



COMPOST TEA: PRACTICAL INFORMATION, ADVANTAGES AND DISADVANTAGES



This factsheet contains complementary information to the Best4Soil video on Compost tea:
Practical information, advantages and disadvantages: <https://best4soil.eu/videos/22/en>

INTRODUCTION

Producing and applying compost tea is a relatively new practice. It takes advantage of the high diversity of microorganisms and other valuable compounds found within compost. Derived from compost, it contains soluble nutrients as well as useful compounds like metabolites and microorganisms such as bacteria, actinomycetes, filamentous fungi, yeasts and oomycetes. These substances and organisms have a synergistic effect on suppressing diseases and promoting plant growth. However, depending on the source material it is also possible that microorganisms pathogenic to plants, animals or humans can occur in the compost tea. Factors other than the source of the compost feedstock that influence the nature of the compost tea are the oxygen content, added nutrients, duration and temperature during the brewing process.

CONTROL OF SOILBORNE DISEASES

Aerated compost tea made with compost based on green waste increased fruit production, reduced the impact of the two soilborne pathogens *Rhizoctonia solani* et *Phytophthora capsici* and advanced flowering by one week of sweet pepper (González-Hernández et al., 2021).

Consistent suppression of damping-off disease of cucumber seedlings caused by the soilborne pathogen *Pythium ultimum* was obtained with aerated compost tea (Scheuerell & Mahaffee, 2004). A critical component was the additives added during the brewing process, as the suppression was achieved only with a specific additive. In contrast, the type of compost used for the production of the compost tea had no influence.

A suppressive effect on *Fusarium oxysporum f. sp. lycopersici* and *Rhizoctonia solani*, two soilborne pathogens of tomato, was achieved with an aerated compost

tea and aerated vermicompost tea (Morales-Corts et al., 2018). The first one had a stronger effect on *F. oxysporum f. sp. lycopersici* whereas the aerated vermicompost tea was more suppressive on *R. solani*. The effect was only obtained when the teas were not diluted before their application.

These three examples show that compost teas can be used to control certain soilborne diseases. But there are also studies showing that compost teas applications can result in no suppression of soilborne pathogens or that the control effect is not consistent.

CONTROL OF AIRBORNE DISEASES

Reduced severity of *Botrytis cinerea* and increased marketable yield was achieved with a compost tea produced with a composted manure-straw mixture (McQuilken et al., 1994). In contrast, when different compost teas were tested for the control of *B. cinerea* on geranium most of them did not result in significant control (Scheuerell & Mahaffee, 2006). In this study, the source material had a significant effect on the efficacy of the compost teas. When compost tea is used to treat above-ground plant organs which are destined for direct human consumption, such as vegetables, fruits or herbs, then a microbial analysis of the source material is needed. If human pathogens are present, this source material cannot be used for the production of compost tea.

PROMOTING PLANT GROWTH / INCREASING NUTRIENT EFFICIENCY

It has been shown that nutrient efficiency can be increased by microorganisms (Backer et al., 2018; Beattie, 2015). Combining both the addition of organic material

and highly active microbes led to improved soil fertility and plant growth (Antolín et al., 2005; Loveland, 2003; Sabagh et al., 2015). The positive effect of compost tea on plant growth has been demonstrated in many studies (Bernal-Vicente et al., 2008; Fouda and Ali, 2016; Sabagh, 2016; Siddiqui et al., 2008). On the other hand, there are reports with no or insufficient effect (Ghorbani et al., 2005; Vázquez Vázquez and Navarro Cortez, 2018; Wang et al., 2014). The combination of organic fertilisers and compost tea were shown to be particularly effective in minimising nutrient losses and increasing nutrient efficiency (Hegazi and Algharib, 2014).

OXYGEN CONTENT

A sufficient oxygen supply is crucial to supply the beneficial microbiology in compost tea. The dissolved oxygen content should be above 6 mg/l throughout the brewing process to prevent the growth of harmful microbes (Ingham, 2005). The quantity and quality of the compost used, the additives and the temperature influence the oxygen consumption during the brewing process.

If you consider buying a compost tea brewer, always ask the manufacturer for oxygen measurements. If the manufacturer cannot provide this information or the brewing system was built by yourself, the following 'rule of thumb' can help:

The air pump used should have an airflow of at least 0.4 – 0.6 litres per minute per litre.

Thus, for example, if a brewing system with a volume of 100 litres is used, the air flow should be 40 to 60 litres per minute.

AMENDMENTS (NUTRIENTS)

Microbial food is added to increase the quantity of microbes derived from the compost. By introducing additives to the brewing process, it is possible to alter the microbial community in the compost tea (Deepthi and Reddy, 2013; Naidu et al., 2010; Scheuerell and Mahaffee, 2004). Simple sugars tend to promote a bacterial dominated compost tea while more complex compounds promote a more diverse microbiology including protozoa and fungi.

DURATION

The brewing process is completed after 24 to 48 hours, depending on the temperature and also the microbes to be promoted. Shorter brewing times promote a bacterial dominated compost tea, which is often used

for leaf application and disease prevention. The longer the brewing time, the more fungi and protozoa are multiplied, that can promote nutrient mobilisation in soils. Due to the high oxygen demand of the microbes, the compost tea must be used immediately after the brewing process and can be kept for up to a maximum of 4 hours.

TEMPERATURE

Temperature has a great influence on the brewing time. The compost tea should preferably be brewed at room temperature (18-24 °C). The brewing process is shortened at warmer temperatures. Temperatures above 30 °C are to be avoided. Low temperatures result in longer brewing times. If the night temperatures fall below 10 °C, a heater is recommended.

APPLICATION

Compost tea can be applied undiluted or up to a 1:10 dilution with water using conventional application devices. If the compost tea is diluted, it is recommended to apply compost tea more frequently. The application should ideally take place in the evening or under overcast skies. Do not apply foliar sprays if rain is forecast within 24 hours. It is best to apply after heavy rainfall.

If the compost tea is applied with a field sprayer, the following points must be considered:

- With the field sprayer, a sieve must be used to avoid clogging. Make sure that the sieve and nozzles are not smaller than 0.4 mm. With a smaller sieve size, some beneficial microbes do not reach the leaf and soil.
- The optimum working pressure of the field sprayer is a maximum of 2 bars. Sensitive microorganisms are killed at a higher application pressures.
- If crop protection products were applied with the same field sprayer, the field sprayer must be thoroughly washed with water before filling with compost tea.

CONCLUSIONS

The effect of compost tea on plants is highly variable, even more so than the application of compost. For a consistent and safe use of compost tea, the standardization of as many parameters (source material, amendments, oxygen content, brewing duration and temperature) as possible is highly recommended.



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Only compost of highest quality should be used. An analysis for human pathogens is compulsory if the tea is used to treat vegetables, fruits or herbs destined for direct human consumption.



Brewing systems creating a vortex allow an excellent aeration of the compost tea.





Special amendments for the nutrition of the microorganisms during the brewing process are commercially available.



Compost tea can be applied with classical spray equipment. However, before applying compost tea, the device has to be thoroughly rinsed.

