November 2005 E-Zine

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1. Meetings

Dr. Elaine Ingham of Soil Foodweb, Inc., Corvallis, Oregon will be in **San Mateo, California** for a 2 day intensive seminar on managing soil biology/ecology for plant and environmental health in January 2006. The seminar is arranged in 3 levels to allow you to participate at the level that serves you best.

Thursday evening **1/19/06**, 7 - 9pm, soil biology overview - $ 25.00. This is enough information about the biology of the soil to dazzle, inspire and assist any level of home gardener in "going organic".

Friday **1/20/06**, 8am - 5pm, all day intensive on the functioning of the soil biology, soil chemistry, and proper treatment for best results.

Saturday **1/21/06**, 8am - 5pm, all day landscape industry intensive on the details of managing a landscape without toxic pesticides, and inorganic fertilizers; use of organic fertilizers and mineral supplements, compost tea and compost. Afternoon session will consist of open consultation and analysis of pre-selected landscape issues from seminar participants - submitted after registration.

The cost is $100.00 per full day session, - OR- $180.00 package for all 3 lectures.

Early bird special is $ 130.00 for all 3 sessions (evening + 2 full day lectures) with registration postmarked 12/15/05 or before. Hot lunch available @ $15.00/day.

The registration form is online at http://soilfoodweb.com/04_news/calendar.htm .

If you cannot access the PDF to fill out the accompanying registration form, or require more information, please contact: Alane Weber @ (650)348-2094, wormlady@sbcglobal.net

- or -

Terry Lyngso @ Lyngso Garden Materials, Inc.in Redwood City, (650)364-1730, tlyngso@lyngsogarden.com

Compost Tea in Hydroponics

How to Convert from Chemical to Biological Control for Sustainable Hydroponics

Learn how to convert a hydroponics system from reliance on salt-based fertilizers and toxic chemical pesticides to a reliance on biology to do the work.

See www.soilfoodweb.com in the section called News, Workshops Calendar for registration and information about the seminar.

ALSO - SOIL ASSOCIATION SEMINAR LONDON ENGLAND

Please contact SFI Laverstoke Park for details

Reports on Soil Foodweb Courses

Canada:

From: Ted Leischner soillife@telus.net
Sent: Monday, 21 November 2005 8:41 a.m.
Subject: Canada Training Program A Resounding Success!

Hello Soil Foodweb Family!

Elaine and I both received standing ovations from the 35 participants of our first Canadian soil foodweb management training program in Vulcan, AB presented Nov 14-19th, 2005.

The program included Elaine's complete set of courses offered through the Soil Foodweb Inc facility in Corvallis OR including intro soil biology and chemistry, making quality biologically enhanced compost and compost tea, and ended with our first light microscope course. Most participants represented farm families on the prairies operating large conventional, biological and organic farms from Alberta, Saskatchewan and Manitoba. The course definitely provided them with real tools and hope and a way out of our present 'crisis' in Canadian agriculture. Two of the largest composting companies in western Canada were also present in addition to established independent nursery and agronomy consultants, marketing companies and special persons from BC to QC...even representatives from 'parks mangement' departments from the cities of Edmonton and Calgary, AB.

Certainly the event 'gelled' huge intangible forces expanding the Canadian soil foodweb management family at a working grassroots level. Yes, it's real, vibrant and growing and moving down a path that cares for Life, Health and Well Being on Earth. Future training programs are

already in the works for the rest of our winter focused on local gardens, commercial green houses and the urban sector. Elaine's articles will be put into the hort press right away! Yes, there will be more microscope courses and any other training demanded by our market. In the new year, I expect to speak at many smaller locations and events over the winter and spring and look forward to our first Canadian Compost Tea Brewing Contest from 5 to 2000 gallon brewers made in Canada. We are still fine tuning the timing and marketing parameters of all this stuff.

One thing is for sure. A very hands-on "on-farm composting training program' featuring 'live' commercial windrow turning and compost pile monitoring demonstrations and activities with minimal lectures is already in the embryonic stage in the womb of creativity and healing of our Soil Foodweb Management family in western Canada out reaching to the east. Our instructors are an all-Canadian group of experienced persons that have made 1000's of tons of the compost as prescribed by Dr. Ingham. So, persons coming to teach are the best of the best from Canadian (biological/organic)agriculture, horticulture and forestry. [Unfortunately, Elaine's schedule will likely not permit her to be here.] The objective is to have all participants leave this training experience, knowing, in concrete/experiential terms, how to make high quality biologically enhanced, mineralized, humified compost on their farms, acreages and city public lands. There is even talk that this program could travel across Canada. We are looking for sponsors and collaborators.

Thanks Elaine for making all this 'healing' possible in Canada!

Blessings on your journey, Ted, SFWC

Corvallis:

This is a report on the 8 day course I took at the Soil Foodweb, Inc., in Corvallis, October 15th through 22nd , 2005. The course sought to teach a respect for the intricate web of organisms in good soil which variously process nutrients from organic detritus into forms available to plant intake and also protect plants from disease and predation. It then went on to show how this soil "foodweb" could be encouraged and protected through proper composting and by use of aerated biologically active compost teas.
Will Fulton, IPM, NTBG

The soil foodweb

A relatively small number of individual soil micro-organisms have been identified and to some extent their interactions with macro-organisms have been ascertained. Many of those identified have been pathogenic or herbivory, because pathogens have been the micro-organisms for which we mostly have been looking. But the vast majority of the soil's microscopic life forms have benign relationships to macro-organisms. Since so very few members of the soil's microbial community have been identified and since the specific functions of the remainder are not well known, and since most of the pathogenic micro-organisms are among the identified, it is not prudent to assume that the unknown multitudes are unnecessary to the whole. A whole that includes those macro-organisms with which the space is shared.

It is highly probable that species diversity in the soil is a necessary condition to its good health. Healthy soil is known to contain the following approximate diversity of microbial organisms per gram: 25,000 species of bacteria, 10,000 species of fungi, 1000 species of protozoa and 50 species of nematodes. To promote this range of diversity the

proper conditions need to be maintained. Oxygen levels, carbon dioxide levels, moisture, temperature, nutrients, even mineral content play greater to lesser roles in providing the habitat requisite to diverse microbial population. At the same time, the microbial community itself creates and maintains the habitat it occupies. Further, the type of plant community growing (or planned for growth) in the soil depends upon the balances of microbial population and microbial species, and even exudes (or will so do) nutrients for the microbial community.

Microbial balance in compost can be predicted by monitoring the carbon to nitrogen ratio. The lower the ratio the more likely that the bacteria to fungi ratio will be greater than 50:50. Conversely, the higher the carbon to nitrogen ratio, the more likely that the bacteria to fungi ratio will be less than 50:50. Early successional plants do well in soils with a higher ratio of bacteria to fungi. These plants tend to be weeds, i.e., plants with shallow root systems that germinate quickly and put most of their energy into producing massive quantities of seed. The later successional plant communities require a bacteria to fungi ratio that is less than 50:50. The later, the lesser.

Bacteria and fungi sequester nitrogen in different forms. Bacteria mostly hold nitrogen as NO3, nitrate, whereas fungi mostly hold it as ammonium, NH4. When protozoa, microarthropods, and nematodes eat bacteria and fungi, they excrete the greater portion of these inorganic forms of nitrogen and make them available to the plants, or to other bacteria and fungi. And so the cycle goes. Similar relationships between micro-organisms and other nutrients are also in play. For example, fungal hyphae are instrumental in holding calcium in clay soils. Lose the fungi, and the Ca:Mg ratio gets too low and clay soils become compacted. Only plants with shallow root systems (e.g., weeds) adapt easily to compacted soils.

The proper way to judge a soil's deficits and imbalances is at the total extractable level, rather than at the exchangeable or soluble levels as is commonly done, because good biological presence will make more nutrients available to the plants than can be measured by common chemistry practices; and measuring at these lesser levels will deceive judgment, precipitate greater inorganic applications, and, subsequently, increase leaching, runoff and environmental toxicity, not to mention waste money. To measure soil nutrients at the total extractable level a leaf assay may be a more exact method than direct soil sampling. If the adequate ranges of nutrient requirements for a given plant are known, then acid digest or combustion analyses of leaves should give a more accurate detail of what the soil needs…given, of course, good biological presence.

Healthy microbiological communities tie up nutrients and then make them available at rates and in forms that plants need, provide competition to, inhibit or even consume pathogens and micro-herbivores, and build tilth so that roots grow deeper and nutrients don't leach. Plant root exudates tend to attract and nourish micro-organisms with which a symbiotic relationship can be built, and whose sheer mass and root surface coverage exclude pathogens and micro-herbivores from gaining purchase. A large portion of a diverse species microbiological population is dormant or in spore form and becomes activated by such stimuli as changing temperatures, oxygen levels, and chemistry.

Some microbial bacteria and fungi can even digest and transform residual pesticides. Some eat chitin or other indispensable components to insects. Some eat pathogenic fungi. But they've all got to be present even when there's nothing for them to eat; so supplying all of their other life requirements is often the human contribution.

Compost happens

There are several acceptable methods of composting. Most of the participants at the seminar were from temperate climates, and so the concentration was on temperate solutions. But we can make a few intemperate adjustments. Carbon to nitrogen ratios are important and can be manipulated if we know what we want from our compost. At these botanical gardens we grow mostly trees and shrubs which mostly prefer composts with a lower bacteria to fungi ratio as soil amendment. Which is good, because that's what we tend to produce, since our available materials for composting are much higher in carbon than in nitrogen, i.e., trees and shrubs. For compost teas, however, our purposes may require a higher bacteria to fungi ratio.

Woody materials are broken down primarily by fungi. Fungi, in turn, are eaten by fungal feeding nematodes (and sometimes macro-organisms such as millipedes). Fungal composting occurs at lower temperatures than bacterial composting.

Green materials (grass clippings, fresh leaves, fruits)and animal wastes are eaten, primarily, by bacteria, which in turn are eaten by protozoa and bacterial feeding nematodes. Bacterial composting occurs at higher temperatures. A pile made entirely of woody materials may never compost, if it is too dry; or may take several months with proper moisture. A pile made entirely of green materials may provide excellent kindling and ignite spontaneously; or with diligent monitoring and turning, could be done in a few days.

It's better to mix the two components and find a manageable medium. When making vermicompost, that is, when letting worms do your composting, a 50:50 ratio of green to woody is suggested. A good bacterial compost ratio is 45% green, 30% woody and 25%manure, by volume. A good fungal compost ratio might be 45% woody, 30% green and 25%manure. It is important to get either bacterial or fungal composts up to a temperature of 135F for at least 3 days, but not to exceed 155-160 F. This temperature level should kill all pathogens. Temperatures above 160F will kill most everything, bad and good. Once we have achieved the first 135F for 3 consecutive days, the pile should be turned. When turning, the ingredients should be fluffed and sprayed with water. Moisture level should be maintained at 50%, which can be ascertained by squeezing a handful of compost: if a drop of water falls from the fist, then the moisture level is 50%. The fluffing is to keep the pile's oxygen levels adequate. Turning needs to occur a minimum of 3 times, to meet organic standards. In reality, turning should be done whenever the compost threatens to exceed safe temperature.

Good compost does not stink. Stink means anaerobic conditions. Anaerobic conditions mean microbiology likely to be pathogenic. Measuring pH can sometimes tell us

whether or not anaerobic conditions exist, or at least have existed. A pH of 5.5 or lower is indicative of anaerobia, present or past. Oxygen content is also an indicator of aerobic/anaerobic conditions. To maintain aerobic conditions the compost must not dip below 5 to 6 mg/L oxygen, nor rise above 7 to 9% CO2. Carbon dioxide measurement tools are cheaper than oxygen measurement tools. Monitoring temperature is the least expensive means of determining the likelihood of aerobic/anaerobic condition.

Inoculam is sometimes needed. The best inoculam comes from the soil of healthy local forests.

Aerobic biologically active compost tea

Aerated compost tea is a method of rapidly multiplying the microbiology present in compost for the purposes of inoculating soils to decompose toxins, to build soil structure where compaction is a problem, to diversify the soil community and generally provide beneficial habitat to plant roots, and for using as foliar applications to suppress disease and to some extent provide nutrients.

A bag of good compost is suspended in a volume of clean, chlorineless, warm water (brew at soil temperature for soil applications and at air temperature for foliar applications). An aerator(s) is turned on to supply constant oxygenation. Foods are added. There is some ability to select for specific organisms with the choices of these added foods. Non-sulfured organic molasses, soluble (baby) oatmeal, kelp, humic acid, orange oil are some examples of tea foods. Oxygen levels should never drop below 6ppm; if they do, then some of the solution should be removed and an equal volume of fresh oxygenated water added, and/or the temperature reduced, and/or inoculam level reduced, and/or the aeration rate increased, because the indication is that populations have reached such high numbers that they are consuming the oxygen more rapidly than it can be supplied. When that happens then those organisms which require less oxygen (anaerobic) and which often are pathogens, have the upper hand.

Since the most critical time to monitor oxygen levels is between 12 and 22 hours of brewing, it is wise to begin the process in the late afternoon.

There are several tea brewers being marketed. Among the important criteria of a good brewer is ease of cleaning. A residual biofilm will remain in certain spots on the brewer after brewing and this must be cleaned out immediately as it can easily go anaerobic. Corners, pvc pipe, and areas that are blocked from easy access by apparatus are more difficult to keep clean than rounded surfaces and removable flexible tubing.

When purchasing a compost tea brewer it is important to ask the manufacturer for data. If the brewer has been well tested, then the manufacturer should be able to provide the brewer's optimal recipes as well as graphic data on oxygen levels and biological activity rates for each hour of operation.

Some brewers:

KIS: http://www.simplici-tea.com/

the **Bobolator**: http://www.norganics.com/tea.html
Earth Tea Brewers: http://www.composttea.com/earth_tea_brewers1.htm
Soil Soup:
http://www.soilsoup.com/store/merchant.mv?Screen=CTGY&Store_Code=S&Category_Code=systems
Tea-riffic : http://www.ecovit.ca/tea-riffic/TR100.htm

There are others. There are also extractors: large expensive machines that rip organisms from the surface of composts. These are for large volume compost and compost tea operations.

Microscopy

The last day of the course was dedicated to teaching us how to identify and count biological communities in compost teas, so to determine their likely efficacies. We learned to differentiate between bacteria and fungal hyphae; between good and bad bacteria; between good fungal hyphae and not so good to bad fungal hyphae; between fungal spores, humic material, encysted protozoa, yeasts, algae, scratches on the slide, etc.; between ciliate, flagellate and streaming protozoa; between bacterial feeding, fungal feeding, predatory and root feeding nematodes. However, it will probably take hundreds of hours of peering into microscopes for anything approaching expertise to develop.

2. Notes from Elaine!

a. The USDA is putting words in the NOP's mouth…again

The following is a transcript of a letter the ICTC received from the USDA about compost tea. If you need the image file of the original document on USDA letterhead, we can email it separately.

(USDA logo)
United States Department of Agriculture
Office of the Secretary
Washington, D.C. 20250

(date stamped) Sep 28 2005

Ms. Tina C. Peterson
President, International Compost Tea Council
14150 NE 20th Street
Suite 293
Bellevue, Washington 98007

Dear Ms. Peterson:

Thank you for your letter dated July 19, 2005, to Secretary Mike Johanns, regarding the production and use of compost tea in organic operations certified under the Department

of Agriculture's (USDA) National Organic Program (NOP). I have been asked to respond to your letter.

The Organic Foods Production Act of 1990 (the Act) does not contain provisions for the use of materials commonly referred to as "compost teas." However, the final regulations implementing the Act permit the use of compost teas, with the restriction that compost teas be used under the same conditions as raw manure is used in organic production. As you are no doubt aware, as a marketing claim, the organic standards must comply with all existing Federal and State health and safety laws and regulations.

The National Organic Standards Board (NOSB) discussed compost teas at its August 15-17, 2005, meeting in Washington, D.C. The NOP will examine the issues raised by the NOSB's report to ensure that the use of compost teas do not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.

Thank you again for sharing your concerns on this important matter.

Sincerely,
(signature)
Bill Hawks
Under Secretary
Marketing and Regulatory Programs

3. Holiday Schedule

For many people around the world, December is a season of holiday cheer. In the world of biology testing, it's also a season to stay aware of shipping delays. Samples for testing need to reach the lab promptly to ensure accurate test results.

Remember, the United States Postal Service and other major shippers will have limited service or no service at all on Monday, December 26 and Monday, January 2.

The Soil Foodweb Oregon lab recommends shipping your samples so they arrive no later than Thursday, December 22, or scheduling your sample collecting so you can ship freshly collected samples after the holidays, on Tuesday, January 3. Of course we will continue to accept and test any samples that reach us.

If you plan to send samples to any other Soil Foodweb, Inc. affiliate lab, it would be wise to contact them to learn their holiday schedule.

Whatever you do, and whichever holidays you choose to celebrate, all of us in the Soil Foodweb family wish you a merry, happy, joyous, and/or otherwise festive as may be culturally appropriate, season. And our friends over at Earth Fortification Supplies Company would like to remind you there's no better holiday gift than a ten pound sack of fungal compost.

Sincerely,
Kevin Haines
Soil Foodweb Oregon