

The Natural Farmer

Diseases of Apple on the Organic Frontier - Spring 2002

by Michael Phillips

Several alternative approaches to organic disease management have come about since Chelsea Green published my book, *The Apple Grower*, back in 1998. I briefly want to explore some of those options here, and by so doing, encourage readers of this article to respond back with their ideas and experiences.

Much of what follows begins with understanding the annual cycles of a given disease. A preventative approach relies foremost on orchard sanitation. Still, the use of a fungicide during the primary infection period can make all the difference when blown-in disease spores and favorable weather conditions make infection likely. Apple scab, black rot, powdery mildew, and the rust diseases take hold on the tender leaf tissue and fruitlets from about the pink bud stage till about two weeks after petal fall. I use the minimum amount of sulfur I can get away with during this time—about three applications on average here in my orchard in northern New Hampshire—based upon the collective experience of many in working with spore maturity, wetting periods, and tissue susceptibility. Much of the nuance of determining when to spray is explained in *The Apple Grower*, as well as in regional fruit production guides.

We'd all love it if we could simply rely on the tree's immune system to simply take care of these fungal woes. Tree health ideally flows from soil health. That's the underlying principle of organic agriculture. And yet, just as the proverbial bumper sticker implies, disease happens. Disease-resistant varieties achieve immunity to some extent, but never across the whole spectrum of possible diseases. Sooty blotch and flyspeck—the so-called summer diseases—can make even a scab-resistant variety like Liberty not all that pretty by harvest time. For my part, I've too high a regard for great-tasting fruit to rely solely on disease resistance as the foremost reason for choosing a particular variety to grow in the orchard. Like many of you, I'm an apple guy who loves all sorts of apples.

So I don't object to spraying elemental sulfur with wise discretion during the primary infection period when several fungal diseases strike. I liken this to what my herbalist wife, Nancy, has taught our family to do whenever we fly. The chance of being exposed to an infectious bacterium or virus in the re-circulating air of a jet comes practically guaranteed. A vibrant immune system keeps us well. Nevertheless, in that highly charged air which so many people share, it doesn't hurt to improve one's prospects by taking Echinacea (an herbal tincture) before and after landing to boost one's immune system. Sulfur works in an entirely different manner, but you get the idea. Applied protection goes a long way when inoculum levels are high.

Another choice in this quest to keep fruit clean is a relatively new product called OxiDate. Hydrogen dioxide (the active ingredient in OxiDate) works as both a curative and a preventative against the

diseases listed above for tree fruits. The oxidation that occurs on spray contact with the disease organisms—and their spores—results in the denaturing of key enzymes and proteins found in these simple celled organisms. After contact, Oxidate biodegrades into water and oxygen, leaving no harmful residues. Here's a product that could readily replace sulfur. And certainly would assist in cleaning up an orchard where past practice allowed disease to build beyond unmanageable levels. I've yet to try it. Those of you who have used hydrogen peroxide in the orchard have homegrown experience with this approach. I'd like to hear about the results of either. You can contact BioSafe Systems for more information about Oxidate at 1-888-273-3088, or check on the web at www.biosafesystems.com.

Research is underway as regards the "disease suppression advantage" of the kaolin clay product known as Surround. This barrier protection approach to insect pressure is proving invaluable for many an organic orchardist long frustrated by plum curculio. (The bugs are another discussion entirely, but for those of you seeking useful information about kaolin clay, contact the Englehard folks at 1-877-240-0421 and request their very informative literature packet on Surround.) The clay particle coating by itself does little or nothing to suppress fungal or bacterial disease. I suspect the clay might be useful in this regard in prolonging the viable life of individual sulfur grains on the foliage surface from ultraviolet degradation. The researchers are looking into this prospect by looking at Surround used in conjunction with both sulfur and lime sulfur. Personally, I'm leery of this idea for two reasons. More than half of our protectant disease sprays occur before petal fall, which is when that clay barrier becomes vital for deterring curculio and first-generation codling moth. Earlier use of Surround may not be warranted for many of us. The less we need to rely on any product purchased off the farm, the better. Secondly, the kaolin can negatively impact mite predators. The same goes for lime sulfur, and, to a lesser degree, sulfur. Our actions always bear upon the balance of life forces at play in the orchard ecosystem. Keeping this big picture in mind is what distinguishes an earth-savvy orchardist.

A holistic approach to disease embraces two notions I'd like to explore further. Much of this comes from my experiences with herbal medicine for people. The biological parallels between our bodies and plants, I think, are rather obvious.

Firstly comes that whole idea of enhancing the immune system. Plants utilize a similar process as we do in warding off invading pathogens. Polysaccharide compounds are produced when hydrolytic enzymes first contact fungi and bacterial membranes on the foliage surface. These in turn activate an internal defense mechanism in the plant that scientists call phytoalexins. These consist of isoflavanoids and terpenes (varying for each unique plant species) which, when produced in sufficient abundance, can resist the invading pathogen. Plant stress, the overuse of synthetic agrochemicals, and climatological factors work against this natural defense mechanism process found in healthy plants.

You know how some of us use vitamin supplements or nourishing herbs (usually as teas) to enhance our diet in order to strengthen the body's own protection systems? The same can be done for plants. A citrus extract being used in tropical fruit and vegetable production serves very much as a plant vitamin to activate the production of phytoalexins. You can read about Citrex on the web at www.citrex.com. Several of my apple friends have found immune-enhancement promise in limited trials using Citrex at spray rates of 6 to 12 ounces per acre for both scab and the summer diseases. The product itself is not yet registered for apples nor is it reasonably priced. I suspect a homegrown garlic brew is another possibility here to vitalize plant defenses. Biodynamic growers concoct a similar brew with nettles and horsetail. This concept of plant medicines for plants has merit, all the more so when we realize the manner in which our intentions prove potent. Obviously, this is a tough angle to prove. Holistic suggestions aren't necessarily for those hung up on isolated events. My hope here is once again to inspire experimentation and the collective sharing of admittedly anecdotal results.

A second holistic notion worth pondering is our cultural fixation on sterility. Somewhere along the line we made a generational decision to equate the lack of microorganisms as being the cutting edge approach to preventing disease. And let's face it, so very few of us can say we've never taken an antibiotic or swiped our counters with an antibacterial soap. Good Lord, you can hardly avoid having to purchase antifungal-treated socks today! This underlying assumption that ridding the environment of critters much smaller than us is somehow safer misses the reality of living on earth. I almost invariably ask folks in workshops I teach to envision holding up 1 to 2 pounds of themselves. This amount of body weight represents that portion of ourselves that isn't "us." Bacteria cover our skin, line our nasal passages, and make the intestines the effective digesters they're meant to be. Our good health is predicated on the right little fellas existing within us in proper abundance.

Let's take this understanding out to our orchards and gardens. Establishing a colonization of good microorganisms somewhat ensures that the "bad guys" won't find room at the inn. I've argued earlier for the discretionary use of fungicides in the primary infection period. Now I want to think outside that box. A new product called Serenade draws its worth from this deeper understanding that microorganisms can out-compete another species of microorganisms. This biofungicide from AgraQuest (call 530-750-0150 for an information packet or check on the web at www.agraquest.com) establishes a culture of *Bacillus subtilis* on the plant surface. This strain of bacterium, prevalent in soils worldwide, is known to release cell contents during growth to eliminate competitors in its immediate environment in order to protect its niche. Furthermore, *Bacillus subtilis* has also been shown to induce the plant's natural resistance against bacterial and fungal pathogens. No doubt by the mechanism explained above. Here's a product designed to immediately reestablish a good culture following the application of fungicides during those weeks in spring of primary infection probability.

Reaching once again for the homegrown solution suggests the use of compost teas. ATTRA has a very useful publication explaining foliar applications of such a microorganism-rich brew; call them at 1-800-346-9140 to request "Compost Teas for Disease Control" or download this write-up direct from the web at www.attra.ncat.org. We are living in a bacterial world. We can substantiate our human claim to being the most intelligent species on the planet by finally according this minute species its due. "Bacteria First" will always be a driving tenet of ecological farming.

Every orchard site remains unique when it comes to the multi-faceted challenges we each will face in growing healthy fruit. And yet by pooling together our collective understanding, we'll each get better at what we love to do. Hope to hear from you!

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