Can crop load be used to minimise rain-induced cracking in sweet cherry?

The aim of this study was to investigate the relationship between fruit load and cracking in sweet cherry.

We naturally associate cherry cracking with rain and the excess water that is absorbed through the fruit's cuticle. Whilst this is true, cracking can also occur with little rain. Excessive water taken up by roots redistributes within the plant and can induce fruit cracking. This prompted the hypothesis that higher crop loads can reduce the incidence of cracking by increasing the competition between individual fruit for water and assimilates. This theory works on the idea of spreading the available water and nutrients amongst a greater number of fruit.

What we did:

Three treatments of low, medium and high crop load were set by hand thinning. Crop load was measured as the number of fruit per cross-sectional trunk area (TCSA). Treatments were applied at different growth stages, to different varieties and in different seasons.

- In 2005/06 and 2006/07, 'Simone' was thinned post bloom; at 4 weeks after full bloom (4WAFB).
- In 2010/11 'Sweetheart' and 'Regina' were thinned at dormant bud, full bloom and 4 weeks after full bloom (4WAFB).

Natural crop load at harvest was recorded over three seasons (2005/06, 2006/07, 2007/08) for 'Kordia', 'Lapin', 'Regina', 'Simone', 'Sweetheart', 'Sylvia' and 'Van'.

All trials received rainfall in the three weeks prior to harvest.

Did crop load affect cracking?

Fruit from trees with higher crop loads had a lower incidence of cracking in all years. This linear relationship shows that total cracking incidence is directly related to crop load (Figure 1). Higher levels of fruit cracking were recorded from trees with either naturally occurring or artificially manipulated low crop loads. In 2011, crop load significantly affected the incidence of both total and side cracks in 'Regina'.

Timing of thinning is also important. Reducing crop load at the later time of post bloom significantly increased the incidence of total and side cracks.

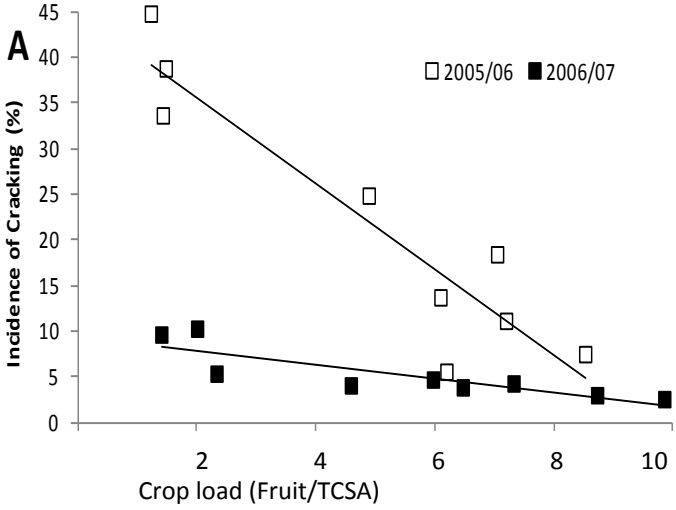

Figure 1: The effect of crop load on cracking of 'Simone' sweet cherry

Is cracking related to fruit properties of size, weight or sugar content?

No significant relationship was found between any fruit properties and total cracking incidence or individual crack types in any of the trials except one. In one trial, increased fruit size was associated with cuticular cracking.

A decrease in fruit size and weight was only observed when crop load was increased dramatically (beyond 20 fruit per TCSA) in 2007/08. However, total soluble solids was not affected.

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Increased Cracking	Number of fruit/TCA			Decreased Size
	10 Low Load	15 Med load	20 High load	
900 trees/ha	**10.3**	**15.7**	**21**	
1000 trees/ha	**11.6**	**17.5**	**23.4**	
1100 trees/ha	**12.8**	**19.3**	**25.7**	
1200 trees/ha	**14**	**21.1**	**28.1**	

Table 1: Yield (t/ha) at 35cm Trunk Circumference

Increased Cracking	Number of fruit/TCA			Decreased Size
	10 Low load	15 Med Load	20 High load	
900 trees/ha	**13.7**	**20.6**	**27.5**	
1000 trees/ha	**15.2**	**22.9**	**30.5**	
1100 trees/ha	**16.8**	**25.2**	**33.6**	
1200 trees/ha	**18.3**	**27.5**	**36.6**	

Table 2: Yield (t/ha) at 40cm Trunk Circumference

Tables 1 and 2 show the range of yields, (t/ha) required to avoid:

- cracking under low crop loads
- loss of size under high crop load

for two different tree sizes (av. 12g fruit)

Key Messages

- Crop load should be a major consideration in developing strategies to manage fruit cracking
- Higher crop loads are directly related to a reduced incidence of fruit cracking
- Cracking susceptibility did not seem to relate to fruit quality properties of fruit size, sugar or fruit firmness
- Increased cracking with post bloom thinning indicates that late season fruit development is important to crack susceptibility
- The results support the hypotheses that crop load influences cracking due to internal water supply and individual competition between fruit.

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