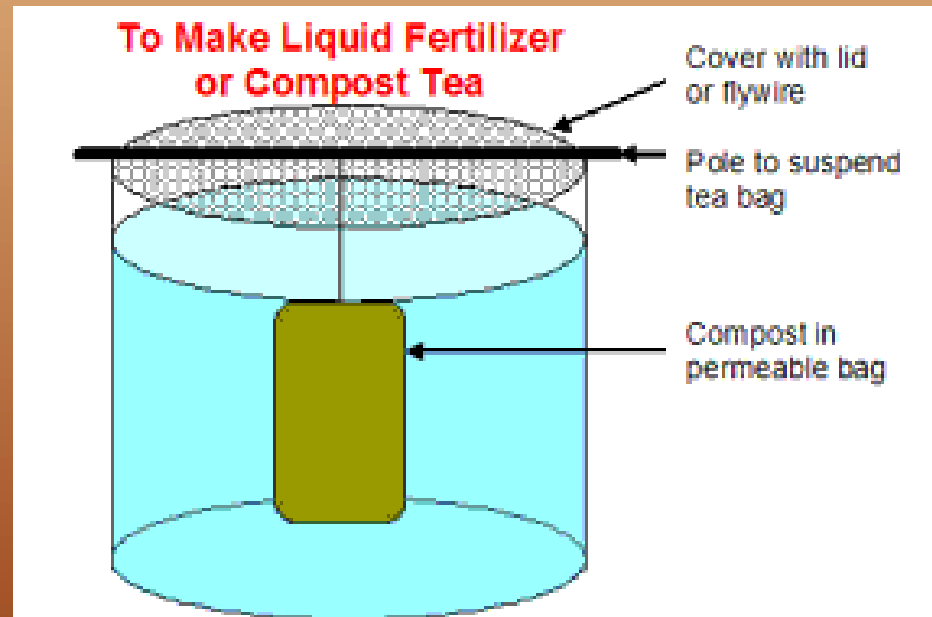


Compost Tea

A guide to Earth friendly soil conditioning through using compost tea



Compost Tea

Learning Objectives

- The learner will gain a basic understanding of what compost tea is.
- The learner will learn what the benefits of compost tea are for the crops and soil.
- The learner will be shown how to make their own compost tea.
- The learner will be taught how to apply compost tea to their growing area, including the crops themselves.

Compost Tea

Introduction

Compost tea is a liquid extract of compost that contains nutrients and beneficial microorganisms.^{[1][2][3]} Compost tea has the properties of being a fertilizer, pesticide and fungicide. It has the properties of fertilizer, in that, it adds nutrients the soil and plant. Unlike fertilizers, compost tea uses microorganisms to enrich the soil,^{[1][2]} while creating a biofilm on the plants.^{[3][6]} The biofilm is a thin coating of organic matter, including living organisms, that act as a pesticide and fungicide. It also provides future protection for the crops by creating a barrier of biomass between the crop and harmful organisms like insects, fungi and molds.^{[3][6]}



Compost Tea

Introduction

Compost tea is simple to make and practical for all gardeners to use. Using compost tea is one of the safest ways to condition soil for optimal crop growth because there are no synthetic chemicals involved in making the compost tea.^{[1][2]}

The benefits of using compost tea include:

- Increase in plant growth
- Provides nutrients to plants and soil
- Provides beneficial organisms to the growing area
- Helps to suppress diseases, while also preventing them
- Replaces toxic garden chemicals by reducing the need for additional fertilizers

http://www.youtube.com/watch?feature=player_detailpage&v=Uj4FL0u1wvg

shows some of the benefits of using compost tea.

Compost Tea

Introduction

The most commonly used compost tea is called Aerated Compost Tea. ^{[1][2][4]}
This type of tea uses air, either forced or mixed in, to promote aerobic bacteria growth. Aerobic bacteria are beneficial to the plants in creating nutrients in the soil, while providing a biofilm on the plants which protect them. In order for the biofilm to build upon the plant, some of the compost tea needs to be sprayed onto the plant as a foliar spray. ^{[3][6]}

A biofilm that is comprised of aerobic bacteria is beneficial to plants because it protects them from diseases like harmful fungus and mold. ^{[3][5]}



A biofilm that has aerobic bacteria in it is beneficial to us as consumers of the crop because aerobic bacteria will out-compete harmful anaerobic bacteria like *E. coli*. ^[5]

Compost Tea

The bucket fermentation method

There are two basic methods for making aerated compost tea; the bucket fermentation method and the bucket bubbler method.^[4]

The bucket fermentation method is the oldest, and most simple method for making compost tea. This method has been used for several hundred years.^[2]

The brew time for this kind of tea usually takes around 10 days.^[4]

http://www.youtube.com/watch?feature=player_detailpage&v=GCbeALuAYsg&t=62 shows the bucket fermentation method for making compost tea.



Compost Tea

The bucket fermentation method

Materials needed

- **A large watertight container** Choose a large container to brew the tea in. Many people choose to use a trash can or a 55 gallon container. It is possible to make tea in a container as small as a 5 gallon bucket,^[1] with the result being less tea.
- **Compost** Choose a compost material that is well composted. Plant compost works the best because it has a high nutrient content. A mix of well composted manure can also be used. If composted manure is used in the compost tea, wait 90 to 120 days from the last application until harvesting due to potential pathogens like E. coli.^[5] Compost from an earthworm bed or simply adding earthworm castings will increase the potency and nutrient value of the tea.^{[2][4]}

Compost Tea

The bucket fermentation method

Materials needed

- **A water permeable container** Choose a sack or bag that lets water through it for placing the compost into. Some people prefer to use a bag, like a burlap sack, while others prefer to tie the compost into an unwanted sheet or pillowcase. Nylon and silk materials also work well.^[4]
- **Non-chlorinated water** Use rainwater or water that has been de-chlorinated. Do not use tap water that has chlorine in it because it will kill the bacteria that we are trying to culture.^{[1][2][4]} If the only source of water is tap water, allow the water to sit in an open container for several hours, preferably in the sunlight, as this will allow the chlorine to dissipate into the air faster. If you have bubblers, let them run in the bucket to help dechlorinate the water.^[1]
- **A big stick** You will need a stick to stir the tea with. A broader stick with a larger surface area will help to circulate the water around the barrel better, though a broom handle or a wooden 2X4 will work fine.

Compost Tea

The bucket fermentation method

Optional materials

➤ **A short piece of rope and a plank longer than the width of the barrel** It is a good idea to suspend the water-permeable bag of compost onto a plank that is laid on top of the barrel. This allows for the bag of compost to have the maximum surface contact with the water. If not suspended, the bag of compost can sink to the bottom of the barrel.

➤ **Additives** There are some additives that will increase the amount of biology and rate of biological growth in the teas. A common additive is unsulfured molasses because the sugar is used by bacteria for food and it speeds up the bacteria growth.^{[1][2]} Some growers also add: yeast extract, oatmeal, fish-based products, kelp and green plant tissue.^[4]



Compost Tea

The bucket fermentation method

Step 1) Fill the watertight container half way with non-chlorinated water.

Step 2) Fill the water permeable container with compost and any solid additives , like oatmeal, then tie the end.

Step 3) Suspend the compost bag with a rope and plank so the compost bag is able to be completely submerged without lying on the bottom of the barrel.

Step 4) Add any liquid additives that you have to the water and mix them in. Many people add one ounce of unsulfured molasses for every seven gallons of water.

Step 5) Stir the tea at least once in the morning, and once at night. Keep in mind; the more the compost tea is stirred, the more oxygen gets into the tea's water. This is very beneficial to the kind of bacteria, fungus and other biological life that we are trying to grow in the tea.

Compost Tea

The bucket bubbler method

The bubbler bucket method is very similar to the bucket fermentation method, in brewing the tea. The bubbler bucket method is more successful in creating high quality teas because this method incorporates more oxygen into the tea while it is brewing.

http://www.youtube.com/watch?feature=player_detailpage&v=-0en00 CSM4 shows how to make and use compost tea from the bubbler bucket method.



Compost Tea

The bucket bubbler method

Materials needed and process

The materials that are needed for the bucket bubbler method are the same as the bucket fermentation method, in addition to bubblers. The bubblers serve as an extra means to get oxygen into the water, rather than just stirring in air.^{[1][2]} The most common bubblers that growers use for compost tea are the same bubblers that are used in fish aquariums. There should be about one bubbler for every five to seven gallons of water.^[1] It is necessary to stir the compost tea frequently throughout a day's period, because it helps separate the living organisms from the compost material.^{[4][5]} Most teas made from the bubbler bucket method are brewed for 24 to 36 hours.^[4] Stirring frequently, or using a more decomposed compost, will decrease the amount of time necessary for the compost tea to brew.^{[4][5]}



These bubblers are commonly called air stones. Using air stones is a good idea because they do not clog easily. Generally, medium to large sized bubbles are desired when making compost tea.^[5]



Compost Tea

Other considerations in making compost tea

- **Good compost tea smells good** A good quality compost tea is characterized by an earthy, sweet smell; it should never stink.^{[1][2]} If the compost tea has a foul smell to it, that means the tea did not get enough oxygen during the brewing process. It should not be used because it has alcohol and anaerobic bacteria in it, which are harmful to plants.^{[1][2][4]}
- **Ratio of compost to water** There are no specific ratios of water to compost. Rather, water is more of a solvent and diluter for the compost tea.^{[2][4]} Very little water will result in a tea that is very concentrated.^{[1][2]} An non-concentrated tea will often be found with a ratio of about 1 part compost to 5 parts water.^[1]
- **Characteristics of the “tea bag”** The material for the bag should not have chemicals in it, like sheet sprays. If the tea is intended for a drip irrigation system or a sprayer, the tea may particles in it that can plug the nozzles.^[4] To avoid this problem, use a very fine mesh like nylon, silk or tight-woven cotton cloth for the tea bag. The tea can be strained after brewing with these cloth materials as well. Do not use multi-layer cloth or felt because hyphae, one of the good biological organisms, get trapped in the fabric.^[5]

Compost Tea

Other considerations in making compost tea

➤ **Temperature** The compost tea should be brewed with water that is close in temperature to the ground temperature. If it is very hot outside, setting the barrel in the shade can help keep the temperature down. The biological life in the tea can be harmed if the tea gets too hot.^[4]

➤ **Pressurized equipment** If the compost tea is going to be spread by pressurized sprayers, make sure that equipment is not pressurized to the point where it could kill biological organisms. Some irrigating equipment for large fields use very high pressures. Usually the manufacturers of large irrigation equipment will state whether or not the pressure is sufficient to kill living organisms.^[5] Most microbes will die at pressures near 150 pounds per square inch.^[6]

Most hand-pump sprayers and spray bottles do not have enough pressure to kill living organisms.



Compost Tea

Other considerations in making compost tea

➤ **Dilution** Some growers who make and use compost tea frequently will dilute their tea. The reason for dilution is that compost tea can be too nutrient rich for the plant's current needs. Always use non-chlorinated water to dilute compost tea. Non-diluted tea can be given to plants about once every two weeks.^[1] To dilute compost tea, mix one part tea with one part water.^{[1][2]} Use diluted compost tea generously.

➤ **Timing for application** The compost tea should never sit for several hours after the bubblers get turned off. Once the bubblers are turned off, the aerobic bacteria begin to die as they use up the oxygen in the tea mixture. It is a good idea to apply the tea within four hours of shutting off the bubblers.^{[1][2]} Another timing factor that should be considered is the time of day. Foliar sprays should be applied in the early morning or at dusk, because of the ultraviolet rays. The ultraviolet rays are harmful to the beneficial organisms in the tea.^[2] In a foliar spray, the beneficial organisms are very exposed to ultraviolet light that shines through the mist.

Compost Tea

Applying compost tea to the crops and growing area

Compost tea has the properties of being a soil conditioner through building a biologically diverse food web in the soil.^{[2][5]} Compost tea also creates a biofilm on the plants when the tea is given to the plants as a foliar spray.^{[3][6]} This biofilm helps prevent water loss of the plants by preventing water from evaporating out of the leaves.^{[3][5][6]} Many plants have the ability to absorb some nutrients through their leaves,^[5] which make plants able to immediately benefit from a foliar application of compost tea. For these reasons, compost tea should be applied as a foliar spray and also used to water the plants near the root zone.^{[1][2][6]}

Compost Tea

Applying compost tea to the crops and growing area

Applying compost tea as a foliar spray

Foliar spraying, or sometimes called foliar feeding, is a term that describes a method of applying a material to the foliage of a plant. There are two basic methods for applying compost tea as a foliar spray.

The first method is relatively simple. It uses a watering can with a nozzle to sprinkle the compost tea over the plant.

The second method of applying a foliar spray uses a spray bottle or a pressurized container with a spray nozzle. The advantage of using a spray nozzle is that the grower can spray the underside of the leaves. This is important because the biofilm is beneficial to the entire plant.^{[3][5][6]} Additional compost tea is usually given to the plant's root zone after a foliar spray is used.^{[1][2][4]}



Compost Tea

Follow-up after making compost tea

After making compost tea, there will be a lot of solid materials from the compost that are still useful. Many growers will use this compost as mulch to place around their plants. Other growers will put the brewed compost solids back into their compost pile because the brewed compost solids have newly cultured life in it that will benefit the compost pile.

The last task is to clean the equipment that was used to make the compost tea, unless another batch is going to be made immediately afterward. The reason for a proper cleaning is that we do not want to have anaerobic bacteria, harmful fungus or mold growing in or on the equipment itself.^[7]



Compost Tea

Follow-up after making compost tea

Cleaning the equipment

The first step in cleaning the equipment that was used to make compost tea is to power wash the barrel. This can also be done with a garden hose and nozzle. After power washing the barrel, it should be hand cleaned with a solution of 10% bleach to 90% water. An alternative to bleach is a solution of 2 to 5 percent hydrogen peroxide.^[7] The bubbler tubes and air stones should be soaked in the cleaning solution and, if reusable, the water permeable bag should be power washed and then soaked in the cleaning solution as well.^[7] Allow all of the equipment to dry completely before storing them in a dry place.

Compost Tea

Review questions

- What are some of the ways that compost tea can be made?
- What are some of the potential benefits for the crops when the crops are given compost tea?
- How should compost tea be applied to the crop being grown?
- What are some of the benefits of giving compost tea as a foliar feeding?
- What does a quality compost tea smell like? What about a poor quality tea?
- What is needed for aerobic bacteria to survive?
- How should the equipment for making compost tea be cleaned after compost tea is made?

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References

- [1] *Compost tea*. (2007). Retrieved from Pennsylvania Department of Environmental Protection:
<http://www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/Tea/tea1.htm>
- [2] *Compost tea*. (2013). Retrieved from Oregon State University Extension Service: <http://extension.oregonstate.edu/douglas/mg/dcmg/aerated-compost-tea>
- [7] Ingham, E. (2013). *Compost tea brewers; Keeping it clean*. Retrieved from Heart Spring: http://heartspring.net/compost_tea_brewer_cleaning.html
- [4] *Making compost tea*. (2012). Retrieved from CalRecycle:
<http://www.calrecycle.ca.gov/Organics/CompostMulch/CompostTea/Making.htm>

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References

- [5] *Making compost tea and extracts*. (2012). Retrieved from The Earth Project: <http://www.theearthproject.org/id53.html>
- [3] Morris, C. E., Monier, J. M., & Jacques, M. A. (1997). Observing microbial biofilms on leaf surfaces and isolation of culturable microbes. *Applied and Environmental Microbiology*, 1570-1576.
- [6] Schmidt, P. (2010). *Foliar applications of compost tea*. Retrieved from CompostJunkie: http://www.compostjunkie.com/support-files/foliar_applications_ct.pdf