scaffolds Update on Pest Management and Crop Development

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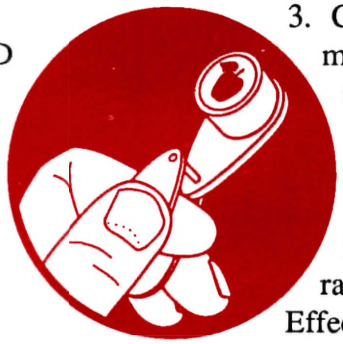
DISEASES

POST-HARVEST II

USING CHLORINATED WATER IN APPLE HANDLING SYSTEMS

(Dave Rosenberger)



❖❖ Chlorine has long been recognized as an effective eradicant of bacterial and fungal contaminants. (That's why swimming pools are chlorinated and most cities chlorinate public water supplies.) Chlorine is effective at concentrations below 5 ppm. However, using chlorine as a decontaminant in fruit handling operations is complicated by a number of factors.

Chlorination presents the following problems when it is used in postharvest handling operations with apples:

1. Chlorine and diphenylamine (DPA) are not compatible. For fruit requiring DPA treatment, chlorination can be used only if fruit are first treated with chlorine, allowed to drain, then treated with DPA in a second drench treatment. Most storage operators will find it impractical to operate two separate drenchers.
2. Unlike fungicides, chlorine provides no systemic or residual protection. (The lack of residue can also be perceived as an advantage in today's anti-pesticide climate.) Chlorine treatment eradicates surface contaminants, which may cause postharvest decays, but it does not protect fruit against fungal spores the fruit may encounter after treatment. Thus, chlorination treatments are really useful only in conjunction with other sanitation measures, which ensure that fruit will not be re-exposed to inoculum after treatment.
3. Chlorine is "inactivated" by organic matter. As a result, chlorine must be added continuously to water flumes or drenches in order to maintain effective concentrations of chlorine.
4. If sodium hypochlorite (bleach) is used for chlorinating water, it will raise the pH of the treatment solution. Effectiveness of the treatment solution is greatly reduced if the pH is greater than 7. "Off-gassing" will also be noticeable at higher pH's. Off-gassing is the release of chlorine into the air and results in a typical "chlorine" or swimming-pool smell. In a packinghouse environment, off-gassing can lead to discomfort for and complaints from workers.
5. Sodium hypochlorite is corrosive and will speed rusting of dump tanks and nails in bins.

Although chlorination has limitations, it is very useful as a sanitizer for water dumps in apple packinghouses. Chlorinating water dumps on apple packing lines ensures that spores from any decayed fruit will be inactivated as soon as the fruit are immersed in the water. Furthermore, wooden bins immersed in the water dumps will also be de-contaminated provided appropriate levels of chlorine are maintained and the bins are kept in the water for at least 4–5 minutes. Chlorinating water dumps also controls populations of bacteria and yeasts that contribute to foul odors commonly noted after dump water has been used for several days.

Many different forms of chlorine are available. Household bleach is the most common form, but it is not labeled for food handling uses. (Possibly other forms of sodium hypochlorite are

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available with appropriate labels, from your agrichemical dealer.) Researchers in Washington State are experimenting with injecting chlorine dioxide gas into their water flumes, but this method of chlorination requires a sizeable investment in equipment for generating the chlorine dioxide gas. Off-gassing is a problem, so the system requires precise regulation of the amounts of active chlorine in the water.

A simpler and safer alternative is calcium hypochlorite. Calcium hypochlorite has several advantages over sodium hypochlorite (or bleach). It is less corrosive than sodium hypochlorite and therefore less damaging to equipment and bins. It is not caustic like sodium hypochlorite and therefore does not damage the fruit cuticle and epidermis. Calcium hypochlorite has no effect on pH, and therefore treatment solutions will emit less "swimming pool" odor. Calcium hypochlorite and an inexpensive dispenser system are available from at least one commercial vendor (Klorman Industries, Alexandria VA, 1-800-925-8745). The Klorman product is labeled for postharvest use on fruits and vegetables. In the Klorman system, dry calcium hypochlorite is added to the system by continually circulating water through a chlorine dispenser. (Other vendors may have similar systems.)

Where chlorination is used in apple water dumps, operators should attempt to maintain a chlorine concentration of 100 ppm. Although concentrations of 25 ppm can effectively kill fungal spores, researchers on the west coast have found that a concentration of 100 ppm is generally required for best results.

To acheive maximum benefit from the chlorination of water dumps, packinghouse operators should also implement other sanitation measures to minimize exposure of treated fruit and bins to spores of decay fungi. Cull bins should be emptied every day to keep fruit from sporulating within the packinghouse. The packinghouse itself should be cleaned periodically to eliminate dust and the airborne spores of decay fungi that will accumulate along with dust. Floors should be washed down regularly. Combining all of these measures is essential for minimizing inoculum of decay fungi in apple packinghouses.❖❖

ROTS OF WOOD

SILVER LEAF
(Dave Rosenberger)

❖❖ Silver leaf appeared in numerous orchards in eastern NY this season. Champlain Valley apple growers are used to seeing silver leaf on a sporadic basis, but silver leaf is relatively uncommon in the Hudson Valley. Its occurrence this year is a result of the wide-spread cold damage which occurred last winter.

Silver leaf is a disease caused by the fungus *Chondrostereum purpureum* (formerly known as *Stereum purpureum*). *C. purpureum* is a wood rotting fungus which invades the old wood in the center of limbs and trunks. The fungus invades trees through pruning cuts and other injuries. Under certain conditions, the fungus

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releases a toxin which causes leaves on affected limbs to develop a silvery, pale green appearance. Symptoms usually appear about petal fall, but growers have noted newly affected limbs throughout the summer this year. Severely affected leaves may turn brown by late summer. Usually only a few trees in a block will show symptoms, and symptoms may be limited to a few branches or scaffold limbs. Occasionally an entire tree may be affected. Affected limbs may gradually decline and die over a period of years, but in other cases they "recover" and show no symptoms of silver leaf until another severe winter predisposes trees to this disease. No fungicides or other treatments are effective for controlling silver leaf.

Growers should be aware that fruit from limbs with silver leaf frequently develop water core and may not hold well in long-term storage. If growers have blocks with many affected limbs, they should consider sending a picker through the block ahead of normal harvest to remove fruit from affected limbs so that water-cored fruit does not go into bins destined for long-term CA storage.❖❖

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations		
(Geneva 1/1 - 9/6):	3005	2154
(Highland 1/1 -9/6):	3624	2582
Coming Events:	**Ranges:**	
Oriental fruit moth 3rd flight subsides	2987–3522	2018–2377
STLM 3rd flight subsides	3235–3471	2228-2472
San Jose scale 2nd flight subsides	2494-3191	1662-2302
Codling moth 2nd flight subsides	2782–3433	1796–2332
Lesser appleworm 2nd flight peak	2961–3235	1927–2326
Apple maggot flight subsides	2923–3174	1958–2169
OBLR 2nd flight subsides	2809–3433	1930–2332
Redbanded leafroller 3rd flight subsides	3114–3433	2013–2332
Peachtree borer flight subsides	2230–3255	1497–2309
Lesser peachtree borer flight subsides	2782–3253	1796–2268

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INSECT TRAP CATCHES (Number/Trap/Day)

Geneva NY

	8/29	9/1	9/6
Spotted tentiform leafminer	542	143	89
Redbanded leafroller	0.1	0	0
Lesser appleworm	0	0	0.6
Oriental fruit moth(apple)	6.1	5.8	1.1
Codling moth	2.6	2.2	0.4
American plum borer(plum)	0	0	0
American plum borer(cherry)	0	0.2	0
Lesser peachtree borer	2.0	0	0.2
Peachtree borer	0.5	0.3	0.1
Obliquebanded leafroller	0.4	0.4	0.1
Apple maggot	0	0.08	0
San Jose Scale	2.4	2.3	0.1

HVL, Highland NY

	8/15	8/29	9/6
Redbanded leafroller	0	<0.1	0.6
Spotted tentiform leafminer	23	8.3	2.2
Oriental fruit moth	0.9	0.6	0.6
Fruittree leafroller	0	0	0
Lesser appleworm	0.4	0.5	0.1
Codling moth	3.9	1.7	0.1
American plum borer	1.7	–	–
Sparganothis fruitworm	2.9	1.7	2.1
Tufted apple bud moth	0.8	0.3	0.4
Variegated leafroller	2.9	1.7	3.0
Obliquebanded leafroller	0.7	0.3	0.1
Apple maggot	0	0	0

(Dick Straub, Peter Jentsch)

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