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Casting Call

Castings Tea: Panacea or Fantasy?

The concept of taking something solid and making it liquid has long been used with profit. Liquefying fruits and vegetables in a blender or juicer is common practice and provides the advantage of enjoying these commodities in a form that is different (and, in some cases, preferable or even more useful) than the original form. But not everything solid may be turned into liquid. And what about compost or earthworm castings? What advantages might there be in pouring or spraying these substances on soil and plants? For many years the valuable properties of solid organic substances have been extracted by water from the parent material—in which case the water extract may be called a “tea.”

Think of steeping a tea bag in water in order to enjoy a cup of tea. Now think of steeping an ordinary looking tea bag filled with compost or vermicompost. Don't laugh. Today it is possible to find tea bags filled with earthworm castings that look identical to tea bags filled with black tea or any herbal teas on the market [see picture of Dr. Scott Subler's *Living Soil* castings teas.] Just don't make the mistake of brewing a cup of castings tea and then drinking it. The purpose of making castings tea from a tea bag is to pour the brew on your houseplants.

Compost and vermicompost (earthworm castings) are solid substances from which liquid extracts—*teas*—have been made in order to use these liquids as foliar sprays or soil drenches. [Note: Whenever the term *compost tea* appears



Dr. Subler's *Living Soil* castings tea bags are sold in tins and look like ordinary tea bags

throughout this discussion, it includes the use of either thermal compost and/or earthworm castings as the source material from which the resulting tea is produced.] The two major emphases in compost tea production today are to deliver the benefits of the solids in liquid form to the plants, and to increase the microbial activity within the tea through a *brewing process*, aerating the water extract for 20 or more hours in order to stimulate the

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Details on page 8

From a presentation made at *Sonoma Valley Worm Farm*, Sonoma, California, May 4, 2002.

A definition:

“Compost tea or compost extract is a water-based solution that is representative of a source compost (or vermicompost). The goal is to extract the organic particulate matter that is soluble enough to go into a solution and the nutrients and the microorganisms that are contained within that compost, to get them into a water-

based solution that can be sprayed on plants or used as a root drench.”

Is tea better than solid compost?

“This does not mean that there is not merit to using straight compost in a soil amendment situation. But mechanically, you can't take that and put it on foliage. So years ago, people began figuring out ways to extract it into water so they can spray it.”

Please turn to **Castings Tea** page 2

Michael Alms Talks Tea

Please turn to **Michael Alms** page 6

Castings Tea continued from page 1

rapid reproduction of the beneficial organisms found within the solid matter. The liquid material, some believe, has a more immediate effect on plants than the solid form. As Vicki Bess, director of BBC Laboratories, Inc., in Tempe, Arizona writes, "Compost tea is a readily available form of compost that will impact the plant more quickly than compost mixed into the soil." ("Understanding Compost Tea," *BioCycle*, October 2000, 71-72.)

Dr. Elaine Ingham, author of *The Compost Tea Brewing Manual*, and principal of Soil Foodweb, Inc., in Corvallis, OR, lists several positive factors for aerobic teas properly brewed from good compost or worm castings:

- Improved plant growth
- Reduced application rates of chemical pesticides, herbicides and fertilizers
- Reduced impacts of chemical-based pesticides, herbicides and fertilizers on beneficial microorganisms in the ecosystem
- Occupation of infection sites on the plant surface so pathogens cannot infect the leaf
- Improved uptake of plant nutrients
- Increased numbers of organisms on and around plants to compete with disease-causing organisms, reducing disease incidence
- Retention of microorganisms in soil or on leaf surfaces, resulting in an increase in retention of nutrients
- Increased plant nutritional quality
- Production costs are reduced
- Reduced application of toxic chemicals, thus reducing run-off into lakes and streams
- Reduced toxic impacts on humans and pets

A Solution to Plant Pests & Disease?

The increased concentration of beneficial microbial organisms in compost tea is being hailed as a natural disease inhibitor. According to some members of the Washington State University Cooperative Extension staff in Whatcom County, compost teas may contain "many microbial components that enhance plant growth and aid disease suppression, including bacteria (*Bacillus*), yeasts (*Sporobolomyces* and *Cryptococcus*), and fungi (*Trichoderma*), as well as chemical antagonists such as phenols and amino acids." They go on to say, "In theory, by introducing a diverse microbial community to agricultural systems, beneficial microorganisms in compost tea out-compete destructive microorganisms for nutrients. This biological control practice is common in plant pathogen suppression." Nevertheless their optimism is tempered by admitting "there is very little scientific data useful for growers, and few facts published about aerated compost tea." (Lisa Wickland, Todd Murray and Joyce Jimerson, "Brewing Up Solutions to Pest Problems," *BioCycle*, March 2001, 64-66.)

Traditionally, compost teas have been made by the steeping

process—immersing a burlap bag, for example, filled with compost or vermicompost in a 50-gallon barrel for a period of time, perhaps stirring occasionally with something like a broomstick. Elaine Ingham, citing E. Brehaut's 1933 study, notes that so-called bucket methods date back to early Roman, Greek and Egyptian times. About 25 years ago, it was a fad for New England gardeners to make this kind of compost tea in five-gallon buckets. At that time there was no thought of aeration of the tea, however. In this technique, molasses or sugar is sometimes added to enhance the growth of microorganisms, but in tea that is not aerated, an anaerobic and potentially harmful concoction may become the unwanted result. "These are typically the production methods," writes Ingham, "from which we hear reports about 'the tea killed our plants,' because poor compost, anaerobic conditions develop or toxic materials are extracted into the tea." [*The Compost Tea Brewing Manual: Latest Recipes, Methods and Research*, Soil Foodweb, Inc., Corvallis, OR, p. 29]

It is important to distinguish between *compost tea* and *leachate*. While compost tea is a liquid extract taken from stable, mature compost, leachate (also called *percolate*) is liquid that has come into contact with, percolated through, or condensed out of composting feedstock or compost containing extracted, dissolved and suspended materials. Thus, it is the liquid that drains from the mix of fresh organic matter. Most soil ecologists are quick to warn that there may be phytotoxins (substances harmful to plants) present in leachates. On the other hand Reln Corporation, the Australian manufacturer of the *Can-O-Worms*TM worm bin, has encouraged the use of "worm tea" leachate by designing its bin with a collector tray for liquid along with a spigot. An early video of this system, made in Canada, suggested that the purported "worm tea" was a form of liquid fertilizer, good for houseplants, and that by pouring more water on top of the upper tray(s), more "worm tea" might be produced. Today, most would dispute the notions that the percolate from a *Can-O-Worms*TM worm bin is castings tea, and that more "tea" (of the same quality) may be produced simply by pouring more water over the worm bed. Yet, there remains the opinion that some value may be present in some leachates. In a 1996 study sponsored by the now-defunct Clean Washington Center, three strengths of runoff (leachate tea) from four yard trimmings compost facilities were tested and compared to MiracleGro by E&A Environmental Consultants. Using 25 marigold plants to test flower production and 25 radish plants to test root growth, the study showed that compost leachate outperformed MiracleGro in root growth and flower and bud production. "Results of the bench trial," wrote the editors of *BioCycle* "showed that the runoff outperformed both the fertilizer and water on both types of plants, and the 1:1 dilution of runoff with water produced the best results. There were no detrimental effects, such as smaller flowers or woody or split radishes." ("Leachate Tea" from Yard Trimmings Improves Plant Growth," *BioCycle*, September 1996, p. 6) Phil Leege, formerly with Procter & Gamble as a compost researcher and author of the US Composting Council's *Compost Facility Operating Guide* writes in the manual's glossary, "leachate from an aerobic compost pile is typically full of plant nutrients and

can be an excellent liquid fertilizer.”

Oxygenating Brewers

The idea of using oxygenating brewers to make tea arose from an interest in maximizing the microbial communities available in compost tea. The simple method of making a compost *extract* by collecting the water that had been purposely passed through compost meant that some soluble nutrients were obtained, but very few organisms. Elaine Ingham writes, “By cycling this water through the compost a number of times, organisms may grow and reach numbers adequate to protect leaf and root surfaces. This is usually not the case, however.” (*Compost Tea Brewing Manual*, p. 8.)

An oxygenating brewer, on the other hand, actually “pulls” beneficial organisms from compost (or earthworm castings) into the water. Ingham writes, “Enough energy has to be imparted to the compost to physically remove the bacteria and fungi from the surface of the compost. Bacteria can glue themselves onto the surface of any particle in compost, and it takes significant energy to remove bacteria from these surfaces. Fungi wrap around particles and the hyphae have to be broken enough to let the strands be pulled out of the compost, but not broken so much that they are shredded into tiny pieces. Thus, most extraction methods that involve blades, whirring mixing bars, or blender action can break the hyphae, or the bacterial cells, up too much and result in poor fungal and/or bacterial biomass in the tea.” Ingham believes “Most of the commercially available machines were developed around the principles of enough aeration and enough mixing to get organisms into the tea, but not shred them to death.” (*Compost Tea Brewing Manual*, p. 17.)

Aerobic vs. Anaerobic Teas

In the article, “To Tea or Not to Tea,” found on the Washington State University Cooperative Extension website, the educators comment on the controversy over whether compost teas should be produced with or without aeration. “Much of the literature refers to this as ‘anaerobic’ vs. ‘aerobic’ teas,” they write. “Teas without aeration are made with placing compost in a permeable ‘bag’ soaking it in water for 24 to 48 hours. Teas with aeration are made with air bubbling through the compost tea continually, and take less time to brew. Again, although many people support the ‘aerated’ approach, saying that those active systems push the beneficial microbes out of the feedstock and into the tea, a number of studies and researchers suggest that anaerobic teas may actually have greater disease suppressive capabilities.” (Compost Tea Talk: “To Tea or Not to Tea” <http://www.whatcom.wsu.edu/ag/compost/>)

Dr. Elaine Ingham, however, cautions that anaerobic teas may be high in disease-causing organisms. On her soilfoodweb.com website Ingham notes, “If the compost wasn’t processed correctly and disease-causing organisms weren’t destroyed by temperature, competition with beneficial organisms, or passage through earthworms, the probability is reasonable that disease-causing organisms will grow rapidly and be in high

numbers in a tea made in anaerobic conditions.” (“What is Compost Tea?” www.soilfoodweb.com/phpweb/topicindex.php?tid=145)

Steve Scheuerell, a graduate student in the Dept. of Botany and Plant Pathology at Oregon State University is actively working on compost tea for disease suppression, with a focus on the nursery industry. He is comparing the disease suppression of extracts made from various feedstocks and made by either the aerobic or anaerobic method. He would like to hear from any growers who have experience with disease suppression for compost or compost tea. Contact him at 541-752-9469.

Results with Worm Castings Tea

Art Biggert, a farmer on Bainbridge Island (west of Seattle, Washington), operates a community supported agriculture farm serving 55 families. While other farmers on the island battled gray mold on bean crops after a damp, cool summer, Biggert was able to grow healthy bean plants so well he had 60 pounds a week to market after taking care of the needs of the subscribers. Why was his farm an exception to the farms of his neighbors? Biggert treated his plants with tea spray made from vermicomposted cow manure. “Biggert and another organic farmer have used compost tea successfully for two years to combat gray mold and tomato blight,” writes Adrienne P. Touart. “The farmers tailor made tea made from vermicomposting about 20 pounds a day of both crop residues and dairy manure for use on a variety of food crops, either as a foliar spray or a soil drench using a roto-tiller drawn sprayer.” (“Time for (Compost) Tea in the Northwest,” *BioCycle*, October 2000, 74-77)

Alison Kutz-Troutman, owner of Cascade Cuts in Bellingham, Washington, bought a tea brewer to use in her greenhouse operation. Although she was not doing scientifically-controlled field studies, Kutz-Troutman found some interesting results in plants where tea had been used on some, but not on others. The material used to make tea by this Whatcom County nursery consists of castings produced by Pacific Garden Company’s worms that are fed local dairy manure. “We have seen a clear suppression of Fusarium (crown rot) in Cyclamen,” Kutz-Troutman says. “The control group was treated with two conventional applications of fungicide, and there was some incidence of Fusarium. We found no Fusarium in the tea group (which was not treated with fungicide.)” She found pansies “noticeably free and clear of any sign of Downy mildew, a recent arrival in the Pacific Northwest in the last few years.” Downy Mildew may be especially dangerous in this crop. “We have not treated for it,” she claims, nor have we seen any yet this spring. The group treated with tea shows dark green foliage color—much darker than the control, as well as large leaf size and great lateral breaks in comparison to the non-treated group,” she reported. (“Compost Utilization—Compost Tea,” WSU Cooperative Extension website: <http://www.whatcom.wsu.edu/ag/compost/cascadecuts.htm>)

In April, 2000, greenhouse grower Kutz-Troutman gave three

Washington State University Cooperative Extension researchers an opportunity to test the claims she had been making. At her farm, ornamental basil crops sown in spring found it difficult to battle “damping off” diseases caused by *Fusarium*, *Pythium* and *Rhizoctonia* organisms. Siam Queen is the most susceptible variety and became the problem the Washington State researchers wanted to test. Their treatments consisted of tap water (as a control), and teas made aerobically and anaerobically with the same ingredients. “For the anaerobic tea,” wrote the researchers, “we soaked vermicomposted separated dairy solids, soluble kelp and molasses in a bag for 48 hours. The solution was strained and mixed with water to a dilution of 1:10. The aerobic tea was brewed in a large aerated container developed by Growing Solutions. This extract also was diluted to the same ratio with water. The tea treatments began upon germination, and continued until the plants were ready for sale.”

What did these researchers discover? “Overall,” they said, “the data were inconsistent. In two of the three trials, we found a significant difference between weekly treatments of water, aerobic tea, and anaerobic tea in the suppression of damping off in seedlings. Although there was a greater incidence of disease in the control plants than both aerobic and anaerobic teas, statistical differences did not occur until six to eight weeks after germination. Thus, when compost tea works, it takes some time to see the results. We found no statistical difference between the bucket-type and the new oxygenated brewing method of tea,” they reported. (Lisa Wicklund, Todd Murray and Joyce Jimerson, “Brewing Up Solutions to Pest Problems,” *BioCycle*, March 2001, 64-66).

Nevertheless, Kutz-Troutman remains convinced of the values found in using castings tea. “Our last controlled study in the fall of 2001 showed control of pathogenic fungi on a wide range of bulb crops,” she says. “It was nice to be able to substantiate what we had been experiencing with compost tea over the last few years over a variety of crops. The disease control achieved was similar to that of fungicidal drenches that are normally used in commercial production of these forced bulbs. Our crew is happy to see the step away from the use of dangerous fungicides in our facility, and as an owner, I feel responsible to reduce worker exposure to chemicals wherever possible.” (Testimonials, Growing Solutions website, www.growingsolutions.com)

Allan Campbell, who trademarked his “Worm Drive” liquid vermicast in Australia, applies castings leachate on his avocado orchards by helicopter. A couple years ago Campbell traveled extensively throughout the western United States, visiting worm farms and learning about “worm tea.” Campbell’s first trial with earthworm-produced leachate was performed on 2,000 macadamia seedlings, which demonstrated this product to his satisfaction and contributed to his “first burst of enthusiasm.” Since then, Campbell has not used commercial fertilizer on his property. When used as a foliar spray, the leachate has noticeably improved the health of his trees and the quality of his fruit. Campbell’s earthworms are fed vegetable matter exclusively. “I don’t even use manure,”

he says. “That way they are not exposed to the risk of picking up anti-tick or anti-worm chemicals through the animals’ dung and there is no chance of contamination with salmonella.” After spraying his avocado orchards with leachate for over four years, Campbell found several encouraging signs. Field evidence suggested foliar sprays reduced anthracnose, a fungal disease that causes the fruit to rot so it is not fit for consumption. Even during a season in which the worst possible humid conditions of heat and rain threatened his trees, Campbell’s orchards had the lowest incidence of anthracnose in the 30 years he had been on the property. He also believes the microbes in the leachate are protecting his avocados against *Phytophthora cinnamoni* root rot. “If you get the right microbes in the root zone they will keep the pathogens out of the orchard,” he says. (“Worm Tea Sprayed on Avocado Orchards by Helicopter,” *Casting Call*, February 2001, pp 1-2.)

Words of Caution, Criticism

David Granatstein, Editor of *The Compost Connection*, a newsletter produced by Washington State University Cooperative Extension, has called attention to the fact that “One of the problems in exploring the effect of compost tea is lack of a standardized process or product. Variables include the type of composts (what feedstocks), the maturity of the compost, the extraction process, and the length of extraction period. Thus, it is not surprising that the results from various experiments with compost tea are inconsistent and often conflicting. Nonetheless, there appear to be some verifiable disease suppression mechanisms at work that could be made useful with additional research and development.” Granatstein cites the work of Hans Wittig, a plant pathologist who tested several types of compost tea against a variety of plant diseases in on-farm tests conducted at four different locations in western Oregon. These tests were conducted with a different crop/disease combination: Apple (*apple scab*, *powdery mildew*); blueberry (*botrytis*); tomato (*early blight*); lettuce, broccoli, spinach (*sclerotinia*); and grape (*powdery mildew*). The results were mixed and inconsistent. (“Foliar Disease Control Using Compost Tea,” *The Compost Connection for Western Agriculture*, January 1999, No. 8 see <http://csanr.wsu.edu/resources/compost/compostnewsletter.htm>)

Dr. Linda Chalker-Scott, Associate Professor at the Center for Urban Horticulture at the University of Washington, goes further than Granatstein in her criticism. In an Internet article, “The Myth of Compost Tea,” Chalker-Scott challenges the statement that “compost tea is an effective alternative to traditional pesticides.” She states, “What troubles me is the speed at which this statement has been accepted as a demonstrable fact, when in truth there are only a handful of peer-reviewed publications on compost teas or extracts.” Articles in support of compost tea found in “popular magazines (such as *BioCycle*),” she says, “are not subject to peer review and are considered to be ‘gray literature’ by the scientific community. In the peer-reviewed literature, the only article I was able to find on field-tested compost tea reported no difference in disease control between compost tea and water.” She writes that “Compost teas have not been suitably characterized, nor have their purported benefits been validated scientifically.” More-

over, “compost teas can be overused and potentially contribute to ground water pollution.” (“The Myth of Compost Tea,” http://depts.washington.edu/mulch/myths/compost_tea.pdf)

Field Use in the Pacific Northwest

In spite of the paucity of scientific evidence, the experience of several field workers in the Pacific Northwest and the willingness of some local governments to use compost tea continue to make news. Ladd Smith’s Harmony Landscape Services of Seattle serves a thousand clients in the greater Puget Sound area. “I brew 50 gallons a day of bacterially dominated tea,” reports Smith. He uses a 10:1 dilution rate and sprays the 500 gallons on his customers’ lawns about five to seven times annually. Hendrikus Schraven, president of Schraven Landscape Construction and Design in Issaquah, Washington, has used tea for two years on all new installations. In one experiment to control erosion, Schraven sprayed a steep hillside with a 1:3 dilution of tea, “planted” worms in the new soil, and hydroseeded the slope with grass seed. After three months of cool wet weather, Schraven found the root mass was four to five inches deep.

The city of Eugene, Oregon uses tea for its rhododendron garden. Snohomish County, the Port of Seattle and the City of Seattle in Washington have all purchased tea brewers for use in their parks and grounds departments. Edward Hook of the Seattle Office of Environmental Management plans to apply compost tea for trial studies on city golf courses, the city rose garden, and in greenhouse propagation. “There is great interest,” writes Adrienne Touart, “in [compost tea’s] efficacy to suppress both fungal turf diseases and rose ailments such as mildew and black spot.” (Adrienne P. Touart, “Time for (Compost) Tea in the Northwest,” *BioCycle*, October 2000, 74-77.)

Christine Groubert who works on the grounds maintenance at King County Airport, Boeing Field, in Seattle, Washington says, “I have been getting good results with the compost tea. Areas where I have been using it have a large increase in the amount of worms in the soil, the drainage is better and areas where I was having root problems are now healthy and the plants more robust.” (Testimonials, Growing Solutions’ website, www.growingsolutions.com)

Patrick Zweifel of Oregon Coastal Flowers in Tillamook, Oregon says, “Compost tea has become the cornerstone of disease prevention in our production. Weekly applications of tea as a soil inoculant in our calla tuber production have given complete control over fungal pathogens in this normally problematic crop. Not only has it enhanced tuber growth and vigor during their growth cycle, it has made a definite improvement in maintaining health and bulkiness throughout their storage period. In addition, compost tea as a foliar spray has prevented powdery mildew and fungal spotting within our artichoke and cut flower production.” (Testimonials, Growing Solutions’ website, www.growingsolutions.com)

Concluding Thoughts

Is the application of compost tea to plants somehow “better” than simply growing plants in compost and/or earthworm castings? If we start with the premise that growing plants in compost and/or earthworm castings is the best we can do, does the addition or substitution of spraying/drenching with compost tea makes things better? If one had to choose whether to do one or the other, which should one choose? Is the verdict “both/and” preferable to “either/or?” Are we to believe that using compost/castings as a planting mix, *coupled* with the regular application of compost/castings teas should become the recommended procedure? Is it possible to *overdo* something here, or is *more, always* better? That is, should we advocate regular *spreches* (spraying/drenching) with compost teas of plants that are also grown in compost/castings media?

No great amount of thought has been given yet to the matter of the spent compost used in the production of the teas. Spent compost, used in tea production, is a waste product. Certainly in small quantities, the spent compost might be added easily to a greater volume of compost with no discernible diminution of quality. However, if the tea craze catches on, will we be left with large piles of spent compost? Will a new waste product be produced, suitable only as a source of waste-to-energy (read, *fuel*)?

Is the cream better than the milk? Babies can grow on milk, but how would they do on a steady diet of cream or ice cream? We enjoy ice cream as a dessert, made from milk. But who can exist solely on ice cream? As a derivative of compost, isn’t compost tea somehow the *cream* taken from the parent material? What is the purpose for extracting and even multiplying the microbial communities found within compost alone? Isn’t it to produce a *liquid* compost that comes in a purer, more convenient form, *boosting* the microbial communities artificially (by extraction and aeration)? By analogy, Western pharmacological science has made its mark, in some cases, by isolating chief properties of an herb, synthesizing it, boosting its potency, and creating a drug that has immense power beyond the herbal original. Drugs (and perhaps compost teas) are prescribed by professionals in times of demonstrated need for *restoration*. A perfectly formed and well-functioning (healthy) baby needs no drugs. So then...Is a steady diet of compost tea (*the cream of compost*) advisable? Might there be dangers ahead for which we are not aware? We can “dose” a plant with tea. Do we want to “dose” or *feed*? Might there be value *enough* in feeding plants through the root zone through the natural, holistic organic substances that are incorporated into the soil?

Agricultural and horticultural practices advocated by modern soil ecologists emphasize the value of promoting both the diversity of soil organisms and the *sustainability* of these practices as well. Are regular, frequent applications of compost tea the *best sustainable* technique? Advocates of compost tea

suggest that it be applied to crops 5-10 times per year and even more in some cases. Yet there is a narrow window of opportunity to apply freshly brewed tea after it has been made (Michael Alms of Eugene, OR-based *Growing Solutions* suggests 18 hours). Weather conditions (air temperature, the possibility of precipitation), dilution rates, and methods of application also affect the potential usefulness of the procedure. Dr. Ingham suggests that 70% of the leaf area should be covered by the spray. And nearly every compost tea researcher has emphasized how crucial it is for the compost to be fully stable in order to make a tea that would be beneficial and not detrimental. Does the potential payoff for making and applying tea to plants outweigh the uncertainty and risks involved? David Granatstein suggests that it may. He says, "At this point in time, compost tea shows promise as a disease suppressive technique, but not for the fainthearted. For growers with few other options, such as organic growers, experimentation with compost tea makes sense. However, the inconsistency of control is a major risk factor. Much more research is needed on specific combinations of crops, pathogen[s], type of compost tea, and application procedures." ("Foliar Disease Control Using Compost Tea," *The Compost Connection for Western Agriculture*, January 1999, No. 8 see <http://csanr.wsu.edu/resources/compost/compostnewsletter.htm>)

For further reading: ATTRA is Appropriate Technology Transfer for Rural Areas. An excellent information packet on compost tea may be available from ATTRA at 800-346-9140. Their informative website is www.attra.org. Steve Diver has published "Notes on Compost Teas," found at www.attra.org/attra-pub/compost-tea-notes.html. Some of the articles cited in this *Casting Call* article may be found on Mr. Diver's webpage. ■

Michael Alms continued from page 1

Shelf life:

"[One should] use it within 18 hours. It doesn't mean you're going to lose value after 18 hours; it's not going to immediately drop off. But you do lose aerobic conditions."

Making 25 gallons of tea in a brewer:

"We use a 20-mesh filter and 7 lbs. of compost."

Particular about particulates:

The goal is to get as much [particulate matter] of the compost in liquid form as possible without clogging up the spray or irrigation system. So, for example, we could just dump this compost directly into the tank and we would make a stellar tea, but trying to manage that [through a spray nozzle] after brewing it would present a challenge. So we have tried to optimize—how much of the material can we hold back and still provide a good enough extraction of the organisms and nutrients, and that's where we've ended up. We've done a lot of testing between different mesh sizes, and at this stage of our awareness, this is where we are.

Application:

Adding the secret sauce:

"We use a catalyst—it's a nutrient charge that we add at the beginning of the cycle. This feeds the broadest range of organisms that are contained within a compost. It is made up of complex carbohydrates, soluble kelp, rock dust and humic acids. It's an inert material—there isn't any inoculum of microorganisms—it's simply a food source. So once we do the extraction, we can feed them. And it's pretty important that you select the right kind of food. For example, we've just made a shift in our company. We no longer use sugar. It had been thought for a long time that sugar was an optimum food source to elevate bacteria. And it will, but it will elevate them to the degree that you compromise the diversity. So we pulled sugar out of our mix and broadened the food resources."



Michael Alms of *Growing Solutions* explains brewing techniques to wine grape growers in Sonoma County, California

Some Don't Like it Hot:

"Three years ago we made our teas at 90-95 degrees Fahrenheit. We had good tea, but we found that we were selecting for a limited group of organisms at that high temperature. And if you've got human pathogen risk, that's an even greater obstacle to overcome at those high temperatures. So we have found that 65-75 degrees Fahrenheit has been our optimum level. We don't really want to put warm tea out on the cool soil and in the cool air, because you will shock a lot of the organisms. By the same token, fifty-eight degree tea applied in Arizona in the summer will probably have a set of organisms that will not mix in that environment. The 65-75 temperature is, right now in our awareness, the best. Temperature and ingredients (catalysts) is where we're spending the greatest amount on our research right now."

Dilution's the solution:

"We've never had any phytotoxicity on applying straight tea at the rate of 25-30 gallons per acre. But, it is not always feasible to make that much tea, if you've got 100 acres to cover."

"Some growers may use 12 gallons per acre. In a greenhouse, one grower has been using a 1:4 dilution. There's a lot of

variability in application rates and concentrations. We're trying to get it so that it's into a format, but every grower wants to experiment. Every grower wants to take our catalyst and enhance it with something. So it's been very hard to keep it as a standard. So we fall back to 5-10 gallons [per acre] concentrate on a 14-30 day rotation."

Range of brew times:

"While 24 hours is convenient, we found that 20-26 hours is the optimum."

Experiment with your microbes' diet:

"I hope I didn't spook you on the use of sugar. Just beware. Some people still use it and have great success. There are thousands of different foods you can put into these things. Imagine all the different varieties of food we have eaten in our lives. Microbes are the same way. They're going to eat what's available to them. So we don't discourage experimentation, just be careful. And try to document this, if you have success."

Water:

"If you're using municipal water that has chlorine, you need to off-gas the chlorine. When we work at our operation in Eugene, Oregon, we're using city water. So we off-gas for approximately one hour. We recommend that you off-gas for at least one hour, depending on the level of chlorine in your system. We take the lid off the machine and put in the amount of water necessary to brew and turn on the aeration device without compost, without any ingredients, just the water. What happens is that by the amount of air we're putting into the system, the chlorine is off-gassed. You can also just put water in a tank and, over time, the chlorine will dissipate. But you're surface area is far less, than if you're running some sort of agitation. The best is if you can use rainwater, well water, and, in some cases, river water. You can use distilled water, but you'll probably cut down on some of the minerals that will be in the water. Now in Las Vegas, they have up to three times the amount of chlorine that we'd normally see in a municipal system. So they end up off-gassing 2-3 hours and they have a very elaborate chlorine test kit. This is going to beg the question, "what about our dilution water?" So if we're going to dilute our tea at a ratio of 1:10, there will be a whole lot of water to deal with. And that is a problem. Ideally, you're going to want to have your dilution water de-gassed, but it's not always feasible. If you can figure out a way to get your dilution water de-gassed, I'd recommend it."

Cleaning:

"It's imperative to perform diligent cleaning of the tea brewer, because if you leave the scum on the inside of the machine, not only is it harder to clean, but you have anaerobic conditions that are going to occur, guaranteed, if you don't have oxygen in there. So the next round, you might inoculate with the wrong organisms. Don't clean the inside of your plastic tea brewer with the green, Scotch brand kitchen scrubbing sponges. It sounds silly, but those were designed for stainless steel pans, and using them will etch the plastic. Microbes will

be able to adhere to surfaces where there has been abrasion. We use a brush and pink and white kitchen scrubbies."

Use it, don't lose it:

"If you cannot get the material out in 15-18 hours, have a back-up plan. Don't throw the material away—at least do a root drench on something."

Buy a brewer and set up shop:

"People are using tea all over the world with great success. And now there is a frenzy under way. When we started we were the only manufacturer. Now there are six worldwide. Hundreds of machines are being placed in many applications—municipal, agricultural, golf courses, and other sports turf applications such as soccer and football fields. Sports fields that are using tea don't have torn-up grass as fast because the root structure is there. It's moving into every sector of the market that you can imagine. We have close to eight garden centers throughout the state of Washington that are selling tea on the weekends to homeowners and small operations. A retail nursery center will buy a unit, make tea on the weekends and provide it."

Cost

Growing Solutions, Inc., of Eugene, Oregon produces three compost tea brewing systems. Their 25-gallon system retails at \$1,295, the 100-gallon system retails for \$3,995, and their 500-gallon system retails for \$9,495. For further information see their website at www.growingsolutions.com or telephone at 541-343-8727. ■

It's a "Squirm of Worms"

Squirm of Worms joins Gaggle of Geese, Pod of Whales, Pride of Lions as collective noun

Columbus, OH – May 10, 2002: Avid worm composters have struggled for years with what to call the increasing hoards that are chowing down their kitchen wastes. "Do you call them a herd, a bunch, a mass, a handful?" The awkwardness of description leads to the obvious solution and that is to declare: It's a Squirm of Worms.

Vermi- or worm-composting is a popular method of recycling organic materials. Using red wigglers (*Eisenia fetida*), vermi-composting converts food waste, grass clippings, leaves and other organics into a nutrient-rich humus or compost, of value for growing plants. It's a method used by apartment dwellers, homeowners, classrooms and, increasingly, in industrial applications to recycle organic waste.

"I estimate that there are well over a million people in North America who have chosen to welcome redworms into their home and have them chow down on their discarded organic materials," said Mary Appelhof, author of the best-selling book, *Worms Eat My Garbage*. "People have been asking for a way to describe their batch of worms. And I'm relieved to finally be able to say that it's a *squirm*."

The wiggly decision was made official at this week's International Composting Symposium held in Columbus, Ohio

through discussions between Appelhof and The Composting Council of Canada.

“We’ve been having fun trying to figure this out for a number of years,” said Susan Antler, Executive Director of the Council. “I’m sure that this term will quickly be adopted by worm supporters around the world. No one would want to squirm out of this.”

“There are about 4400 named species of worms worldwide,” said Appelhof, a biologist and educator who has been studying worms for 30 years. “The red wiggler is one of the best suited for vermicomposting. It’s tolerant of a wide variety of temperatures and conditions, it reproduces in a confined environment and it is capable of eating up to half its body weight each day. Worms are natural recyclers and produce worm castings or vermicompost full of nutrients useful for plants.”

“Worm composting is simple, it’s easy, it’s fun,” said Antler. “All that you need are an aerated container, bedding such as shredded newspaper, worms, moisture and to follow a few maintenance procedures.”

Bees have their swarm and now worms have their squirm. ■

October 2002 Seminar in Portland, Ore.

Save \$50 by registering before August 30, 2002 for the two-day *Best Management Practices in Vermicomposting Seminar* to be held at the Portland Airport Shilo Inn, Oct. 11-12, 2002. Fee includes 2 lunches, 420-page manual, and 2 full days of instruction and personal contact with world-class worm workers Mary Appelhof, Dr. Scott Subler, Kelly Slocum, Dan Holcombe and other invited special guest speakers (to be announced). If her schedule permits, Dr. Elaine Ingham of Soil Foodweb, Inc., will give a presentation on compost teas. **Alumni: You may register for just \$149! Save 50%.** Early registrations are coming in, so don’t miss out. Call 541.476.9626 or register online at www.vermico.com ■

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Casting Call is a bi-monthly newsletter published in February, April, June, August, October and December. Subscription rate is \$18.00 US (\$24 outside US) for six issues. Our principal focus areas are: vermiculture, composting, soil fertility and related issues of organic waste. Copyright © 2002 Peter Bogdanov. No part of this newsletter may be reproduced without permission in writing from the editor.

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