MECHANICAL-THINNING IN CLING PEACH: FINAL REPORT, 2008 – <u>SOUTH STATE</u> <u>DEMONSTRATION TRIALS</u>

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Britton and Van Konynenburg Partners Orchard Trial:

Mechanical thinning was performed on 18 April on 'Loadel' trained to 'vertical V' system in a Salida orchard (Britton and Van Konynenburg Partners Orchard; Fig. 1). Two side-mount shakers with different frequency configurations (34 Hz machine, adjustable to 40 Hz, and a 17 Hz machine) were tested on these trees, planted to 6'x18' spacing, 20 yrs old producing 19-20 tons/A. Crop load was estimated by the 'shake' method described for the 'Micheli' trial site and 4 rows of trees were mechanically thinned.

Protocol:

1) Estimation of crop load and evaluation of machines and machine settings for thinning this orchard

- a) Tree 1 -- first shake removed 7.95# fruit measured from half of the tree (size was 64 fruit/lb)
 - i) machine settings were 1 sec @ 1100 rpm, open pattern; second shake was 1 sec, 1100 rpm in open pattern
 - ii) total amount of fruit removed from half of the tree in 2 shakes and hand-stripping = 10.1#
 - iii) From this we estimate a total of 36.2# fruit/tree
 - iv) 36.2# x 64 fruit/lb = estimate 2317 fruit/tree
 - v) Final cropload desired by growers after hand thinning = 250-300 fruit/tree; ~360 fruit would be this target + 20% surplus to account for potential small fruit drop between now and hand thinning ('target' to leave on ~450 fruit)
 - vi) Fruit size at thinning: 5 fruit measured in mm 22.6, 15.2, 20.7, 23, 20.9 for average diameter of 20.5 mm
- b) 2nd tree, used 17 Hz machine with extra weights added in a loop pattern
 - i) 1st shake at 7/8 sec, 1500 rpm removed 10.1# fruit from half of the tree and snapped a small limb at the top of the tree
 - ii) Fruit removed was 86 fruit/lb
 - iii) 2nd shake was 1 sec in duration at 1100 rpm speed, removing 5.9# fruit
 - iv) Total amount of fruit removed was 16#, estimating 32# for the whole tree
 - v) 32# x 86 fruit/# = 2752 fruit
- c) This machine was too hard on the tree (snapped limb, seemed to lift the roots from the sandy soil), so we will continue to use the higher frequency machine, taking off half of the weights and increasing the frequency to 40 Hz

- d) 3rd tree -- half of weights removed by taking out 16# of weights (distribution of weights was 3:2 or 18#:16#)
 - i) Changed from open to loop pattern
 - ii) Took off 1 wt on the fast side, changed rpm from 2000 to 1500, then 1200 at corresponding duration of ¹/₂ sec, ¹/₂ sec, ¹/₂ sec
 - iii) Each of these changes was still removing too much fruit, but getting better
 - iv) Shook 3 trees in a row, changing these speeds
 - v) 4th tree, decreased time to 1/3 sec at 1200 rpm. The problem is that the stopping the weights from moving is difficult to control, so the accuracy is not the best. The 'better' machine, which is currently being modified, has much better precision in weight control
 - vi) 5th tree weights moved to the outside in a 2:1 distribution, open hook pattern at 1400 rpm for ½ sec—this is much better
 - vii) This setup was then used to shake 16 trees, then ~ ½ acre (2 rows on each side of the drive row) =- 4 half rows total
- e) The best machine setup at this orchard was 10# weight on the 'slow' side of the shaker + 1" spacer and on the 'fast' side of the shake, a 12# weight + a 2.15" spacer, 1200 rpm for ½ sec in loop pattern with no amplitude
 - i) When we tested 2000 rpm for 1 sec, 2200 rpm for 1 sec on the same tree, the results were not as good

Conclusions:

Sandy soils and smaller trees necessitated a slightly different approach than that for the North State trial. Optimum machine and machine configuration, as expected, required input from the grower, particularly as he knew the bearing capacity of the orchard. This is in keeping with previous trials. Carrying capacity of this orchard (on a 'per tree' basis) was one-third that of the 'Micheli' site in the North State, and the vertical V system proved to allow more even distribution of fruit remaining on tree than with open vase. Fruit was very easy to remove, even at an average size of ~20 mm cross-suture diameter.

Klein Orchard Trial:

After shaking at V-K Ranches, the shaker machine was moved to Norman Klein's 'Loadel' orchard on Patterson Road. This orchard is also planted to a perpendicular "V" at a spacing of 6.5' x 18' (372 trees per acre). The same machine set up was used as in the V-K Ranches trial. The average fruit size was 18.1 mm (168 fruit / pound) which appeared to be better than the larger fruit size at V-K (easier to manage fruit thinning).

Four complete rows were thinned by the shaker machine. It took one minute, 40 seconds to thin ten trees which calculates to 62 minutes per acre if the machine ran continuously. It was noted that very vertical scaffolds were often not thinned well while stiff, horizontal hangers were often thinned almost completely. Branch angles of $45^{0} - 55^{0}$ may be best.

Overall, the mechanical pre-thinning with Erick Nielsen's machine looked promising. Unfortunately, the trial area was prematurely hand thinned by the grower and we were unable to document differences in time to hand thin.

Figure 1. Britton and Van Konynenburg Partners orchard, Salida; shaken fruit to estimate cropload; fruit size and stage of development (semi-solid endosperm, some fruit still 'in the jacket').

