GREENAKERS
FARM & GARDEN ADVICE DESIGN EDUCATION IMPLEMENTATION

EWT™ Earthworm Casting Tea Brewing; Standard Operating Procedures

Worm Casting Tea Brewing Recipe (All measurements are by volume, not weight)

50 Gallon Batch *(in 60 gallon re-used food-grade barrels or similar)*

- 50 gallons of dechlorinated water (or well water).
- 1.5 gallon earthworm castings
- 6 fl oz unsulfured blackstrap molasses, (organic, or at least non-gmo is best.
- 4 fl oz Maxicrop Soluble Seaweed Powder (other kelp products may be used, although application rates may differ greatly).

30 Gallon Batch *(in 40 - 50 gallon barrels)*

- 30 gallons of dechlorinated water (or well water).
- .8 gallon (3 qt 6.4 oz) earthworm castings
- 3.6 fl oz unsulfured blackstrap molasses, (organic, or at least non-gmo is best.
- 2.4 fl oz Maxicrop Soluble Seaweed Powder (other kelp products may be used, although application rates may differ greatly).

4 Gallon Batch *(in 5 gallon buckets)*

- 4 gallons of fresh dechlorinated water (or well water).
- 14 oz of earthworm castings
- 14.2 mL unsulfured blackstrap molasses (a ½ oz or 1 Tablespoon is sufficient).
- 9.46 mL Maxicrop Soluble Seaweed Powder (2 teaspoons are sufficient, other kelp products may be used, although application rates may differ greatly).

EWT brewing may be scaled to any sized batch!

Brewing Instructions and General Guidelines

1. Use fresh well water, clean rainwater, or dechlorinate tap water with aeration 12- 24 hours before starting any batch.
2. Insert "tea bag", filled with worm castings.
3. Pour in the molasses and seaweed.
4. Stir slowly for 2+ minutes
5. Start the aerator and run it continuously.
6. After 24-36 hours, add ½ as much kelp, and ¼ as much molasses, repeat as needed.

- Temperature - The aerobic microbes living in the earthworm casting tea solution are most productive between 70ºF and 90ºF. 80ºF is an ideal baseline temperature However, in a regular tea application program it is microbally beneficial to allow the tea to stay reasonably near to the ambient temperature of the the air and/or soil in the environment which it is applied. Temperature may be controlled externally of the brew tank, and/or internally with an aquarium or pond heater.

- The tea brew should be kept free of contaminants. It is important to sanitize all tea making tools, containers, airlines, etc., before and between making new batches. A spray bottle containing either Sanidate 5.0, vinegar, or peroxide used with a scrub brush works very well for sanitizing in this case, but rinse thoroughly! It may also be helpful to make a screened lid for the brewer that blocks most debris, insects, etc. while allowing plenty of air to circulate through.

- A constantly aerated batch of tea can last 1 - 2 weeks, and will have a sweet, earthy odor. If the tea smells foul, it has become anaerobic and should be disposed of. One disposal option is easily carried out by using the expired tea as a soil drench at the base of a large woody perennial shrub or tree, which is able to make use of the now anaerobic bacteria rich tea without waste or run-off.

- A light, brown foam will appear and develop on the surface of the tea. This foam consists of proteins and carbohydrates which are beneficial byproducts of aerobic microbial activity. If the foam decreases, this may be an indicator of needing to add more seaweed and/or molasses, or possibly a problematic decrease in aeration. Some healthy brewing systems produce less surface foam than others if the set-up allows the tea to be well oxygenated with less agitation than is typical.

Microbial Feedstocks & Additives

Molasses and seaweed/kelp products are essential feedstocks for successful microbial tea brewing. The inputs provide ample food to bacteria, fungi, and higher microbial life forms as well.

Seaweed and/or Kelp are available in several forms and concentrations. Maxicrop brand soluble seaweed powder is a trusted and preferred input (avoid use of Maxicrop's ready-to-use liquid as it contains a preservative). Keep all dry kelp products sealed and very dry when stored, and a little bit will really go a long way! *(Maxicrop is just what has always worked well for us, other types and brands of kelp products may be used, but application rates will vary).*

Molasses - It is important to use unsulfured blackstrap molasses, which is commonly what is found in grocery stores, and available in bulk quantities. Non-gmo agricultural grade molasses is acceptable for use and usually less expensive than food grade.

Fertilizers, other elemental inputs and even some pest controls may be added to worm teas as a wonderful carrier with which to make these inputs highly available to plants and soils. But, we must keep in mind that the most powerful nutrients are those which the plant

can extract from the organisms. Therefore, it is critical to be mindful of how these inputs will affect the organisms within the tea solution.

Also, many bioactive inputs such as fish hydrosolate and other microbially inoculating inputs may be added to EWT to enrich the brew. However, we must ask if our practical purpose is to proliferate and foster the microbiology provided by the worm castings alone, or to introduce other species which may or may not compete or synergize with these input endemic microbes (so, think in terms of bio-support!).

Equipment Needed

- Reservoir - Most 5 gallon buckets are made of HDPE plastic which is considered food grade and will work well. Larger HDPE containers (up to 270 gal) are commonly available through resellers (Old 60 gal olive shipping barrels make for excellent 50 gal setups!). Stainless steel and glass are also great reservoir materials.

- Tea bags - Any porous bag with holes between 300 - 600 microns (400 is best!) will typically work well. Paint strainer bags will also work, as does burlap and several other natural fiber solutions. Even thin T-shirt material works well as a last resort! Many pre-manufactured compost tea bags are now available online, as is 400 micron filter cloth.

- Air pump - External fish aquarium or hydroponic air pumps are commonly used. Some pumps are louder than others and it is normal for some to get quite warm during operation. (See below for sizing recommendations).
- Airline tubing - Most aquarium pump air hoses are made from vinyl, which should generally be avoided when possible. Poly tubing is a better option available at most hardware stores and online.

- Air diffusion - Large silica aquarium air stones can work fine, but need to be replaced frequently. DIY diffusers can work very well (see youtube.com for examples). Some prefabricated units are now available. Diversity in bubble size is desirable for microbe access, and the more bubbles the merrier!

A note on aeration...

Aquarium and hydroponic pumps have traditionally been used to oxygenate casting and compost teas, and the following instructions are based on GreenAkers experience with operating this type of mechanical oxygen delivery. While pump performance varies greatly per make and model, the following guidelines may be helpful. And, turbulence is good, so always error on the side of more power!

- 5 gallon brewer: 500–1000 gallons per hour (GPH)
- 15 gallon brewer: 1000–1500 GPH
- 30 gallon brewer: 1000–1500 GPH
- 50 gallon brewer: 1000–2000 GPH

Using aquarium pumps is a proven method. However, the oxygen being the most and constantly needed input for the various microbial species in the tea, delivery is all about surface area, and diversity of bubble size. Many tea farmers are now demonstrating that homemade and commercially sold devices called microbulators, and air-systems which create more water turbulence, and/or a vortex motion, are likely superior in proliferating microbe activity and populations.

- Thermometer - Any reliable submersible aquarium thermometer or better should do the job..
- Heater - An aquarium heater may be necessary if the tea is not brewed in an indoor controlled environment. Choose a wattage rated for the volume of water used in brewing.

Earthworm Tea Applications

Dosage

Full strength tea is ideal, especially for occasional use, or as a matter of preference.

If tea is applied on a regular or scheduled basis, it is often sometimes to ½ strength by adding clean, fresh non-chlorinated water (some folks dilute down to as much as ¼ strength with immediate efficacy). While still potent, dilutions are sometimes more economical in terms of distribution, and effective in repeated use. Tea which is added to large spray tanks for field distribution is still effective down to 10% potency, often with elemental or microbial additives.

Fortification / Additives

When organic based fertilizers and minerals are added to EWT in order to enhance the solution for a desired outcome and/or reducing labor, tractor passes, etc, only water soluble inputs should be used. Because EWT is full of microbial life, anything anti-microbial or significantly pH changing needs to be avoided,

Foliar Feeding

Foliar feeding is appling nutrients directly to leaves, typically through a spray or mist. Due to surface area availability, this is the most effective way to apply EWT to plants, and brings one of the largest ROI's in farming. Not only do the plants absorb the tea, but the tea offers microbial benefits by coating the leaf, and this even causes the cutaneous (skin-like) surface of the leaves to thicken, thereby making it difficult for insects and spores to penetrate., And, the plants are able to immediately metabolize the tea, making its constituents highly available to soil microbes by way of root exudates, thereby creating a continuous bio-nutritious feedback loop.

When plants are subjected to foliar feeding they are able to metabolize nutrients in a manner which makes the nutrients highly available to microbes feeding within the plants

rhizosphere (root zone). This in turn "charges" these microorganisms with these nutrients, so they may now be again utilized by the plant more effectively.

Sprays offer the best coverage efficiency of the small, oxygenated particles of liquid. When using a sprayer, it is important to coat the underside of the leaves, where the greatest absorption takes place, as well as the top and other exposed plant tissues. Simply spray each plant, once aiming up and once aiming down, and all-around. Resulting plants should be evenly wet without too much excess dripping or runoff. Allow the spray to fall on the soil or any permeable mulch surface as well. Backpack sprayers are useful for this action. Tractor-drawn sprayers won't typically be able to spray upward, but often their powerful spray delivery results in enough reflected mist to be effective. Water-can delivery is obviously not as efficient or effective, but still well worth the effort, particularly where additional soil drenching around each plant is desired.

Surfactants should always be used in foliar applications as they tend to reduce the surface tension of a liquid in which it is dissolved. Thus, greatly improving the ability of EWT to "stick" to leaf surfaces. Products containing yucca extract are the best at this, although 1 tiny drop of biodegradable dish soap (treats up to 5 gallons/drop) may be used.

Soil Drenching

Soil drenching is the simple act of applying EWT to the soil surface, through many various methods. This provides heavy dispersal of pre-biotic nutrition, and may be an effective delivery method for inoculating soils with microbial life. Soil drenching also offers an opportunity to directly add liquid humates, fertilizer products, or other microbe-safe inputs.

Injection (fertigation)

More cost-effective than soil drenching, injection is an efficient way to deliver EWT and other input to the rootzone, thereby affecting both plants and soil simultaneously. This is a very direct soil delivery method which has greater efficacy when coupled with foliar feeding. Various injectors and systems which are plumbed into existing irrigation systems are available from a variety of sources.

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