Effect of application of Kaolin and Pinolene on grape berry cell death, shrivel, and ethanol accumulation

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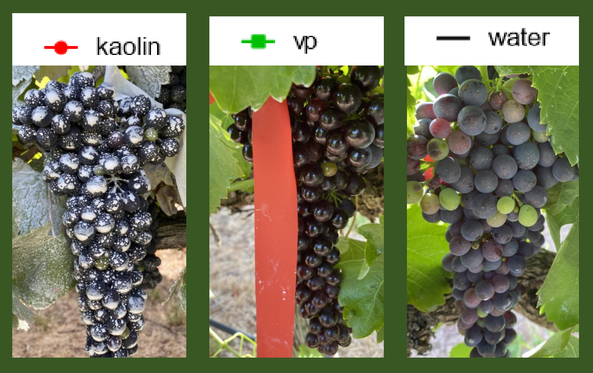
Pinolene but not Kaolin appears to be an effective treatment to reduce berry shrivel and prevented high sugar concentration.



Pinolene and Kaolin did not affect grape berry cell vitality, bunch temperature, oxygen diffusion, or ethanol accumulation; Pinolene may decrease berry shrinkage by reducing transpiration without impacting sugar content.

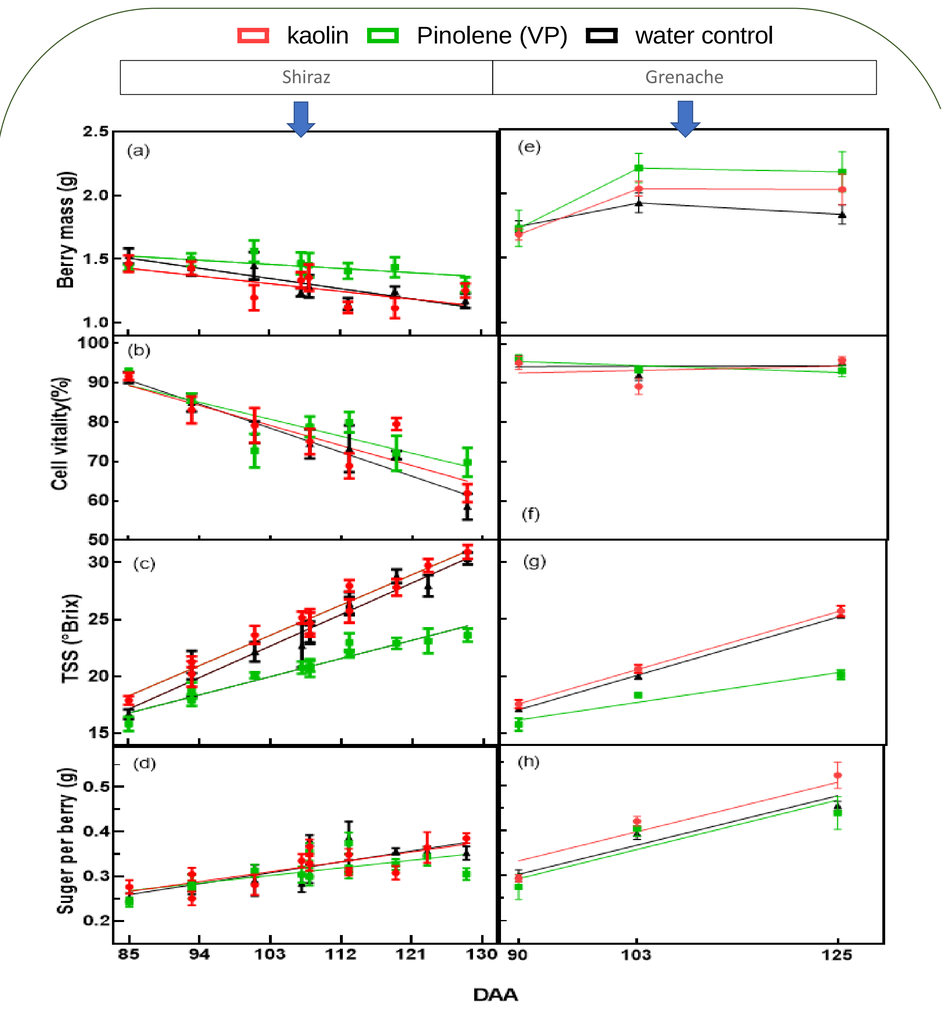


Fig.1 Berry mass, cell vitality, total soluble solids (TSS), and sugar per berry as a function of days after anthesis (DAA) on Shiraz (a, b, c, d) and Grenache (e, f, g, h) .

No significant difference between Kaolin and water treatment ; Loss of berry mass and increase in TSS were reduced by Pinolene in both cultivars, while it did not influence sugar per berry, cell vitality, or oxygen distributions.

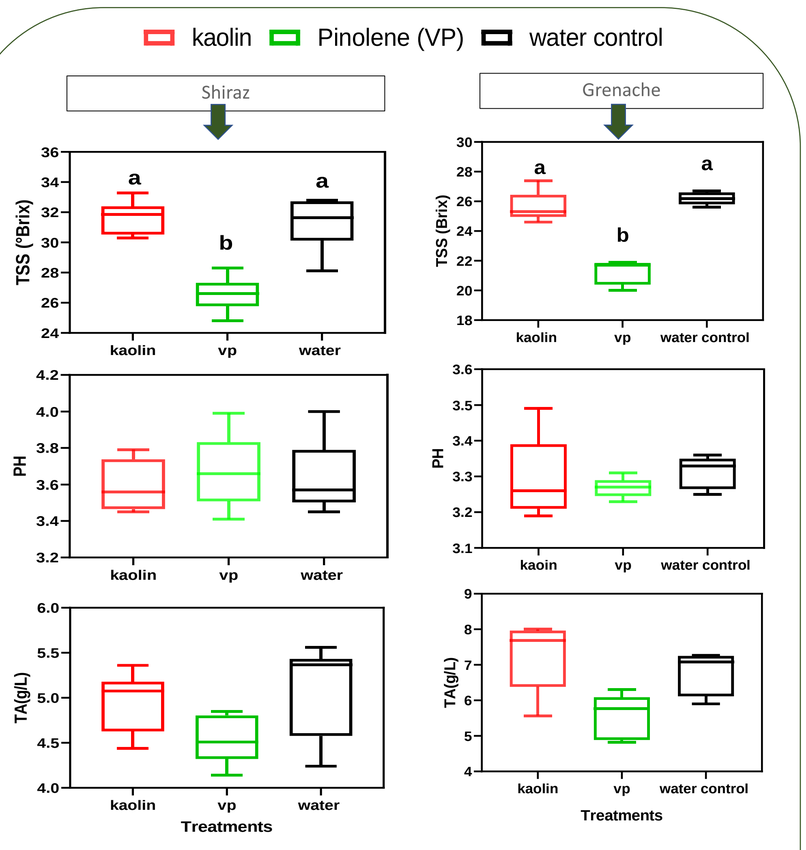


Fig 2. TSS, titratable acidity (TA) , PH from harvested bunches of Grenache and Shiraz, (means ± (SEM),n =5) under 3 treatments

No significant differences between kaolin and water treatment in terms of TSS, TA, and pH.
Pinolene (vp) treatment significantly decreased TSS and TA with no influence on pH for both varieties.

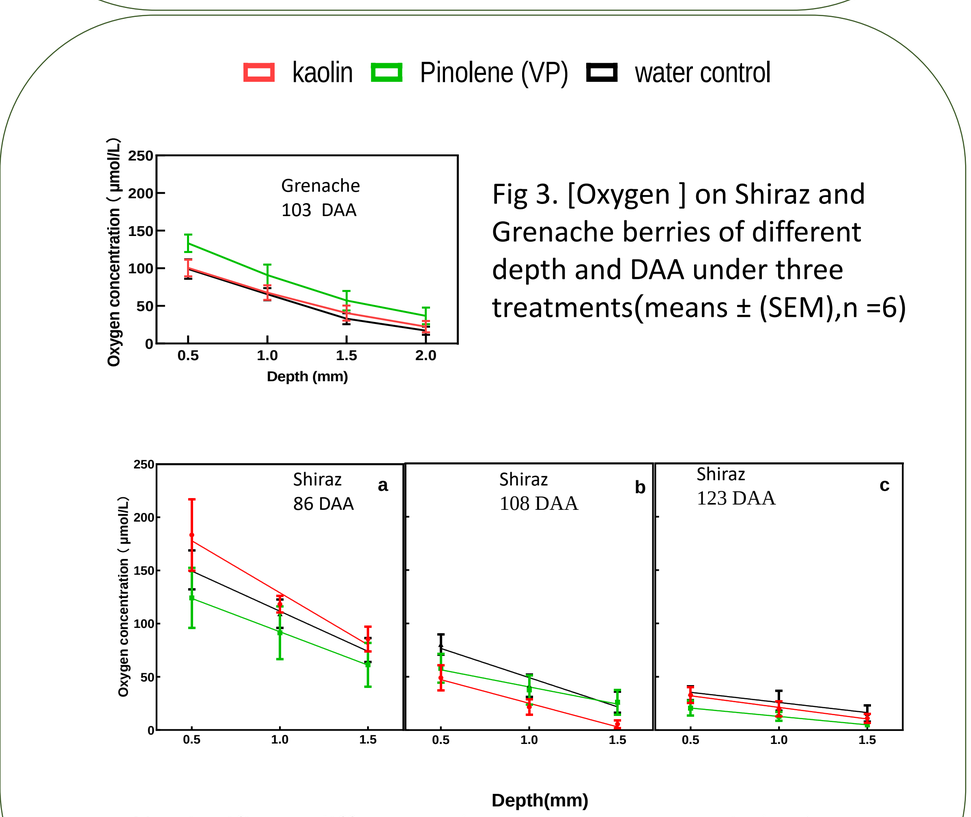


Fig 3. [Oxygen] on Shiraz and Grenache berries of different depth and DAA under three treatments(means ± (SEM),n =6)

No significant differences between treatments in both varieties

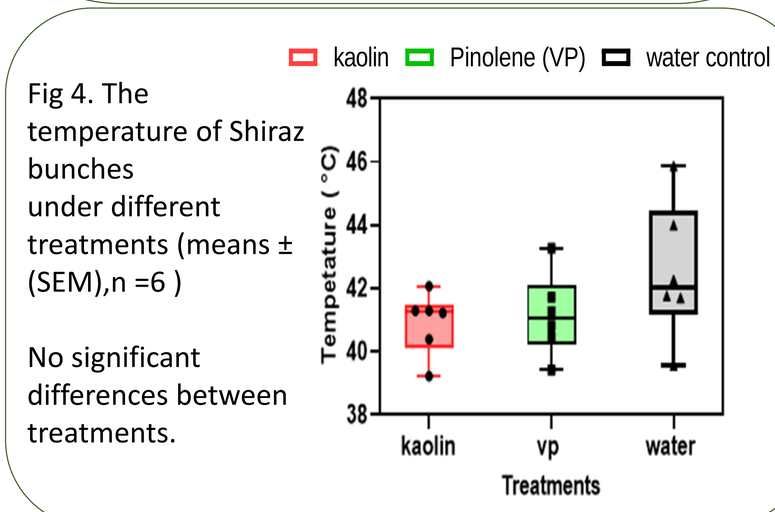


Fig 4. The temperature of Shiraz bunches under different treatments (means ± (SEM),n =6)

No significant differences between treatments.

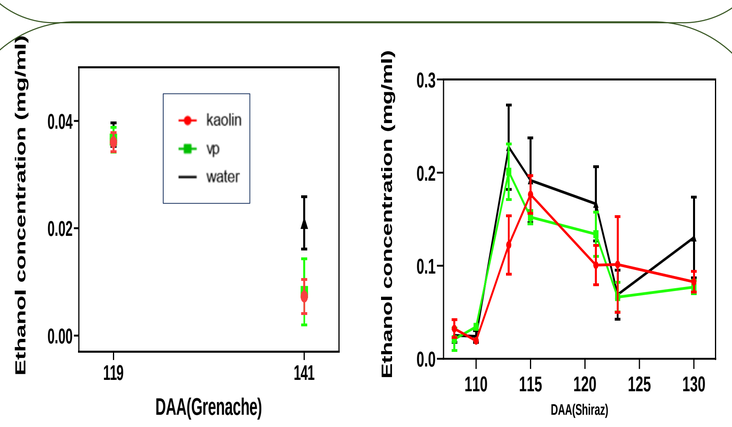


Figure 5. [Ethanol] changes with time in Grenache and Shiraz berries ((means ± (SEM),n =10)).

Treatments had no significant influence on [Ethanol] in both varieties;

BACKGROUND

Berry shrivel late in ripening decreases yield and quality. While common in Shiraz it rarely occurs in Grenache. Reducing berry transpiration using antitranspirants is one possible way to reduce berry shrivel. However, cell death that leads to berry shrivel is proposed to be caused by mesocarp hypoxia at high temperatures. The diffusion of oxygen into the berry occurs through the pedicel lenticels and these could easily be blocked by application of antitranspirants thereby exacerbating the problem.

Aiming to examine the effects of two film-forming antitranspirant coatings, kaolin ($Al_4Si_4O_{10}(OH)_8$) and pinolene (Di-1-p-menthene) , on berry physiology during ripening on Shiraz and Grenache bunches.

METHODS

Kaolin (6% w/w), pinolene (vp) (1% w/w), and water were sprayed on Shiraz and Grenache bunches including pedicels until saturated during ripening every 7 to 15 days.

Berry mass, cell vitality, internal oxygen concentration, ethanol accumulation, and bunch and canopy temperature were recorded during berry development for both varieties.

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