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Organic Chemical Bloom Thinning of Tree Fruits

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Effective crop load management is critical to successful orchard operations, having profound impact on farm labor costs, fruit size and quality, and annual yields. Chemical thinning is an important element of crop load management, yet organic growers have fewer options than conventional orchardists. The lack of effective OMRI-approved postbloom materials forces organic operations to complete all of their chemical thinning during bloom.

Since 1999, we have conducted nearly 180 replicated field trials of various chemical blossom thinners in commercial Washington apple, pear, cherry, peach, nectarine, and apricot orchards. We have sought to identify and refine programs that improve growers' bottom lines by:

1. Reducing labor costs (primarily due to hand-thinning).
2. Maximizing retention of high quality fruit (improving fruit size, packouts, storability, and eating quality).
3. Promoting annual cropping by improving return bloom.

For apple and pear, roughly half of our trials have been applied by growers using their own spray equipment, while more complex trials were applied by WTFRC staff using a prototype Proptec research sprayer. Each treatment has usually been sprayed twice, typically at 20% and 80% open bloom. Trials were randomized and replicated with untreated controls to accommodate formal statistical analysis of results. Trial sites have included all growing districts, cultivars, rootstocks, and training systems important to the Washington industry. Several apple trials have included segregated harvests and commercial packouts of individual treatments. Stone fruit thinning trials generally have been conducted on smaller scales.

While individual trials have produced variable results, the sheer quantity of trials we have conducted has allowed us to evaluate them collectively and, in doing so, some clear patterns have emerged. Our results demonstrate that oil + lime sulfur thinning programs have achieved each of the three thinning goals most consistently. Our best results have been from a tank mix of Crocker's Fish Oil + lime sulfur, but many other petroleum and vegetable oils have also performed well with lime sulfur. Higher rates of lime sulfur alone have shown good thinning effects but not as often as oil + lime sulfur tank mixes. Third tier performers include NC99 (an OMRI listed magnesium/calcium chloride brine) and the popular conventional blossom thinner ammonium thiosulfate (ATS), both of which have been particularly disappointing in terms of return bloom.

Initial results in pear suggest that lime sulfur alone and oil + lime sulfur programs can achieve some thinning of Bartlett and Bosc but are generally not as effective as ATS. Cherry, peach, nectarine, and apricot results have been highly inconsistent, with oil + lime sulfur programs performing well at times and not at all in others.

Ongoing WTFRC crop load management efforts include cooperation with Don Elfving (WSU, Wenatchee) to evaluate OMRI-listed gibberellins as tools to influence apple flowering behavior. We continue to explore novel timings and chemistries such as vinegar and vegetable

oil emulsions for organic chemical thinning in collaboration with scientists around the country including Jim Schupp (Penn State), Curt Rom (Univ. of Arkansas), Steve McCartney (NC State), and Ross Byers (Virginia Tech). Our cooperation with Chang-Lin Xiao (WSU, Wenatchee) has demonstrated that lime sulfur thinning programs can play valuable roles in effective apple powdery mildew programs.

Our results helped lay the foundation for the registration of lime sulfur and lime sulfur + oil programs for chemical thinning in Washington. We have observed dramatically increasing adoption of these programs by both conventional and organic growers throughout the state who generally report good results consistent with what we have observed in our structured trials. While organic growers may not be able to rely on postbloom thinners such as carbaryl, NAA, NAD, ethephon, or benzyladenine, they have several excellent options available as blossom thinners.