



# Compost Tea Research

## Sunbeam Family Farm 2016

### Purpose

Evaluate the qualities of compost tea products brewed on the Sunbeam Family Farm.

### Methods

Three independent batches of compost teas were prepared using well water and cistern rain water collected at the farm in Licking County, OH.



**Figure 1: Compost teas brewed under farm shop conditions during mid-summer.**

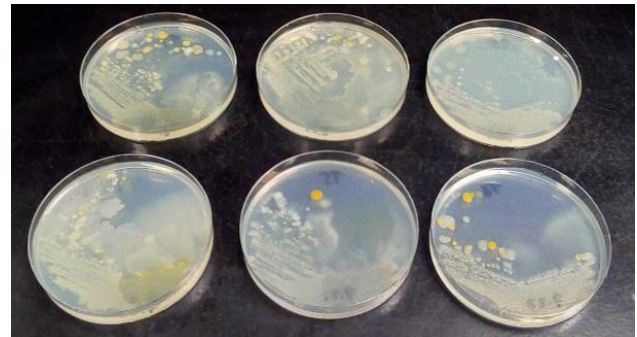
The compost teas were prepared using i) Sustane 4-6-4 pre-packaged tea bags without added aeration, ii) Sustane 4-6-4 Medium with aeration, and iii) KIS Compost Tea brewing kit with aeration. All materials were added to water at a rate of at 1:100 w/w and brewed for 18 to 24 hrs. at room temperature on July 6, 13, and 26. After brewing, samples were taken for biological and chemical analyses.

The microbial load of each was determined by serial dilution on liquid media and solid media. Microbiological samples were incubated at room temperature for four to seven days before analysis. The concentration of dissolved phenolic and humic substances was determined colorimetric ally. Soluble plant nutrient concentrations were determined by ICP at an independent commercial

laboratory. Plant bioassays were conducted using oats and cucumbers grown in a commercial potting mix under nutrient limiting conditions. Seedlings were treated with 50 ml of liquid per 6 in. pot at two and, again, at three weeks after planting. Pots were incubated in a growth chamber with a daily 12:12 hr. light: dark and 25:15 degree Celsius temperature cycle. Plants were harvested at four weeks after planting at the V3 growth stage to determine effects of the compost teas on shoot growth.

### Results

The compost teas prepared in this study all contained microorganisms, humates, and plant nutrients, but in varying amounts. The aerated compost teas both harbored 0.1 to 1 billion culturable microorganisms per ml. In contrast, counts in the static brews (prepared in the watering cans) typically harbored just 2 to 20 million microorganisms. The colony morphology of most abundant bacteria cultured differed somewhat between treatments (Figure 2). All of the compost teas included morphotypes typical of species commonly found in commercial microbial inoculants intended to stimulate nutrient cycling and/or plant growth promotion.



**Figure 2: Morphotypes of dominant cultured bacterial obtained from the tested compost teas. The large number of colors and shapes indicates a diversity of species.**

All of the tested compost products released humic substances into the brewed liquid teas. The concentration of solubilized materials was greater in the aerated Sustâne tea than the KIS tea as indicated by a darker color (Figure 3) and a higher EC ( $P < 0.10$ ).



**Figure 2: Color differences in brewed compost teas.** From left to right, Sustâne Tea Bag (static brew); KIS (aerated), and Sustâne 4-6-4 (aerated).

Nutrient analyses of the compost teas revealed substantial differences indicating that Sustâne's compost teas were rich in essential plant nutrients (Table 1). When prepared with suitable aeration, Sustâne 4-6-4 released more soluble nutrients into solution than the KIS product ( $P < 0.05$ ).

Product	Air?	N	P	K	Ca	Mg	S	Micro
Sustâne	Yes	64	96	412	26	52	338	11
KIS	Yes	6	2	176	76	12	184	1
Sustâne	No	20	48	210	8	20	96	3

**Table 1: Average soluble nutrient concentrations in compost tea.** Values are given in PPM of solution. Note that aerated compost tea prepared from Sustâne 4-6-4 was significantly richer ( $P < 0.10$ ) than the KIS material in all essential plant nutrients except Ca and S.

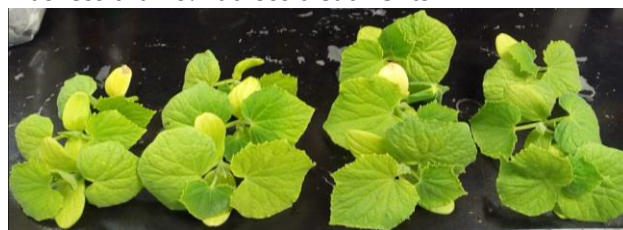
Macronutrients, present as ammonium, nitrate, phosphate, and potassium ions, were all more abundant. Micronutrients, including Fe, Cu, B, Mn, Mo and Zn were also more abundant in the Sustâne teas. Only soluble Ca was more abundant in the competing product. In the absence of aeration, nutrient concentrations were typically less. However, the static brewed compost teas varied more batch to batch, indicating that variations in water temperature, quality, and agitation can greatly affect the amount of nutrients released into solution.

Applications to plants grown under controlled conditions were made to determine the potential of compost teas to improve growth and health of plants. Both the static and aerated brews of Sustâne compost tea supported significantly greater plant growth than all other treatments ( $P < 0.05$ ).

Treatment	Oat	Cucumber	Total
Sustâne (aerated)	5.5	14.9 A	20.4 A
KIS (aerated)	5.6	12.9 B	18.6 B
Sustâne (static)	5.9	14.9 A	20.9 A
Water	5.6	12.1 B	17.7 B

**Table 2: Average plant biomass (in gram fresh weight) following compost tea treatment.** Plants were germinated in 6 inch pots, treated twice, and harvested after four weeks of growth. Values in the same column followed by different letters differ significantly ( $P < 0.05$ ).

Specifically, the Sustâne products increased growth by 15% over water alone and 10% more than the KIS tea. In contrast, the KIS compost tea supported only 6% more growth than the negative control, a difference that was not statistically significant. The differences were most clearly related to the growth of the cucumber plants, as variation in oat biomass was less than 6% across treatments.



**Figure 3: Plant growth enhancement by compost teas.** From left to right, shoots of cucumber harvested from pots treated with water, KIS (aerated), Sustâne (aerated), or Sustâne Tea Bag (static) brewed compost teas. The larger leaf size and deeper green color of the Sustâne treated plants indicates superior performance.

These data indicate that Sustâne compost teas contain significant amounts of microorganisms, humic substances, and plant nutrients which can all contribute to plant growth enhancements and contribute positively to plant health. While not intended as a primary fertigation source, Sustâne's compost teas can serve as a supplemental source of soluble macro and micro nutrients. In this study, applications were made as a drench treatments in this study, foliar applications may also prove beneficial.

For more information on this project, contact us at [help@sustane.com](mailto:help@sustane.com)

Ben Dilbone at 740 405 3467  
bendilbone@yahoo.com