



Response of *Vitis vinifera* L. cv. Pinotage to irrigation strategy and trellis system in the Breede River Valley Region (South Africa): Vegetative growth, yield and quality



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2025

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Motivation

- Pinotage is a South African bred red wine cultivar and is second only to Shiraz in terms of the South Africa's wine exports.
- Since rainfall in the Breede River region is low, vineyards in this region depend on irrigation.
- In drought situations, water restrictions could be imposed, so the sensitivity of Pinotage/99R to different irrigation strategies was tested in a field trial on the ARC Research Farm at Robertson for three seasons.
- The possibility to produce more grapes with the same volume of water was also investigated.



Materials & methods



Experimental vineyard

- Robertson Research farm
- Clay loam soil
- Irrigation was scheduled with tensiometers.
- Irrigation was applied by means of micro-sprinklers.

Irrigation strategies

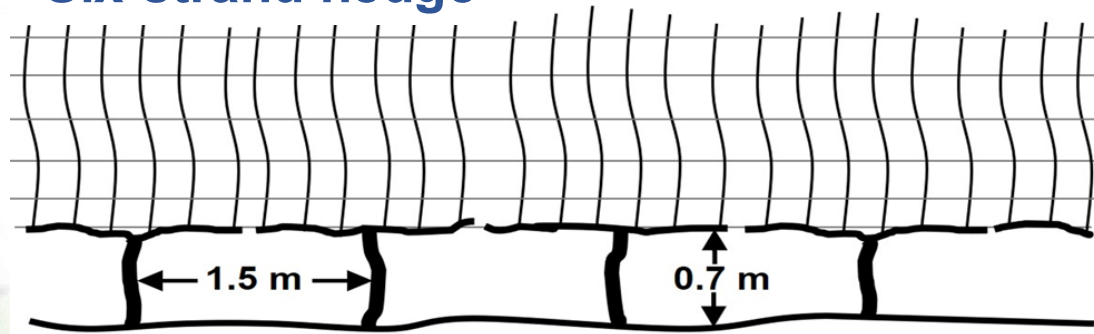
- Irrigation strategies entailed combinations of 50% readily available water (RAW) depletion, 75% RAW depletion and no irrigation (NI) between various phenological stages, viz. budbreak, flowering, pea size berries, véraison, 17°B and harvest.
- Irrigation applied at 50% RAW depletion from budbreak until harvest (S1) was regarded as the control.

	Bb	Fl	Ps	Vér	17°B	Har
S1:	50	50	50	50	50	50
S2:	50	NI	50	50	50	50
S3:	50	NI	NI	50	50	50
S4:	50	50	50	50	NI	NI
S5:	50	50	50	NI	NI	NI
S6:	75	50	50	75	75	75
S7:	75	75	75	75	75	75
S8:	75	75	75	NI	NI	NI

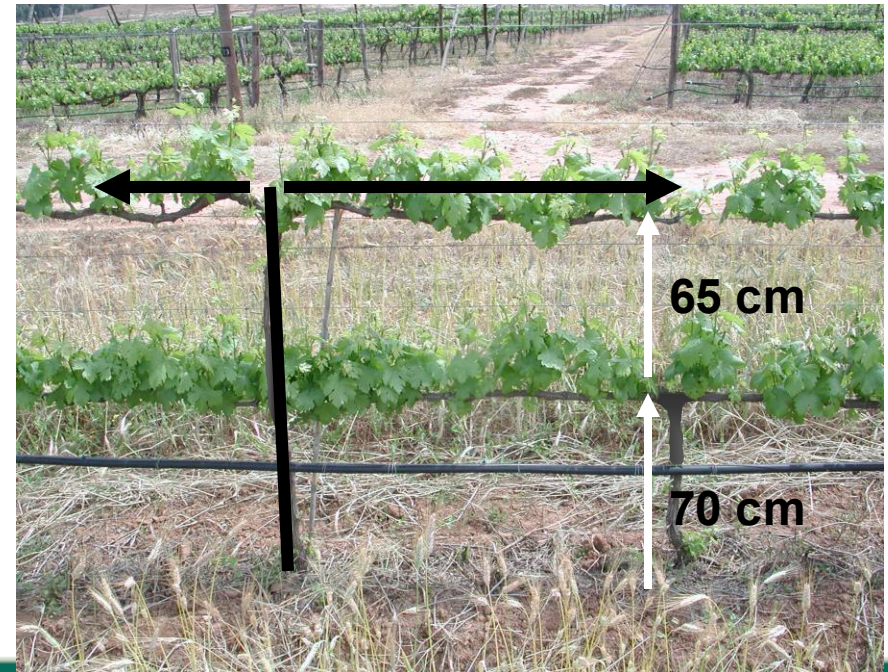
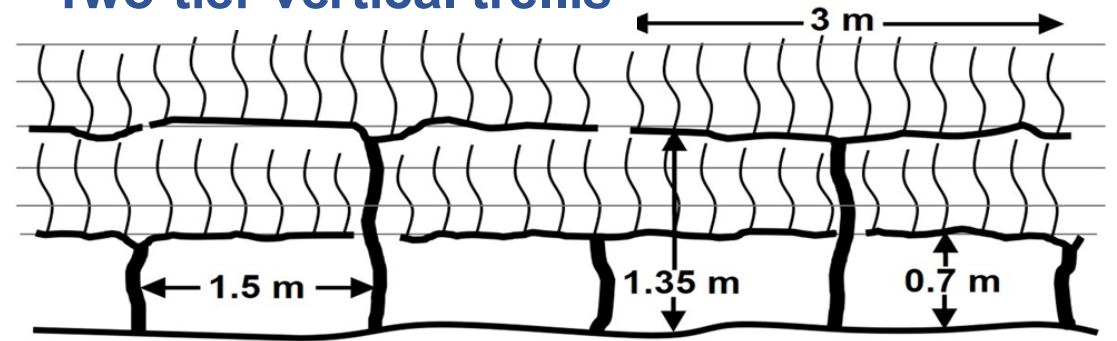
Trellis systems

- Each experimental plot was split into a six-strand hedge and two-tier vertical trellis.

Six-strand hedge



Two-tier vertical trellis

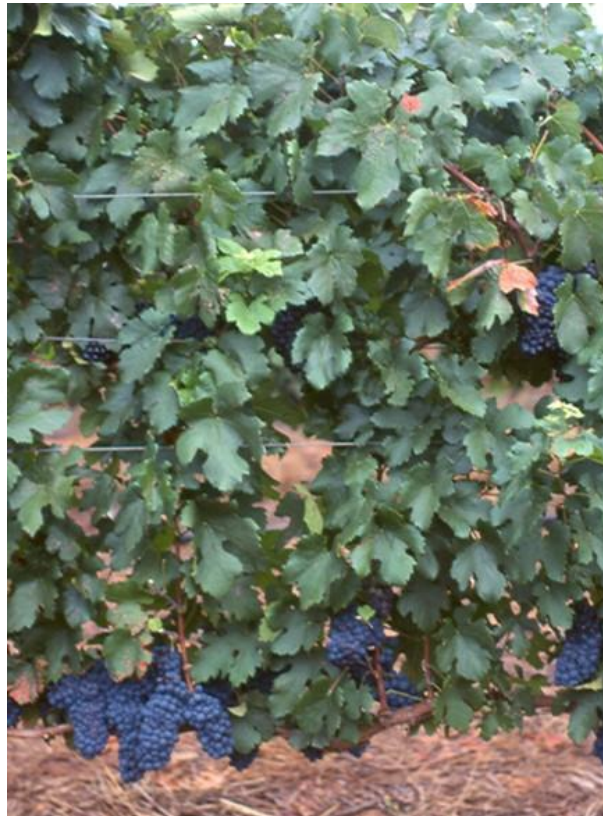


Measurements

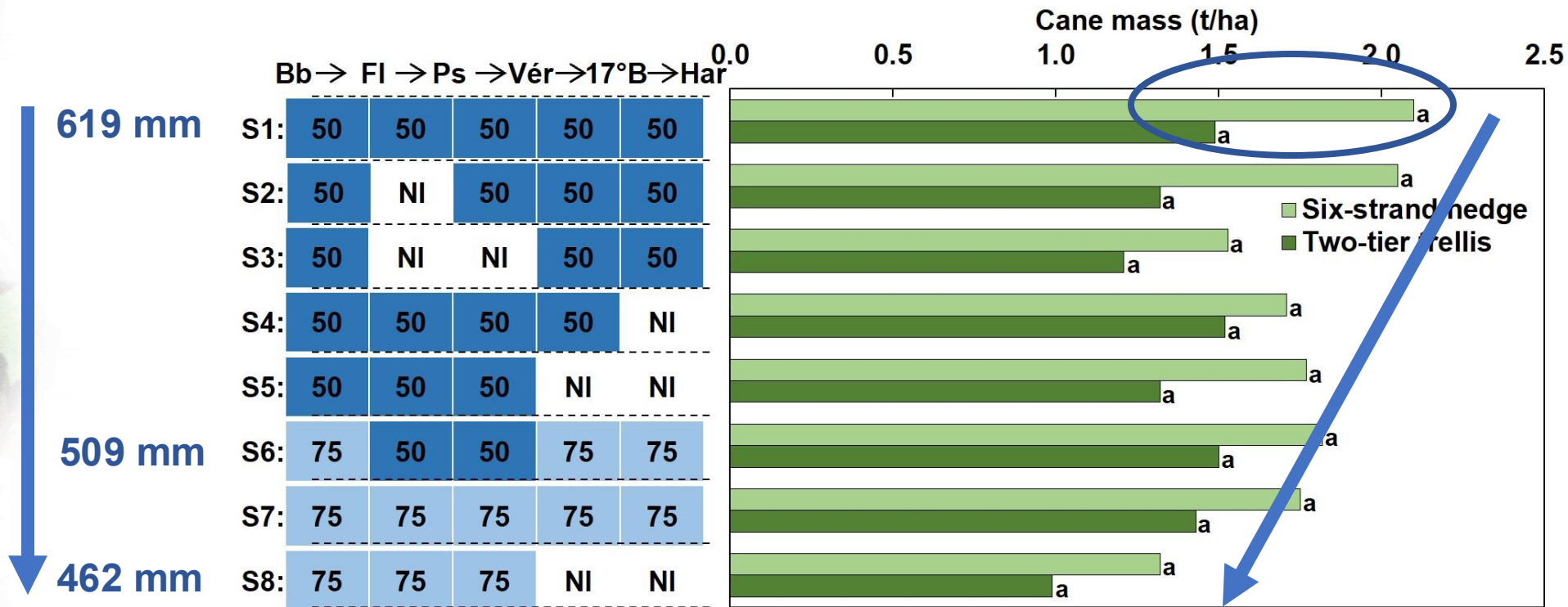
- Cane mass
- Yield and its parameters
- Wine quality



Results

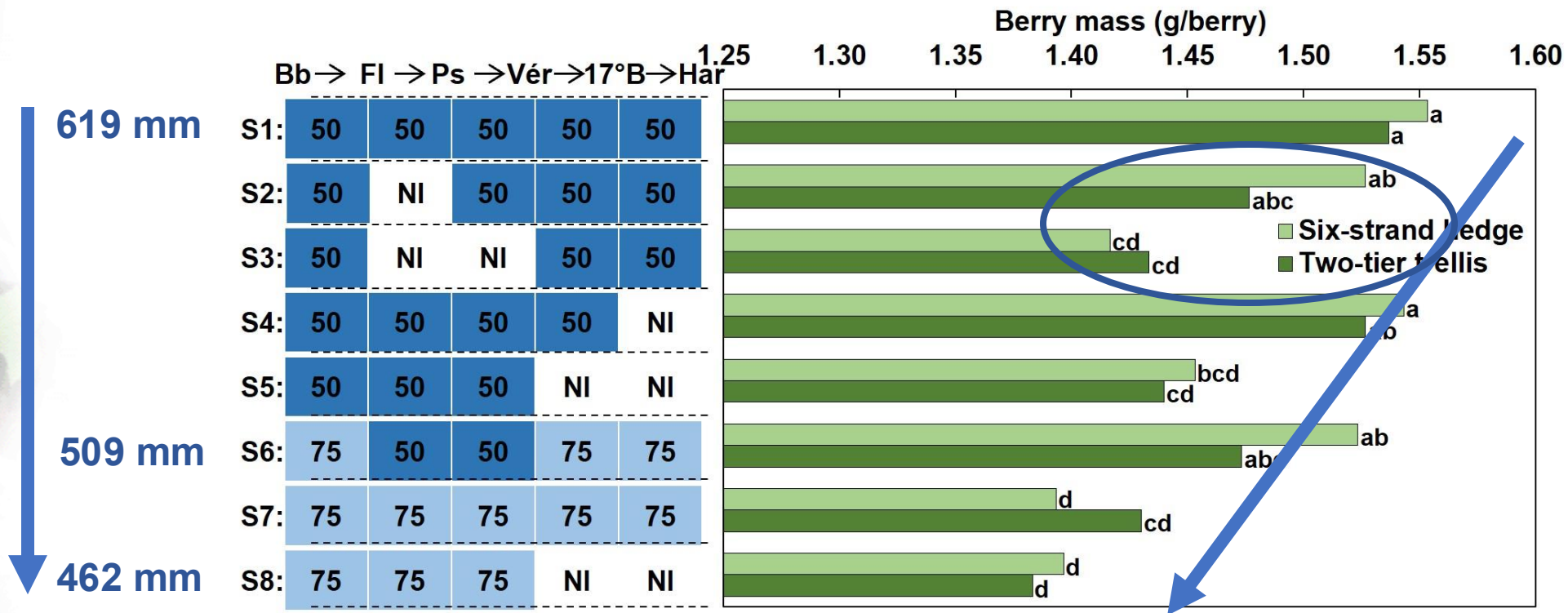


Cane mass



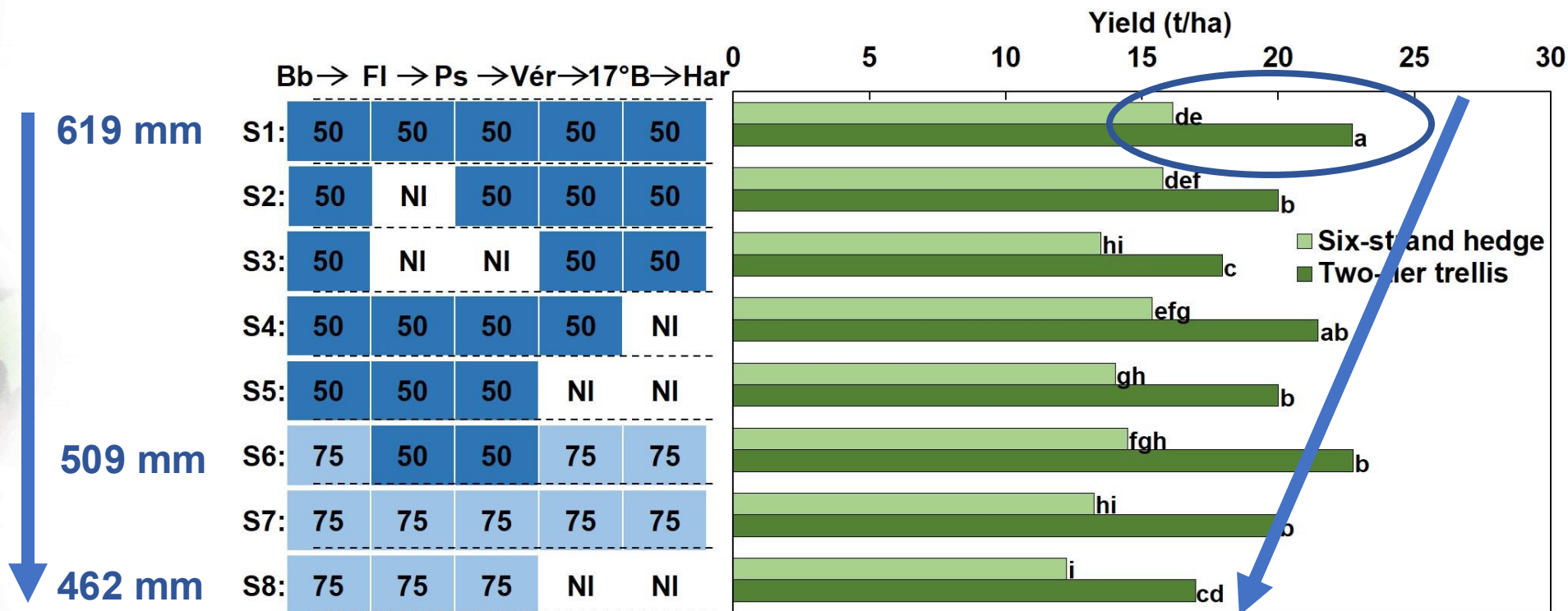
Effect of irrigation strategies (S) consisting of different levels of soil water depletion and no irrigation (NI) on cane mass of Pinotage/99R trained onto two different trellis systems near Robertson (Bb = bud break; FI = flowering; Ps = pea size; Vér = véraison & Har = harvest). Data are means for three years. Columns designated by the same letters do not differ ($p \leq 0.05$).

Berry mass



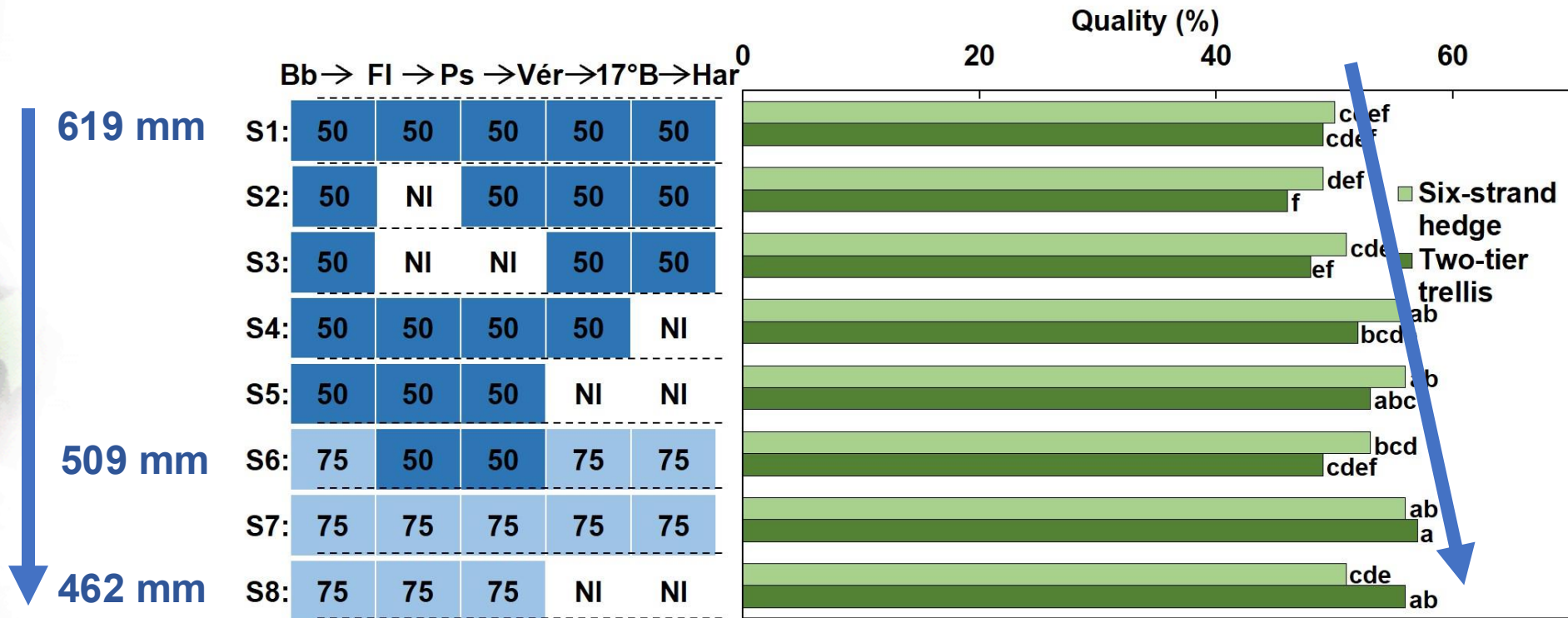
Effect of irrigation strategies (S) consisting of different levels of soil water depletion and no irrigation (NI) on berry mass of Pinotage/99R trained onto two different trellis systems near Robertson (Bb = bud break; Fl = flowering; Ps = pea size; Vér = véraison & Har = harvest). Data are means for three years. Columns designated by the same letters do not differ ($p \leq 0.05$).

Yield



Effect of irrigation strategies (S) consisting of different levels of soil water depletion and no irrigation (NI) on yield of Pinotage/99R trained onto two different trellis systems near Robertson (Bb = bud break; Fl = flowering; Ps = pea size; Vér = véraison & Har = harvest). Data are means for three years. Columns designated by the same letters do not differ ($p \leq 0.05$).

Wine quality



Effect of irrigation strategies (S) consisting of different levels of soil water depletion and no irrigation (NI) on wine quality of Pinotage/99R trained onto two different trellis systems near Robertson (Bb = bud break; FI = flowering; Ps = pea size; Vér = véraison & Har = harvest). Data are means for three years. Columns designated by the same letters do not differ ($p \leq 0.05$).

Practical implication of results

- Berry mass was most sensitive to water deficits during the pre-véraison period and continued water deficits from budbreak to harvest. This eventually reflected in the yield.
- It was possible to produce more Pinotage grapes with the same volume of irrigation water by extending the vertical bearing capacity of grapevines. Furthermore, it was also possible to produce more grapes with less water.
- The best irrigation strategy for Pinotage for optimum yield and quality is to avoid water constraints during the pre-véraison period. If irrigation water is limited, or when water restrictions are imposed during droughts, irrigation can be reduced or even terminated during the post-véraison period.

	Bb	FI	Ps	Vér	17°B	Har	
S1:	50	50	50	50	50		
S2:	50	NI	50	50	50		X
S3:	50	NI	NI	50	50		X
S4:	50	50	50	50	NI		✓
S5:	50	50	50	NI	NI		✓
S6:	75	50	50	75	75		
S7:	75	75	75	75	75		✓
S8:	75	75	75	NI	NI		✓

THANK YOU



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