A Quick Trip to the Rodale Institute to Study Compost Tea

The name Rodale may be familiar to you if you read *Organic Gardening or New Farm* magazines. Rodale publishing produces these magazines and has produced many other magazines on healthy living and slew of other topics. The Rodale family is credited with the early promotion of organic farming. In the 1970's the Rodale family purchased a farm and started the Rodale Institute. Today they have fields that have been under continuous organic practices for three decades. The institute has several hundred acres of farmland for demonstration and research purposes. The institute also has a laboratory and classroom for organic research and teaching.

Driving through the mountains in Pennsylvania

A long trip

In April Jackie and I decided to take a few days off the farm, hit the road, and drove from Minnesota to eastern Pennsylvania. We had a nice uneventful drive other than a couple hours of wet snow fall as we traveled through the mountains in central Pennsylvania. We were thankful the warnings of up to a foot of snow did not materialize. We made it to Allentown on Monday afternoon with plenty of time to settle into our hotel. Bright and early Tuesday morning Jackie dropped me off at the Rodale Institute for my first full day class on brewing compost teas. After Tuesday's class we had a couple days to kill before the microscope class on Friday. Jackie and I both took the microscope class. We learned how to evaluate compost samples and tea samples using a microscope to assess the quantity and diversity of microorganisms. On Wednesday we found Don Jantzi (the manager of the Rodale apple orchards) and spent the better part of the morning walking through orchards and talking apple trees. Don has been managing the Rodale Orchards since the early 1980's.

Don Jantzi manager of the Rodale Orchards with Jackie Hoch

Original Rodale Orchard planted on hillside overlooking the campus

Newer Orchard located near the Rodale Store

The Apples

The apple crop is harvested and sold on-site through the Rodale store, pick you own, and special events. Lower grade apples are made into sweet cider by a local cider mill and some are cooked down into a 'Nothing but apples' organic apple butter. I have to mention that the Rodale store is housed in a beautiful old brick one-room schoolhouse that was built in 1900.

Rodale Store

The orchards are certified organic and have been under organic management since the first trees were planted in the early 1980's. Although there is not any research going on in the orchards right now, the viability of the organic concept is demonstrated in apple production by managing the orchard organically for over two decades.

The Campus

After we finished bothering Don we walked around the farm looking at the

grand old buildings and talking to the friendly staff and interns. The main office is in an old wood-frame farmhouse with the date of 1790 on the front. There are two other houses made of stone that house interns. There are also two amazing barns and many outbuildings. The grounds are landscaped and there were tulips everywhere.

Rodale Institute main office

Rodale Institute Main Office

Intern housing

Grand old barns

The Purpose

While we really enjoyed seeing the grounds, orchards, and buildings at the Rodale Institute, the primary purpose of our trip was to learn more about brewing and evaluating compost tea. Dr. Elaine Ingham (known for her work with compost and the soil food web) is now the lead scientist at the Rodale Institute. The Rodale institute offers a series of classes taught by Dr. Ingham on soil health,

composting, tea brewing, and microscopic evaluation of compost and teas.

Jackie and Dr Elaine Ingham in class

Our Plan

We use post-infection applications of liquid lime sulfur to control apple scab at Hoch Orchard. You can read more about this system on our website under the 'Farming Practices' button. I have an article that goes into great detail that you can download as a PDF. While this program has been working well the past few years we are always looking for more sustainable ways to produce our fruit. We have been very interested in Michael Phillip's (author of *The Apple Grower) concept* of disease suppression by enhancing the arboreal food web. Michael advocates spraying materials that promote beneficial bacterial and fungal growth on the leaves and fruit. In this system the plant surface is colonized by nonpathogenic organisms which then out-compete the disease organisms. He also suggests spraying materials that enhance the trees natural immune system to fight off the disease organisms that occasionally survive the competition of the other organisms. I am not going to go into the materials and timing of this system in this article. If you are interested in this system you can read about it in Michael's new book The Holistic Orchard.

We started testing this sulfur free system on our farm last year. This year we expanded the acreage and added the application of compost tea to the mix. This system eliminates the use of mineral fungicides and depends on biological competition. We are keeping the two management systems in separate apple blocks on our farm. I feel that even small amounts of sulfur residue are going to have a disruptive affect on some of the beneficial organisms. Spraying products to enhance beneficial organisms along with the use of copper and sulfur is kind of like driving with one foot on the brake and one foot on the gas. I went so far as to dig out an old 1980's era sprayer that I mothballed a few years ago. This old sprayer is now my designated tea applicator. I am not taking the chance that the sulfur residue in the sprayer could kill off the most sulfur sensitive beneficial organisms in my tea.

The Compost Tea Concept

Properly prepared compost contains a great diversity of microorganisms. Compost made from woody mulch should have a mix of bacteria, fungal strands, and protozoa. To make compost tea you need a well designed tea brewer. The brewer is a large water tight container that mixes large amounts of oxygen into the water and creates turbulence and constant flow throughout the container. The high oxygen environment enhances the aerobic organisms and kills or forces the anaerobic disease organisms into dormancy. Compost is put into the brewer in what looks like an oversized teabag. Water moves through the bag and extracts the microorganisms. After a few hours of brewing the compost bag is removed and nutrients such as liquid fish, molasses, or fish oil is added to the tea.

These nutrients feed the organisms causing exponential growth.

While these organisms grow and thrive in the high oxygen high nutrient environment, they are being whisked and tumbled around in the solution. These are the same organisms that make the soil strong and exude the glues that bind soil particles together and create humus. These organisms don't want to be floating around; they want to bind to something. The brewing process stimulates them to produce even more glues so they can stick to something and stop tumbling. Although these glues are what make the slime that is difficult to clean out of the brewer, this accelerated production of glue is exactly what we want for foliar application. When we spray the fresh tea onto the orchard, the microorganisms are covered in glue. This really sticks them the plant surface. These organisms have been tumbling around in water for hours and are ready to grab onto the first surface they contact.

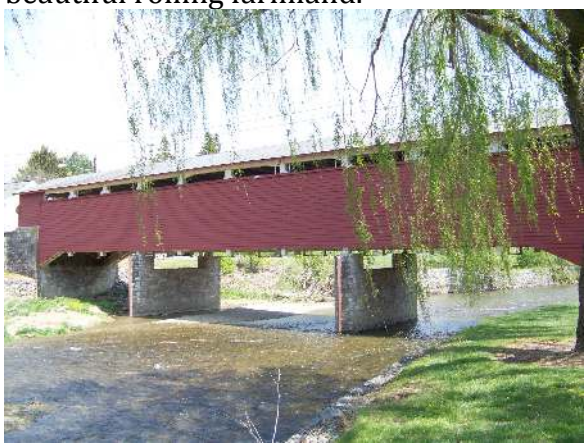
Good compost is full of millions of different organisms. Many are adaptable to different conditions while some only wake up under specific temperature, humidity, or when they contact certain host surfaces. The idea behind the compost tea is that some of the organisms that are in your tea are going to be perfectly suited to growing on the surface of your plants. These nonpathogenic organisms will then thrive on your plants and consume the surface nutrients that the pathogens need to sustain them while they are trying to infect your plant. Many beneficial organisms will also produce toxins that suppress their competitors. There are commercial fungicides (Serenade and Sonata) made from beneficial bacteria that work this way. Those two products have specific strains of bacillus that are known to compete with pathogens like powdery mildew. While the commercial products depend on one organism, compost tea uses many organisms to colonize the plant surface and out-compete the pathogens. Of course you can't see these organisms with the naked eye, but if you look at plant surfaces with an electron microscope you will see a landscape of organisms all competing for space. Spraying sulfur, hydrogen peroxide, vinegar, copper, or any fungicide will kill off many of these beneficial organisms leaving the leaf surface open for colonization.

Using compost teas is not as simple has throwing compost in a bucket and letting it steep. Making good tea requires a high quality brewer that has been tested. It also requires good compost. We have to use certified organic compost and certified organic nutrients to make our tea. Untested or homemade brewers can create anaerobic conditions in the brewer. Anaerobic teas can have toxins that will damage your plants or make you sick.

There has been a lot of research done with teas on vegetables, field crops, and ornamental plants showing great success. Unfortunately there are only a few published studies using teas to control diseases on fruit. While the concept seems very promising, the practices need a lot of work. We are taking some early steps here on Hoch Orchard.

Jackie and I had a great trip to the Rodale Institute. The farm is only a couple hours from Philadelphia so we took a little side trip and spent the day there. We also spent part of a day driving through the Pennsylvania country side looking at

covered bridges, old buildings, and beautiful rolling farmland.



Old covered bridge

Mennonite tractor with spoked wooden wheels

I highly recommend visiting the Rodale Institute and spending some time in the area. The Rodale store has a large number of books and pamphlets on organic production along with a nice selection of natural products and other interesting stuff. The main campus is set up for self guided tours. Check out their website www.rodaleinstitute.org for class schedules, special events, and store hours.