

Objectives and Rationale

Outside canopy 'Forelle' pears have a higher risk of becoming mealy and are associated with a lower neck density and cavities (Muziri et al., 2016). This study aimed to understand when outside canopy fruit develop cavities.

Methods

Shade cap trail:

Outer canopy pears were shaded bi-weekly from 14 weeks and 13 weeks before harvest (2018 and 2019, respectively). Fruit surface temperature (FST) and irradiance were measured at each interval. X-ray CT was performed to determine tissue density and cellular structure. Fruit were harvested at commercial maturity and evaluated at harvest, after 8 weeks of cold storage at -0.5 °C, plus 0, 4 and 7 days at 20 °C. Evaluation at 11 days of ripening was added in 2019. Maturity, mealiness and cell wall evaluations were performed. Alcohol insoluble residue sourced for the 2018 season to compare the degradation of cell wall polymers by their epitope abundance in collaboration with The Departments of Viticulture (SU) and Plant and Environmental Sciences (Copenhagen University).

Shade netting trail:

Shade nets were applied 13 weeks before harvest for the 2019 season and kept until commercial harvest on 27 February. Treatments consisted of (1) 20% white, (2) 20% black, (3) 40% black, and (4) 60% black net, (5) a shade caps and (6) an uncovered control. FST and irradiance were measured for each treatment. Maturity and quality indexing was conducted at harvest and after 8 weeks of cold storage at -0.5 °C, plus 0, 4, 7 and 11 days of ripening at 20 °C.

Key Results

Shade cap trail:

Fruit shaded closer to harvest showed improved fruit size and blush colour. Tissue density differences between outside control fruit and fruit with shade cap treatments were found, due to the significantly higher porosity in outside canopy fruit. Porosity and mealiness for fruit shaded 8 and 10 weeks, before harvest in 2018, fruit shaded 7 and 9 weeks before harvest in 2019 differed significantly to other treatments.

Shade netting trail:

A higher netting percentage severely reduced blush colour. All fruit became mealy although a link seems to exist between irradiance % and mealiness. Lower fruit firmness coincided with higher mealiness.

Conclusion and Discussion

Shade cap trail:

A link exists between time exposed to sunlight and mealiness development based on an accumulation effect due to prolonged exposure to extreme irradiance and FST. X-ray CT results illustrated a significant shift in mealiness occurred between week 8 and 10 (2018) and,

while a similar shift occurred week 7 and 9 (2019). These timeframes give a good indication of the mealiness induction phase. Ripening and firmness proved to be crucial in mealiness expression, highlighting the need to include ripening time intervals rather than a snap-shot at one ripening time.

Shade netting trial:

Shade netting cannot be advised as mealiness development still occurred above commercially acceptable levels and contributed to a lower blush colour. Shading does contribute to a lower FST, however does not take away the surrounding air temperature's effect on FST and still resulted in FST's of above 40 °C in the hottest time of the day.