# PEAR FLOTATION STUDIES, 2001-2002

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According to a survey of pear packers in the western U.S. in 1998, approximately 70% of packinghouses used some form of ligninsulfonate as a flotation agent in pear dump tanks. With the closure of a major source of ligninsulfonate in the Pacific Northwest, it became important to evaluate new and existing alternatives for pear flotation. For the 2001 packing season, new products K-Float (product of CH2O) and Xeda F (product of Xeda Americas) became available for use in Oregon, though not in Washington. K-Float is based on potassium carbonate, while Xeda F includes potassium phosphate and potassium pyrophosphate. In the four packinghouses of Medford, Oregon, the 2001 season saw each house using different flotation materials: soda ash (sodium carbonate); sodium sulfate; Xeda F, then K-Float; and ligninsulfonate from a source in the mid-west.

In laboratory studies, it was found that there is potential for injury to fruit (burning) related to the phenolic content of dump tank solutions. The phenol comes from sodium o-phenylphenate (SOPP) added to the dump tank as a disinfectant (Steri-Seal or other products). The tendency for phenol to become available depends in part on the pH of the dump tank, which is strongly affected by the flotation material. A relatively high pH solution (e.g., soda ash) would have a low tendency to burn fruit, while a relatively low pH solution (e.g., Xeda F) would have a greater tendency to burn fruit. In addition, the temperature of the solution strongly affects the tendency to burn. At solution temperatures of 35 to 40 ºF, all materials tested appeared to be safe for use with pears floated for durations of one hour or less. In warmer solutions, the risk of burn increased with lower pH and with increased duration of flotation. An exception to this pattern is ligninsulfonate, which generates a low pH solution but appears to have a "safening" property with respect to phenol injury to fruit.

In another experiment, reduced rates (0.5% instead of 1%) of SOPP were compared, in combination with various flotation materials. The results indicate that with high pH flotation solutions, 0.5% SOPP was inadequate; the full 1% solution was necessary for adequate decay suppression (Table 1). With relatively low pH solutions, however, the decay suppression by 0.5% SOPP was more nearly equivalent to that provided by a 1% solution. One implication of these results is that maintaining 1% SOPP levels through monitoring and adjustment are more critical when using high pH flotation solutions than when using relatively low pH solutions.

Combinations of different flotation materials in the same tank can affect the ways that solutions react. When ligninsulfonate, being low in pH, was combined with a high pH flotation material, the overall drop in pH resulted in increased fruit injury if the proportion of ligninsulfonate was 10 or 25%, but at 50% ligninsulfonate, it appeared that the "safening" quality was sufficient to avoid injury, even at low pH.

In sum, the new flotation materials K-Float and Xeda F as tested in 2001 appear to be safe for use with pears provided that the dump tank solution temperature is sufficiently cold and flotation duration is less than one hour. There may be advantages to using relatively low pH flotation solutions with respect to decay suppression and management of disinfectant concentrations.

**Table 1**. Effect of flotation material pH and concentration of Steri-Seal (SS) on incidence of gray mold in inoculated pears. Experiments were conducted at the Southern Oregon Research and Extension Center, Medford.

| RELATIVELY HIGH PH SOLUTIONS | % infection | | RELATIVELY LOW PH SOLUTIONS | % infection | |
|---|---|---|---|---|---|
| Sod. carbonate | 80.0 | b | Xeda F | 96.0 | ab |
| Sod. carb. + SS 0.5% | 82.0 | b | Xeda F + SS 0.5% | 22.0 | e |
| Sod. carb. + SS 1% | 40.6 | cd | Xeda F + SS 1% | 12.0 | e |
| K carbonate | 75.6 | b | Calcium chloride | 91.6 | ab |
| K carb. + SS 0.5% | 73.0 | b | $CaCl_2$ + SS 0.5% | 36.0 | d |
| K carb. + SS 1% | 29.6 | de | $CaCl_2$ + SS 1% | 17.0 | e |
| | | | Sodium sulfate | 83.0 | ab |
| | | | Sod. sulf. + SS 0.5% | 23.0 | e |
| | | | Sod. sulf. + SS 1% | 18.0 | e |