

**ASSESSMENT OF COMPOST TEA APPLICATIONS
AT THE GREAT BARRINGTON HOUSATONIC RIVER WALK,
2006-2009**

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Project Proposal (2005)

Compost tea is an aerobically brewed, cold water extract of compost. Compost used for compost tea production has been intentionally formulated, produced and analyzed to quantify content, measure beneficial qualities and ensure non-toxic properties. It must be made with fully finished compost containing a known and desirable number, type and proportion of microorganisms and fungi. Dr. Elaine Ingham (President of Worldwide, Soil Foodweb Inc and Professor at Southern Cross University, New South Wales) has shown that the organisms extracted through this process suppress disease and produce plant accessible nutrients (2005). Her studies show that aerobic compost tea can increase the biodiversity of soils and improve root number and length. Compost tea reduces the need for fertilizers, irrigation and fungicides in the following agricultural crops: apples, potatoes, grapes and turf grass. Through beneficial fungal and bacterial activity, soil toxins and pathogens can be decomposed [Ingham, 2005].

The ½ mile River Walk site consists primarily of steep slopes with urban soils made of accumulated municipal detritus and waste products such as cinders and ashes, demolition debris, sand and other non-geologic fill. These materials have been dumped on top of the flood plain of the Housatonic River since the town of Great Barrington began. The organic layer of the soil consists of highly granular worm castings, a sign of ecological stress.

On the River Walk, we propose to use non-toxic compost tea rather than to further compromise the River Walk site and its surface waters with petrochemical fertilizers. Non-toxic compost tea mitigates river siltation by increasing root growth and plant vigor,

thereby stabilizing the granular fill. Vigorous plants process toxins from the soil, reducing groundwater contaminants. Hendrikus Schraven, a landscape professional and soils investigator in the Pacific Northwest, has used compost teas to stabilize soils on steep slopes prone to mud slides, and to revegetate soils ravaged by sterilizing forest fires [Schraven 2004]. To our knowledge, River Walk is the only site in Massachusetts that is testing compost tea on steep riparian conditions.

The long-term goal is to reclaim a total of 13,300 sq ft. or 0.305 acres (5 sites) of riparian buffer by developing soil biodiversity and productivity to a self-sustaining level of nutrient availability.

The designated sections of damaged riparian soils will be improved by multiple applications/year of non-toxic compost tea (per site): (7) applications in Year 1; (5) applications in Year 2; (3) applications in Year 3; and (2) applications of organic soil amendments/year (per site).

Soil Foodweb, Inc. (Port Jefferson Station, NY) will measure changes in microbial activity and other soil improvements with (1) pre-application soil test/year (per test site) and (1) post-application, end of season soil test/year (per test site). Four professional compost tea analyses will occur throughout each year to ensure non-toxicity and to tailor the tea to the soils.

2006 Year End Report on Compost Tea Applications

The 2006 River Walk compost tea season showed success in developing the overall compost tea application program. The additional tea testing this year was essential in guiding the brewing process, resulting in more fungal teas desired for our sites. Soil foodweb analysis showed marked improvements in the fungal numbers, types and activity levels. Weather was favorable to applying all proposed treatments, both teas and soil amendments.

The introduction of the trial run test plots, in preparation for next years' work taught us some important details to consider in our assessment of the efficacy of compost tea applications. While professional scientists designed the experimental protocols through the process of the trail run we realized the need for irrigation of the control quadrats at the time of tea application. All quadrats will now receive the same amount of moisture, at the same time and from the same source as used in the brewing of the compost tea.

A question concerning the source of irrigation water to be used on new sites next year also came to our attention. Irrigation is only used during the period of plant establishment, but the quality of the water is critical. Water from the town of Great Barrington is chlorinated and using chlorinated water may have a negative impact on the goal of establishing diverse and sustainable bacterial and fungal communities in the soil. The use of in-line chlorine filters on our hoses to remove the chlorine as we irrigate will be discussed if a problem develops.

Compost tea analysis shows that the teas being applied contained adequate and appropriate numbers of bacteria and fungi, significant improvement in the fungal element was achieved. The protozoa numbers also improved.

Soil analysis conducted pre and post treatments show improvement in bacterial and fungal numbers. The realization that river walk soils require both the tea treatments and soil amendments in order to produce the lasting changes that will lead to self-sustaining and robust plant communities along the river walk has been emphasized again in this years' test results. These materials are available and readily introduced to the sites being treated. Paul Wagner of the Soil Foodweb, Inc. NY continues to assist with the development of future treatment plans.

This exciting investigation demonstrates that the application of compost tea is an effective method of soil improvement. Soil improvement leads to the improvement of plant health and greater sustainability of restored landscapes. Compost Tea as a method of addressing degraded soils and landscapes is a developing tool in the bag of tricks available to landscape restoration practitioners. It requires consistent monitoring and good guidance to achieve its' full potential.

2007 Year End Report on Compost Tea Applications

In 2007, the River Walk compost tea season was challenged by approximately eight weeks of extremely dry conditions resulting in hydrophobic soil conditions. The hydrophobic soils make applications more challenging especially on slopes. This season 2 test sections received their third and final year of treatments with 6 applications being applied to both the Downstream 1 and William Stanley Overlook areas. The newly delineated test quadrats also received 6 treatments, with each quadrat receiving an equal amount of either water or compost tea.

Compost tea analysis shows that the teas being applied contained adequate and appropriate numbers of bacteria and fungi but that fungal activity needs improvement. The brewing recipe has been modified to accomplish this change.

This year all composts for tea brewing were locally sourced in an effort to keep our materials as local as possible. Composts obtained from the Holiday Farm Compost facility were used. The resulting teas had excellent bacterial content, good fungal content but less active fungal content overall. Soil samples were taken from all quadrats both pre and post treatment.

Soil analysis, completed by the Soil Foodweb of NY, showed improvements in the active fungal numbers, compared to active bacterial numbers, and clear improvement in mycorrhizal levels in all treated plots. Throughout, protozoan numbers improved and nematode types shifted to more beneficial types resulting in more plant available Nitrogen in all test quadrats receiving treatment except the Church Parking Lot and the Downstream 1 section. Soil amendments of feather meal were applied twice this season to add fungal foods to the soils

The realization that River Walk soils require both the tea treatments and soil amendments in order to produce the lasting changes that will lead to self-sustaining and robust plant communities along the river walk has been emphasized again in this year's test results. These materials are available and readily introduced to the sites being treated. Paul Wagner of the Soil Foodweb, Inc. NY continues to assist with the development of future treatment plans.

2008 Year End Report on Compost Tea Applications

In 2008, the River Walk received 7 applications of compost tea on three sites, Brooks Extension, Church and DuBois River Garden, and 5 sets of test quadrats. These same locations also received two applications of soil amendments. All applications were made according to the schedule proposed in 2007. Each quadrat receives an equal amount of either water or compost tea and all quadrats receive an equal portion of soil amendment. Compost tea analysis shows that the teas being applied contained adequate and appropriate numbers of bacteria and fungi but that fungal activity still needs improvement. The brewing recipe has been further modified to accomplish this change.

This year all composts for tea brewing were locally sourced in an effort to keep our materials as local as possible. Composts obtained from the Holiday Farm Compost facility were used. The resulting teas had excellent bacterial content, good fungal content but less active fungal content overall. Soil samples were taken from all quadrats both pre and post treatment.

Soil analysis, completed by the Soil Foodweb of NY, showed slight improvements in some of the protozoan and amoebae numbers and nematode population changes. The wet nature of this past growing season seems to have contributed to somewhat anaerobic soil conditions favoring some types of protozoa and nematodes.

Soil amendments of feather meal and granular humates were applied this season to add fungal foods to the soils. Over all the bacterial number gains have outstripped the fungal gains. In 2009, we will add mycorrhizal fungal inoculant to the brew to boost fungal numbers and diversity. We will also reduce the number of tea applications to three throughout the season and add one soil amendment application, 3 total in 2009, to aid the fungal communities without further enhancing the bacterial community in River Walk soils.

The realization that River Walk soils require both the tea treatments and soil amendments to produce lasting changes that will lead to self-sustaining and robust plant communities has been emphasized again in this year's test results. These materials are available and readily introduced to the sites being treated. Paul Wagner of the Soil Foodweb, Inc. NY continues to assist with the development of future treatment plans.

2009 Year End Report on Compost Tea Applications

In 2009, the River Walk received the final 3 applications of compost tea on three sites, Brooks Extension, Church and Du Bois River Garden, and 5 sets of test quadrats. These

same locations also received one application of soil amendments. All applications were made according to the schedule proposed in 2007.

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Soil analysis, completed by the Soil Foodweb of NY, showed slight improvements in some of the protozoan and amoebae numbers and nematode and ciliat population changes. The wet nature of this past growing season seems to have contributed to somewhat anaerobic soil conditions favoring some types of ciliates and nematodes. Soil amendments of granular humates were applied this season to add fungal foods to the soils. Over all the bacterial number gains have outstripped the fungal gains. In 2009, we added mycorrhizal fungal inoculant to the brew to boost fungal numbers and diversity. We will also reduced the number of tea applications to three throughout the season and applied one soil amendment application.

The constructed River Walk soils have changed as a result of the compost tea applications. They are more bacterially diverse and populus than they were three years ago. In order to achieve the same increases in fungal populations it is recommended that at minimum soil amendments continue to focus on autumn applications and fungal foods. These materials are available and readily introduced to the sites being treated. Paul Wagner of the Soil Foodweb, Inc. NY continues to assist with the development of future treatment plans.

References and Literature Cited

- Ingham, PhD. Elaine R. 2005. *The Compost Tea Brewing Manual*, 5th Edition. Corvallis, Oregon: Soil Foodweb, Inc
- Schraven, Hendrikus. 2004. "Conference presentation." *Compost Tea for the 21st Century: New Practices in Landscape Sustainability*. Oyster Bay, NY: International Compost Tea Council.