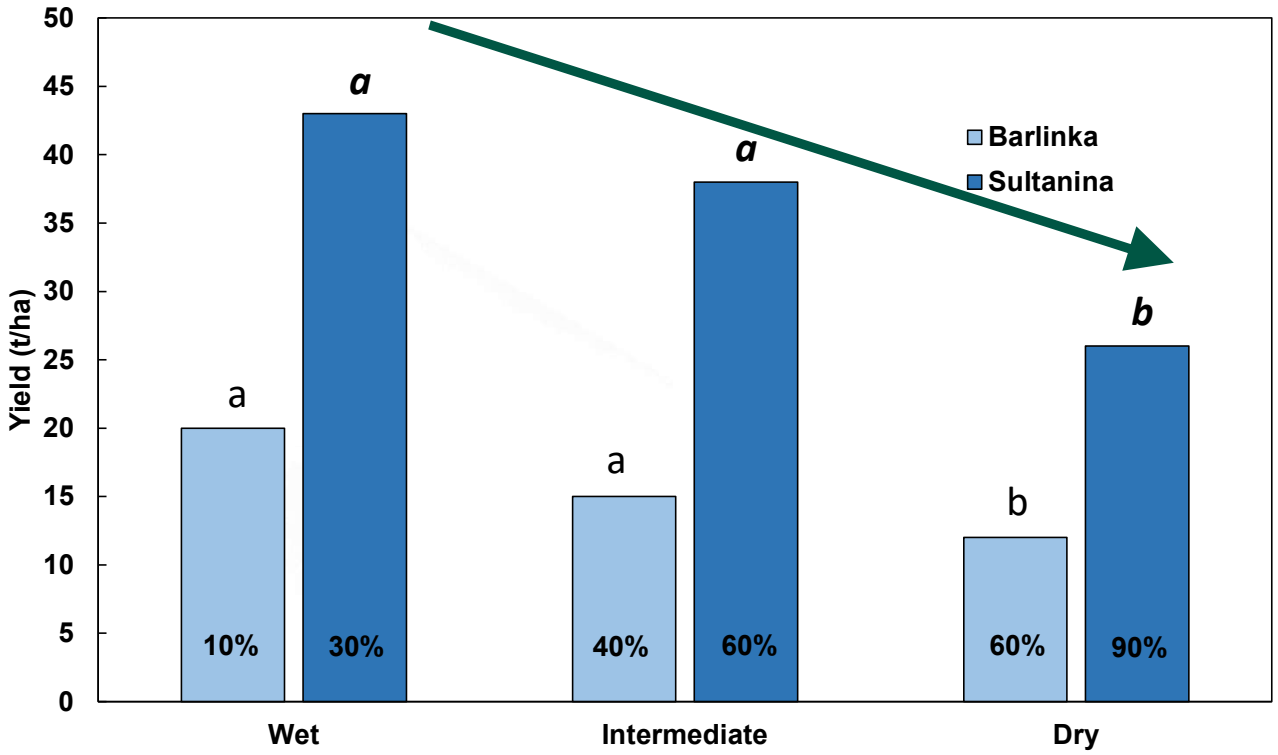
The effect of constant soil water depletion level from budbreak to harvest on vegetative growth of Barlinka (Myburgh, 1996) and Sultanina (Myburgh, 2003). Values designated by the same letter for the Barlinka and Sultanina do not differ significantly ($p \leq 0.05$).

Constant depletion level from budbreak to harvest…



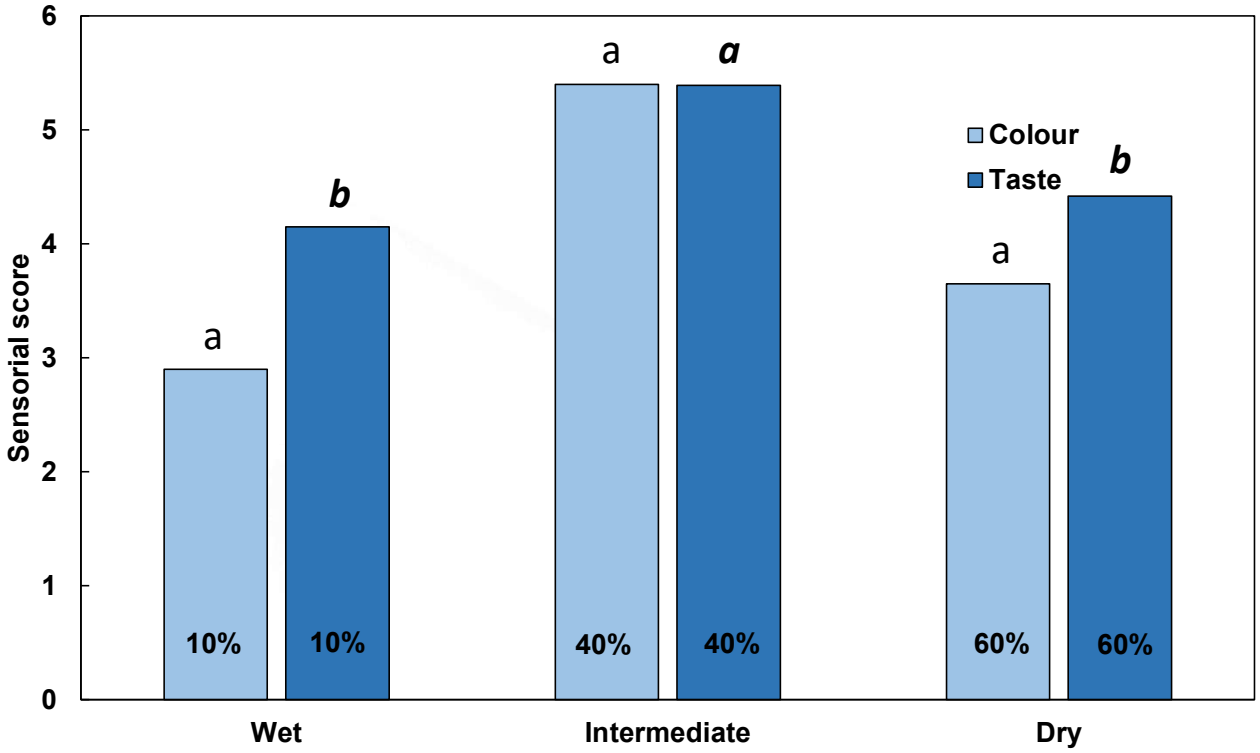
The effect of constant soil water depletion level from budbreak to harvest on berry mass of Barlinka (Myburgh, 1996) and Sultanina (Myburgh, 2003). Values designated by the same letter for the Barlinka and Sultanina do not differ significantly ($p \leq 0.05$).

Constant depletion level from budbreak to harvest…



The effect of constant soil water depletion level from budbreak to harvest on yield of Barlinka (Myburgh, 1996) and Sultanina (Myburgh, 2003). Values designated by the same letter for the Barlinka and Sultanina do not differ significantly ($p \leq 0.05$).

Constant depletion level from budbreak to harvest…



40-50% PAW depletion throughout the season for optimum balance between yield and quality

The effect of constant soil water depletion level from budbreak to harvest on Barlinka colour and taste (Myburgh, 1996). Values designated by the same letter for the different data sets do not differ significantly ($p \leq 0.05$).

Using stem water potential to set the refill line for table grape irrigation



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Using stem water potential to set the irrigation refill point

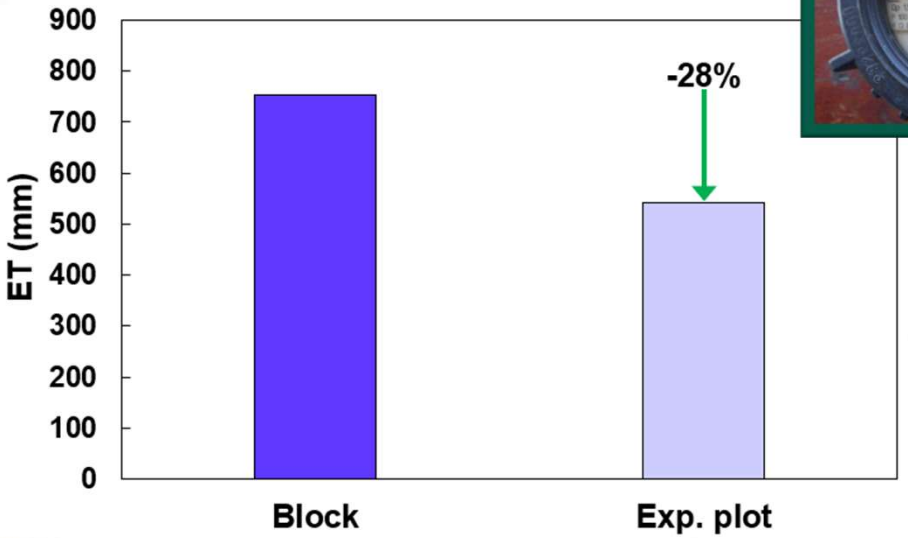
- The aim of Project P04000206 was to set refill lines for irrigation of table grapes according to midday stem water potential (Ψ_S).
- Project was carried out in ten commercial vineyards in the Noorder Paarl for three seasons.
- In each vineyard, an experimental plot was established that could be irrigated on its own.
- These grapevines received their first irrigation when Ψ_S of -0.8 MPa was reached, and the block section was irrigated by the grower according to their schedule.

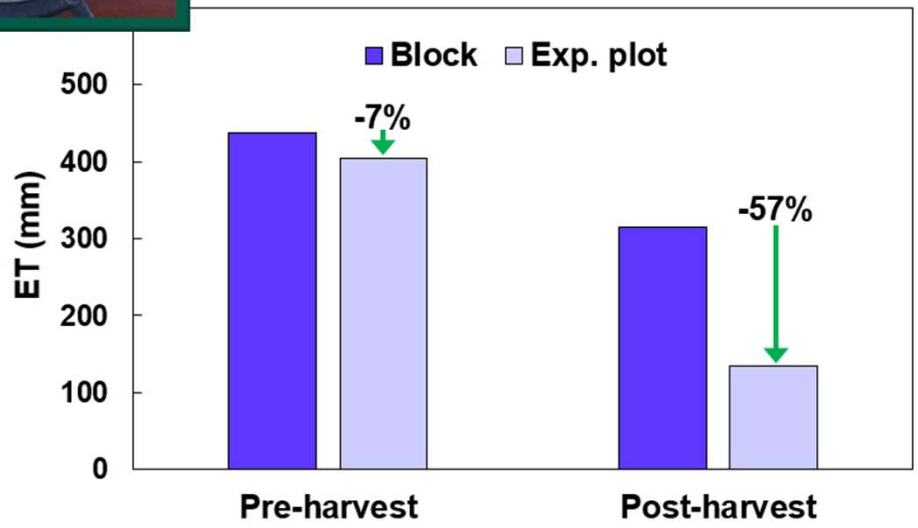




Vineyard water use (ET)

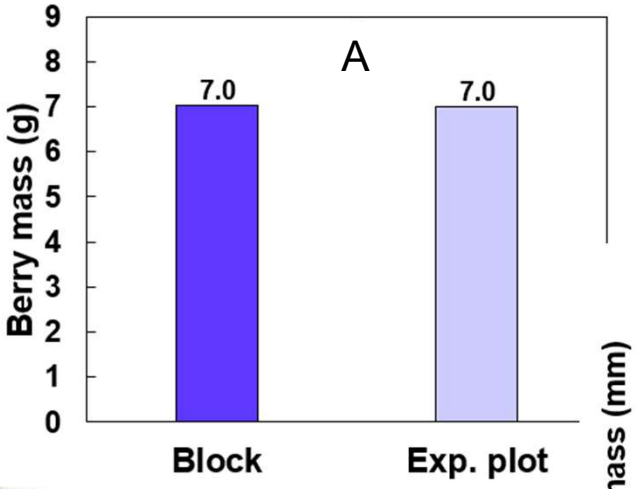


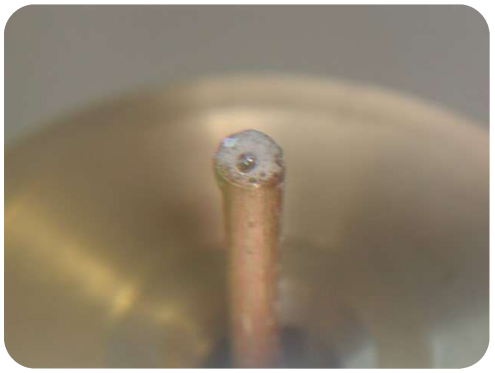


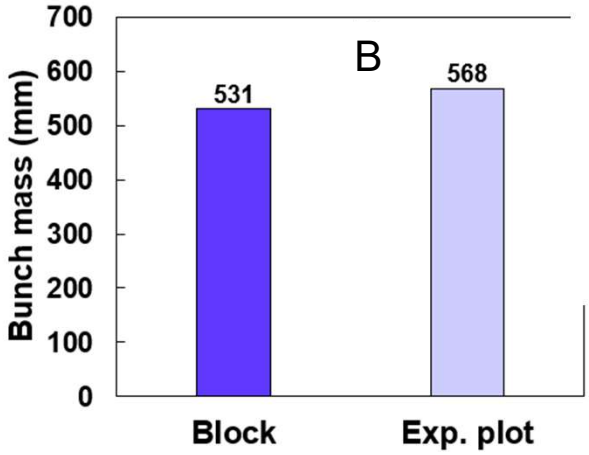


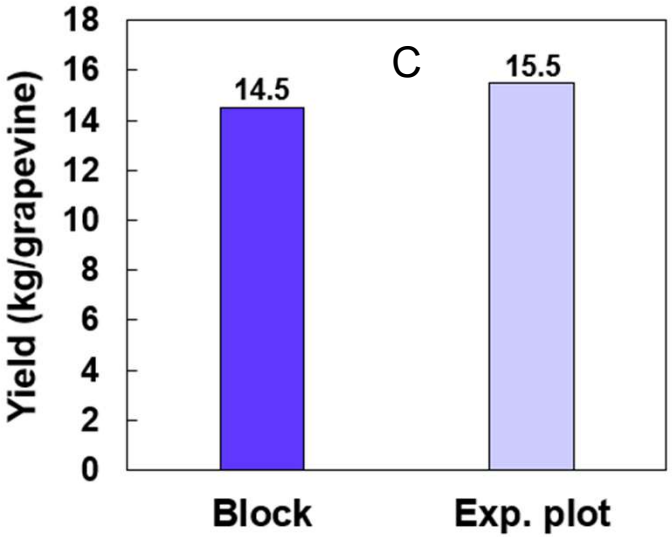
Comparison between seasonal evapotranspiration (ET) where (A) irrigation was applied according to the growers schedule (Block) and (B) midday stem water potential thresholds (Exp. plot). Data are means for ten cultivars from 2018/19 until 2020/21.

Yield responses









Comparison between (A) berry mass, (B) bunch mass and (C) yield where irrigation was applied according to the growers schedule (Block) and midday stem water potential thresholds (Exp. plot). Data are means for ten cultivars from 2018/19 until 2020/21.

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How can irrigation of table grapes be adapted during ripening to improve grape quality?

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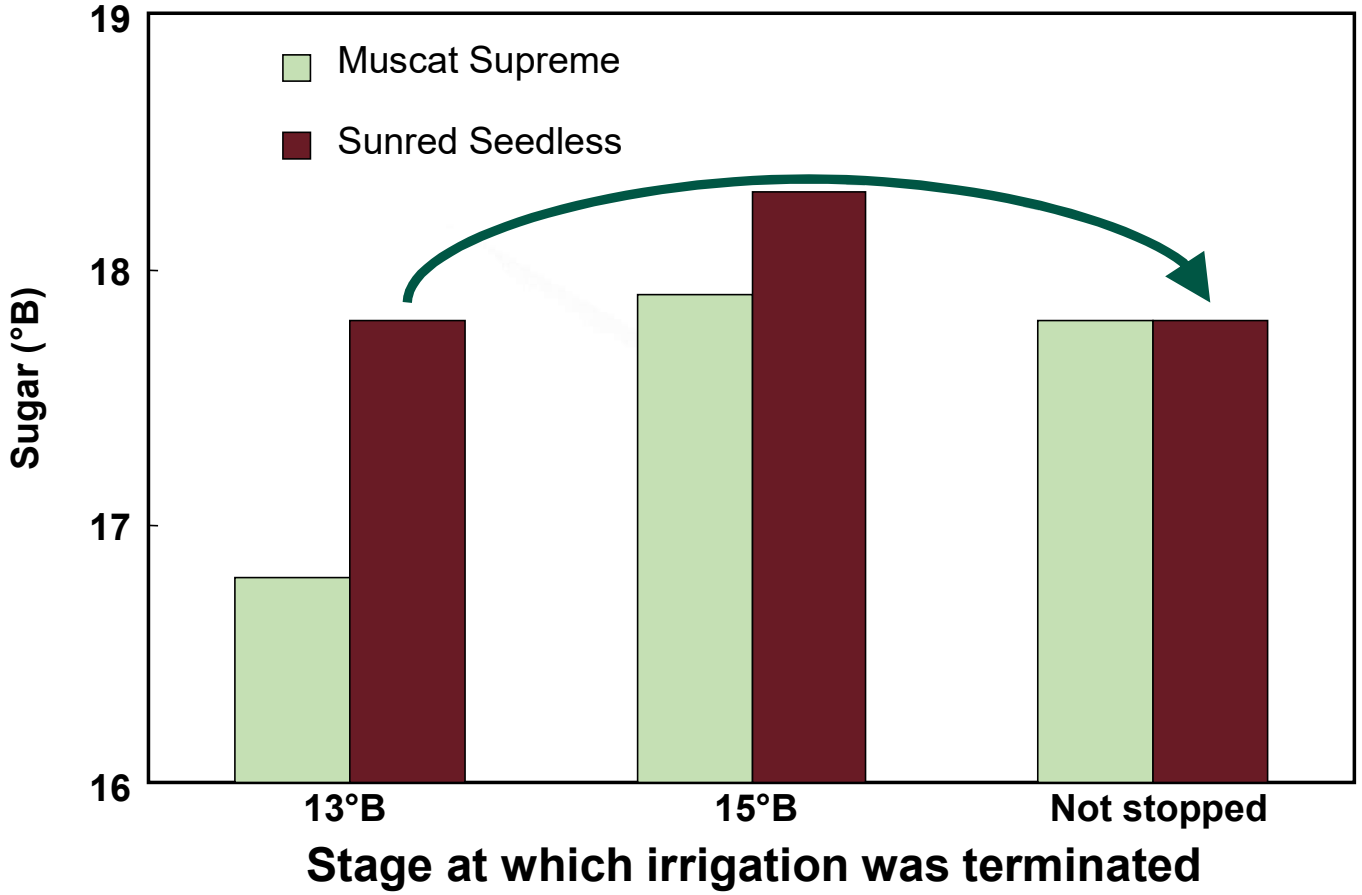
Termination of irrigation of Sunred Seedless

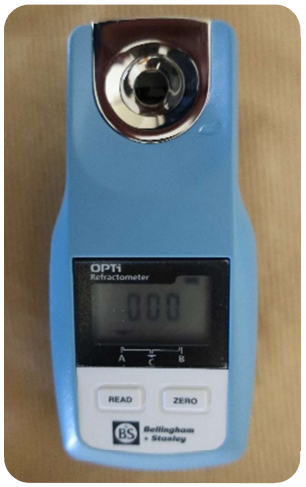
Stage where irrigation was cut off	Bunch mass (g)	Production (t/ha)	Overall quality
20% PAW depletion (véraison to harvest)	622 a[1]	10.2 a	4.66 b
20% PAW depletion (véraison to 13°B)	535 b	9.1 ab	5.15 ab
20% PAW depletion (véraison to 15°B)	555 ab	9.3 ab	4.70 b
40% PAW depletion (véraison to harvest)	571 ab	9.0 ab	4.95 ab
40% PAW depletion (véraison to 13°B)	539 b	8.9 b	5.07 ab
40% PAW depletion (véraison to 15°B)	538 b	8.4 b	5.46 a

[1] Values followed by different letters differ statistically.

Myburgh & Howell (2006 & 2007)

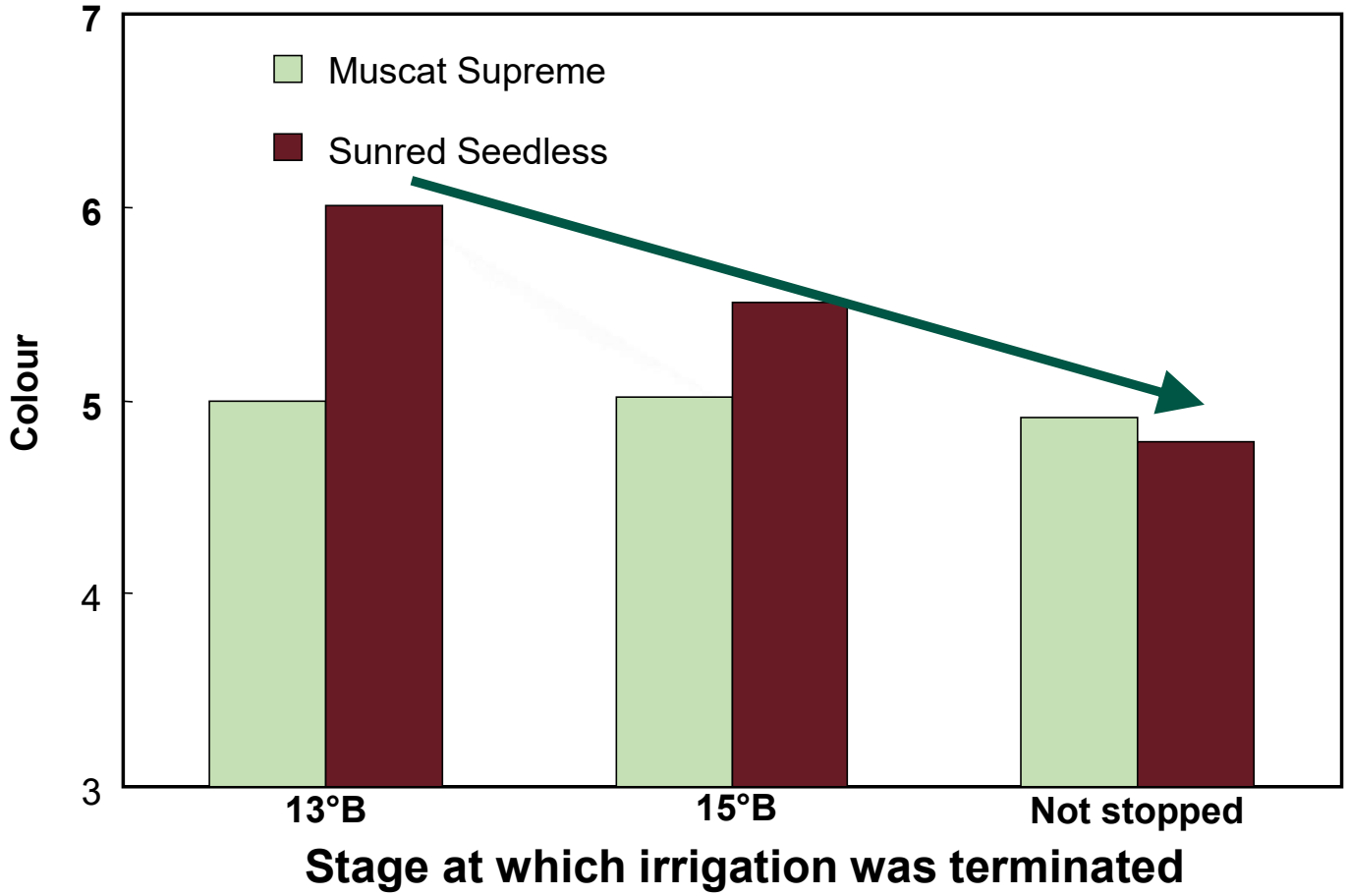
Termination of irrigation of Muscat Supreme and Sunred Seedless…





The effect of irrigation from véraison to harvest on Muscat Supreme and Sunred Seedless in the Hex River valley. Data is the average of three seasons.

Termination of irrigation of Muscat Supreme and Sunred Seedless…



The effect of irrigation from véraison to harvest on Muscat Supreme and Sunred Seedless in the Hex River valley. Data is the average of three seasons.

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How should table grapes be irrigated during the post-harvest period and winter?



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Irrigation in the winter

- Does not effect grape quality but affects production.

- Production can be affected after extremely dry winters in the Western and Northern Cape.

- Production is also affected particularly when the humidity is low.







Irrigation of Sultana in the winter…

Stage of irrigation termination	Bunches per vine	Bunch mass (g)	Production (t/ha)
7 Weeks post-harvest	8 c*	146 b	2 b
11 Weeks post-harvest	20 bc	181 b	7 b
15 Weeks post-harvest	25 b	199 b	9 b
Irrigation not stopped in winter	48 a	299 a	24 b

* Values followed by different letter differ significantly.

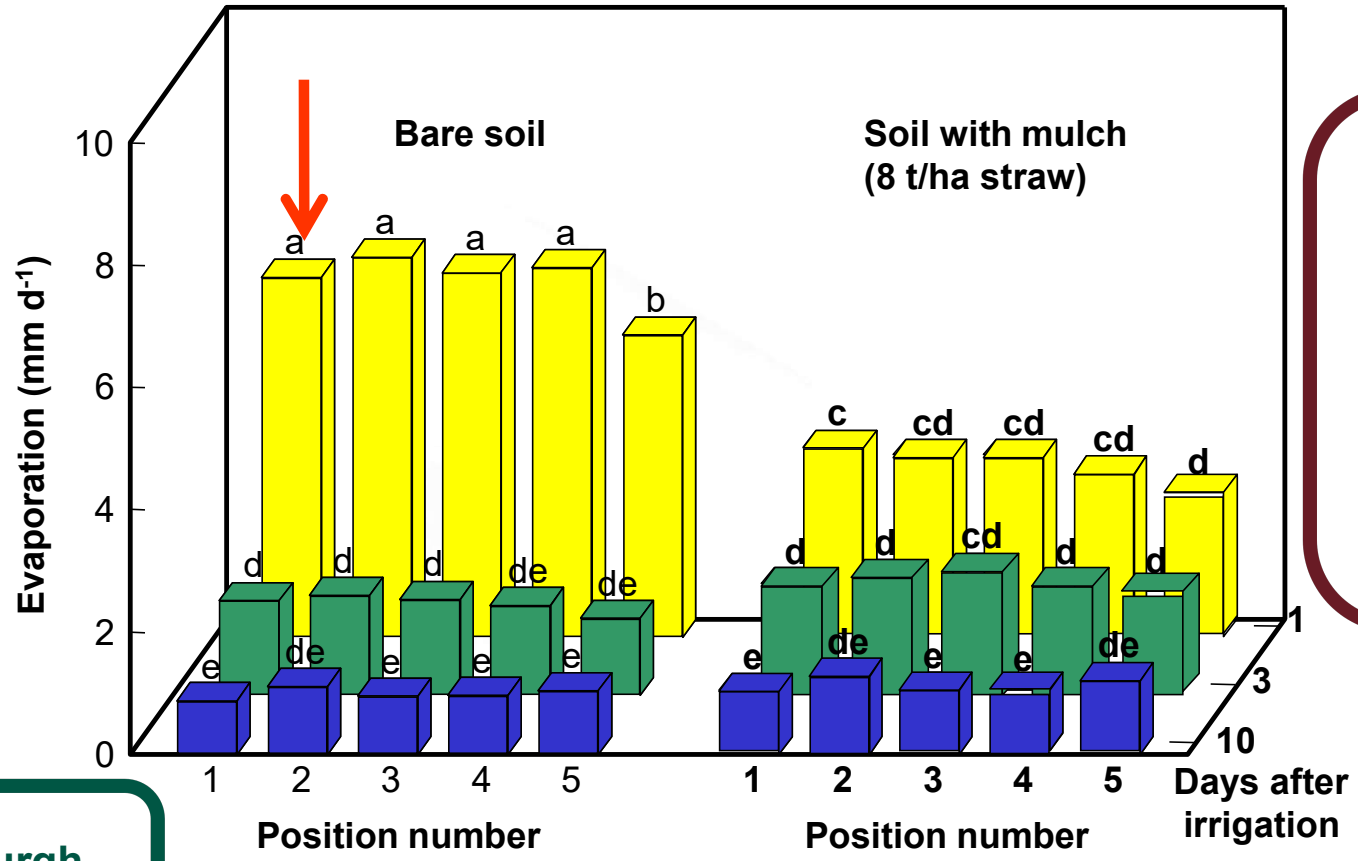
Myburgh (2003)

Soil and vineyard management guidelines for irrigation during water shortages



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Evaporation



Long-term soil practices as well as irrigation management are critical so that vineyards will be better buffered against drought.

Myburgh (1998)

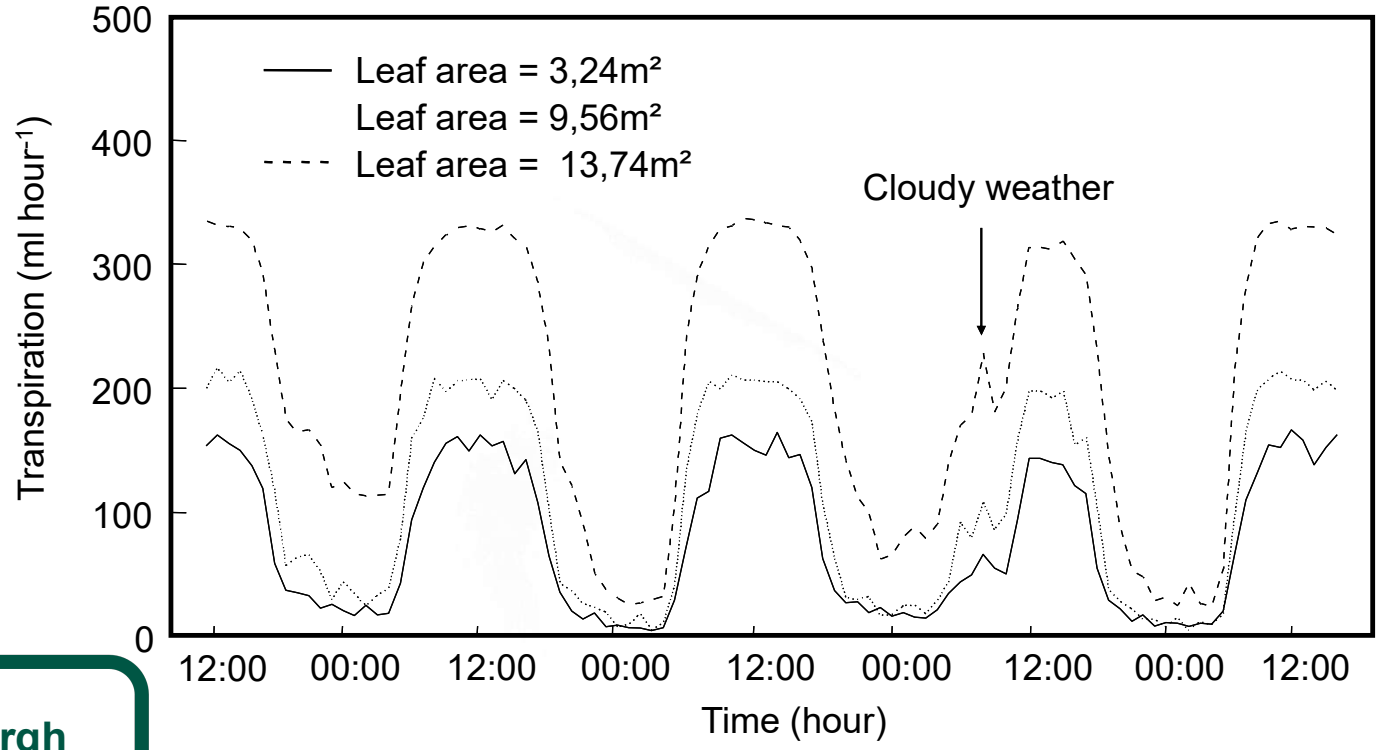
Soil management practices

- In terms of soil management, producers must:
  - apply a mulch to the grapevine row;
  - remove all weeds in the vineyard; and
  - not disk the soil as this increases evapotranspiration.





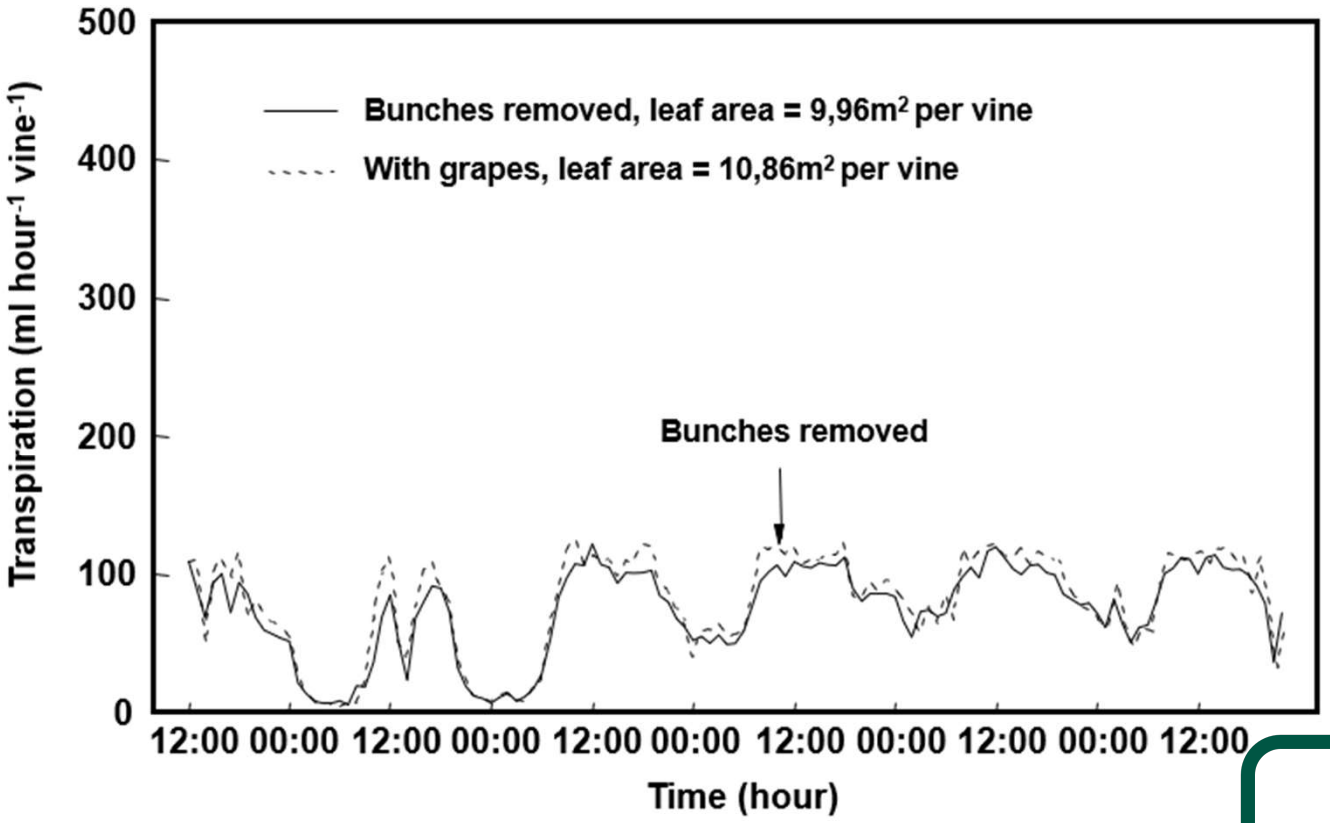
Effect of leaf area on transpiration



Myburgh (1998)

Higher leaf area = higher transpiration tempo

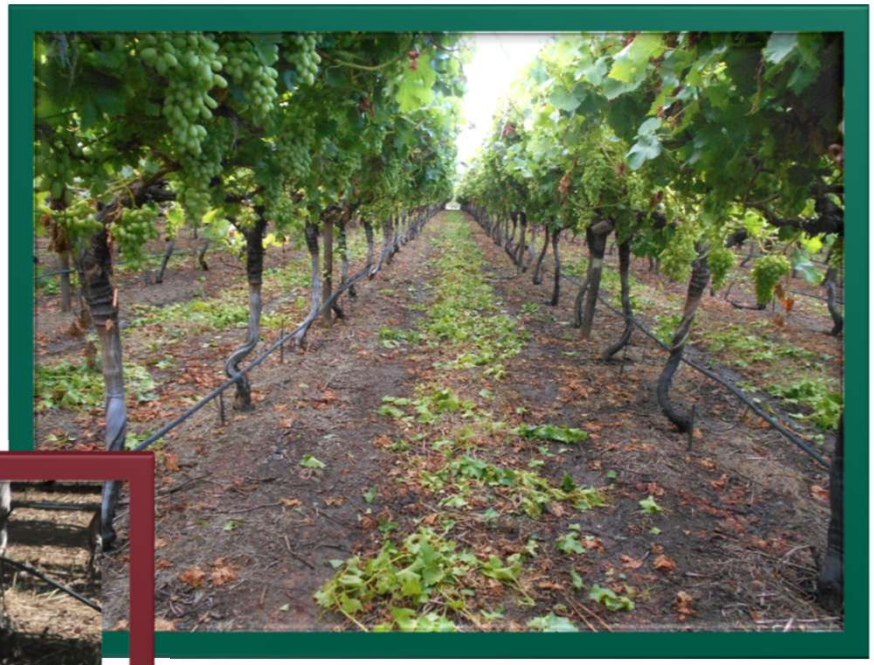
Effect of grapes on transpiration



Myburgh
(unpublished data)

Vineyard management practices

- The foregoing suggests that producers must:
  - remove unwanted shoots,
  - remove unwanted leaves, and
  - keep bunches in times of drought.





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Take-home message

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Take-home message

- The roots of young grapevines must be encouraged to proliferate throughout the entire soil profile.
- A constant depletion level of 40-50% can be maintained from budbreak to harvest.
- Irrigation refill lines can be set using stem water potential. This approach saves water without an impact on yield.
- For red cultivars, irrigation can be terminated in the ripening period to improve colour.
- There are guidelines for managing soil and vineyards during drought but long-term practices are important.



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Acknowledgements

SATI
SOUTH AFRICAN TABLE GRAPE INDUSTRY
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