

Innovative Technologies for Thinning Fruit

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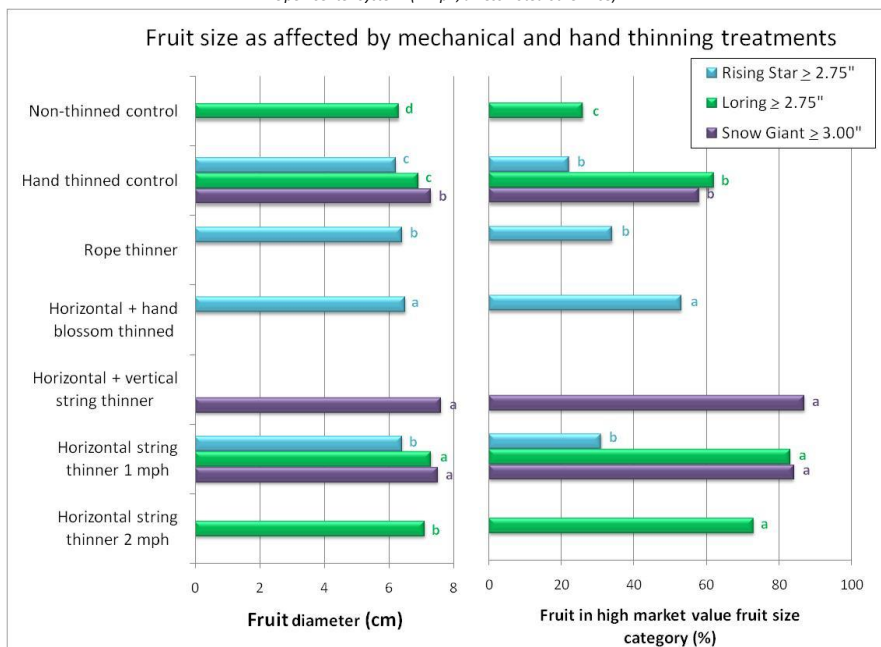
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Hand thinning of fruit is among the most labor-intensive orchard practices, and consequently contributes significantly to fruit production costs. Preliminary research in Pennsylvania commercial orchards on mechanical string or drum shaker thinners demonstrated that these methods have potential for reducing the hand thinning requirement in crop load management programs. These technologies also lessen the competition from a portion of the excess crop early and rapidly—thereby improving fruit size, quality, and return bloom. Being non-chemical, the obstacle of registration for a new compound is avoided. New mechanical thinning strategies coupled with narrow tree architectures have potential to favorably impact grower profitability both by reducing labor requirement and by improving fruit size and quality.

In the second year of research with mechanical string and drum shaker thinners at bloom and the green fruit stage respectively, the preliminary results from 12 trials in peach orchards and studies in Gala apple and Hosui pear blocks are encouraging. Peach blossom removal ranged from 30 to 50% with a vertical string thinner, 25 to 70% with a horizontal string thinner prototype, and 35 to 40% with a drum shaker used at bloom. Thinning results with drum shakers at 35 days after full bloom (DAFB) were highly variable. The vertical string thinner performed best at 2 mph, while optimal thinning with the horizontal string thinner was at 1 mph, with peach crop load being reduced by an average of 50%. The double drum shaker reduced crop load more than the single drum shaker but bark damage was a concern with the double versus the single drum, indicating the need for changes in engineering design. Vertical string thinner trials on pome fruit indicated mechanical thinning may be more effective in removing lateral blossoms (that produce smaller fruit) than chemical thinners.

Follow-up hand thinning time was reduced by 29 to 60% by the string thinners operating at optimum speeds and by 7 to 28% by the drum shakers. Fruit in higher market value size categories increased by an average of 35% and 11%, respectively. Net economic impact of mechanical thinning versus hand thinning alone ranged from \$237 to \$1164 per acre and -\$30 to \$299 per acre, respectively. Net economic impacts in string thinner timing trials were greater than \$237 per acre for all bloom stages (pink through petal fall), suggesting a wide window for acceptable thinning. Net economic impacts for pruning trials were \$242 to \$1164 per acre, with a \$100 per acre benefit with fan versus standard pruning. High market value yields were comparable across mechanical thinning treatments in all but two trials, and this is an area that requires further study. Several combination treatments—string thinner + hand blossom thinning, string thinner + drum shaker, and horizontal + vertical string thinner—suggested additional strategies for achieving the most desirable thinning results.

Comparison of Horizontal String Thinner to Rope or Hand Blossom Thinning
Open Center System (1 mph, unless noted otherwise)



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Additional results from the 2008 trials are posted at <http://frec.cas.psu.edu/>