

CHAPTER 4

TLO Medium: Your Living Soil Mix

True Living Organics Growing Style

A TLO grow is a huge shift in a growing dynamic, and actually turns the clock back, way back, to the style plants have been growing under in the wild for millions of years. I often refer to TLO as a “Just Add Water” growing style, and done correctly, it certainly is that. This style relies on the strength and power of the relationship the plant has with the living soil mix. Using the same style that plants have been using themselves for millions of years, but inside of a plastic container and under high-intensity lamps, may seem counterintuitive, but the basics of that style are transferable to any sort of set up, and I will show you how it is done. This technique does require a little faith. The microbial life needs a little time to reach a balance, or equilibrium, in the soil mix, and while you’re waiting for this to occur you must resist the knee-jerk reaction to use liquid food. Instead, you just need to let nature work its magic. Building your containers with a non-homogenous soil mix is the first step.

Just like when they’re in the Earth, your plants’ roots can find various things underground in TLO containers. Creating a perfect medium is a big part of the “Just Add Water” growing style, because you have to skillfully add various elements, not only in different ways, but in different balanced ratios. Does that sound hard? It isn’t. All you have to do is copy my recipes and pull off a harvest or two, then you’ll see what I’m talking about. After that, you can dive deeper into learning why things work so well in TLO if you wish and become a TLO guru yourself.

Mycorrhizal Fungi (Myco Fungi)

This is an incredibly important addition to any all-natural growing style that uses containers. I always use this in a granular form, which I apply just before any transplant, and I set the root-ball right on top of some of the granular Myco fungi. Additionally, I have a soluble form of the Myco fungi as well, that I apply with chlorine-free water, about 2–3 weeks after any transplant.

The Myco fungi cannot live very long without living plant roots to attach to once moisture is added to the store-bought products containing them. This is why you must always bring Myco fungi in yourself. It is of utmost importance in TLO growing, and without it, your plants will have very small yields, and will need to be fed Soup-Style just to keep them healthy. You can get all the bacteria and other kinds of beneficial microbial life into your soil mix by using fresh, healthy earthworm castings or compost. If the earthworm castings still have living worms in them, then they are extra awesome and full of microbial life.



Just add water!

You can see in the picture of my bottled microlife that I use some additional bacteria products, along with BioZome. BioZome is a form of microlife that is unique, but acts mostly like bacteria and is just as beneficial. At the end of the book I will tell you where you can find some of these things, like BioZome and Myco fungi; the only essential addition is the Myco fungi, and in container growing, it's a must have. Please note that Myco fungi can be rendered useless very quickly if you use raw liquid nutrients on your containers, especially those with higher levels of available phosphorus in them.

REV'S TIP

You can buy Myco fungi off the shelf at higher end nurseries, and it comes in both granular and water soluble forms. Most believe that cannabis uses only the Endo subspecies of Myco fungi, but I still use both Endo and Ecto versions and the brand Down to Earth offer several versions of these along with beneficial bacteria. You could go with something like Great White Myco fungi, with beneficial bacteria as well. I recommend going with quality here if you are able.



For ten bucks a piece, myco fungi is well worth the cost

Bagged Soil Mixes

Gardner & Bloome Blue Ribbon Blend Premium Potting Soil, with Mycorrhizal fungi added, is a great and inexpensive soil mix to use. Something like Fox Farm's Ocean Forest is also an old favorite

of mine, though it has just gotten rather expensive lately, and you can get an equal amount of soil mix and comparable quality for half the price going with the Gardner & Bloome soil. Now, using TLO methods we are pretty much going to become sustainable growers after a crop or two. However, for things like freshly rooted clones, or for some quick soil if you forgot to make some, it's good to have some bagged mix lying around, and these are a couple good ones. Essentially any good quality organic soil mix will work. We make our TLO soil mix super natural, with about 25% of it being a good bagged organic mix like these are.



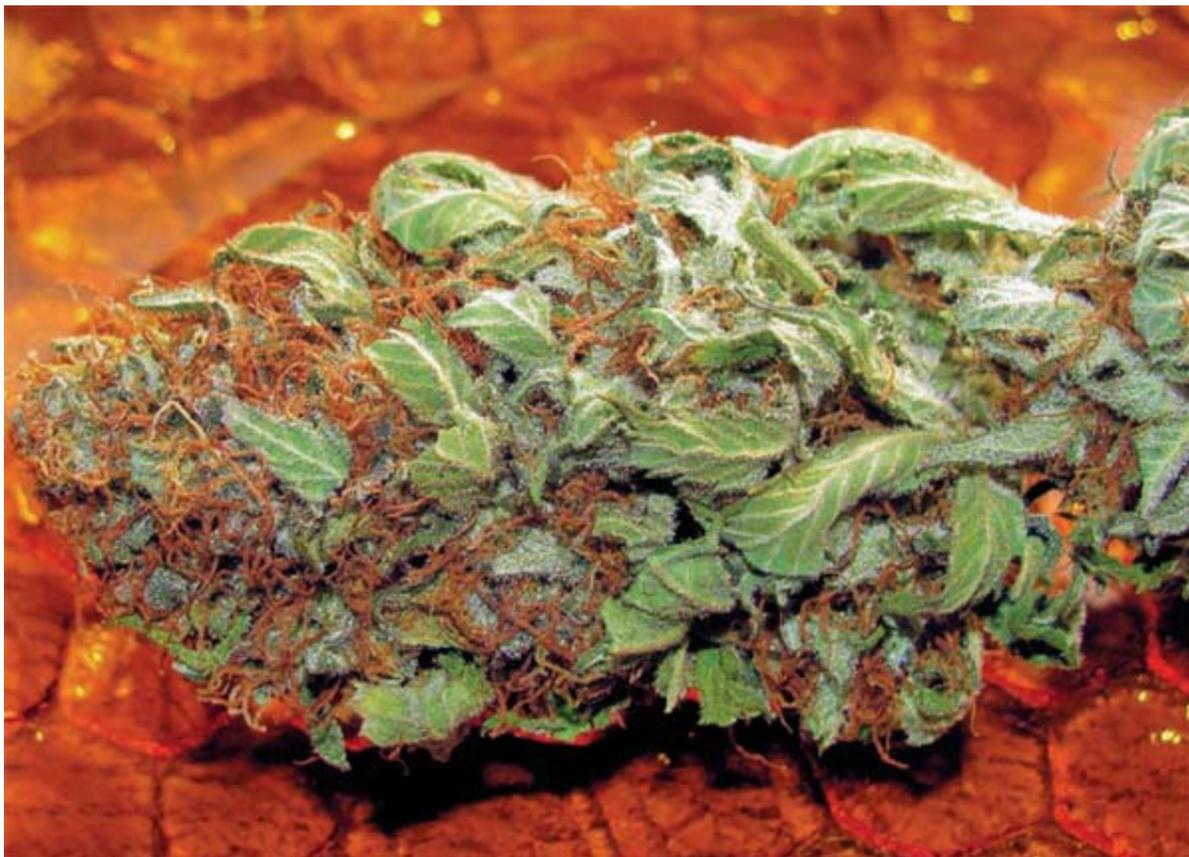
This is a great choice of organic soil for TLO growing

You can use just straight high-quality bagged soil mix, you will just need to use larger container sizes is all, and likely you will also have to add some perlite to help with aeration; however, don't expect results anything like you will get using the TLO soil mix I give you in this book.

TLO Soil Mixes

Okay *mi amigos*, here's where the really good shit starts to happen, and right off the bat I am going to tell you that you don't need to be paying \$20+ per bag of soil mix, really! You certainly can if you want to, and that is almost always good organic soil mix in my experience, but you don't have to spend a lot to get a great soil mix. My favorite, which is pretty much available all over the USA at the time of writing is by Gardner & Bloome, and you can get it for about half the price of other bagged soil mixes. I get mine locally for about \$10 per 2 cubic feet bag—which is nice. This stuff is every bit

as good as anything out there, and all it needs to supercharge it for TLO growing is the addition of some perlite. I would cut this soil mix by about 20% with small nugget-sized perlite, and I would also add about 1 cup of greensand per cubic foot of soil mix before using it on cannabis. Just make sure, above all else, that your soil mix is ALL or 100% natural and/or organic, without any synthetically chelated nutrients present.



The rewards of TLO growing are super naturally elegant

Cooking Your Soil Mix

First I want to help you to understand that “cooking” your soil mix is simply another way of saying “composting” or “fast composting” your soil mix. Another word for it would be decomposing. This is a very important aspect of custom soil mixes, and without doing this, more times than not you will fry your plants. If you are making your own custom mixes, adding things like kelp meal and guanos that have not already been composted, and you are not “cooking” your soil mix, then this will be the cause of your problems.

It’s worth saying that again: raw, all-natural additives like lime, meals, guanos and manures, all need to be processed in the cooking procedure before roots will be super happy in the custom soil mix. All you need to do is mix together your soil mix, get it all nice and moist but not wet and keep turning it over every few days for 2 to 4 weeks, or longer if you like. Ambient temperatures during this cooking process should be at least 60° F. and the cooler it is, the longer it will take to complete the cooking process. In my cold garage it takes about 30 days for mine to cook. Don’t worry; even over time the nutrients don’t evaporate from your soil mix, so if it ends up being a year before you use it, that’s okay too.



All natural additives, and especially guanos, need to be cooked before adding them to your soil mix

REV'S TIP

ALL soil mixes and soil elements, including mineral elements, need to be cooked BEFORE living roots arrive on the scene. Even Dolomite lime needs to be cooked first, so when you are getting your soil mix or your containers all put together, don't be tossing in extra bat guano, or Dolomite lime, or even kelp meal, because if it is not cooked in yet it can cause problems. My motto for TLO growing is this: always cook everything first.

Put simply, what cooking the soil does is allow massive amounts of microbial life to colonize the soil mix and work its magic on it, just like they would do in a compost pile. What else do composting and soil cooking have in common? High levels of nitrogen (N) are really effective when cooking your soil mix, just like in composting. This is where things like alfalfa and blood meal really kick it up a notch, and your soil mix should actually heat up a little while cooking. This is absolutely normal when some elements that are higher in N, like blood meal and alfalfa, are added. Things like feather meal are all good too, but the N release of feather meal is a lot slower than that of the alfalfa and the blood meal. You could also use guanos and manures effectively here as a catalyst to cooking, as these supply high amounts of available N.

The bottom line, folks, is that you MUST cook your custom soil mixes, period. Failure to do this will almost always result in disappointment, so really make sure you take this seriously. Try to understand what each element brings to the table in a custom soil mix, and right after I give you my latest and greatest mix I will go over all additions, and why they are there, in order to help you to fully understand the processes at work. Substituting things in the mix is usually a bad idea unless you

know what you are doing, so try hard to stick to the recipe for your first few grows, so you can use a proven successful soil mix as your benchmark before you start modifying it.



With my recipes your soil will be so healthy even the worms will love it

THE REV'S 2.1 MASTER SOIL MIX RECIPE

Let me first say that this mix was designed to be cooked first, and to be used with pure water sources like reverse osmosis, distilled, or rainwater only! Also this mix is designed to be used in concert with the TLO style of using “Layers” and “Spikes.”

Base Mix

- 2 gallons quality organic soil mix (or healthy organic recycled soil mix)
- 2 gallons thoroughly rinsed coir (coconut fiber)
- 2 gallons perlite (small nugget size)
- 2 gallons earthworm castings (fresh earthworm castings, and/or fresh compost works too)

Amendments

1½ cup Grow or Bloom “Pure” by Organicare (or 1 cup 5-5-5)

½ cup greensand

¾ cup ground oyster shells (1 cup if no crushed oyster shells)

1 cup crushed oyster shells (optional)

½ cup dolomite lime (powdered)

1¾ cup prilled (pelletized) fast-acting dolomite lime

¼ cup blood meal

¼ cup high N bird/bat guano 12-8-2 N-P-K

½ heaping cup feather meal

1 cup un-steamed granular bone meal (like Whitney Farms brand)

½ cup bulb food

¼ cup powdered soft rock phosphate

½ heaping cup powdered gypsum

½ cup kelp meal

4 heaping cups composted steer manure (this inoculates your mix with specialized microbeasties and primo organic matter)

½ cup Azomite granular (add an additional ¼ cup greensand if no Azomite)

1 cup granular humic acid ore (such as Down to Earth brand)

1 cup alfalfa meal (or 2 cups pellets—make sure pellets are all organic no additives)

½ cup rock phosphate granular (optional)

1 heaping cup organic rice (important for the good fungi in this soil mix)

REV'S TIP

This recipe is only for use with pure water sources, like reverse osmosis, rain, or distilled water. Do not use well, tap, or spring water with this recipe.

This mix should be moistened with chlorine-free water, but be sure not to get it soaking wet. It should also be turned over every few days, for about 15 days before use. This is what I call “cooking” your soil, and letting it get pretty dry before use is fine. Again, the nutrients don’t evaporate or anything over time, so there are no worries there. If this soil mix turns out to be too powerful for some reason, just cut it with good quality bagged organic soil until you get the strength

your environment and genetics demand.

I find cooking mine for about 30 days works the best for me, but I have often used it sooner, for example after 2 weeks. Just remember the warmer it is outside, the faster the cooking processes will happen. You can use a soil pH meter to tell when it is finished cooking too. I wait until it is in the 6.2–6.8 range, which normally takes about 2 weeks, because as it kicks off cooking the pH will often be very low. Readings of 4.9 aren't uncommon when it first starts to cook.

This soil mix is meant to be used along with the spike and layer TLO dynamic, and while it is quite capable of standing alone, it works super naturally when you add the spike and layering dynamics. If this is too overwhelming of a formula, just use some of the fast soil mix recipes in this book, or use the base mix of this recipe with no cooking at all in order to get your feet wet, so to speak.

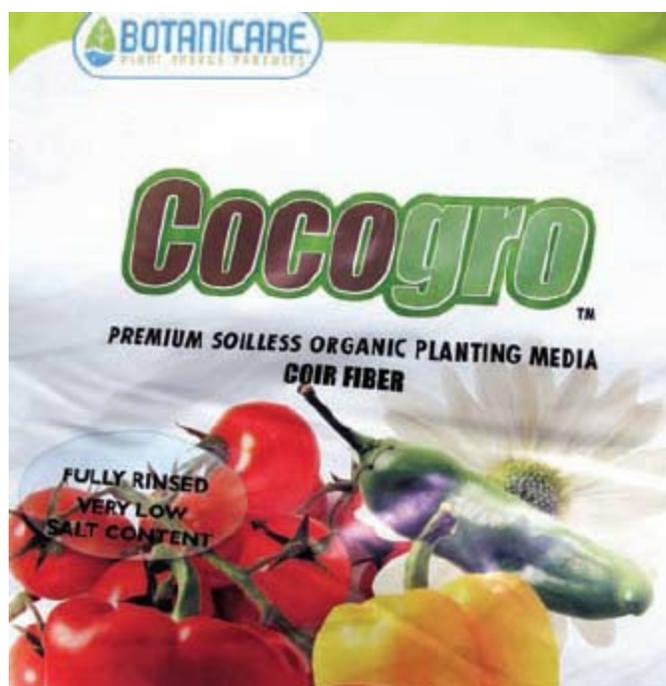
Base mix examined closer

The organic soil mix or your recycled all-natural soil mix works fine here; just make sure your recycled soil mix has had the opportunity to cook and break down most of the raw root and leaf/stem matter, with some nitrogen added to catalyze those processes, as I explained above in the cooking your soil mix section. When I cook my recycling soil mix I tend to use chicken guano as my high N source, because it contains lower sodium and higher phosphorus than most barnyard manures.

Don't bother using a bagged soil mix that has added Mycorrhizal fungus here, because it will not survive the cooking process without living plant roots to attach to, so although it's not harmful in any way, it's just a waste of money. I also want to add that if you are going to be recycling your soil mix, make sure to avoid using a bagged soil mix with a large amount of peat moss in it. Peat moss tends to really favor the fungus and will cause recycled soil mixes to drop to a very low pH; more about that in the troubleshooting section.



Sup'r Green chicken poop is my favorite for recycling



Cocogro is my favorite brand of coconut coir, and is great at buffering the pH of your soil mix

Coconut (Coir) fiber is an awesome TLO custom soil mix amendment for a couple of reasons, including the fact that it seems to me to be great at buffering the pH of your blend. It keeps the pH from diving too low, which is a common problem when your soil mix contains a lot of raw organic matter that has not been decomposed. Also, as this coir breaks down, which it does quickly in TLO like in any other organic style, it releases available potassium (K) which is always an important thing to cover when flowering cannabis. Cannabis loves her K, and the microbial life really likes the coir fiber as well, so this stuff is great—although it does not aerate soil well as some believe. Always use perlite for superior TLO soil mix aeration. Another thing to note about the coir is that it is also able to hold a lot of water for its size, and this is always a big plus when you favor growing in smaller container sizes.

Last, but by no means least, always get coir that has been thoroughly rinsed with fresh water. It will say so on the product, and keep in mind that sea salt is all natural, but those salts are detrimental in a TLO soil mix in any great amounts. Botanicare has a fantastic coconut coir product called “CocoGro” that has been left outside for a season or two and thoroughly rain rinsed. Be aware that coir products can fly all natural/organic labels, including OMRI rating labels, but still have too much salt for TLO growing.

Perlite is the stuff, boys and girls! Aeration in your living soil mix is über-important, and you can pretty much cut any bagged soil mix with perlite by at least 20% to accommodate super natural levels of microlife. I recommend smaller nugget-sized perlite, and this is straight-up good math. Smaller particles equal more surface area, and more surface area equals more aeration. Perlite is not consumed by the micro-beasties for food so it hangs around for a long time, which is why it works so well. Shredded bark and coconut coir are both examples of organic stuff that sucks to use for aeration in TLO growing, due to the fact those both decompose rapidly in a TLO soil mix.

Another less well-known property of perlite that any TLO grower has to love is its very porous and neutral pH nature, which makes it a beautiful place for microlife to colonize. Think of it as lots of miniature versions of artificial reefs out at sea that coral builds upon; in your soil mix the microlife does the same thing, attaching to the perlite for essentially the same reasons.



The white bits here are perlite, an essential part of any living soil mix!

Earthworm castings and compost are both superior additions for several reasons and one, if not both, of these are a must have in my opinion. Bagged versions of earthworm castings can be good or poor, and a good rule of thumb for TLO growing is this: if the earthworm castings still have living worms in them, they are primo! This is the prime reason you are using earthworm castings or fresh compost: to bring in microbial life, including micro-predators like amoebas and other protozoa. These guys are every bit as important as the bacteria and fungi in your soil mix! Avoid anything that is sterile, or has been sterilized, and use your nose; nothing should These bagged earthworm castings are smell bad, but should have a very of a high quality and great for TLO use clean and earthy aroma. You will get to know that smell if you don't know it already. It is easy to learn how to compost, and there is a ton of info at your local library or on the Internet.



These bagged earthworm castings are of a high quality and great for TLO use

Another great benefit of using either or both of these amendments is that they contain vast amounts of organic matter all broken down into humus. Humus translates into fantastic nutrients for your plants.

Dry amendments examined closer

Grow or Bloom “Pure” by Organicare (or All Purpose 5-5-5) is an all-purpose, dry all-natural nutrient. Any good one will work, but it is important that all three of the numbers be around the same. Several brands of all-purpose dry nutrients will have numbers like 4-6-2 regarding N-P-K values, for example. The potassium (K) is an important nutrient for cannabis, so always opt for more equal numbers if possible. I particularly like the Organicare all-purpose Grow and Bloom granular “Pure” nutrients with 6% added calcium. Additional calcium is almost always a plus in cannabis growing, especially when using a living soil mix, because the microbeasties love their calcium almost as much as the plant does.

Greensand is very important indeed, so do not underestimate its super powers! This element enhances soil structure and airflow through the soil mix, and also supplies potassium and over 30 trace and micronutrients/elements in a very slow-release form. Potassium (K) and Iron (Fe) are two of these. Greensand is not something you would use to counter a deficiency so much as you would use it pro-actively to back up supplies of things like iron and potassium. If you recycle your soil mix you’ll really get the most bang for your buck here because greensand keeps giving for years. Back in the olden days we used to use manure and greensand at the bottom of the holes we dug to plant our

outdoor cannabis. For many years we treated this combo like a big secret because it really made that much of a difference, so be sure not to leave out the greensand in your grow. Tomatoes, strawberries, and cannabis all love this amendment. I have noticed greensand tends to buffer pH somewhat as well, and likely works well with barnyard manures due to this, because manures tend to drop the pH a tad like most organic matter does while decomposing.

Oyster shell products are uniquely capable of a few excellent contributions to a living soil mix. Cannabis loves calcium, and microbial life needs and loves calcium as well. Oyster shell products provide slow-release calcium, and that's the first benefit, but wait, there's more—when building soil mixes you always want to be somewhat aware of the ratio of calcium to magnesium, which should be around 5:1 respectively. Oyster shell products essentially provide a pure calcium carbonate which breaks down very slowly, releasing calcium for the microbial life, and hence the plants, to use. If your magnesium levels get too high, bad things start to happen, and so this can be a tricky dance, due to the fact that cannabis also loves a lot of magnesium. Dolomite lime (see below) brings in magnesium along with calcium, and I use this in my mix as well.

I use two grades of oyster shell products, the ground and crushed versions. The crushed is just larger pieces than the ground, which has a sand-like consistency, and the main difference here is the length and the strength of the buffering effects the calcium carbonate has on the soil mix. This is another benefit of using these shells. I like using the ground shells (also known as oyster shell flour) as a buffer for spike and layer mixes using things like guanos and blood meal in them. If not for the buffering effects of the ground oyster shell, those products would really take the pH down too low for a time. In addition, calcium is one of the most underrated nutrients ever in cannabis growing, because cannabis loves slowly released sources of calcium, and I even use crushed oyster shells in my worm farm food (kitchen scraps and leftover cannabis matter with shredded junk mail) to make sure my castings are calcium rich. I advise you to keep calcium on your mind when customizing soil mixes and you will be one happy camper!



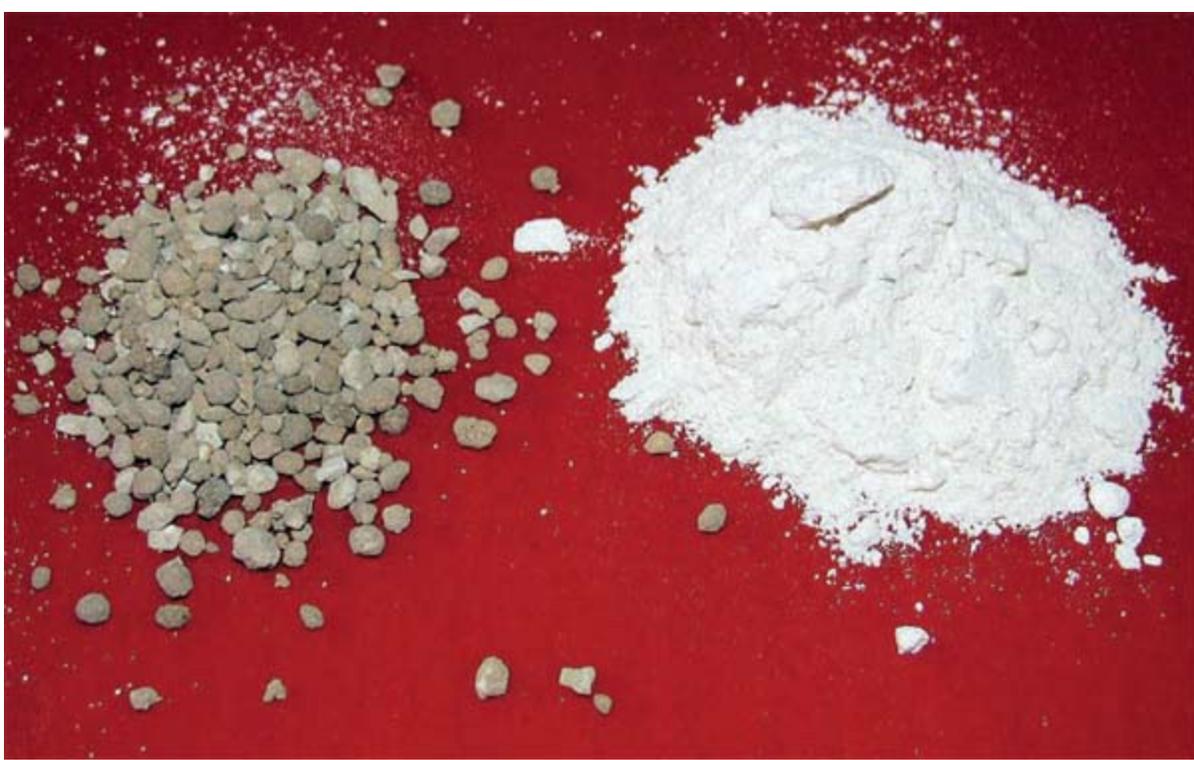
Both crushed (right) and ground (left) oyster shells are fantastic additions to a living soil mix

You can see that I use plenty of the crushed shells globally in the 2.1 soil mix, and this is because I like the larger pieces for their artificial reef qualities, and for the length of time it takes them to break down. Elements in a living TLO mix tend to break down much faster than is stated in many organic grow books. My crushed shells last about 90 days, from what I can see.

Dolomite Lime is really important for you to understand, when growing in containers especially. It is made from both calcium and magnesium, and cannabis plants love plenty of both of these elements. There are many kinds of lime, so be careful here. Using hydrated lime, for example, could very easily become a disaster in a living soil mix. Dolomite lime is what you want here, and I use this as one of my only magnesium sources, with the other being CaMg+ liquid by General Organics. There are several grades of Dolomite lime, so let's take a look at these first.

There is a granular version of Dolomite lime that looks like tiny reddish volcanic rocks. This is a very dense form of Dolomite, and really takes a long time to break down. This grade is virtually useless in container growing in my experience. There is also a granular version that looks like small shards of rock salt, and this works well for global applications for buffering. It is also a readily available source of calcium and magnesium for all the life in the container, including the plant! Another granular type is called "prilled" and this is little round reddish balls with a soluble shell of Dolomite lime, with a smaller harder rock in the center—sort of like a Peanut M&M—and this stuff is awesome for global applications. Both the prilled and the rock salt-looking granular types say "fast acting" on the bag, and this is a key phrase to look for when shopping for it. Fast-acting granular Dolomite works really well, but avoid the granular dense rocks that are not fast acting. Powdered Dolomite is an essential element in a custom soil mix and it is also super important to "cook" (as above) any soil mix to which you have added powdered Dolomite lime globally, or root damage is likely to happen.

Dolomite lime is one of my major sources of magnesium and calcium, and it also buffers the soil mix pH from dropping too low. The powdered version really helps to keep bacteria happy during the soil mix cooking process, because they tend to not like any drops in the pH of the soil. Fungi will take over the container soil mix if the pH drops super low in my experience, and once they have a certain level of dominance they seem to me to kill most or all of the bacteria present. Plant roots are not happy in the super low pH ranges that these fungi enjoy, and these fungi also tend to keep the pH down as well from their natural exudes. When mixing a lot of powerful nitrogen sources like blood meal and bird/bat guanos with Dolomite lime, make sure to see the section below regarding soft rock phosphate, to avoid losing some nitrogen before it's had a chance to affect the soil.

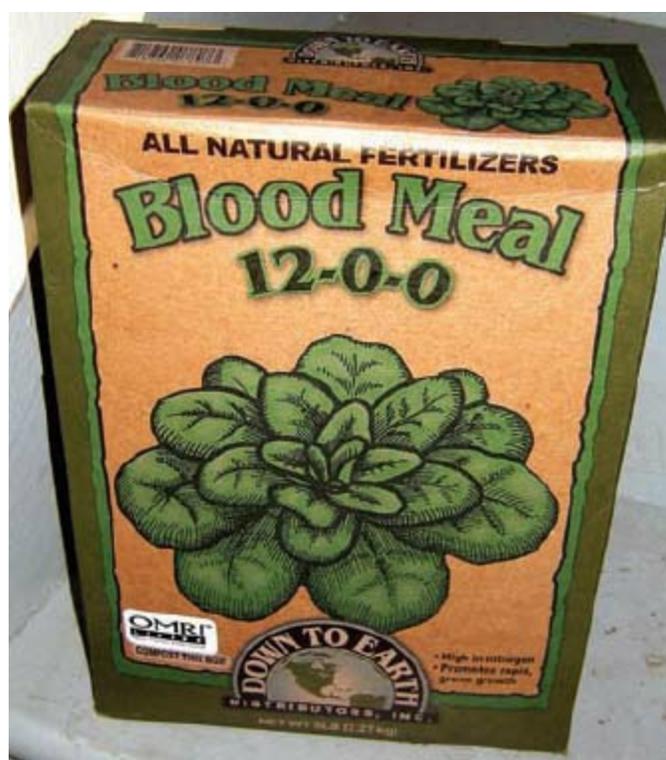


Dolomite lime comes in both prilled and powdered states

REV'S TIP

Dolomite lime is the only lime to use in TLO growing. Avoid any others. This is because Dolomite lime buffers the soil mix rather than just raising the pH like any other lime will do. Dolomite lime likes to take pH up, but no higher than 7.0 as a rule of thumb.

Blood meal and bird and bat guanos are powerful nutrient sources, and the N-P-K ratios are usually about 15-0-0 for blood meal, and 12-8-2 for bird and bat guano. These are essential additions for a super natural living soil mix. Blood meal can be as dangerous to use as it is powerful, so have great respect for the amount of damage this can cause if you misuse it. Guanos are only slightly less dangerous for all the same reasons as blood meal. These elements both catalyze large populations of microbial life, and you will need to cook any soil mix that contains these due to the rapid decomposition that happens while the microbial life has these high power sources of nitrogen to feed off. This reaction is the same one that happens in compost piles when high nitrogen is added; even additions like grass clippings or alfalfa have enough nitrogen to really get things cooking big in a compost pile, and all the decomposing will happen very fast with true heat from all the motion of the micro-beasties feeding and colonizing.

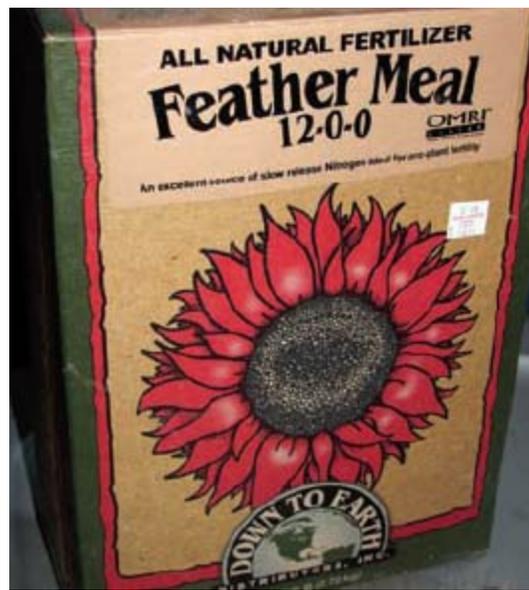


Blood meal is a great soil addition but one that needs to be used with care

As far as levels go, even $\frac{1}{2}$ a tablespoon of blood meal in a gallon of soil mix will overdose most cannabis plants if it is not cooked first. The same approximate measurement applies to guanos, as they are only slightly more forgiving. I like to use these elements in layers and zones as well as spikes. Again, it is very important to cook it first in a soil mix when mixed globally, because otherwise it can really cause big problems with nitrogen overdoses, and actual heat generated by the microlife, not to mention things like pH fluctuations. You will read in books about blood meal lasting 6 months in a soil mix, and in a TLO living mix it might last 2 months, but only for 1 month of that will it give massive nitrogen release, in my experience. Organic matter tends to decompose very quickly in a TLO environment, and bat and bird guanos only really rock the nitrogen for about 3 weeks and last about 4 weeks total. There are, of course, plenty of slow-release nutrients that will continue to be released through the natural cycles of the microbial life, but the “Big Bang” effects of those nutrients burn out rather quickly.

REV'S TIP

High-phosphorus bird and bat guanos are very acidic and will quickly lower the pH of your soil mix, so it is not a good idea to mix these globally. This is due to their highly available levels of phosphorus, which is proven to discourage fungi and algae in things like golf course ponds and home water features. This includes the all powerful and beloved Mycorrhizal fungus, so that puts bird and bat guano soil additions out of favor with TLO growers. You'll notice the 2.1 soil mix calls for zero high-phosphorus bird or bat guano mixed globally, and there's a good reason. However, I do love high-phosphorus guanos in special nutrient blends I use for layers or spikes, for flowering plants.

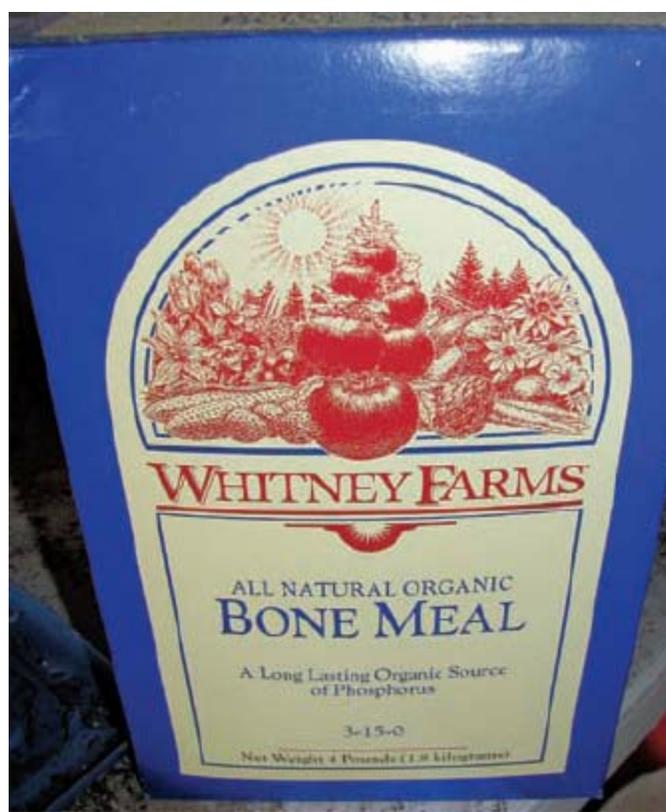


I use the Down to Earth brand feather meal

Feather meal is very out of the ordinary and is a fantastic element in your TLO soil mix. N-P-K ratios on this one usually are around 12–0–0, but it is a very “slow burning” source of nitrogen, and it lasts for a long time, even in super natural living soil mixes. Calcium is another benefit from feather meal, and while reading this book you will hear a lot about how very important both nitrogen and calcium are to all the soil life. Take a look at pretty much any good, all-purpose, dry organic fertilizer and you will see “feather meal” in the “derived from” portion of the label. There’s a very good reason for this; this slow-release nitrogen is wonderful for larger flowering plants in an organic garden.

You might read various opinions regarding feather meal, such as someone’s belief that the bio-availability of nitrogen in feather meal may be very low, or how nematodes and bacteria are the primary decomposers of feather meal. I can tell you firsthand that it is an extended-release nitrogen source, and just like any other nutrient, you can overdose your soil mix with it, causing problems and burning your plants. Feather meal is a byproduct of the poultry industry, and another perk of using it is that it brings calcium to your mix. Feather meal gives a continuous medium to slow nitrogen feed for about 10 weeks or so in my experience, and I dearly love this stuff.

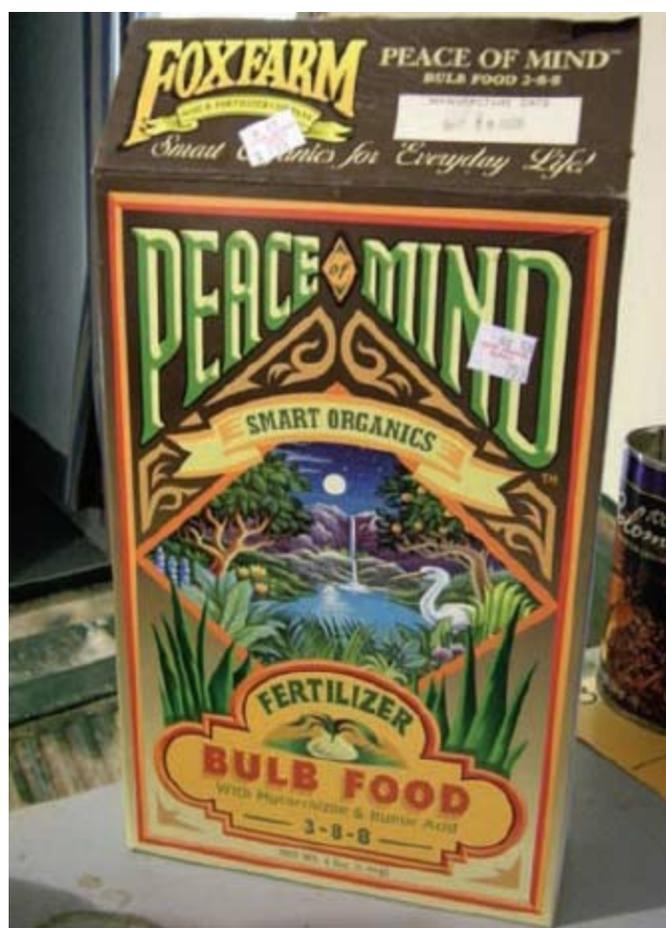
Bone meal is the source of one of the most common problems when using a living soil mix. You should assume that all bone meal is steamed bone meal, unless it is very granular; unsteamed bone meal is granular compared to the steamed version. Whitney Farms brand offers a great unsteamed bone meal that I use all the time. Let me explain why this matters so much, because it is a major issue. Much like high-phosphorus bat or bird guanos, steamed bone meal simply puts too much phosphorus into the soil mix for many of the good fungi, like the Mycorrhizal fungus, to handle. They just can’t deal with it and usually you will end up locking out phosphorus, or having the iron or calcium from the “extra” phosphorus bonding with calcium and/or iron, making them all unavailable to the plant. Never mix anything with a lot of available phosphorus into a living soil mix such as the soil in a TLO grow, because it is counter-productive.



I recommend Whitney Farms Unsteamed Bone Meal as it has always been a great product for me

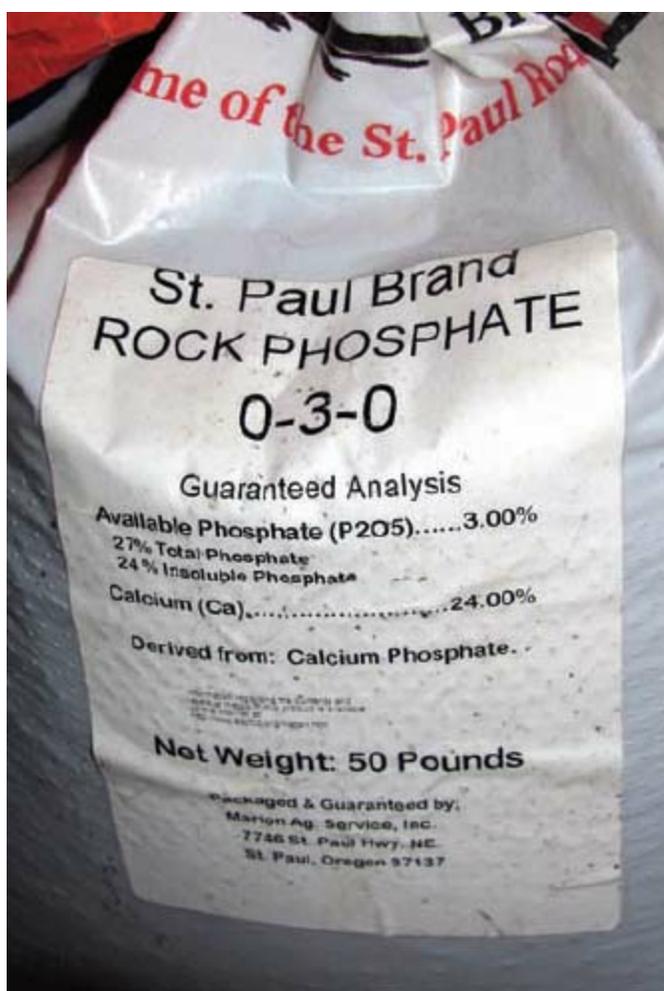
Unsteamed bone meal, however, does not piss off the good fungi, and is a slow- and longrelease phosphorus amendment. That's exactly how the plants need phosphorus: slow and steady. Plants can't take up a lot of phosphorus at any one time, so use the unsteamed bone meal globally as a buffer for pH and as a source for slow phosphorus, calcium, and nitrogen release. Use steamed versions of bone meal for spikes and layers only! Even though both of these types of bone meal (steamed and unsteamed) have N-P-K ratings of 3-15-0, it is important to understand the difference in the release rates as this is what makes all the difference in TLO growing.

Bulb food is something I like to add to the soil mix globally in small quantities. The buffering from the calcium content of this, and the high levels of potassium (K) and phosphorus (P) with a little nitrogen, makes this one a winner with a low enough P ratio to not impact the fungi negatively when added globally in small amounts. A standard N-P-K ratio of bulb food would be 3-8-8. The bulb food slowly releases P and K for a very long time, and very slowly, just like the plant prefers. Good stuff, Maynard.



Peace of Mind make a fantastic organic bulb food

Soft rock phosphate and rock phosphate are important short and long-term ingredients. I like granular rock phosphate (RP) for a super long-term phosphorus source. I recycle my soil mix, so I am really playing into the strengths of long-term nutrients like this. Soft rock phosphate (SRP) is powdered, and along with delivering very available phosphorus at a medium to slow release rate, it also has many other trace, micro, and secondary nutrients as well. This addition also has a really big benefit for any custom soil mix, and that is how it seems to counter a natural chemical reaction in the soil mix. When high-power nitrogen sources (like blood meal, alfalfa meal, and guanos) meet lime, some of the nitrogen converts into ammonia gas, which is just another form of nitrogen. However, when some powdered SRP is added to your custom soil mix, this does not happen. If you have ever mixed up a batch of soil and let it sit, then noticed it smelled like ammonia, this is why. I keep the ratios of SRP in the soil mix on the low side, due to the fact that too much of it (or any readily available phosphorus) will inhibit the good fungi, including the Mycorrhizal fungus.

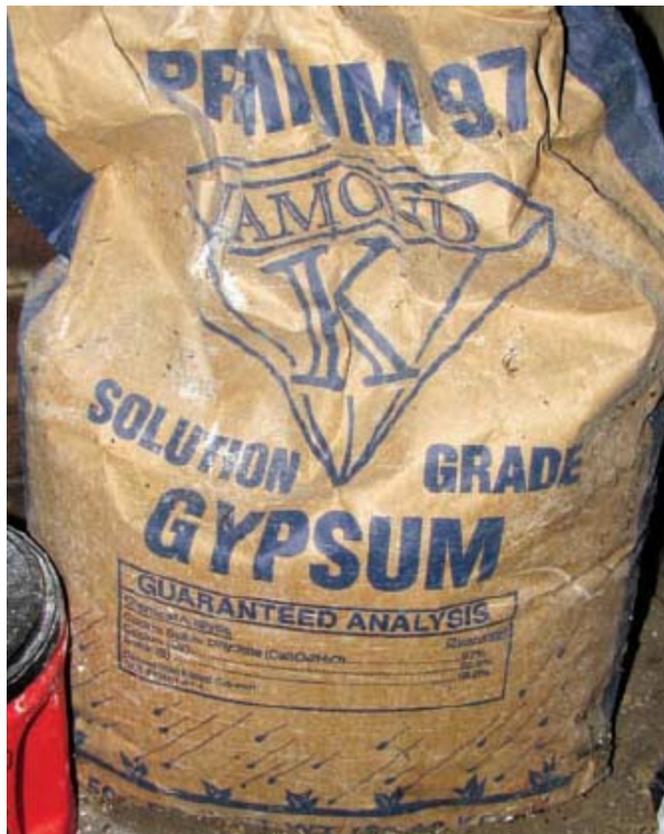


This granular rock phosphate has N-P-K ratios of 0-3-0



This powdered rock phosphate is a little lower in phosphorus

Gypsum is one of the most underappreciated elements in many all-natural gardens, and what it brings to the table is all good for cannabis especially. Some ancient organic growers from around “The Pygmy Forest” in Northern California used to rave all the time about gypsum, and how the slow-release sulfur enhanced natural smells and flavors in the final cannabis buds. Gypsum is calcium and sulfur, and many people believe, as I used to, that it radically lowers soil pH. The truth is that it will have this effect in soils that are already very low, and I think this is due to the fact that fungi really love gypsum. Outdoors gypsum works wonders on big clay-packed soils, and aerates them by somehow bringing in fungus to thrive on the clay minerals. Where fungi are dominant they tend to cause the pH to drop, as most of them prefer a lower soil pH. The upshot of this is that you should not make the mistake of using gypsum in a soil mix that has a low pH to start with: the low pH will give the fungi a little too much help and an unfair advantage. If the fungi get out of hand they will normally take the pH way too low and fry the plants. They seem to have done that to me in the past on three or four occasions.



I use powdered gypsum and love it for its slow-release sulfur



Down to Earth's kelp meal needs to be cooked before it is used, or it can drag the pH of your soil mix right down

In well-buffered soil mixes gypsum is a fantastic addition with a bunch of slow-release calcium and sulfur. Sulfur is very dangerous to add straight in its elemental form, due to the fact that sulfur will plummet your soil pH quickly and completely! As a direct sulfur addition is too dangerous, bringing in some sulfur like this in the gypsum is awesome because of the slow-release method. As long as your soil mix is well buffered, gypsum will not radically drop the pH value of your soil mix, but instead will only slightly lower it without any problems.

Kelp meal is always a great addition that brings in some fantastic elements and raw organic matter. It's rated high for nutrient and other beneficial elements, such as 60 minerals or elements, 12 vitamins and 21 amino acids. I like it a lot in any soil mix, but it really needs to be cooked first, because as it breaks down it can tend to take the soil's pH down pretty hard. I noticed that this happened repeatedly to me, when I was using soil mixes containing high amounts of raw plant matter of any kind; alfalfa, kelp, pot, lawn clippings, etc. Always cook a soil mix with any real amounts of raw (non-cooked or non-composted) organic matter in it.

You can easily go overboard with liquid seaweed and kelp products—as well as the soluble dry versions. This is a rookie mistake, and one that many of us have had to experience to know of its importance! Take my advice and be very careful not to overuse the liquid or soluble dry kelp and seaweed products. It is pretty tough to overuse kelp meal, but anything is possible. Kelp and seaweed products are also very full of available potassium (K), which is always a good thing in moderation. Always read the labels on any products before you use them.

Steer manure (always composted) is something I add in small amounts, because there are some

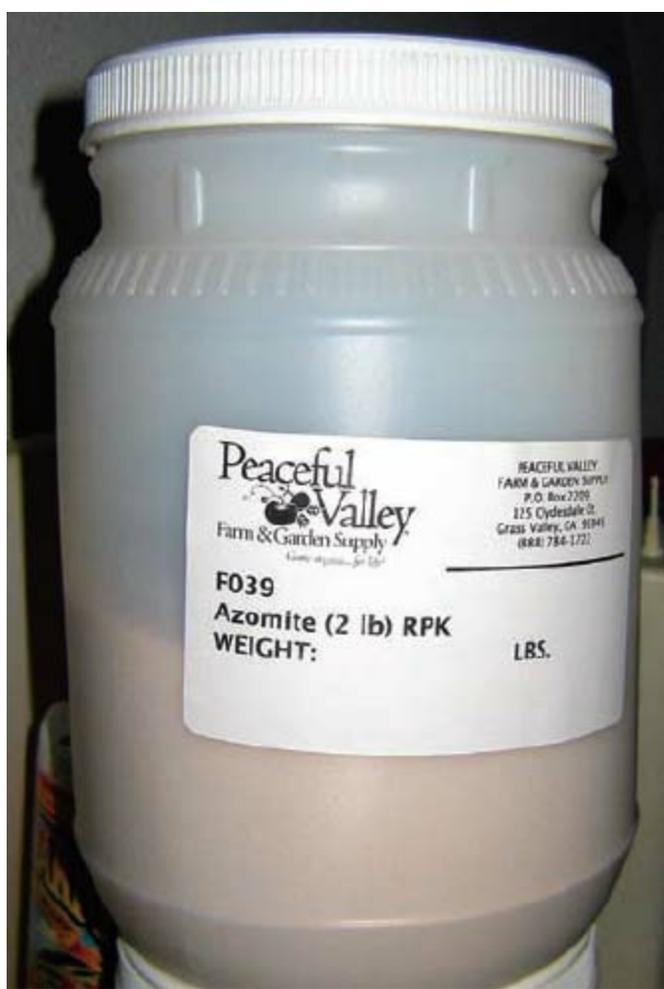
specialized and very beneficial microbeasties that tend to colonize steer manure, as I understand it. It also has a wonderful amount of nitrogen and highly bioactive organic matter, which is an excellent source of micronutrients as well. Find a good source for steer manure, or ask your local nursery to get some, because you will love the results you can get from using it. Cattle or barnyard manures are all good, but I have always found when it actually contains mostly steer manure, cannabis plants react very favorably, especially when it comes to flowering.



Composted steer manure might not sound great, but it's good for your soil mix in small amounts

I use a whole lower layer based on steer manure in my containers, and I'll give you the recipe in this book. When using steer manure in any real amounts, it is important to both buffer it a little bit and aerate it a lot. You will see these details a little farther along, but don't forget the steer manure.

Azomite has over 60 mineral and trace elements and this is really one of my big power hitters as far as long-term mineral nutrients—especially micronutrients—are concerned. It is available in finely powdered or granular versions. I use the granular version in my soil mix. Azomite is finely ground "Rock Dust", and if you can get hold of it, I strongly recommend its usage.



Peaceful Valley Farms' powdered azomite is full of micronutrients



Humic Acid Ore is very interesting, and I use the granular version made by Down to Earth. This is really a catalyst that aids in the absorption of micronutrients, phosphorus and potassium. It also acts like a wetting agent, allowing water to penetrate and permeate the soil mix extremely efficiently. This makes for excellent soil structure and enhances soil tilth as well. This also seems to lower the pH of the soil mix slightly, but if it is used at my suggested ratios this should not be a major problem.

Alfalfa meal or pellets are an awesome source of nitrogen, and alfalfa is super bio friendly due to its beautiful carbon to nitrogen ratio, although this results in rapid decomposition (cooking) that you don't really want happening with living roots on the scene. Rapid decomposition is a great thing, you just don't want it happening around living roots is all; that is why these things need to be composted or cooked first before living roots get to them.

Make sure if you use the pellets of alfalfa they are clean of any kind of additives. Alfalfa brings many trace and micronutrients to the table, as well as an exotic, all-natural growth enhancer called Triacantanol that may also help fight off parasitic fungi. I feed this stuff to my worms, top dress with it (which means to add a layer to the top of soil) and use it in teas almost always. Alfalfa is one of the cornerstone elements of TLO soil mix going super natural.



Alfalfa pellets, once composted, bring loads of lovely nitrogen to your soil mix

REV'S TIP

Alfalfa meal is great to add to worm food or to a soil mix before it is cooked. I prefer using the pellets of alfalfa, but you need to check these out thoroughly to make sure there are no additives in them.

Rice is a cool thing to add and I use Basmati rice. I always noticed my fungi stayed happier and kept my phosphorus and calcium levels more available to my plants when rice was in the soil mix. I always use it and I never forget or omit it, as I feel it is a very important component in a TLO soil mix—and it's cheap!



Believe it or not, Basmati rice can help the phosphorus and calcium stay available to your plants

**REV'S CUSTOM BOTTOM LAYER
MANURE MIX**

- 1 gallon composted steer manure
- 1 gallon perlite (small nugget size)
- 2 cups (heaping) coconut coir fiber (well rinsed with fresh water)
- 1 tablespoon greensand
- 1 tablespoon kelp meal
- 1 tablespoon ground oyster shell
- 2 tablespoons granular rock phosphate

In a typical 2-gallon container, this layer would be at the bottom, about three inches deep. However, I have made them both thinner and thicker, and they both work great, so figure out what works best for you. Composted steer manure is my first choice here, but any good composted farmyard manure should work fine. Steer manure, in my experience, seems to work phenomenally for flowering cannabis plants, while cow and other farmyard animal manures also work fine but not as amazingly.

Do not set the root ball of a transplant directly on this layer. Always have a nice little layer of mellow soil mix right under the root ball; the steer manure layer will burn roots if they are put directly on it. Allowing the roots to grow into it allows them time to adapt to feeding from the manure layer. I use this manure layer in every container except the initial 3-inch containers. In flowering this layer really makes a big difference to the final quality and size of the harvest.



These TLO clones have just been freshly planted and rooted. Look how happy they are!

TLO Soil Mix for Freshly Rooted Clones

You should always use a very mellow soil mix when planting freshly rooted clones. I have found that freshly rooted clones need a mellower soil mix than sprouts do. It is a common mistake to put freshly rooted clones into a soil mix that is too heavy with dry nutrients or to feed them with liquid nutrients too soon. Both of these actions will end up frying the plants. Here is my tried and true soil mix for this exact application:

MELLOW CLONE MIX

- 1 part bagged organic soil mix
- 1 part coconut coir fiber (thoroughly rinsed)
- 1 part small nugget-sized perlite

Try to always avoid touching new roots to bone-dry soil mixes, and don't forget to inoculate with some Mycorrhizal fungus and get that plant and beneficial fungus relationship up and running.

Balancing Your Soil Mix and Your Water Source

It is super important to keep the quality of your water on your mind all through your growing period. If you are not using a pure water source for some reason, and you think your water is low enough in dissolved minerals to be able to use, then I'll trust your judgment. Just make sure to use carbon filters if it is city tap water, because chloramine will devastate a living soil mix.

Say for example you want to use your city water; you have the carbon filtering all figured out, and your water registers about 60 PPM on a TDS meter. Since most of the dissolved minerals in any city tap or spring/well water will be calcium and magnesium, you just have to compensate for this by tweaking the dolomite lime ratios in your TLO soil mix. Your calcium and magnesium ratios are very important, and you need to have considerably more calcium than magnesium at all times. If you are using spring, well, or city tap water and you are having problems it could very well revolve around these ratios; it is not uncommon for well water or city water to be pretty high in magnesium. Too much magnesium in your living soil mix and the whole soil structure seems to break down; the soil takes on a real "crusty" state and becomes choked of good air flow (aeration), which is of course über-important for a living soil mix to have. Plants tend to die slow and horribly when magnesium levels are too high.

FAST ATTACK TLO SPIKES

When I first began spiking I used pure blood meal for vegging spikes and pure bone meal for flowering spikes. They were both a bit much given that I prefer to flower in 2–3 gallon containers. So I began experimenting with various blends and here are some that work really well. The real key to all these are establishing them days before the roots reach them. This way the roots can adapt to what they find and where they find it, rather than having the roots suddenly exposed to raw nutrients. Remember for a fast TLO soil mix go with 1 part earthworm castings, 1 part perlite, 1 part good quality soil mix like Gardner & Bloome. Just make sure it is all natural.

PURE POWER SPIKE

- 4 parts blood meal
- 2 parts high N bat or bird guano
- 2 parts feather meal
- 2 parts kelp meal

FLOWER POWER SPIKE

- 2 parts bone meal (steamed is fine)
- 2 parts high N bat or bird guano (yes I mean high N)
- 2 parts feather meal
- 2 parts kelp meal

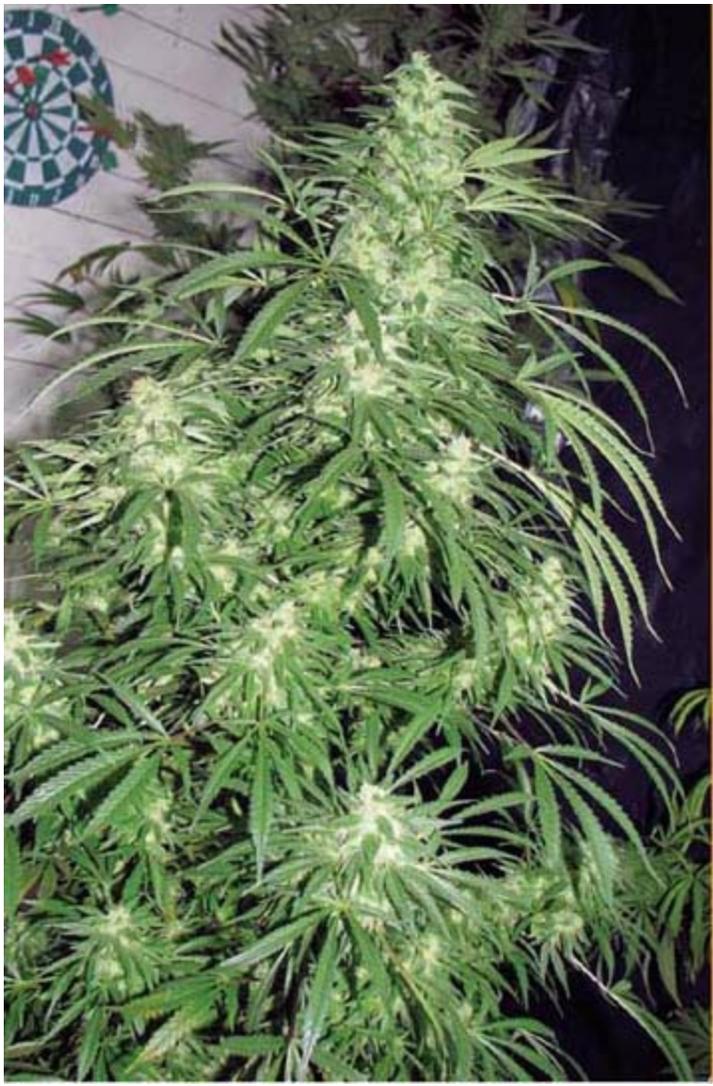
TLO ALL PURPOSE SPIKE (longer flowering sativas)

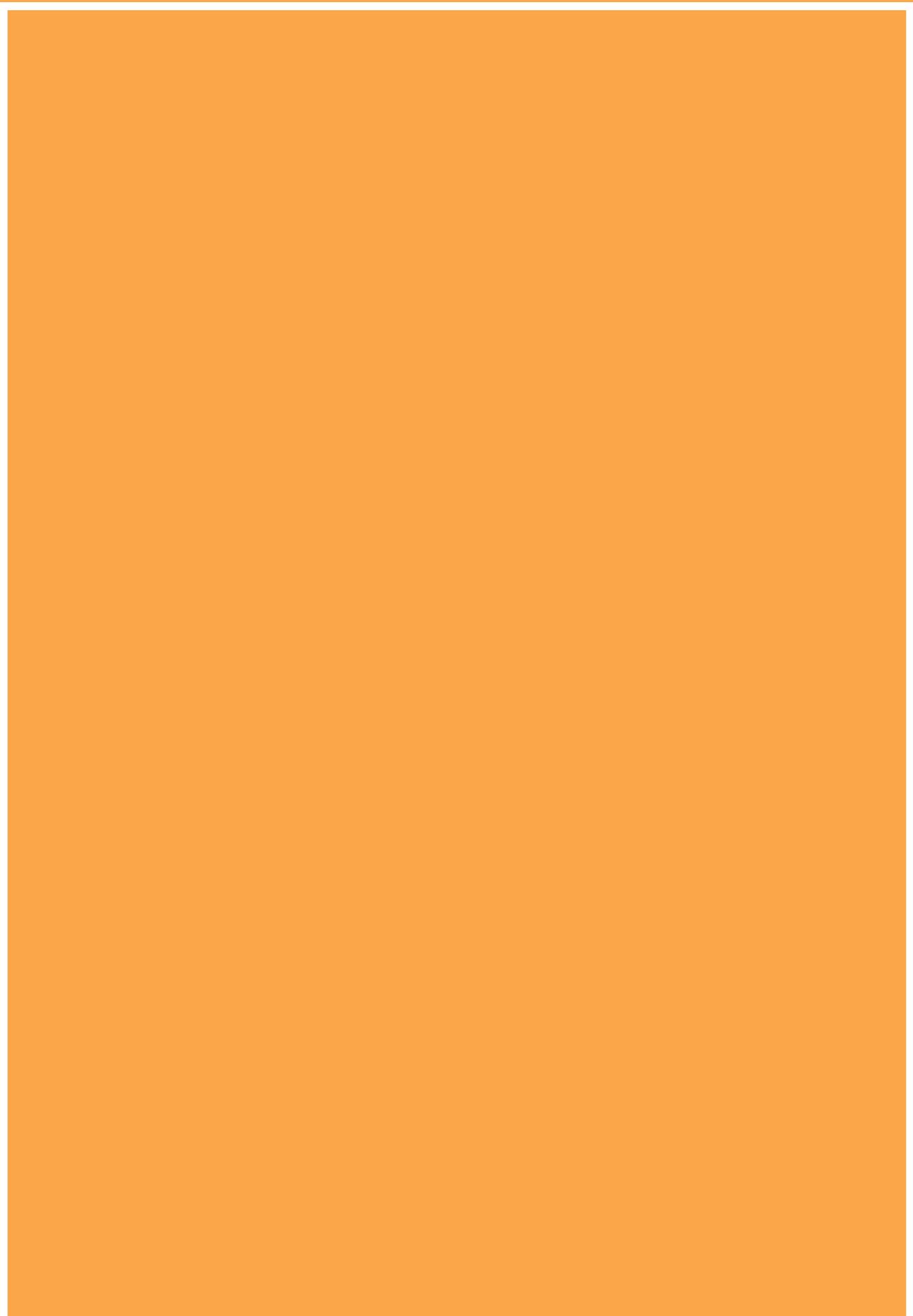
- 2 parts blood meal
- 2 parts feather meal
- 1 part high N bat or bird guano
- 2 parts bone meal
- 2 parts kelp meal
- 1 part alfalfa meal

EXOTIC ALL PURPOSE SPIKE (nice for landrace types)

- 2 parts blood meal
- 2 parts feather meal
- 2 parts high N bat or bird guano
- 2 parts kelp meal
- 1 part soft rock phosphate
- 1 part bone meal

- 1 part high P bat guano (0-5-0 N-P-K values)
 - 1 part ground oyster shell
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CHAPTER 5

Spikes and Layers



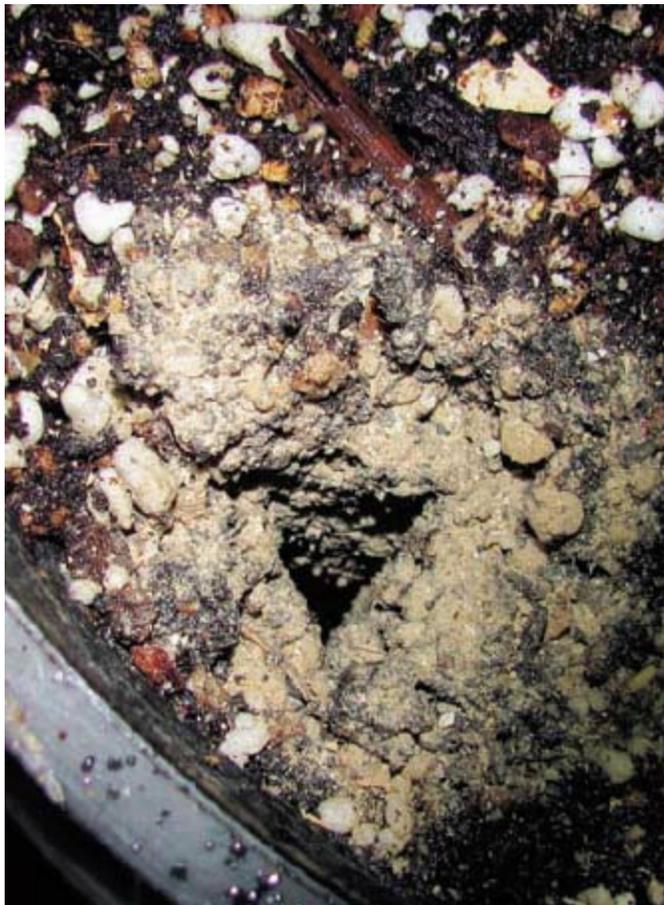
To create a hole for spiking, use something like this: my 2 gallon container spiking tool



The spike should go almost to the bottom of the container



Place the tool all the way in, as deep as you can



Now fill up the hole with your spiking mix and watch your plants thrive!

Spikes, Layers, and Zones, Oh My!

Here's the first real big twist that separates TLO growing from most other all-natural styles. Spikes give a lot of power to hungry weeds indeed. The TLO soil mix in this book requires additional elements in the container, and spikes are essential for bringing in more important elements such as nitrogen and phosphorus, to name two biggies. Nitrogen and phosphorus cannot be added globally to the soil mix in sufficient amounts, or there would be big problems with the microlife, and that is never a good thing in TLO growing.

Here are a couple of the main spike mixes I use, made from all-natural dry elements blended together:

ALL PURPOSE HIGH N SPIKE

- 2 parts blood meal
- 1 part steamed bone meal
- 1 part high N bat/bird guano (N-P-K example 12-8-2)
- 1 part feather meal
- 1 part kelp meal

FLOWERING SPIKE

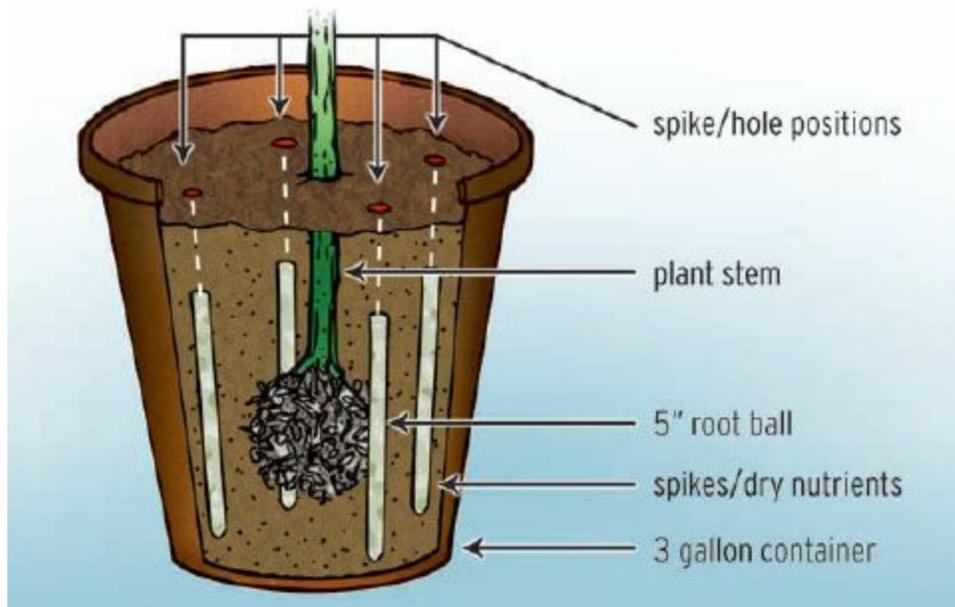
- 1 part bulb food (NPK example 3-8-8)
- 1 part feather meal
- 2 parts high N bat/bird guano
- 1 part steamed bone meal
- 1 part kelp meal

In the picture of the store-bought Jobe spikes, you can see the concept that we're going for here. You push these spikes into the soil mix for your roots to find and feed from. In TLO you can use these spikes if you like, as long as they are all natural, or you can blend your own—like I do—with the recipes above. In TLO you just make holes in your containers' soil mix and fill in those holes with the spike blends. I find a wooden dowel about ½ an inch wide makes for a great spike hole maker. You want to make the spikes BEFORE there are roots present, so I always do this during transplant, then the roots can find the spiked nutrients and adapt to them accordingly.



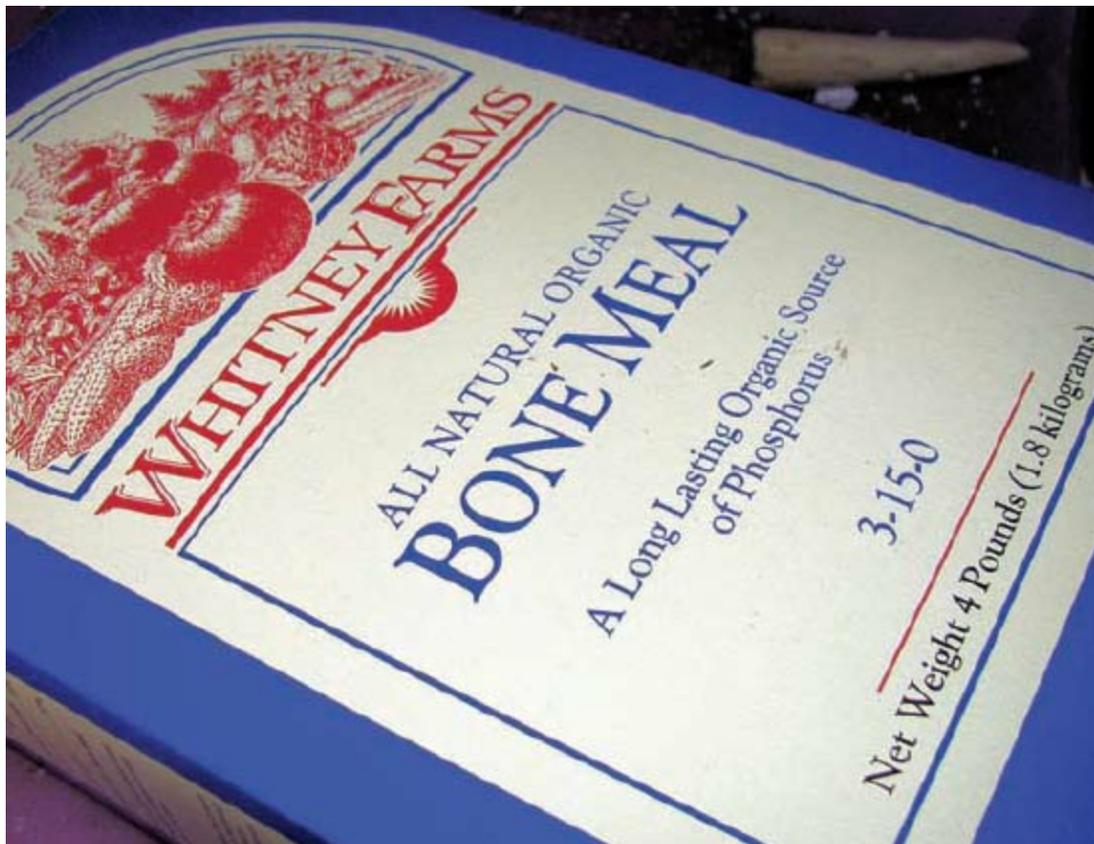
You can also buy commercially available organic spikes like the ones above

Using these spikes, along with the layering technique that I will explain later, allows you to add additional amounts of powerful all-natural dry nutrients without frying your plants, which is what would happen if you mixed these nutrients globally into a soil mix. Dry nutrients like steamed bone meal and blood meal can be used in spikes very effectively. My spikes are placed close to the container rim, so the roots have to grow a bit to reach them. In a typical 2-gallon container, planning for a 9-week flowering plant with a final height of about 2.5 feet tall, I would have my spike hole about ½ an inch wide and about 90% of the height of the container. So, if my container was 1 foot tall, let's say, my spike holes would be about 10–11 inches deep. A surprising amount of spike blend can be poured into these holes. After filling the holes, simply add a shredded bark mulch layer on top and water everything well.



Here you can see the perfect positions for spikes in a container full of soil mix

Do try your own blends too, but please use the ones suggested above first, as these are proven winners in TLO and will help you to understand the fundamentals before you embark on trying your own mixes.



Unsteamed bone meal is much better to use globally in your soil mix than steamed bone meal

REV'S TIP

Steamed bone meal is great for layers and spikes, but not so good to

blend in with a living soil mix like TLO. Also, things like blood meal and guanos (mixed in globally) must be treated with much respect for their powers of destruction if overused. These additives are potentially as destructive as they are beneficial. Mixing in too much dolomite lime will create a magnesium overdose in your soil mix, so don't overdo that either. Unsteamed bone meal can be blended into your soil mix globally, and it is easy to tell unsteamed bone meal because it is much more granular than the steamed variety.

Layers and zones essentially run to the same concept: concentrating some nutrients in a specific location(s), like with the spikes. In the case of layers and zones, you start with the “floor” of the container, which is just the bottom (inside) of a growing container before any soil mix has been added. I normally apply a thin splattering of a custom high-nitrogen blend here on the floor, along with some all-purpose dry nutrients, before I add any soil mix to the container. I put another thin layer of just high nitrogen blend under the bark mulch layer on top of the container mix once filled and spiked.



Here is a custom TLO layering blend that's high in nitrogen

HIGH NITROGEN LAYERING BLEND

- 2 parts blood meal
- 1 part feather meal
- 2 parts high nitrogen bird or bat guano
- 1 part ground oyster shells (a.k.a. “oyster shell flour”) or steamed bone meal

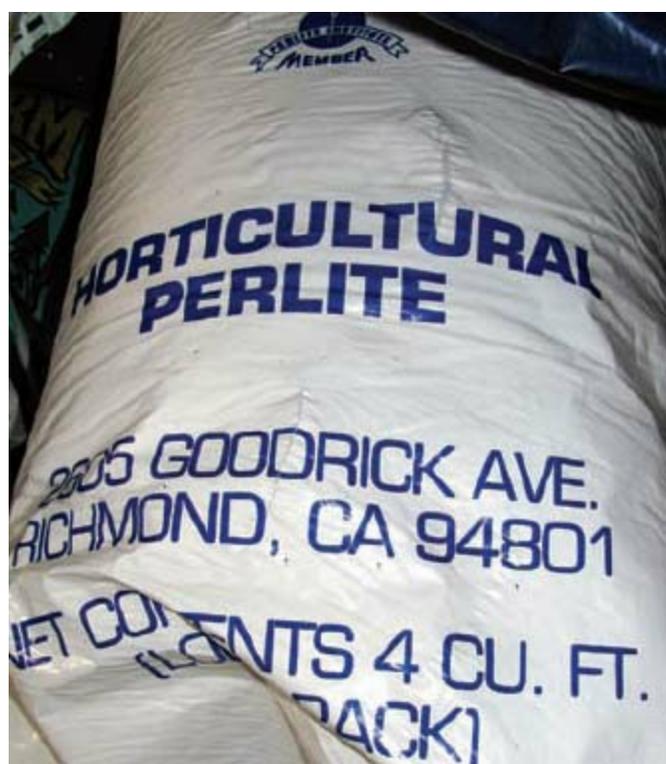
REV'S TIP

I use ground oyster shells by Down To Earth Company. You can find these online at the time of writing at: <http://www.americanag.com/>.

Just do a search for OYSTER SHELL to get taken right to them. Otherwise, contact Down to Earth to find the closest distributor to you. This is an important component in TLO growing. It is at once a pH balancing/buffering element as well as a slow-release calcium source, and an aerating amendment—nice!

I believe that it's better to use layers and zones with higher nitrogen blends. You could also try layering with things like high phosphorus bird or bat guano, but you would need to buffer that with some steamed bone meal or ground oyster shells. If you don't use a buffer, phosphorus bird and bat guanos will really lower the pH in that zone or layer. In the High-Nitrogen Layering Blend, you can substitute steamed bone meal for the ground oyster shells. The ground oyster shells are highly valuable in TLO, so try and locate some if you can.

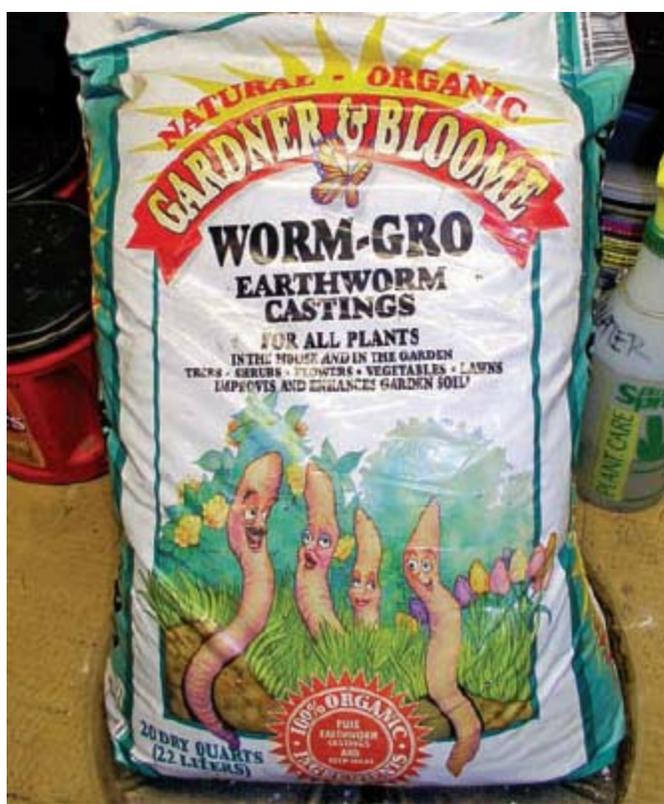
In larger containers, you can use earthworm castings and/or compost to fill spike holes and use in zones/layers. Just keep in mind you need to aerate these and *keep them aerated*. Things like coconut coir fiber and shredded bark mulch are all well and good to start out as aerating additions; however, these are made of organic matter and will be decomposed rapidly in a super natural TLO living soil mix. This often results in anaerobic conditions arising, which smell like shit (literally) and kill roots—and hence, kills your plants. This is why perlite is such a great amendment for all aeration needs in TLO container growing. There is no type of microbial life in your TLO containers that consumes perlite, which is nice. Simple mathematics dictates that smaller nugget perlite is better at aeration. I know you may think larger nugget sized perlite would work better, but trust me, that is a false assumption. I flower in relatively small containers, so I need more “bang” in my spikes and layers/zones than castings or compost can deliver.



I can't recommend perlite strongly enough; no indoor living soil mix is complete without it!

One final note regarding coconut coir fiber products is that many of them are salty, with sodium, sea salts or potassium salts. Excess amounts of these are very bad for a living soil mix, so make sure you get a good brand that says it has been flushed of excess salts, such as Botanicare's CocoGro Coconut Coir Fiber.

Earthworm Castings and Fresh Compost are two of the most effective organic matter sources you can use in all natural cannabis growing. The upsides are many, and the downsides are few; we always love that! It is important for you to understand when growing the TLO style, we do not like the word "sterile"—except, perhaps, in regard to our cloners. You always want fresh castings or compost if possible; fresh and healthy. The smell should be earth-like and clean, not stinky at all. It is pretty easy to find earthworm castings, and if there are living worms in the bag of castings, everything is beautiful! Any beneficial life that fresh (or living) castings or compost brings to your soil mix is arguably its greatest benefit. My favorite brand of bagged earthworm castings is called Worm-Gro by Gardner & Bloome; I'm not compensated in any way to say that, I just happen to be a big fan. Talk to your local nursery or grow shop and see if they will order them for you if they do not carry them already. These are wonderful castings, totally full of life and nutrients that your plants will love. TLO is all about life, and living compost or earthworm castings not only bring in a wide array of bacteria and fungi species that are super beneficial, but also micro-predators like protozoa, which are essential to a super natural soil food web of life, just like lions are needed in nature.



Gardner and Bloome castings are excellent for TLO growing



Alpaca Gold all organic earthworm castings are perfect for use in TLO growing

You can use compost or castings in layers or spikes when you are building your containers; just remember that these need heavy duty aeration due to the magnitude of microlife that will colonize these layers or zones. Again, use small nugget sized perlite at a ratio of around 30:70 perlite to castings. I would also like to give a shout-out to Alpaca Gold Organics Earthworm Castings of Oregon, USA. I use these mixed with my own homemade earthworm castings at about a 50/50 ratio

with amazing results. These are Red Wiggler castings from worms that are fed alpaca poop. If you are able to get your hands on some of these castings, I highly recommend it! These are extra rich in secondary and micronutrients.

As a rule of thumb, the larger your container size is, relative to your plant size, the mellower you can be when building your container mixes. I use spikes full of dry nutrients like blood and bone meal because I tend to flower in smaller (2-gallon) containers, under 400 watt Eye Blue Halide lamps. However, if I were doing the same thing in 3-gallon containers, I could just use castings and perlite in my spikes. In addition, the flowering time of whatever genetics you choose to grow will be another relevant factor when deciding how to build your container mixes.



Since I invested in my own personal earthworm farm I haven't looked back!

Having your own earthworm farm is the best option for some people, including me, and I am able to keep mine actually inside my indoor TLO cannabis garden, as you can see in the picture. Once you get the hang of taking care of one of these it is super easy and beneficial in lots of ways. I even got a juicer and started eating way healthier, just so I could have a good source of worm food. They like juicer leftovers, used coffee (or tea) grounds and filters, as well as any vegetable leftovers including all leftover cannabis plant matter like leaves and stems. You should let any fresh plant matter dry out before adding it to the worm farm, and chop up the stems a bit as well. Buffering the pH of all the organic matter with crushed up eggshells, crushed or ground oyster shells, and coconut coir fiber is recommended. I also feed them all my junk mail after it goes through the shredder.



This organic cannabis matter is drying, before I feed it to the worms (spread the love!)

The liquid that collects from a spigot on my worm farm is very powerful stuff, and I usually pour mine back into the worm farm, but not until I've used a little in watering my plants. My ratios are about $\frac{1}{2}$ cup of worm juice per gallon of reverse osmosis water, and I don't do that every time I water. My worm juice is very high in PPM/TDS and this is likely due to the fact that I routinely add a little greensand and ground oyster shells to my worm food; these both also help to buffer the pH as well. The excellent minerals in the greensand are quickly broken down and accessed, due to all the living organic activity in the proximity. This is my theory at any rate, because I know that supernatural levels of microbial life tend to require surprisingly high amounts of calcium and nitrogen. The microlife will actually steal this from the plant roots if supply is limited.

We will discuss earthworm castings and compost teas later in this book. The liquid that collects from these kinds of worm farms (which comes out of a spigot at the base) is actually called leachate or leachate worm tea, but it should not be confused with an organic TLO tea. I have also found it beneficial to aerate all my worm food with small nugget sized perlite, and I leave the spigot at the bottom open, with a small catch tray underneath. This encourages more airflow, and it is always good to be extra concerned with airflow when you are spawning huge populations of microlife. In your TLO containers, if air is hard to find, the living soil mix can and will take air from the roots; and this is never a good thing. Always be thinking of how to supply better aeration to any living medium, be it your earthworm food/castings, or your containers full of living TLO soil mix.



These lovely worms will give you some great soil mix additions!

REV'S TIP

Here's where I got my worm farm and starter worms from: <http://www.homecompostingsolutions.com>. It will cost you around a hundred dollars to get all set up with one like mine, complete with some Red Wiggler worms.

Layers and spikes revealed further

Here are two TLO spike recipes. The vegetative spike leans more heavily towards nitrogen, but I think they are both well balanced and well buffered.

SPIKE #1 ALL-PURPOSE/VEG

- 1½ cups blood meal
- ½ cup steamed bone meal
- ½ cup high N bat/bird guano
- ½ cup feather meal
- ½ cup kelp meal
- 1 tablespoon ground oyster shell (optional)

SPIKE #2 ALL-PURPOSE/FLOWERING

- 1 cup feather meal
- ¼ cup bulb food with N-P-K ratio of 3-8-8
- ¼ cup soft rock phosphate
- ½ cup steamed bone meal
- ½ cup high N bat/bird guano
- 1 cup kelp meal
- 1 tablespoon ground oyster shell
- 1 tablespoon Azomite powder (optional)

These are basically just custom dry blends for filling up spiked/poked holes in the container mix. This is done during a transplant so that the microlife has time to colonize the nutrient-rich spikes before the roots arrive. Don't do this once a plant has put roots throughout the container. Spikes can go top to bottom in length, or they can be shallower. It's totally up to you and your needs. In a typical 1-gallon container for vegetative stage plants, I would make 4 spike holes, and I would fill 2 of the holes with some earthworm castings, and 1 with the veg spike recipe and 1 with the flowering spike recipe. Alternately, I would use the flowering spikes and the vegetative spikes in equal numbers—like 2 of each for example—even in a vegetative growing stage; plants always prefer some balance to their nutrients, just like your own body does.

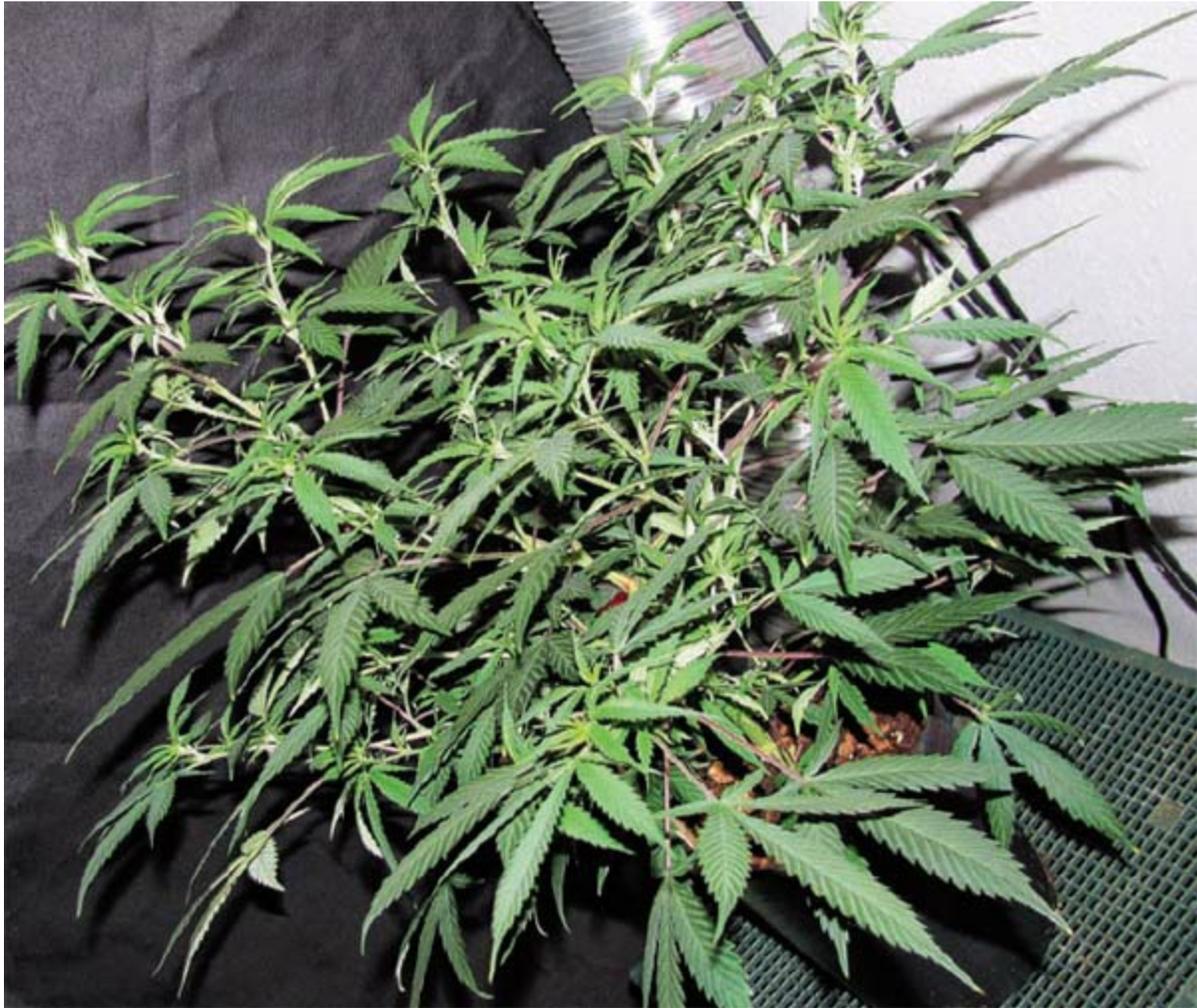


This is a filled spike hole in a 2 gallon container

Avoid using lime (of any kind) in spikes. I have consistently experienced bad results when adding dolomite lime to spikes. I prefer to use ground oyster shell, and things like bulb food and steamed bone meal to balance the pH of my spikes to some degree, keeping them from experiencing a drop in pH from things like guanos, blood meal, and any raw organic matter like kelp or alfalfa meal.

Layers take on two basic meanings in TLO growing. You can layer with either an actual, specially mixed soil mix used at some level of the container, like the custom steer manure bottom layer mix, or you can create a layer of pure nutrients. Both of these can be very beneficial to your TLO grow. Any time I am filling a container larger than $\frac{1}{2}$ gallon I will use layers out of habit. The steer manure layer on the bottom is standard TLO practice for me, and I will also very often mix in extra earthworm castings for the top couple of inches of the soil mix—just under the bark mulch layer on the very top. However, layering with pure nutrients is something I also do regularly. I really love the two granular dry nutrients for usage here by Botanicare called “Pure,” and they come in both grow and bloom versions. I will often use a tablespoon of these nutrients at various levels as I am filling my containers during a transplant, and on the “floor” of the containers before I ever add a soil mix of any kind. Typically in, say, a 1-gallon container, in the vegetative state, I would use something like blood meal, or bird/bat guano (high-nitrogen type) on the floor along with the Botanicare Pure, before adding the soil mix. If I didn’t have any Botanicare Pure, I would use another good, all-purpose style dry nutrient in its place, with fairly even N-P-K numbers, such as 5-5-5. I would then use the Pure or all purpose again at least once at some level, as I filled the container up, after I had placed the root ball in. This would give a horizontal plane in the container surrounding the root ball with an extra tablespoon worth of all-purpose dry nutrients of some type. This concentrates the nutrients so the roots can choose to avoid it or dive in if they wish. This avoids frying your plants, by using spikes and layers, rather than just goosing up the nutrient additions globally in the whole mix, which will frequently kill or stunt your plants.

You can get carried away with the practice of layering, so start out easy and tune it up slowly as needed. There are areas in your container that need some special attention, especially when it comes to nitrogen. The massive populations of microlife near the drain holes on the bottom and just under the bark mulch up top are super nitrogen hungry, so it is always advantageous to layer in some extra nitrogen at these locations.

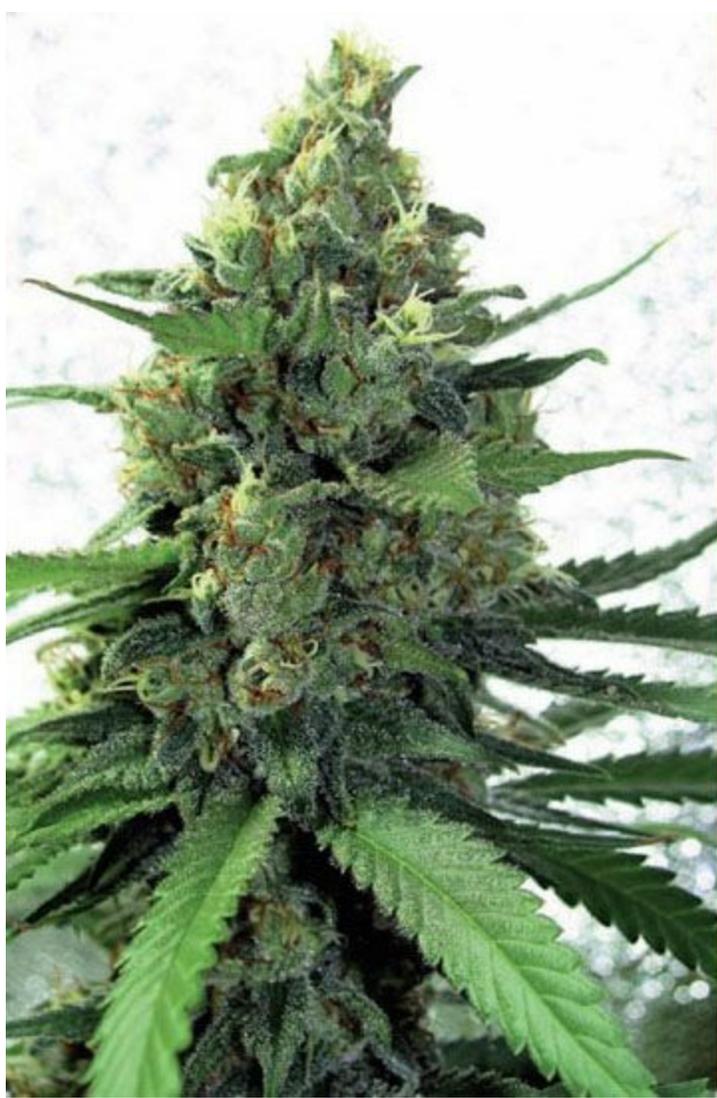


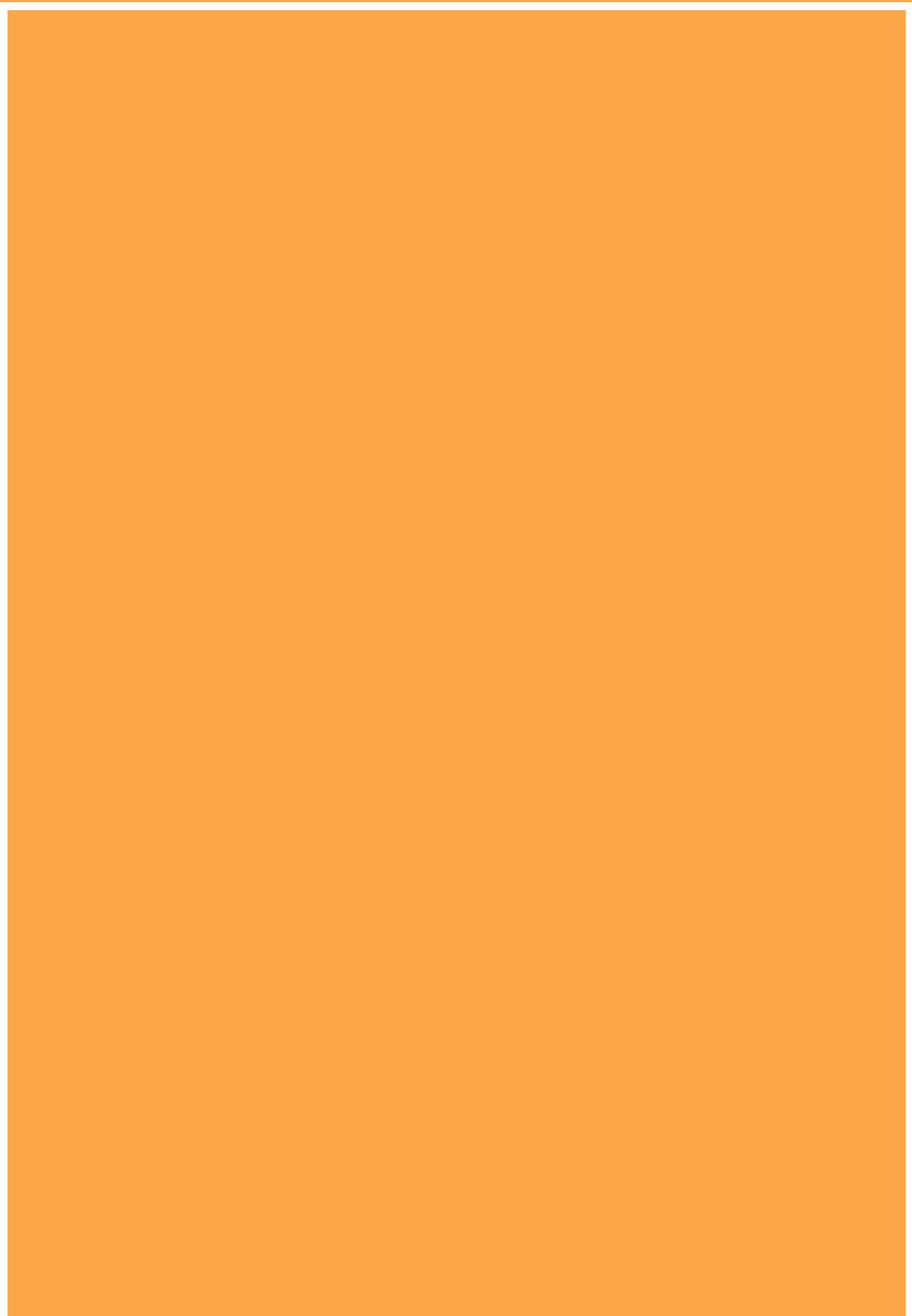
Layers and spikes are perfect for smaller TLO containers

AWESOME TLO TWEAKS THAT GO THE EXTRA MILE

Here are some of the higher end tweaks I use, and as you get more comfy with TLO you will have your own favorite tweaks as well. Just remember not to do a whole bunch of new stuff all at once because if something goes south you will have too many variables to figure it out.

- Get a little earthworm farm, or make one, and start recycling your soil, roots, etc.
 - Use high-grade organic molasses for teas during flowering stages.
 - Use a pure water source like reverse osmosis, rain or distilled.
 - Always add a little calcium and magnesium to your pure water—I recommend CaMg+ liquid by General Organics at 10 drops per gallon of pure water.
 - Use dry soluble kelp/seaweed products rather than liquid because they will stay good forever.
 - If you use an aero or bubble cloner, after your cuttings have been in it for about 4 days, add about 10 drops of CaMg+ by General Organics and the roots will BOOM!
 - Use a high end and fresh source for any microbial life (like Myco fungi) in a bottle. Great White is awesome in my experience.
 - Always use a shredded bark mulch layer on top of all your containers; this has a million benefits and no downsides. Avoid cedar and walnut products.
 - Big Bloom by Fox Farm is great stuff, just like a concentrated tea full of highly nutritional microbeasty food.
 - If you use coconut fiber, try the expanded Cocogro product by Botanicare. It's thoroughly rinsed for low, low salts; a very important thing.
 - Try keeping your lights at about 2 feet above plant tops, as this makes for super happy plants.
 - LED lights are badass for sprouting and vegging, I love them and they run cool.
 - Use 400 watt HID lights rather than 1000 watt due to several reasons of convenience.
 - I would always recommend using Eye Blue Metal Halide Bulbs for flowering at the time of writing, and I have been a huge fan of these bulbs for almost a decade.
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CHAPTER 6

Additives

Dry Additives and Elements

The notable dry additives and elements in a living TLO soil mix are many, but I want to run through several of them here to give you a better idea of why you are using specific things. Understanding this, or even starting to, will allow you to successfully substitute for other amendments when necessary—with “successfully” being the key word here. Also, understanding many of these things will really open your eyes as to how things work in the natural world. It sure opened mine and continues to amaze me at every new turn.

The differences between a granular and a powdered form of elements is important to note, and usually is directly relative to strength of release and length of release. There are several issues when growing TLO-style where this will matter a great deal and I will strive to point all those out to you as we cover them.

Perlite

Perlite is, simply put, a volcanic glass that is all natural and quite solid in nature. When heated, this glass expands big time, resulting in the highly porous and light material called perlite. This material does not decompose or otherwise break down easily, which makes it perfect for aerating a living TLO soil mix. I would be lost trying to use a living soil mix in containers without perlite. I recommend using small nugget sized perlite due to the increased surface area, making it a much more effective aerating amendment.



Here you can see both large and small nugget sized perlite

I like to use perlite in any soil mix I am using in containers. My standard application rate for

already bagged soil mixes is around 1 part perlite to 2 parts soil mix. When using living mixes in container growing, you always need to be highly concerned with making sure there is enough air for all the microlife to breathe AND enough for the plant roots as well. Please always use a respirator when mixing perlite; the dust can cause a really bad cough if inhaled. I always open the bag and spray a bit of water inside, just to cut down on the dust as much as possible.

Mycorrhizal fungus

Myco fungus, as I call it, is one of the most important parts of container growing. You need to know just a few things about this amazing fungus to use it successfully in TLO, and the first is the expiration date! Be sure to get a high-quality fresh product here. When dormant and dry in bottles they are good for almost 2 years, and in soil mixes they are also good for at least a year as long as the bags of Mycoinfused soil mix have not been stored in direct sunlight or high heat.



Great White is a fantastic brand of myco fungi and has never let me down

There are two main types of Myco fungus, and these are the “Ecto” (ectomycorrhizal fungi) and “Endo” (endomycorrhizal fungi) types. Simply put, the Ecto type of Myco fungus mostly associates with tree roots, while the Endo type associates with vegetables and cannabis. The term “arbuscular mycorrhizal fungus” (AMF), is also used, and refers to a type of Endo Myco fungus. The fundamental differences between the two types is that the Ecto tends to “sheath” around the roots with its spiderweb-like hyphae growth, while the Endo/AMF actually penetrates the cells of living roots, forming a symbiotic relationship with the plant.

REV'S TIP

Myco fungi that is dormant in the bottle for sale is pretty easy to find at high-end nurseries or grow shops. It comes in both granular and soluble dry forms and is actually reasonably priced for what it does for you. Your yields and overall quality levels are greatly increased when this fungus is used in TLO container growing. The Myco fungus is known as a mutualistic fungus, and it actually works with the plant. The roots supply the fungi with certain elements, and in turn the fungus actually brings available minerals and elements to the plant, effectively extending the reach of the roots. Not only can these Myco fungi bring in nutrient elements, they can actually free locked-up nutrients, such as phosphorus (P), in the soil and bring them in an available state to the plant roots. P is über-important to both root growth and size of flowers/yields, so you can see how important it is to have these Myco fungi on the scene in your containers. I use all three; I have a soil mix from the nursery with Myco fungus in it, and I have soluble and granular versions in the bottles as well.

Soluble applications of Myco fungus should be delivered using chlorine-free water only. I use this version a week after sprouting or 10 days after any transplanting. I use the granular version in the container just below where I set the root ball down, and I actually set the root ball down on a thin sprinkling of this granular version. Whenever I transplant freshly rooted clones, I use a Myco fungi-infused soil mix, and my favorite for this purpose is the Gardner & Bloome brand of Blue Ribbon Potting Soil. This is great soil, and it only needs to be aerated with a little additional perlite.

Blood meal, feather meal, and guanos

These are high-nitrogen, dry, all-natural fertilizers and I use all of them in TLO container growing. Cannabis likes a lot of nitrogen, and so does the living soil mix. The biggest and most notable difference in those elements is the strength of release. The guanos (from either birds or bats) and the blood meal are both very strong and supply a lot of nitrogen fast. The feather meal has a weaker release rate, but lasts very long in the soil mix. Why does this matter? First of all, you have to be very careful using blood meal and guanos because these are so powerful; in fact, they can sizzle your poor plants into a burnt brown mess in no time. The feather meal is a great fertilizer, and supplies slower nitrogen over a much longer time, along with some calcium. Nitrogen and calcium is a much-loved combination by TLO growers, and you'll come to see why.



Be very careful using bat guano as too much can quickly sizzle your plants

REV'S TIP

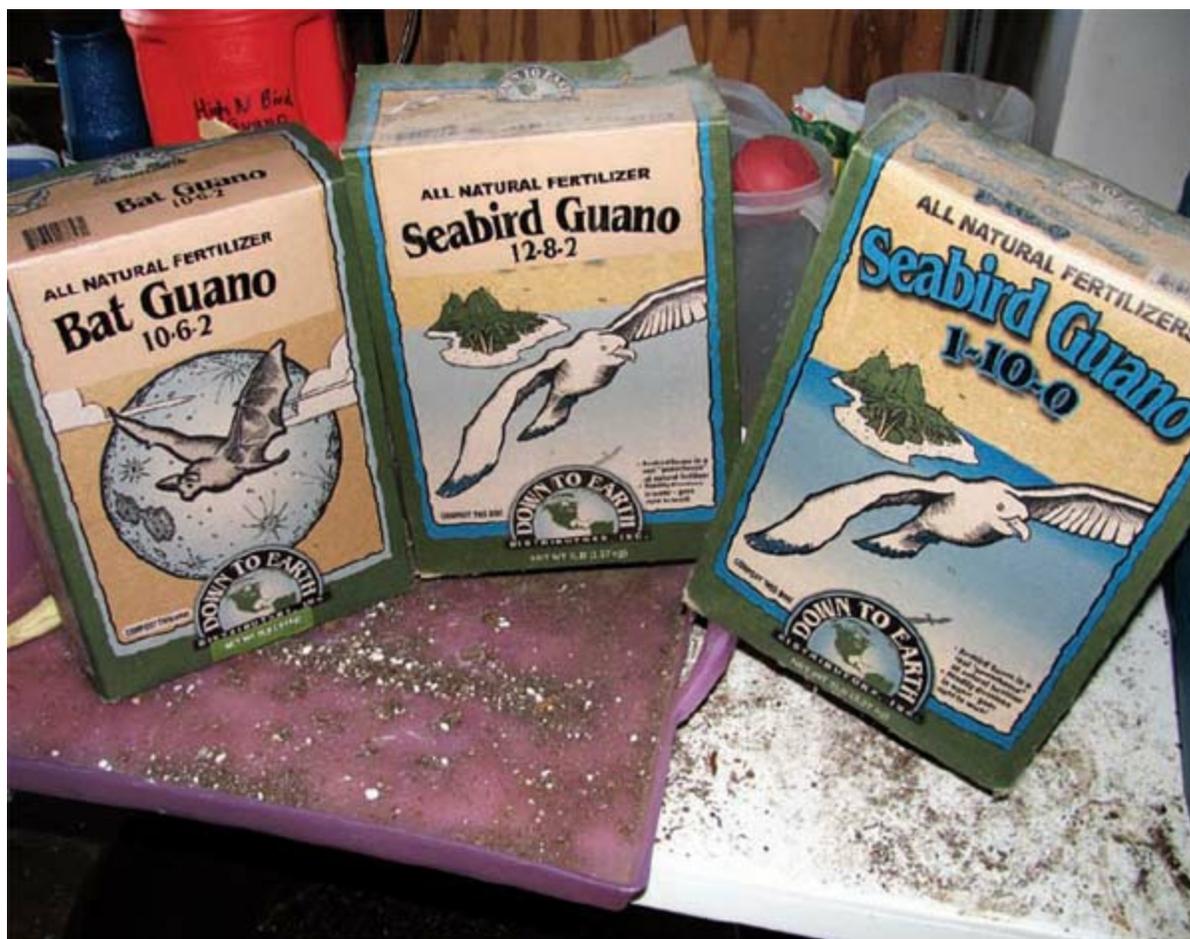
Here's one of the custom TLO blends I use all the time. This is a major ass-kicker when it comes to supplying nitrogen, as it is both very powerful and long lasting, not to mention buffered for pH balance by the ground oyster shell.

TLO CUSTOM HIGH (AND DRY) NITROGEN BLEND

- 2 parts blood meal
- 2 parts high-nitrogen bat (or bird) guano (example around 12-8-2 NPK)
- 2 part feather meal
- 1 part ground oyster shell

This mix is not only high in nitrogen, but has some phosphorus, iron, and calcium as well. I use this mix when layering dry nutrients on the floor of the container, and right under the bark mulch layer to add some much-needed extra nitrogen and calcium for the microlife. Yes, you are feeding the soil! In a typical 2-gallon container, I would use about 1 tablespoon in two places, on the floor of the container (before anything else is added to the container) and just under the bark mulch layer on top.

High phosphorus (high P) guanos affect the pH of the soil mix more than the higher nitrogen types, in my experience. This needs to be considered if using this globally mixed in the soil mix, as the pH will be dragged down heavily. Buffering it with ground oyster shells is a good idea, but keep in mind that too high a concentration of additives such as high-P guanos, steamed bone meal, and even powdered soft rock phosphate (all higher-P dry fertilizers) globally mixed in your soil mix can have a real negative effect on the good fungus in your living mix. We love the good fungus in TLO and there are many kinds, including the mycorrhizal fungus, which are actually a critical part of TLO and any type of growing in a living soil mix.

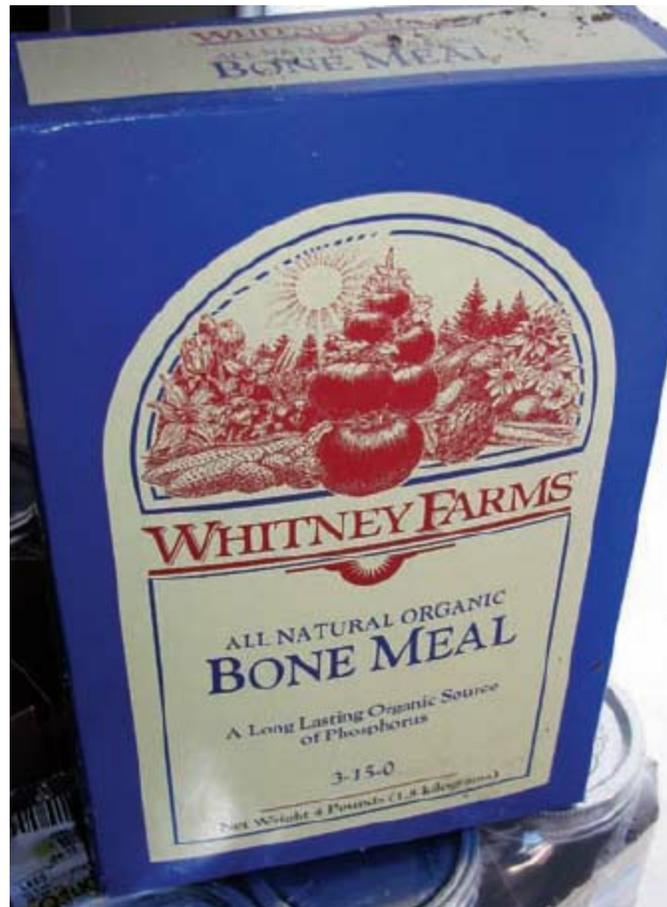


These are a few of my favorite dry guanos

A final note on guanos: don't use these fresh out of the birds or bats, or else you will most likely kill your plants with them. Be very careful when collecting dry guano from bats or birds. Many dangerous things can be lurking, including a few types of fungi that are very nasty to humans. Always use a respirator, and be sure to compost the guano first if at all possible. It must be at least dried before it is safely usable in container growing.

Bone Meal vs. Steamed Bone Meal

This is one of those things that seem irrelevant when you have synthetic mindset, but let me assure you that this is a very important distinction, and I'll tell you why. Typically both kinds have N-P-K ratios of 3-15-0 or so. The steamed variety delivers way more available phosphorus faster than the plant can use it. This results in left over phosphorus, which locks up fast. Not only does that cause a domino effect of problems, but it also really pisses off the good fungi and that is bad news for any living soil mix. On the other hand, unsteamed bone meal is all good to mix in globally with your soil mix, and I always add some. Bone meal buffers the pH from dropping drastically and supplies the all-important calcium as well. I only use steamed bone meal in spikes, or layers, due to the reasons above.



This bone meal is unsteamed and is good to mix globally into your soil

The unsteamed type of bone meal is easy to spot due to its more granular nature. My favorite brand is the Whitney Farm brand as it is available to me locally. Steamed bone meal is always in an almost powdery state, due to the steaming process.

Lime and Dolomite Lime

I have noticed that the lime stuff tends to perplex many new TLO growers, so let me break it down to you from a TLO perspective. Dry lime in your mix serves several purposes in TLO growing. First of all let me say that you should never mix any lime directly with dry nutrients, such as in a spike or a layer. When I talk later in the book about “cooking” your soil mix, you’ll see that this is partly necessary due to the initial lime additions to your soil mix, and the instant reactions this causes with other nutrients, which can be detrimental to roots. I use two grades of dolomite lime: a granular, fast-

acting, prilled type, and a powdered type. Prilled is just like granular, except it is more soluble, hence its “fast-acting” nature. Some granular dolomite lime is just like small rocks and has very little power to influence pH or supply nutrient elements, due to its dense state. Prilled dolomite lime has a soluble shell around small dolomite lime granules, and it works really well.



Both prilled and powdered dolomite lime can be used in TLO

You can also get horticultural lime that is pure calcium, or dolomite lime that is calcium and magnesium. Hydrated lime should be completely avoided; due to its extreme power it can easily kill life and take pH into deadly ranges for your plants. Dolomite lime gives the plants magnesium and calcium as well as buffering pH from dropping too low. You should have plenty of magnesium available to your plants, especially during flowering, but too much magnesium can really turn out harsh in your smoke. It can also lock up your soil mix into a cement-like state, starving everything in it for airflow and turning the soil mix structure to shit, so make sure you stay on top of that. Cannabis likes a lot of magnesium, but like everything else you can go too far, especially using things like Sul-Po-Mag (also known as KMag), which is very powerful.

There is another type of granular dolomite lime, and these granules look like little rock salt pieces. This type is fine to use, but be careful as it is really fast acting and highly soluble in this form. I recommend that you use two types of dolomite lime in TLO container growing, both powdered and prilled. Make sure the prilled dolomite lime says “Fast Acting” on it, so as not to get it confused with granular (hard rock) dolomite lime.

Greensand, Azomite, and Zeolite

In my opinion, greensand is a must have for TLO container growing. Azomite also goes by the old-school name of “rock dust.” Zeolite is a little harder to lay your hands on, and is an optional addition

to TLO soil mixes. I add all three of these myself, but you should try to use the Azomite in powdered form along with greensand. Of course, feel free to use the granular form of Azomite as well, but I find that the powder is really the best option. I use reverse-osmosis water as my water source, so I don't have a constant influx of minerals like calcium and magnesium, etc. from city tap, well or spring water. It is important to use a pure water source for TLO gardening in containers, as this way you can duplicate your results anyplace and you don't have to gamble with seasonally changing ratios of dissolved minerals and other elements, like you do using those types of water sources. We will discuss these things in greater detail farther along, so don't worry too much about them right now.



Greensand is essential for a TLO grow running to its full potential

Oyster Shells

You'll hear me talking about calcium a lot, and rightly so. It is one of the most important elements when TLO growing in a living soil mix. I treat it much more like a primary nutrient than a secondary nutrient. Not only do oyster shell products bring calcium to the TLO table, so to speak, they are also responsible for creating a very bacteria-friendly soil mix, especially the crushed oyster shells. Now, there are two grades of these processed oyster shells: one is almost in a powder form, and this is called "ground oyster shell" or "oyster shell flour" by some brands and nurseries. The other form is called "crushed oyster shell" and it is in smaller pieces about the size of a dime. These small pieces are like little artificial reefs in the ocean in many ways. The oyster shell surface is very porous and buffers the pH upwards; those are two very bacteria-friendly things right there. The pH is only affected in the direct vicinity of the oyster shell pieces. This is wonderful news for the fungi, which can grow through the soil mix mostly avoiding the oyster shell pieces.



Here are two types of oyster shell; ground on the left and crushed on the right

Much like phosphorus (and all other mineral elements particularly), calcium must be released more slowly to match the speed at which the roots can actually absorb it. The goal in TLO is not to cram nutrients down the plants' throats. Too much calcium, or phosphorus, or anything else, basically, is a bad thing. You cannot "fix" problems by just pouring more of any particular additive into your plants' containers. It is best to provide the calcium in TLO from multiple sources, like bone and bulb food, feather meal, lime, and oyster shell. This is how I do it.

REV'S TIP

You have to look a bit for oyster shell products. I love the Down to Earth brand of ground oyster shell (also known as oyster flour). Since I live on the coast I also have access to crushed oyster shell, which is just a very coarse grade version of the ground shell. This stuff is fantastic for several reasons; it's pH balancing, the bacteria just seem to go crazy with this stuff in the mix, and the worms love it too! It gives a very slow and steady release of calcium, and it also serves as "artificial reefs" for the microbeasties to attach to. I would go out of my way to find this stuff, or get a local nursery to order some for you.

Soft Rock Phosphate and Rock Phosphate

Don't blow off the soft rock phosphate (SRP) and rock phosphate (RP) in your mix. The most important thing you will want is the SRP, in powdered form, when mixing your own custom soil mixes involving lime and high nitrogen. The SRP has a sort of magical (magical to me at any rate) effect on a soil mix when a lot of powerful nitrogen like blood meal and/or bird/bat guanos, are blended with lime (calcium). Normally, you would lose some nitrogen in a gas (ammonia) form from the chemical reaction here. However, the SRP keeps the nitrogen in the soil mix rather than allowing it to float away as ammonia gas. It also allows the calcium to "stick" to the soil mix instead of leaching out due to electromagnetic properties of the SRP.



Powdered soft rock phosphate is great in mixes that contain lime

I use both granular rock phosphate and powdered SRP in my soil mixes, and SRP is going to be a very important part of yours as well. The microbeasties seriously love their nitrogen and calcium. I'll say that again: the microbeasties inside your soil mix, the little living things that make TLO growing work absolutely love nitrogen and calcium. You would do well to tattoo that on the inside of your eyelids so you'll be reminded of it even when you're asleep. I use rock phosphate as well because I recycle my soil mix. If you are not planning on recycling your soil mix, then there is no reason I know of that granular rock phosphate should be used.

SRP is just a great, phosphorus-filled mineral, and it is pretty available to the plant, as phosphorus goes. It possesses boron and silicon, to name just two of the 60 or so trace elements it has. I love this stuff and I try and get it in the smallest particle size possible. Micronized is my favorite grade of this, and as you will see in my custom soil mixes, a little bit of this goes a long way in container growing.

REV'S TIP

I get my SRP from a place called Nitron Industries online, 5 pounds at a time. 5 pounds will last me, with a personal size garden, probably 5 years or longer—and it is a little expensive. I think it costs me as much to have it sent as the product itself. Anyway, my point is you want some of this—it's fantastic stuff full of good things for a living soil mix.

Notable Liquid TLO Friendly All-Natural Nutrients

Many liquids that are actually all organic and even some that fly OMRI ratings are counter productive in TLO growing, because they either kill or piss off the microlife, due to pH swings and unnatural availability of nutrients, such as phosphorus and nitrogen. I keep the liquids very simple in TLO, so let's just go over what I use, when and why. This way my experience can guide you here at first, because trust me amigos, you DO NOT want to casually pour some kind of sneaky synthetic liquid into your pristine TLO soil mix, lest disasters ensue! Your primary mission when TLO growing is to NOT use anything with any synthetic salts in it, dry or liquid. Any synthetic nutrient salt kills microbial life once the soil starts to dry out, and keeps the soil mix inhospitable to the beneficial microbeasties as well.

Organic Acids

These are used for the same reasons synthetic salts are used. Synthetic nutrient salts and organic acids, like fulvic, humic, and ascorbic acids chelate nutrients. For our purposes here, chelating nutrients means making those nutrients very absorbable to the roots; I would argue it is actually more like force-feeding. Mother Nature and the plants know what they need and when they need it. In TLO growing, we put the plant in charge of choosing which nutrients it wants by allowing it to interact with the microbial life in the soil mix, the way plants have been doing it for millions of years. Drastic pH swings caused by these organic acids basically gives the microlife the microbial version of The Bends, just like scuba divers get. Both the microlife and scuba divers suffer when there's a drastic change in the density of their environment, way too fast. Anything that messes with the soil mix microbial life will cause the plant uptake problems shortly thereafter.



Humic shale ore makes nutrients very available to your plants

Organic acids are all well and good, but liquid nutrient products that have high amounts of these acids should be used with great care, and I recommend avoiding them in TLO growing, especially the products that are straight humic, and/or fulvic acid. True Living Organics lets life do what it does best, not what humans think it should do. Force-feeding is not the way to the highest quality harvest in my experience, and that's the real deal with this book. This will guide you to the finest quality smoke that can be had; to me, TLO bud is equal to or greater than all other contenders in quality, and I have smoked a lot of weed. Once you have used a good dose of something heavy with organic acid(s) on your soil mix, you may be stuck having to use that on a regular basis, if your soil mix doesn't repopulate quickly and reach equilibrium.

Liquid Calcium and Cal-Mag products

I use these products sometimes, but depending on your particular situation I can see where some use of this type of all-natural, mineral liquids could be beneficial. I have a bottle of Calplex, by Organicare, and I have had it for a year at least. I use mine at a ratio of 10 drops per half gallon of reverse osmosis water, maybe every third watering. It is very important not to overdo it with any mineral liquids. If you shop around for one of these types of liquid mineral supplements, make sure there isn't something like iron added, because that likely means there are synthetic salts (called EDTA) present and these will wreak havoc on your soil/plant health. Look in the "derived from" part of the label.



This cal mag product contains synthetic nutrients and should NOT be used in a TLO grow

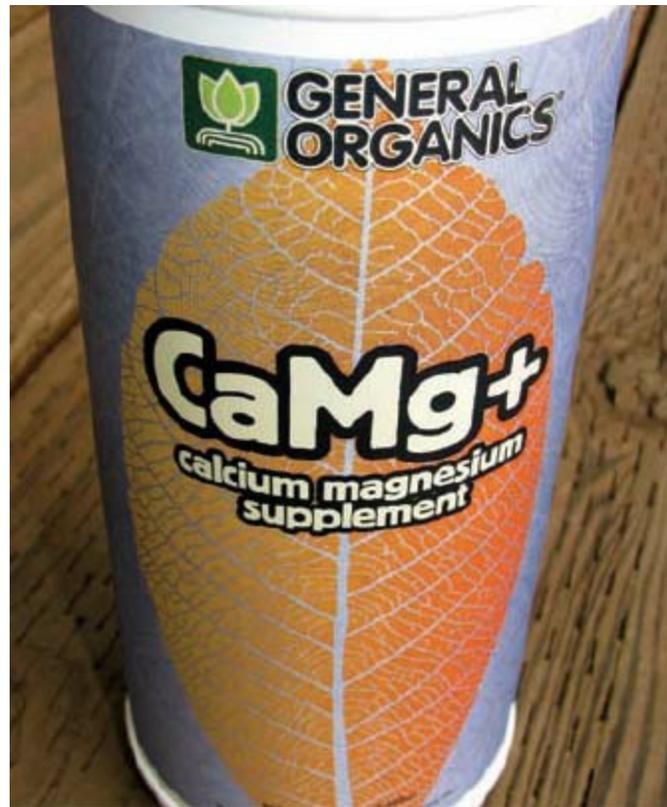
I have warned you before, and I will warn you again: maintaining good magnesium levels is a skill in TLO growing. Cannabis likes a lot of magnesium, especially in flowering, but too much is very bad. As you acquire TLO skills, having available magnesium in your soil mix from multiple sources will be easy. At some point you may overdo it and have too much magnesium; I was a victim of this very thing myself. The soil mix in your container gets like a crust on top and becomes very hard. The effects of an overdose of magnesium on the soil structure makes it tough for water and air to flow and penetrate the soil mix well, and in TLO that is very bad. Life needs plenty of air and about life, these things need to be water, and as TLO growing is all provided in abundance!

REV'S TIP

Rev's Tip: Controlling pH in TLO growing is rarely a concern. Balancing and buffering your soil mix, along with using a pure water source, makes all that pH stuff basically irrelevant. Liquid mineral supplements usually raise the liquid pH, and things like 100% grape juice and lemon juice lower the liquid pH. Doing this can have detrimental effects on the microbeasties, so I hardly ever concern myself with pH of liquids, because I rarely use anything but water and organic teas, which I will tell you about later in this book.

I have grown very successful TLO crops using CaMg+ by General Organics, with reverse osmosis filtered water, and using about 10 drops per gallon (or until about 65 PPM on a TDS meter) every

time I watered or fed with a tea. Consider this sort of application if you are shy about using calcium and/or magnesium. This particular product has a 5:1 (five to one) ratio of calcium to magnesium, which in my opinion is awesome for cannabis growing. Choosing whether or not to use this kind of product will depend a lot on the mineral value of your chosen TLO soil mix, but if you are using a pure water source, you may benefit greatly from dialing in a certain level of this type product every, or perhaps every other watering.



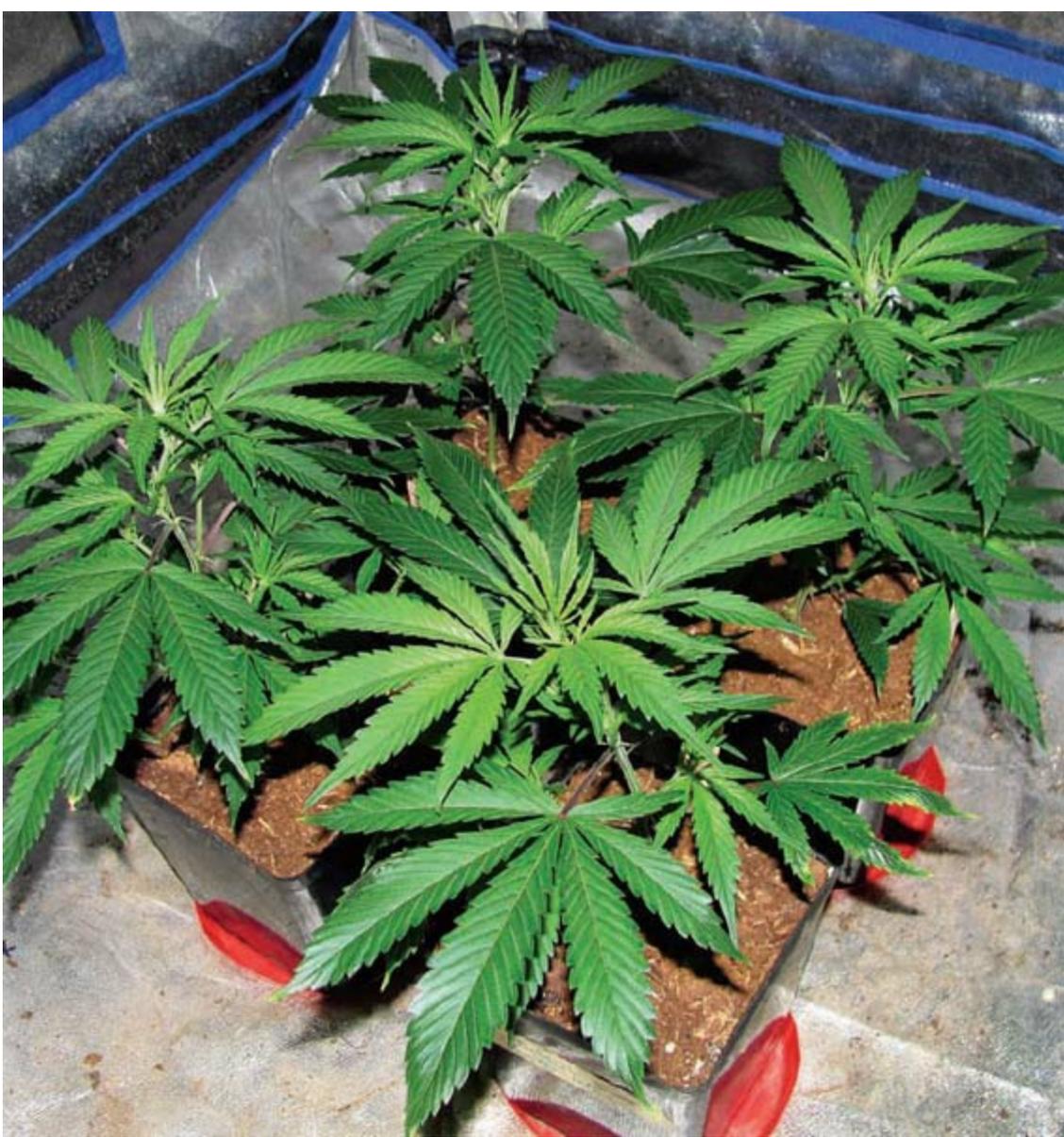
General Organics CaMg+ works great in TLO growing



Fish Fertilizer and Fox Farm's Big Bloom

Oh man these are my favorite TLO liquids of all time! To me the fish fertilizer and the Big Bloom are both invaluable. You can always tell a good TLO liquid because it's thick, and full of organic matter; this is the food for the microlife, and they feed the plant. Both the Big Bloom and fish fertilizer are full of organic matter that you can actually see! In fact, when watering with either of these present, I tend to stir up the solution between plants, to make sure they all get equal amounts of the organic matter, because the matter will actually start to settle faster than you might think. This can cause an unequal distribution of the matter, and the same can happen with teas, so keep this well in mind and stir up your solution between plant feedings.

Take extra special note of the N-P-K (0.01-0.3-0.7) numbers on the Big Bloom. This is very important if you are subbing something out for it. These über-low numbers are what it is all about, and the microlife loves this stuff! Now don't go thinking that all Fox Farm liquid fertilizers are this natural, because they are not. Big Bloom is special, and exactly suited to TLO growing conditions. You will notice the level of phosphorus (0.3) is less than half of the potassium (0.7) in the Big Bloom. This is great for TLO since you have the spikes and the layers in which you can deliver higher phosphorus from sources such as guanos and bone meal. Potassium is every bit as important as phosphorus during flowering, and at any stage of growth for that matter. In indoor growing environments, the plants tend to transpire (breathe) a lot at high metabolism rates. This will very often create a need for greater potassium (K) availability near the roots. I would recommend having Big Bloom on your shelves if at all possible. Use suggested ratios, and read all about it; you'll like it! If you have to sub something else out for it, try to get as close as you can.



Super naturally healthy TLO grown from a fish-based tea!

Fish fertilizer liquids vary quite a bit in their N-P-K values, and this should be a consideration. My favorite fish fertilizer N-P-K ratio is 5-1-1, for high-power growth in smaller containers. 3-3-0.3 is also a great combination, and this one is especially useful with longer flowering sativas and sativa dominant strains in smaller containers. Mixing some kelp (liquid seaweed) and fish emulsion is a really excellent all-natural, all-purpose nutrient. Never mix liquid nutrients with other liquid nutrients without water, as that can lock out nutrients before they ever get on the scene! Always mix liquid nutrients in water. Molasses is another great thing to mix with fish fertilizers in teas, and they complement each other in a great way! Be very careful when selecting liquid fish fertilizers, and as always be extra wary of anything with added iron, or “Organic Based” or “All Organic Base” and try to select one with an OMRI rating.

Extreme Serene by Roots Organics

This is my flowering safety net for sure, and a single quart of this will last me at least a year. This is phosphorus and potassium (0-2-2 N-P-K) fairly well chelated with organic acids, and I will occasionally either underestimate a certain plant’s needs or screw up and lock out the nutrients by killing the microlife, specifically the fungi. In this case I will whip out the Extreme Serene, and use it

according to the label instructions to finish off hungry females. I think plants finished with this nutrient are all fine and smooth, but like anything else, don't use too much, especially towards the very end (last couple weeks) of flowering. It's best to feed your plants pure water for the last two weeks before harvest.



Roots Organics' Extreme Serene is my safety net in the flowering stage

This is one of those great nutrients, full of organic matter and derived from great sources, with many similarities to Fox Farm's Big Bloom nutrient sources, including kelp and earthworm castings and/or guanos. The Extreme Serene is pretty heavily chelated with organic acid(s) and your first clue here is the severe pH-down effects it has on the water. I start out using this at ½ recommended strength the first time, and often that's the only booster shot I need to finish well. However, if I don't screw up then I have no need for this nutrient, as it is really more suited to "Soup-Style" organic growing, which is explained elsewhere in this book.

Molasses

Molasses has an N-P-K ratio of around 1-0-5, so not that much is needed, and in teas I usually use about 1 tablespoon per gallon. If I were using it on the plants immediately, I would use more like 1 teaspoon per gallon, but I rarely, if ever, use it outside of teas. It also helps other nutrients to be absorbed by plant roots by means of mild chelation. Make sure you use the "unsulfured" version of molasses, and I recommend those that are overtly organic; make sure it says ALL natural or organic. Blackstrap molasses is awesome, and is my preferred type. It's just a bit tougher to find, and if it's not readily available where you are, either kind of molasses works fine.

Care should be taken during the last few weeks of flowering when using a lot of molasses in teas. The high magnesium value of molasses, which is one of its great assets, can be detrimental to the

smoking qualities of the final product. Just be aware of this, because any leftover magnesium will be stored in your buds and make the smoke rather hot, compared to properly finished buds. Cannabis loves her magnesium, so a lot has to be available to her throughout growth and especially in flowering. Molasses is a great way to provide this, but like anything else, you don't want to use too much. Spring, well, and city tap/municipal water is normally high in totally dissolved magnesium and calcium levels too, so be careful if using those.



Molasses has more uses than in cookies! I use small amounts in my best tea recipes

Grape Juice 100%

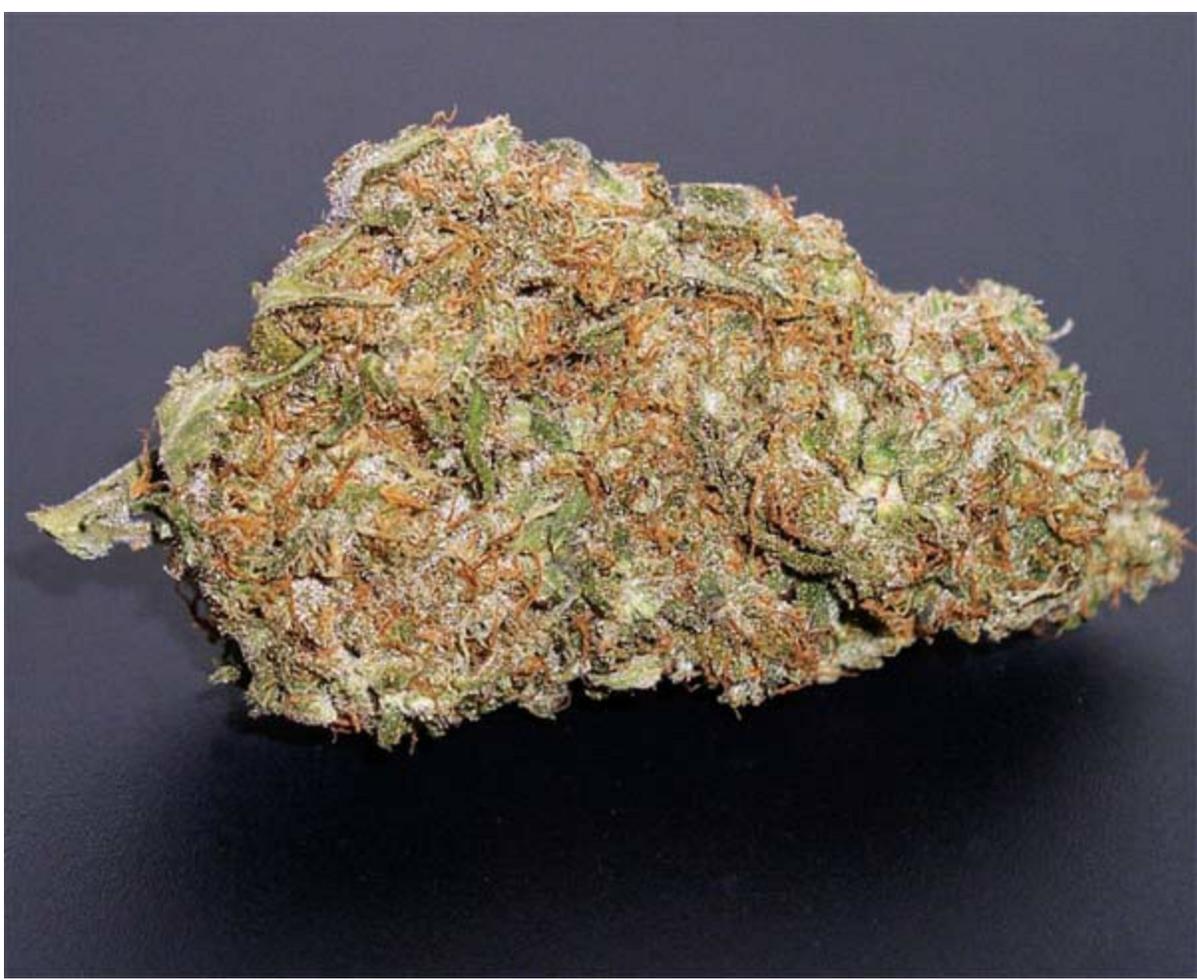
I rarely use this, but I must say it has served me well when I have used it: both as a pH-down, and as a source for fast carbohydrates, such as any simple sugars bring to the table. Occasionally my flowering tea will get a pretty high pH, so I will pre-water with small amounts of grape juice in plain water first, waiting about 20 minutes then watering with the flowering tea. Another option here, should you need to employ it, is "All Natural pH-Down Crystals" by Earth Juice brand. This is just ascorbic acid (vitamin C) crystals that are very powerful, and don't also have the fast carbs that come with the grape juice.



This isn't something I use regularly, but it can bring down a pH that's gotten too high

Lemon, lime and orange juices all work well here in my experience; however, I have always found grape juice to be the most friendly to the microlife. Adding any of these juices or any kind of pH-adjusting element to brewed teas should be avoided. This will kill microlife in the tea. If you start your tea out with some grape juice or other juices, just make sure to let it aerate or bubble for a whole day before adding your prime living organic matter, such as compost and/or earthworm castings.

Use a lot of caution if you choose to use this, or anything that radically alters pH globally, because if a pH swing is too drastic it can really upset the balance of the microbeasties in the soil mix. I would avoid using anything like this at all if I were you, until you have a better understanding of how to use a tool like this and still be microlife friendly.



A beautiful TLO nug of Kingdom Organic Seeds Champagne Thai

REV'S TIP

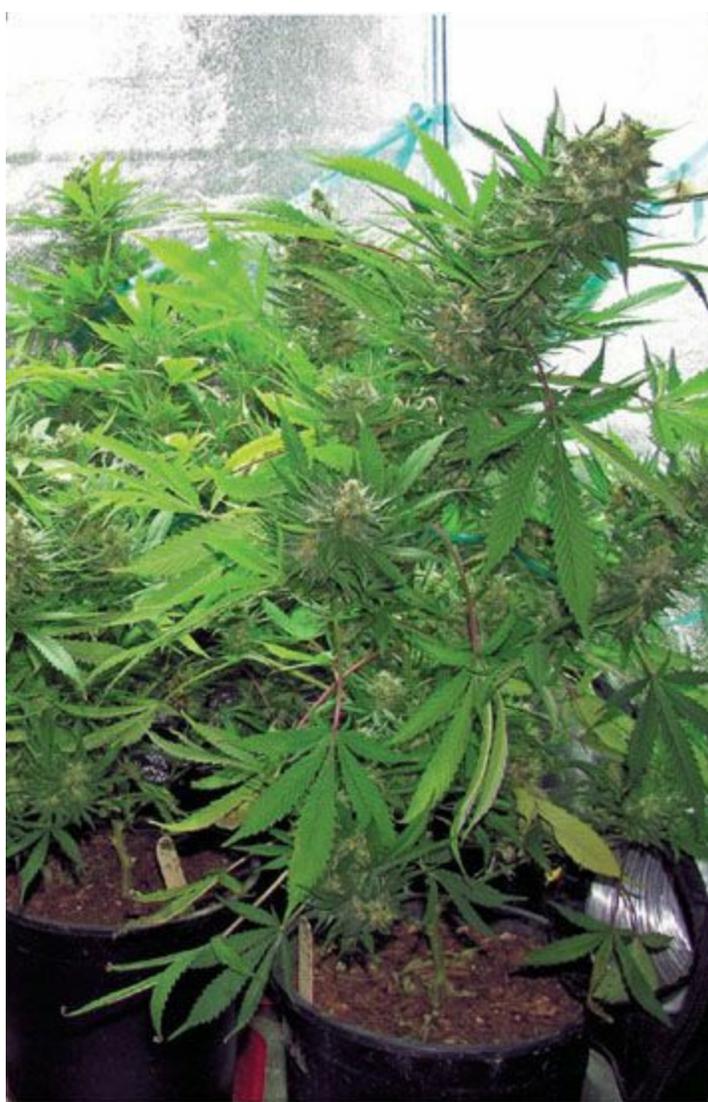
Whenever my fellow growers or smokers come up to me and say they have the finest smoke, I always say the same thing: “Compared to what?” Once you pull off a True Living Organics harvest, you will know what the finest smoke quality is, and there will be no doubt about it. Mark my words, *amigos*, mark my words.

PRODUCTS THAT ARE NOT TLO-FRIENDLY

Not all products are TLO-friendly. Your biggest enemy here will be synthetic salts, which are often just listed as a few capital letters like EDTA on plant fertilizer. These salts will really kill a TLO container soil mix fast, so avoid these types of salts! There are synthetic salts in both liquid and dry amendments. Also, there are other salts that are bad because of the levels of them in certain products, and especially coconut coir products. Sea salt is certainly all OMRI (Organic Materials Review Institute) good, but too much of it is not good for a TLO grow in the same way that too much is not good for you.

Here is a partial list of common products that should NEVER be used in a TLO grow.

- Liquid, Tiger Bloom or Grow Big by Fox Farm (synthetic salts)
 - Dry, American Pride or Marine Cuisine by Fox Farm (synthetic salts)
 - Hot Shots No Pest Strips (poisonous big time)
 - Avid or Floramite (poisonous big time)
 - Sulfur burners (poisonous and harshes out your smoke big time)
 - Liquid, Earth Juice fertilizers (too high in organic—chelating—acids)
 - Liquid, soaps or oils like Neem oil entering the soil mix from run off treating bugs or mold.
 - Generally speaking almost all of Advanced Nutrients products are hostile to TLO style (synthetic salts)
 - Generally speaking almost all of Botanicare products are hostile to TLO style (synthetic salts)
 - Softened water (way high salt content)
 - Hard water (way high salt content)
 - Chlorinated water (chloramine is the super chlorine in most city water these days)
 - Super Thrive
 - Liquid Karma
 - CalMag Plus by Botanicare (synthetic salts)
 - pH-Up or pH-Down products, period
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CHAPTER 7

Watering and Feeding

Water Sources and Filtering Options

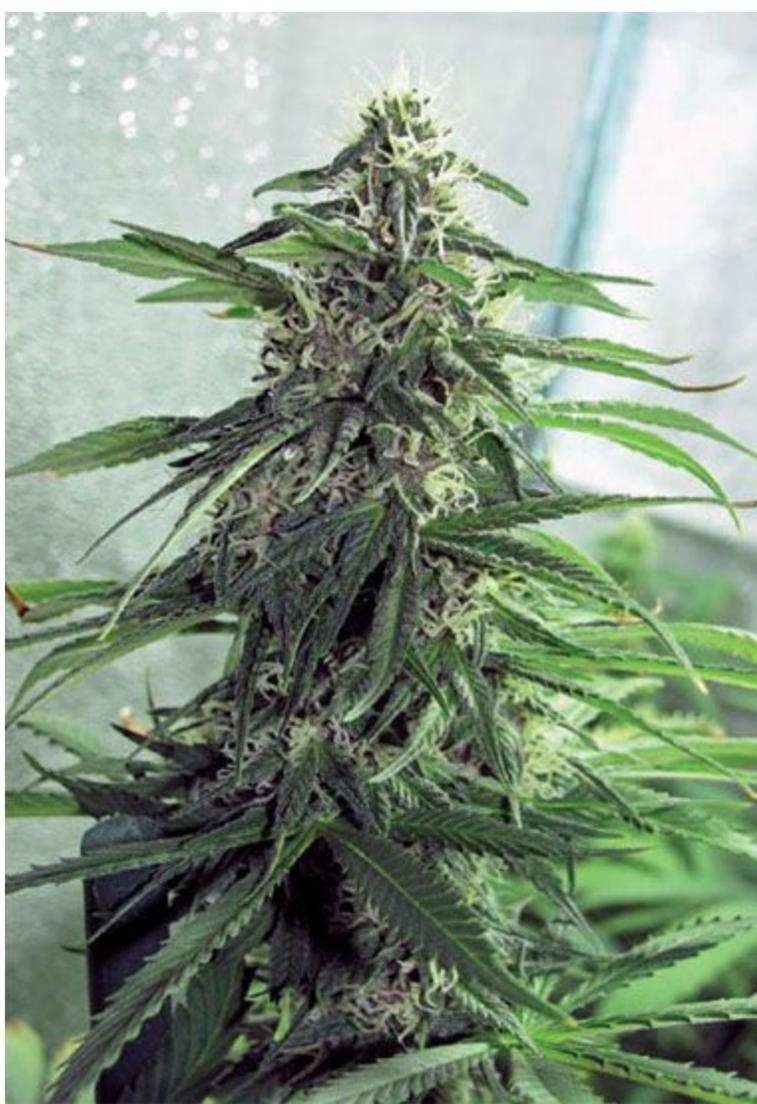
Both water sources and filtering of your water are very important considerations when TLO growing, and a whole bunch of people already growing organically could likely get a huge boost in quality and yields if they were aware of just how important this whole subject is. City tap or municipal water is the biggest potential problem when growing with a living soil mix. Filtering this type of water is actually fairly simple, and I will share my favorite sources for water filtration. My favorite brand for this in the USA is called Pure Water Products. More about them and their filters later, but for now suffice it to say that your water source is a huge deal when growing TLO or any organic style. If you use well, spring, or tap/city water, then you really want to filter it for a number of reasons.

REV'S TIP

River and stream water is always awesome to use outdoors when growing plants in the Earth, but you should check it with a TDS meter to make sure it is not too high in dissolved mineral salts. A reading below 100 PPM is almost always fine even when container growing—you just need to flush now and then. River and stream water (in fact any groundwater source) should be checked for unknown possibilities like pollution, including the existence of bad microbial life, and organic chemical elements out of balance. Rivers and streams especially can have some nasty stuff in them, thanks to people or companies nearby.

City, well, and spring water all have some potentially bad things in common. Often they are “hard,” which means they contain a lot of dissolved magnesium and calcium. This type of water will accumulate salts (magnesium, calcium, et al) around the root zones (rhizosphere) altering the pH drastically, and making the area inhospitable to some of the key microbeasties. It seems to me to really mess with the mycorrhizal fungus, so things like phosphorus tend to lock out in the soil mix. Another big downside is the seasonally changing ratios of various dissolved mineral salts, along with who knows what else from local plumbing. Every once in a while, spring or well water will be perfect for your style, growing all organically, because of low ratios of dissolved salts, and a nice balance of them as well. City tap water has huge problems, including all those that spring and well water have.

City/municipal water these days is almost always disinfected with a compound called “chloramine”—which is, simply stated, a very stable form of chlorine that you cannot simply bubble or even boil out of the water. This is hazardous to your soil mix in a huge way! Activated carbon filtering is the way to deal with this issue, and carbon filtering will also remove many other potential nasties from your city water, like fluoride. Fluoride interferes with over 30 natural plant processes, and can definitely mess up germination rates. Reverse osmosis filters always have a carbon stage or two to them as well, just so you know.



Good water is essential if you want to grow gorgeous buds like this exotic sativa cola



I love my tabletop reverse osmosis (RO) filtering unit!

Watering Twice

Arguably one of the most important fundamental practices in TLO container growing is watering twice. This can have a huge influence on root health as well as mineral absorption. Here's how it works: you water with plain water, lightly, until you see some water run out the bottom of the container. Then wait for at least 1 hour (I often wait a couple of hours) then water again until you see drainage from the bottom. This evenly saturates the container soil mix and the roots. If you do not do this, the roots will actually start guiding the water flow through the container and you will end up with dry spots that are bad for roots, and bad for plants, especially when container growing!

I like to have trays underneath my containers so that any water that drains out initially gets sucked back up into the soil mix through the process of capillary action. There's no real need to flush when growing TLO container-style, unless you are prone to overusing liquid nutrients, or your water is fairly high in dissolved salts/solids. If you overdose your plants with liquid nutrients, you can usually flush these out in time if you catch the problem right away. Higher TDS/ PPM levels like the ones found in city tap, well and spring water will accumulate salts around the root zones of the plants, and will end up strangling them if you don't do regular flushing.

Great Tabletop Reverse Osmosis and Carbon Filtering Units

Okay, no more Mr. Nice Guy—just get one of these and you will solve so many of your problems if you are using well, spring, or city tap water, and trying to grow organically in containers. If you have

no problems, then by all means, don't change anything, but if you do have problems, reverse osmosis filtering is likely much easier and cheaper than you anticipate it will be. A countertop reverse osmosis filtering unit (R/O filter) comes with 3 filtering chambers. Two are used for carbon filters, and one is the actual reverse osmosis membrane that removes dissolved salts/solids. First the water hits the pre (carbon) filter, then the R/O membrane, then the post (carbon) filter and mine makes about 2.5 gallons per hour. I get my filters from Pure Water Products, and these guys will set you up with a garden hose attachment free for the asking. I use their "Style A" countertop R/O Filter. I replace the pre filter once every 6 months, and the post filter once per year. The R/O membrane filter lasts for 3 years or so.



This carbon filtering unit removes chloramine among other things

REV'S TIP

Here's the link to Pure Water Products' website: their shipping is free in the USA: <http://www.pwgazette.com/> I use the Style A countertop Reverse Osmosis Machine, with a free garden hose attachment. I also use their carbon filters, which are designed to remove chlorine/chloramine from 20,000 gallons of water, and they're about \$20.00 USD each.

Here are a few great tips about using reverse osmosis units in order to get the most out of them for the longest time. First, get a TDS meter to see when you actually need to change your R/O membrane. Also see “Softened Water” in the Troubleshooting section of this book. I would also always recommend using some kind of sediment filter before the R/O unit. If your water is “hard” and above, say, 150 PPM on a TDS meter, then you can install a water softening unit to make your R/O Unit last much longer. NEVER use straight softened water on your plants; it will kill them!

Water pH And Water TDS/PPM

PPM stands for “Parts Per Million” and it is how your TDS (Totally Dissolved Salts/Solids) meter will display the readings it takes. After I use my R/O unit my water is about 10 PPM and for any water that is 60 PPM or below you can probably get away with just using a carbon filter, for chloramine and fluoride removal. Also, the pH of the water is basically irrelevant if the water is below 40 PPM. If TDS levels are above 100 PPM, the pH starts to matter.

As your smoking appreciation becomes more and more sophisticated, your high-quality organic palate will be able to tell cannabis grown with pure water sources from cannabis grown using higher TDS/PPM water sources; hard to imagine perhaps, but absolutely true. Because of this, I always recommend pure water sources for TLO growing, and choosing rain, reverse osmosis, or distilled water will make everything that much smoother and raise the smoking quality to five star all the way! To really get a good idea of how elegant cannabis smokes, I always recommend doobies. Glassware with resin from synthetic grown cannabis will really mess up your organic smoke, so don't screw yourself there and use a clean piece, or make it doobie-time!



Hard Water And TLO Container Growing

Hard water is water that contains high levels of dissolved magnesium and calcium mineral salts. You can see the “scale” it leaves over time on your coffeemaker if you use city, well, or spring water. This will also happen to your soil mix if you water your plants with hard water. The mineral salts will collect around the root zones and build up, interfering with airflow through the soil, to the roots, and to the microlife. You need to flush regularly—every other time you water I would say—and I do not recommend using spring, well, or city water unfiltered, especially if it is hard water.

Now on the flipside, if your tap/city water comes out of the faucet at (or below) say 60 PPM you may be able to get away with using an activated carbon filter (see the single carbon filter in the picture) to remove the chloramine and the fluoride. The trick here is to let the water flow **slowly** through the filter unit, because how effectively/thoroughly these elements are removed is determined by the length of time the water is in contact with the carbon filter. I also have used a dual version of the filter in the picture which allowed me to thoroughly remove the chloramine and fluoride while also allowing me to run the water more quickly through the filters, and this comes in handy in larger grows.



Single carbon filters can work with low PPM water

Dehumidifier and Rainwater

Water collected by dehumidifiers is essentially distilled water, and is fine to use in my experience as long as you keep the unit clean around the collection areas. Rainwater is my number one favorite to use in TLO growing, and if you have that option then use it, you lucky devil! If you collect rainwater off your roof, do some checking into the type of roof you have, because there are types of shingles that

will leach out chemicals into the rainwater. If your roof is all good, by all means set yourself up to collect the water from there into storage tanks under or above ground where the water can be stored while being aerated with air pumps.

There are many resourceful ways to collect rainwater, and when I was a guerrilla grower outdoors, we would even set up collectors made from tarps tied to trees. We would then fill waterbed mattresses. Where there's a will, there's a way! Rainwater is the best you can get in my opinion, and is full of all kinds of beneficial elements and even microbial life. I could devote a lot of pages to rainwater, but let's just say that this is the water you seek for the ultimate five star connoisseur buds, in my humble opinion. If I owned my own house I would for sure set up a rain collection system, but for now I use reverse osmosis water and get cannabis that smokes great. So as long as your water source is a pure one, for the most part, your final product will be suited for the connoisseur!



Once your palate gets used to TLO buds, you'll be able to tell those grown with good quality water from those that weren't!

REV'S TIP

I can't say enough good things about rainwater. Like distilled water it is nominal in dissolved solids, and it also seems to contain microlife too; heavenly microlife! If I was using this water exclusively for TLO container growing I would almost always add about 10 drops per gallon of CaMg+ by General Organics to keep the slow and steady supply of calcium and magnesium coming to the microlife and the plants.

Freshwater Fish Tanks and TLO Growing

If your fresh water fish tank is all healthy and happy, and you don't add chemicals to remove chlorine or anything along those lines, your freshwater fish tank water is like a giant organic tea, full of good microlife, and you should use this water when brewing your own organic teas. You need to use reverse osmosis water to fill your tank, or very low TDS water, if you want to use this water very often on your plants. If you don't, extraneous mineral salts will build up in the rhizosphere, causing problems. I have a 55-gallon freshwater fish tank full of guppies and a huge 13-year-old goldfish. I do water changes of 10 gallons once a month using reverse osmosis water. I never add any chemicals to my water and my fish have never been sick. The living dynamic in the fish tank is on a parallel with your TLO growing containers with plants in them. The soil mix is the water with the fish being the plants, and they both depend upon high levels of good microbial life. Fresh water fish tanks, as long as they're healthy, are a great source of water!

Basically, if you have a healthy freshwater fish tank, the water in it is mega-full of good microlife! It can also be added to teas, as a bio-catalyst; I add fishy water to my teas at a rate of 1 cup per gallon of tea, and I do this about every second or third time I make a tea. Because I use pure water for my fish as well I add aquarium salts at a ratio of about 1 tablespoon per 10 gallons of reverse osmosis water, and my fish are almost as healthy as my pot plants.



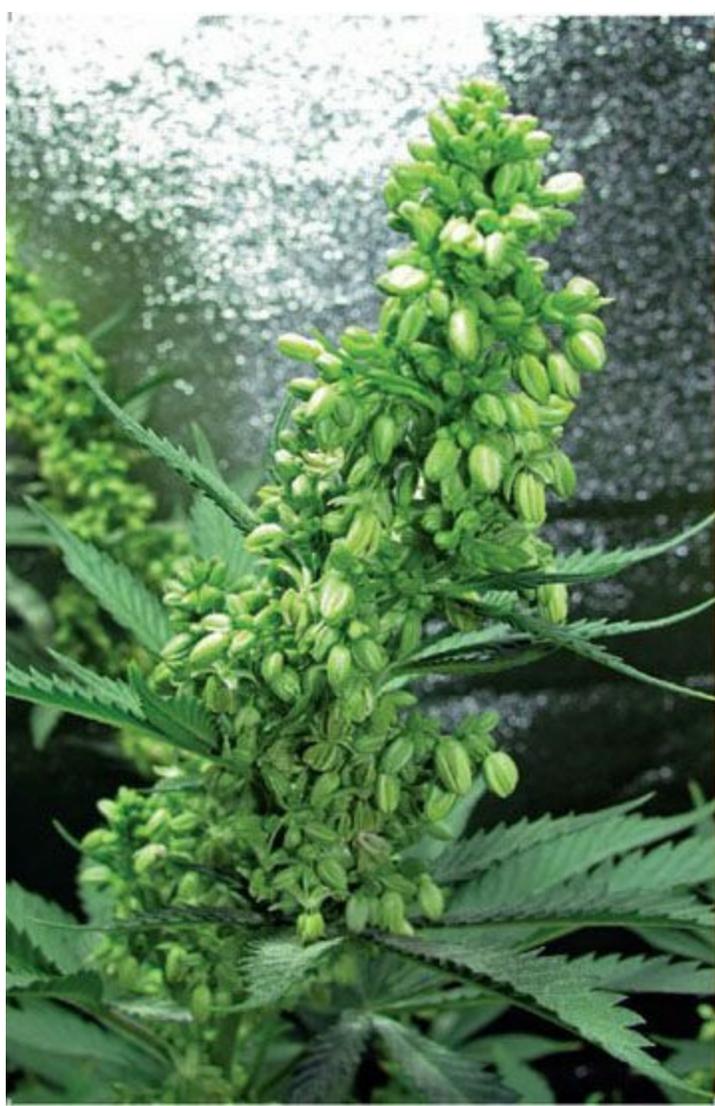
Fresh water fish tanks, as long as they're healthy, are a great source of water!

ADDITIVES FOR RECYCLED SOIL MIX

These are basic guidelines and remember that all this stuff needs to be cooked (composted) first for about 30 days before use. I will give these to you in per (dry US) gallon of soil mix amounts, so just do a little simple math to make larger amounts.

Per single dry US gallon of soil mix:

- Kelp meal: 1 tablespoon
 - Blood meal: 1–2 teaspoons
 - Bone meal: 1 tablespoon
 - Dolomite lime powdered: 1–2 tablespoons
 - Dolomite lime pelletized (prilled): 2–4 tablespoons
 - Bird or bat guano (high nitrogen types): 1–3 teaspoons
 - Bird or bat guano (high phosphorus types): 1–2 teaspoons
 - Bulb food: 1 tablespoon
 - Alfalfa meal: 1 tablespoon
 - Greensand: 1 tablespoon
 - Gypsum powdered: 1 tablespoon
 - Gypsum granular: 2 tablespoons
 - Living earthworm castings: 1 cup
 - Perlite (always use small nugget size): 2 cups
 - Coconut (coir) fiber (well rinsed or pre rinsed): 2 cups
 - Humic acid ore (granular): 1 tablespoon
 - Rice (raw): 1 tablespoon
 - All purpose fertilizer like 5-5-5 N-P-K: 1 tablespoon
 - Feather meal: 1–2 tablespoons
 - Oyster shell (ground): 1 tablespoon
 - Oyster shell (crushed): 2–3 tablespoons
 - Azomite powdered (rock dust): 1 teaspoon
 - Azomite granular: 1–3 teaspoons
 - Soft rock phosphate powdered: 1–2 teaspoons
 - Rock phosphate granular: 2–3 teaspoons
-





CHAPTER 8

Composting and Mulching

Better and Safer Composting

Composting is a huge part of TLO, so this section should be considered very important. Technically, TLO growing is about decomposing matter, both mineral and organic, and it has the very same processes that happen in the compost pile or your growing containers. The microlife decomposes organic matter for food, and decomposes mineral elements as well, with enzymes and exudes. Fungi usually handle the more dense matter, initially, until it is broken down sufficiently for the bacteria to take down further. Wood and mineral elements are two good examples of these types of more dense things, which fungi prefer to process normally.

REV'S TIP

TLO is all about composting. Nature is all about composting, and, dare I say the universe is too. I always call composting “cooking” and if you get good at cooking stuff, your plants will seriously blow your mind, I promise.



A respirator mask is essential when dealing with certain soil mix additives

Bird & bat guanos

Both bird and bat guanos always need to be composted before use; hot composting is always best if possible. When handling dried or fresh bird or bat guano, you should always wear a respirator mask, which is designed to keep fungi spores out of your lungs. Things like dried-up chicken guano can really cause you huge problems if you inhale it. There are some nasty fungi that like to hang out in dried bird and bat poop, so wear your mask anytime you mess with it. Please get a good mask, as many of the things you will be mixing, like perlite, can be hard on the lungs without having anything to do with fungus. A higher quality mask is a must have, and the slightly higher cost will seem negligible when you realize how dangerous such things can be. In my opinion, the painter/surgical-mask type is not good enough.

Manures

Manures are great for TLO growing. I love to use steer manure in the lower areas of my containers mixed with coir, perlite, and crushed oyster shells. As with bird and bat guanos, you always want to use hot composted manures, as using fresh manure can easily kill your plants. Hot composting kills any evil microbial life that may be lurking in barnyard manures and wild manures especially. Regular slower styles of composting are all good, and normally just fine, as long as you know the animals who donated the manure are very healthy. Still, it's better to be safe than sorry, so always hot compost if possible!



Sup R Green chicken manure by Stutzman Farms is a favorite manure of mine

Shredded bark mulch

This is a very important part of any living soil mix, period. Avoid anything from a walnut tree here, and cedar bark is still questionable to me for indoor use. Always try to locate composted bark mulch,

preferably shredded, because it will cause there to be less decomposing of that mulch and will therefore preserve some of the nitrogen that would otherwise be temporarily unavailable to the plant. I make it a practice to sprinkle some blood meal on top of the soil mix, just before adding the bark mulch. This gives both the plant and the microbial life a rich source of available nitrogen so they won't compete so much for it. Also, make sure your bark mulch is in its natural state, with no dyes or paints added for esthetic value.



Composted and shredded bark mulch isn't pretty, but it is very useful

Mulching TLO Growing Containers

I notice that many people growing organically indoors do not often use a mulch layer on top of their soil mix. You always want to use a mulch layer when TLO growing. The mulch layer is all about enhancing and increasing the microlife in the soil mix. This provides an environment that is shielded from intense light, and from winds rapidly drying it out. These conditions are great for all the life in the soil mix, including the roots of your plants. Always try to use composted and shredded bark mulch for this purpose. If it is not composted, you will need to make sure there is some extra nitrogen up top for all the life that will start decomposing (eating) the bark mulch. Actually, I would use some extra nitrogen up there no matter what, because the mulch increases the populations of microlife, and if they begin to run out of nitrogen, they will steal it from the roots, sometimes causing a premature nitrogen deficiency which is indicated by the lower leaves yellowing, with this symptom progressing upwards on the plant.



Always mulch your TLO containers!

You can use a lot of different kinds of wood and products to mulch with. As far as types of wood are concerned, again, I would avoid walnut and cedar bark. Composted and shredded bark is the best in my opinion. Mulching your containers makes everything better for everything that's living in the soil mix, including the plants. This allows the plant roots to come very close to the top (just under the mulch) and feed. There is tons of air and food in the soil up top there, and this will also make top dressing with small amounts of things like bird or bat guanos very effective, especially when used in a proactive manner.



A layer of bark mulch assists this cool whirled mutant sprout on its way to maturity

REV'S TIP

Always remember that tons of air is always good when composting. That's why I add a lot of perlite to my worm food, and to my soil mix; when I make compost piles outside I always skillfully use enough twigs to keep the air flowing. Microlife (and minilife) are the decomposers, and they need air. More air equals more microlife, and that, my friends, results in supernatural growing!

Home Earthworm Farms

Now you don't *have* to have any of these cool little earthworm farms, but boy, are they ever awesome! I have one, and I love it. I have had mine for about 2 years now, and in that time I have learned quite a few things about them. First of all, you'll learn about all-natural nutrient sources, such as potato skins and cantaloupe, and what using them can bring to your resulting earthworm castings. At first I just followed the directions that came with the earthworm farm, and then I tweaked a few things out along the way. To help you out with your first farm, let me give you my custom TLO earthworm food additions below.

TLO CUSTOM EARTHWORM FOOD

ADDITIONS

Amounts listed are for addition to approximately 2 gallons of moist kitchen scraps

I don't add all of these elements every time I feed the worms.

- 4 cups perlite
- 1–2 cups well-rinsed coconut coir fiber
- 1 tablespoon greensand
- 2 tablespoons crushed or ground oyster shell
- 1 tablespoon granular rock phosphate
- ¼ cup all organic alfalfa pellets
- 2 tablespoons kelp
- 2 tablespoons humate (humic acid ore shale)
- Plenty of dried cannabis leaves, stems, and roots
- 2 cups shredded junk mail/paper

To a typical 2 gallons of kitchen scraps and cannabis plant matter, I would always want either some eggshells or crushed oyster shells in the mix to bring some additional calcium and for some pH buffering. Don't add lime, dolomite or otherwise; these have never turned out well for me at any rate. Make sure you use Red Wiggler worms, and make double sure you won't get freaked out by a few fruit flies or gnats here and there. I can tell you right now that no TLO super natural grow is going to be bug-free. They are attracted to the pristine all natural conditions that TLO brings to the table; it invites and enhances life. Who knew?

You may be wondering why you'll need all the minerals. Minerals break down pretty fast when in proximity to high levels of bioactivity from the microbial life. These minerals are ones that are hard to make available all naturally, like phosphorus, potassium, calcium, and many micro and secondary nutrients as well. All those are very important to your grow, especially during flowering for large yields.

The calcium from the oyster shells is awesome, and so is the pH buffering. The coconut coir fiber is a fairly effective pH buffer too, and the worms also seem to really love having it around. When the coir breaks down (which it does pretty quickly in TLO) it brings decent amounts of K into availability in the soil mix. If your earthworm food seems too wet, just add some more shredded junk mail and dry coconut coir to it, and if it is too dry just add some chlorine/chloramine free water or more moist kitchen scraps. The real key is to keep it somewhat moist, but never dry.



I seriously love my indoor earthworm farm, and all the little critters in it

The humate (humic acid ore shale) really adds to the availability of secondary and micronutrients in the castings. The kelp meal brings in good amounts of K, growth hormones and enzymes that are beneficial, and micronutrients too. The alfalfa brings in great nitrogen, iron, and Triacantanol. Triacantanol is a growth hormone, and a very special one at that, and as far as I know it is only found in alfalfa. The perlite is an absolute must have; no doubt about it. It enhances the castings' ability to cycle air throughout and so enhances the microlife populating the castings; a win-win situation. I actually got a juicer right after purchasing my worm farm, so I eat healthier now and always have great food scraps for my worms too.

These home worm farms all normally have a spigot at the bottom for collecting leachate worm "tea" from. You have to watch it if you use my recipe here, because that worm tea is super high in TDS/PPM (totally dissolved minerals) so it must be diluted and only used occasionally. Don't use this stuff for every watering or the excess mineral salts will build up in the root zone of your container plants and you will need to flush them very well in response. I normally just pour my leachate tea back in the top tray whenever I add new worm food, or use it diluted on houseplants and in the veggie gardens.



Leachate tea from an earthworm farm is really high in totally dissolved minerals

EASY TLO FIXES FOR PEST PROBLEMS

The best fix is always not to have the problems to begin with. However, this is not a perfect world and let's face it, shit happens.

I have looked deeply into many types of controls for pathogenic and parasitic attacks on your cannabis plants, so here's your fast reference for some of the über-important things you need to know whenever you plan on killing things in a living organic garden. These will also make sure you or your friends/patients aren't poisoned.

Bugs and how to get rid of them:

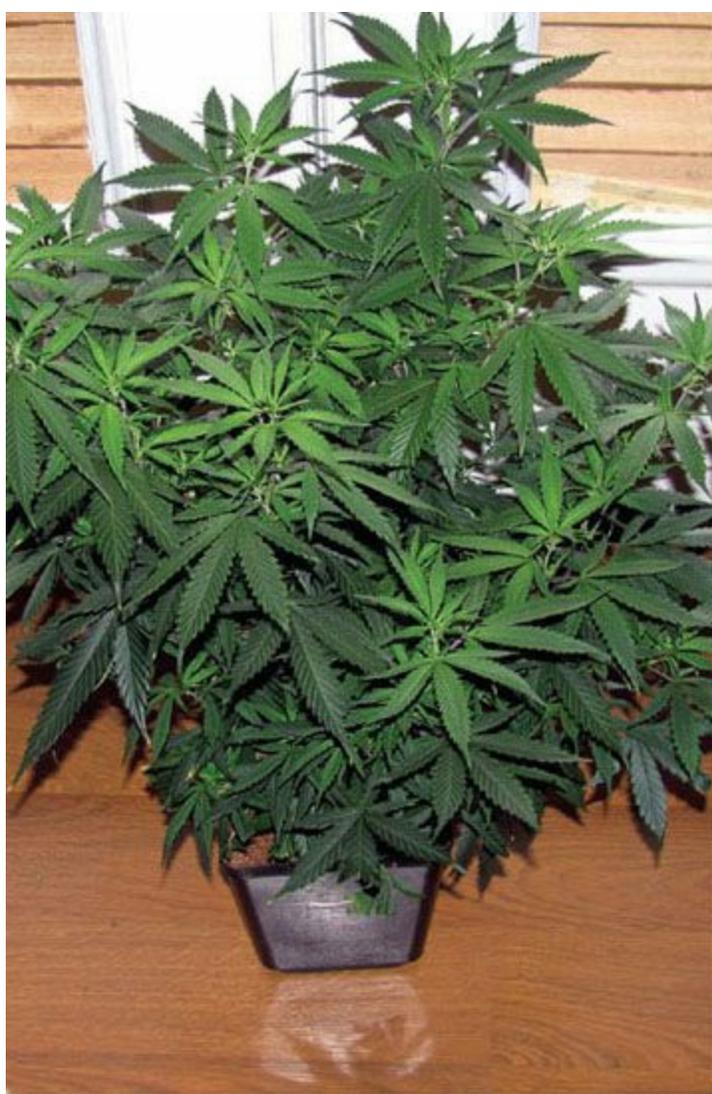
- **Spider Mites:** Safer's End All II, neem oil and liquid castile soap mixtures work well against these suckers. Alternating every third time using the neem x liquid castile soap works well in my experience using End All II the rest of the time. Shield your soil mix with paper plates or saran wrap while dripping. Organocide is another option; however, this stuff is beyond stinky, like dead fish stinky, so not really for use on an in-house garden.
- **Powdery Mildew:** Neem oil x liquid castle soap mixtures work well to remove the mildew from your plants. However, you will need to be "addicted" to using this about every 2 weeks to keep it under control. Many times special tea recipes will work well when applied foliar style (sprayed on to the plant leaves). Get some high quality milk and dilute it to 9:1 water/milk and spray it on the plants (foliar style). This often works very well. Serenade is my old go-to method for fighting powdery mildew; it works very well, but it is also pretty offensive smelling.
- **Thrips:** Treat these like spider mites above. The big difference with thrips is with diligence you can totally eradicate them, while spider mites are much harder (if not impossible) to eradicate utterly with treatments of safe warfare.

Pest fixes that should NEVER be used in TLO:

- **Hot Shots No Pest Strips:** Don't think for a second that these are even kind of alright to hang in your gardens. You may as well be slowly spraying your plants with Raid or Black Flag insecticides. Read the directions on these little poison bombs and you will see they don't recommend it to hang where there are people or pets; now why do you suppose this is? Smoking poisons that kill well is not a good idea.
- **Avid and Floramite:** No friggin' way, not once, not ever! Anytime something says it is meant for ornamental only, that is your warning that it is POISONOUS! Don't be a dead dork!

Great choices for TLO pest warfare:

- **Bio Warfare:** There are a lot of natural predators out there available for purchase to combat various pests like spider mites. Most indoor grow rooms run hot and at very low humidity. This is really a fast death sentence to most predators, so really, once again I have to say an ounce of prevention is worth a pound of cure. Spider mites for example just love it hot and über dry, because they are hooked up to the plant and get all the water they need to avoid dehydration.
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CHAPTER 9

Building a TLO Container Mix

Let's Build A TLO Container Together

For this example, let's use a 2-gallon container—the size of container I like to flower plants in—under 400 watt metal halide Eye Blue lamps. My plants rarely get over 2.5 feet tall when finished under the 400 watt lamps, and this is perfect for me. Building from the bottom up, use a new or clean 2-gallon container; I like to spray the inside of the container with a little water before anything else, and this allows any nutrients applied in a layer on the floor to adhere and start processing better.



This plant is growing vigorously in a TLO container

REV'S TIP

As a rule of thumb, the day I am going to build containers, I cut my TLO soil mix with some (living) earthworm castings and perlite. This inoculates the whole container mix with massive microbial life and diversity—so your mission is not to kill them—plus it will aerate better, which is always a good thing. I also like to make sure the root ball sets on very mellow soil mix and I usually just use a little Gardner & Bloome Premium Potting Soil with Myco fungi already added for this purpose.

This is exactly how I build my containers:

- Sprinkle about 1 tablespoon of something dry and high in nitrogen on the floor of the container, such as blood meal, or high-nitrogen bird or bat guano. I actually use my custom high-nitrogen layer blend (also found in this book) for this purpose.
- Sprinkle about 1 tablespoon of dry, all-purpose nutrients, like Organicare Pure or something all natural with equal N-P-K numbers as close to the same as possible.
- Then use a few inches' worth of my custom steer manure bottom layer blend; keeping in mind you will NOT want to set the transplant's root ball directly on the steer manure bottom layer. Leave some room here.

At this point I would water the container soil mix (basically just the steer manure bottom layer and some extra nutrients on the floor of the container) just to make sure it's good and moist, but not wet. I allow this to sit and process for at least a couple of days. I then like to use some type of high-quality soil mix just under the root ball at the time of transplanting. This soil mix should have added Mycorrhizal fungi, but if you don't have any soil like that available to you, then get some granular Myco fungi to place just under the root ball before setting it down. I would use about 1 teaspoon of the granular Myco fungi for this application. The Myco fungi inoculation is an essential part of container growing in TLO, and your yields—among other things—will suck without any Myco fungi alive and well in your container soil mix. Use at least an inch of regular quality soil mix + Myco fungi directly under the root ball.



Good myco fungi is available in both granular and soluble versions

- For the fill, use the custom soil mix I recommend above for super natural growth and results. If you can't use the recommended soil mix, a good bagged organic soil mix will also work well. For the very top inch or so, add about a 50% cut of earthworm castings or compost to the soil mix.
- The first watering must be done with water that's free of both chlorine and chloramine. For this first watering before making the spike holes use about 1 quart of water. Wait a few minutes then

make your spike holes close to the outer rim of the container. Remember, you don't want the roots to reach these spikes for at least a couple days. Fill the spike holes with your chosen fill mixes. I of course recommend my custom spike mixes above, as they are proven winners for me.

- Time for a little topping off with about ½ tablespoon of custom high-nitrogen blend, blood meal, or high-N bat guano. Sprinkle this around on top being careful to avoid getting any right up next to the stem.
- A layer of shredded, composted bark mulch is added as the final topping. Make sure it's around an inch deep.
- Water the soil mix very well, allowing the runoff water to freely drain off. I use about ½-gallon of water this time, and allow to thoroughly drain before putting a catch tray under.



[This soil mix looks full of life and nutrients; just what we need!](#)

Set a reminder to inoculate again with soluble Myco fungi once the plants are about 3 weeks into flowering. Anytime you think you may have pissed off or killed the Myco fungi, re-inoculate using the soluble version. Avoid dosing your plants with high-phosphorus liquid organic nutrients, because this will really have a negative affect on those good Myco fungi. The steps above show you exactly how I build 2-gallon containers for flowering. I usually like to put these freshly transplanted females back into the vegetative state for at least a week, before flipping them over to the flowering photoperiod for good. This makes for happier plants I think, and happier plants always make for happier smoke.

REV'S TIP

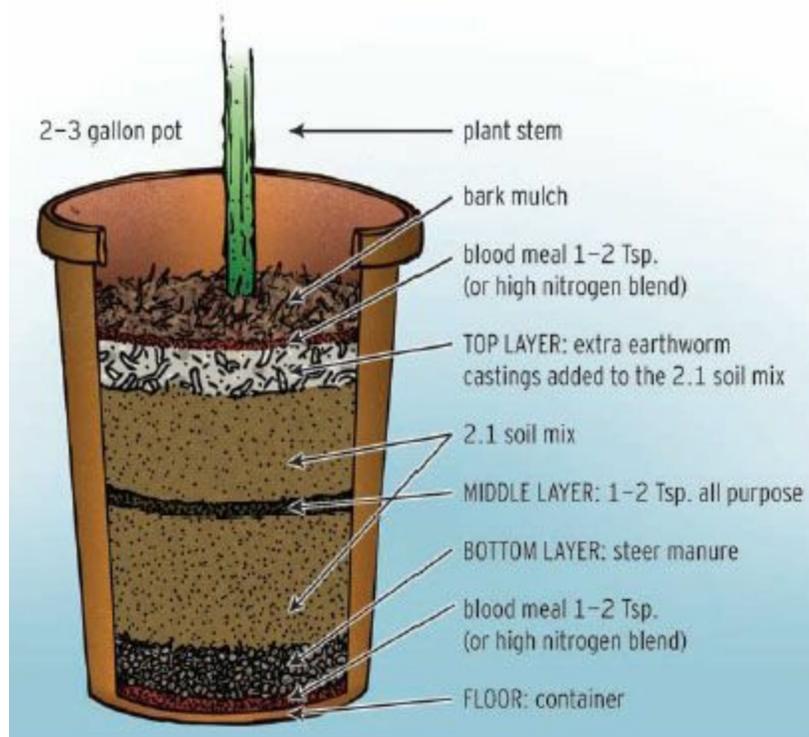
Keep in mind earthworm castings are already cooked (composted), so all good to add and roots will love it! Do not add any global raw minerals or things like kelp meal here, as these things should have already been added ahead of time and cooked in for the best results.



This plant has been flowering for five weeks in a TLO-built container

CONTAINER BREAKDOWN: 2–3 GALLON SIZE

Here is a side view of a typical flowering container size I use for flowering under a 400 watt Eye Blue metal halide HID lamp. I am a bit disabled so the ability of TLO style to flower in these sized containers is a big help to me.



Bark Mulch

This is just shredded bark mulch you can get at any nursery and many other places as well. Just make sure it is not painted or treated with anything, and if it is already composted that is always a bonus too.

Blood Meal 1–2 Teaspoons

I sprinkle this down on top just before adding the bark mulch layer over it. Avoid getting blood meal or any nutrients too close to the main stem and keep it kind of out more toward the edges of the container. I use the custom TLO high nitrogen blend here, but bat/bird guanos that have high nitrogen work well also.

Top Layer

I like to add extra earthworm castings to the top couple inches of 2.1 soil mix at a ratio of 2 parts soil mix to 1 part extra castings. This really gets things going well in the container, regarding the microlife equalizing.

2.1 Soil Mix

I usually cut this with about 25% earthworm castings the same day I transplant to inoculate the soil mix fully with massive bacteria, fungi, nematodes, amoeba, etc.

Middle Layer

This is where, during the filling with the 2.1 soil mix, I will put down a layer of some quality all-purpose dry organic/all natural nutrients. My favorite is to use about 1 teaspoon of Botanicare's Pure, then sprinkle in about 2 tablespoons of pure worm castings right on top of the all-purpose, then continue filling with the 2.1 soil mix.

Bottom Layer

Here I use the custom TLO steer manure blend and do NOT set the root ball of the plant you are transplanting directly on to this layer; it can go very wrong sometimes. Always have some normal soil mix to place the root ball on to, so don't make your bottom steer manure layer too thick.

Floor/Blood Meal

I use about a tablespoon of blood meal or custom TLO high nitrogen blend here on the floor of the container before anything else is added. You can also use high nitrogen bird or bat guano here as well, and if the variety is a longer flowering type, you can also put about a tablespoon of dry all purpose down on the floor as well along with the high nitrogen elements.

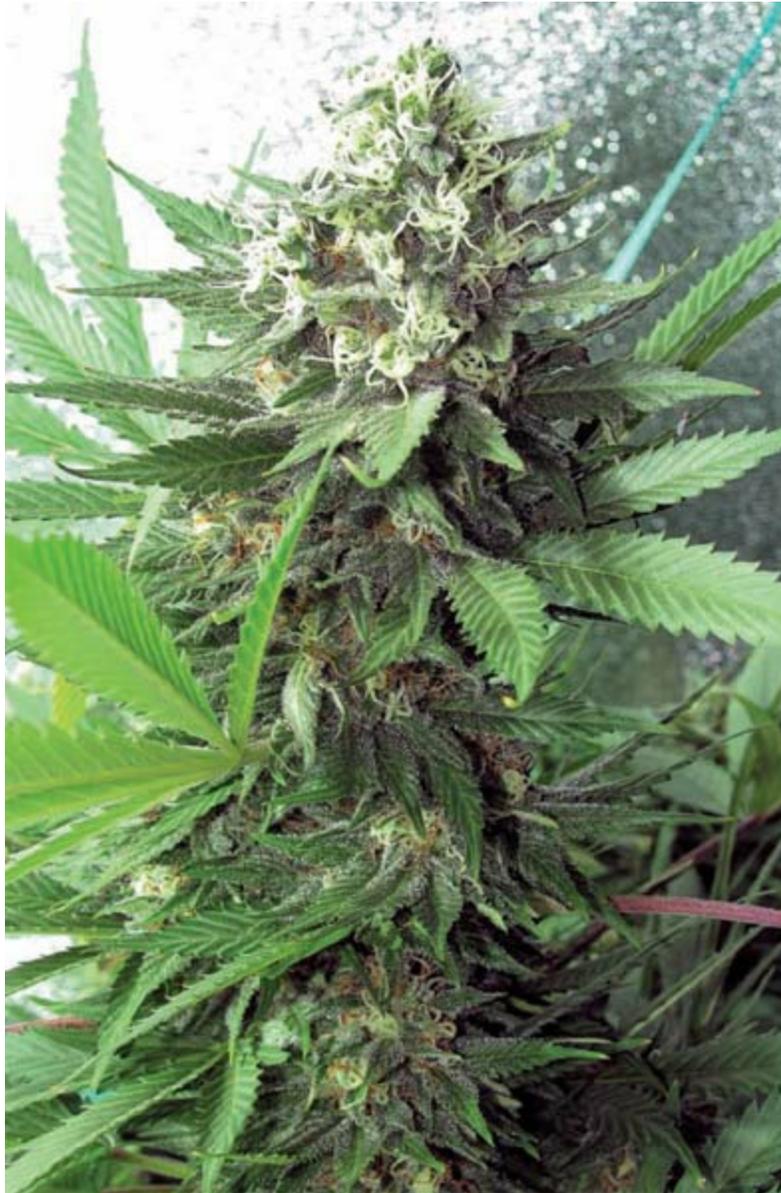




CHAPTER 10

Recycling Your TLO Soil Mix

This practice has come full circle for me, and I always recycle my own mix. It is even recycled mix that I use in the TLO custom soil mix. When I say full circle, what I mean is that when I first started doing soil mix recycling, it was very simple. At some point thereafter, it became a very complex set of rules and formulas, and it really didn't work as well so I eventually went back to the simple stage.



Yields almost as big as hydroponics yields can be harvested using TLO

REV'S TIP

To put TLO soil mix recycling into its most basic terms, you are replacing organic matter that will decompose to a humus state, where it supplies the plant with very available nutrient values. Microlife and minilife are responsible for breaking down all organic matter. Cannabis roots are the main staple here for breaking down/decomposing, and as luck would have it the roots of cannabis are full of all the same exact stored nutrients that cannabis loves! Imagine that: you are about to become a super natural grower.

The Soil Mix Recycling Container

When I basically toss old root balls (soil and all) into a container to recycle them, I prefer the container to be a tough plastic cooler, but a plastic tote, or a plastic kiddie pool will also work fine. I only need one recycling container because my cannabis garden is just my own little personal one, taking up only a single small bedroom and a couple of grow-tents. If your grow is larger, then you might need a couple of containers or more. Essentially recycling is easy: break up the root balls with a shovel and then add water. It's that simple. Don't get it too wet, but make sure it is well moistened. Aerate the recycling soil mix with additional perlite as needed. Add a dry nitrogen source, such as a 50/50 mix of blood meal and feather meal, just before adding water. A good approximation for the amounts of dry high-nitrogen mix to add is this: around 3 tablespoons of the blood/feather blend per cubic foot of recycling mix. One cubic foot of soil mix equals about 6 gallons of soil mix.



My recycling containers of choice are plastic totes and coolers

Two big advantages when using the cooler are the insulation and the drain plug, the latter of which is fantastic to have if you add too much water. It is very important to either have a drain plug or make one. Too much water will turn anaerobic fast and start to smell really horrible. Anaerobic soil mix kills roots on contact due to things like alcohol that are produced by these anaerobic microbeasties that don't need any air to breathe. Indoors, I use some shower curtains or a good tarp underneath these containers and that has always been great for containing small spills. With time you will get a "sixth sense" about how much water to add, and how often, to keep it just a little moist and not soaking wet.

You need a bit of space in a garage or shed to recycle soil mix, but I have recycled with tarps and coolers in a 15x20x8-foot bedroom with a small closet, and that was large enough for me!



Recycling set ups needn't be expensive or complicated



Cooked root balls can be broken up with a shovel or trowel

It takes about 30 days or so for the broken-up root balls to finish decomposing, as long as ambient temperatures are above 64°F. Keep the mix moist and turn it over at least once every 5 days or so. You can also use a solution of 1 teaspoon of all-natural molasses to 1 gallon of chlorine/chloramine-free water to use on the recycling mix. This will expedite the processes and really power up all the micro-life that are actually doing all the work for you. Don't forget that they are your own personal micro-farmers who work 24 hours a day for you and your plants, so treat them nicely!

I used to add all kinds of stuff to my soil mix as it recycled, like all my leftover cannabis plant matter, stems and leaves, along with things like kelp meal, alfalfa meal, steer manure, greensand, and dolomite lime. Since I got my own little worm farm, they do most of the big work for me, and my recycling mix only actually needs to process the cannabis roots. I highly recommend the worm farm approach to recycling, as it actually makes everything much easier to recycle, and faster too. If you prefer, you could also go down the route of a home composting unit, like one of those barrels you can spin. It's all about getting a bunch of healthy broken-down organic matter back into your soil mix, so whichever way suits you is the one you should choose.

Raw Organic Matter Considerations

When composting, it's very important to understand that raw organic matter tends to burn "hot" and is not totally root friendly during the process. In nature, organic matter decays mostly up top, slowly working its way down towards the roots as it is broken further and further down. However, in a well-aerated soil mix like a TLO mix, if you have something like alfalfa or kelp meal mixed in the soil, and

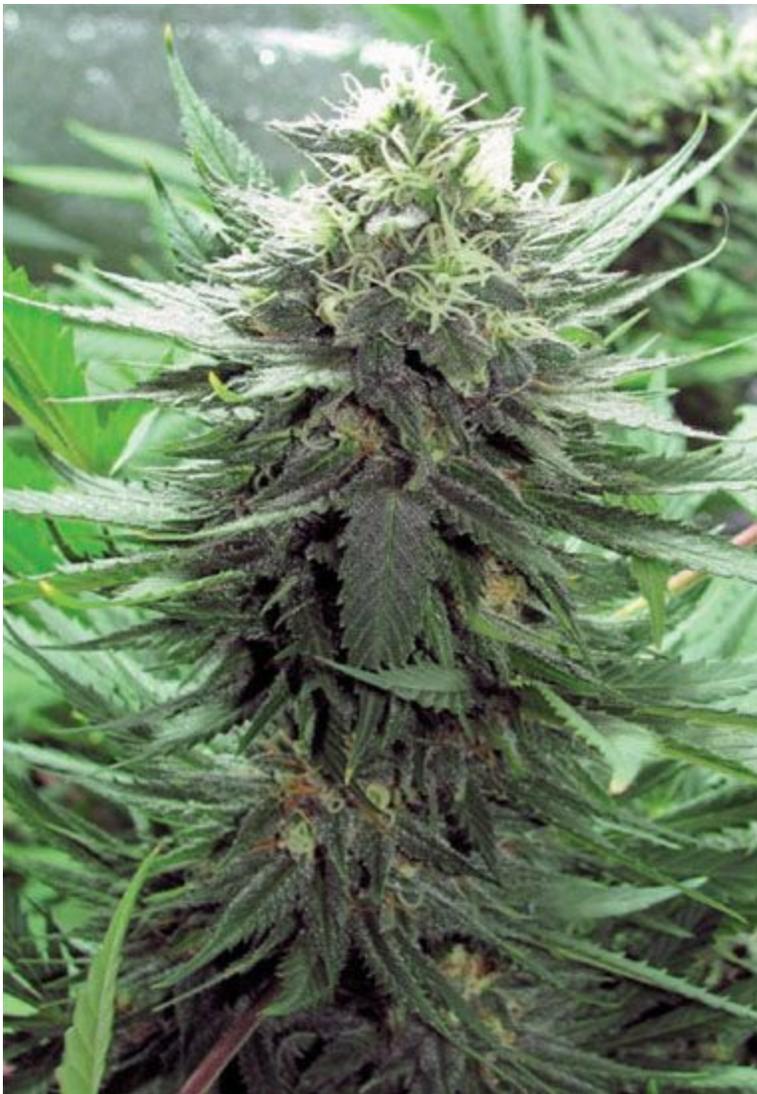
you put your plant in there too at the same time, things may not go so well. Even dolomite lime, especially the powdered variety, needs to be cooked into the soil mix like organic matter, otherwise lime in a raw reactive state does not get along well with roots. Any meals, blood, cotton, etc, that are organic will fall into this category, and need to be cooked first. All guanos and farmyard-type manures need to cook or be composted before use—always. This is all important stuff, so make sure you “get” this, or else you will end up killing innocent plants—and when you kill them this way, they die ugly!



Raw organic matter ready to cook for 30 days



TLO roots in a recycled soil mix are happy roots!



TLO-grown buds can look every bit as beautiful as their non-organic counterparts—or in my mind, even better!

EASY FIXES FOR NUTRIENT PROBLEMS

When you are TLO growing in containers with my suggested recipes and formulas to start out with, you cannot experience a nutrient deficiency. However, if you do have a problem nutrient, use this guide to troubleshoot your issue.

- **Potassium deficiency (K).** This often has to do with your environment being too hot and dry which raises your plants metabolism and they almost literally sweat out the potassium. Molasses, kelp meal, greensand, and alfalfa all bring in good levels of potassium, and make sure to add enough greensand when first making your soil mix as a proactive measure that works awesome.
- **Nitrogen deficiency (N).** Nitrogen is easy to supplement with liquid fish fertilizer in teas. Top dressing with high N bat or bird guanos will work within 10 days or so. Feather meal in your mix is actually very important here as a proactive measure, because in a supernaturally alive soil mix even blood meal can be consumed über-fast. Feather meal has staying power and is especially important when building containers for longer flowering sativas.
- **Phosphorus deficiency (P).** Never ever pour liquid phosphorus rich fertilizers on; this will completely screw up the myco fungi in the container. Using spikes, along with additions of Big Bloom liquid in teas, can keep the fungi happy and healthy while still enriching the soil mix. Cannabis can store enough P to take her about half way through flowering (4 weeks).
- **Sulfur deficiency (S).** This looks a bit like an iron deficiency. Gypsum and soft rock phosphate are both great proactive ways to avoid this from being deficient in recycled soil mixes. Running ambient temperatures too high during lights out time can interfere with sulfur uptake and absorption. Foliar feeding with dissolved Epsom salts will work in an emergency and allow about a week to take effect, spraying every day.
- **Magnesium deficiency (Mg).** Greensand, soft rock and rock phosphate all bring in some Mg, and molasses is usually high in Mg too; around 8%. Molasses and or CaMg+, used mellow but steady, should fix a lack of this in about a week.
- **Calcium deficiency (Ca).** Ca and K are closely entwined in TLO growing, and when you have an issue with one, the other will almost certainly show up. Too much calcium is normally the problem here, and you should be careful of your water source and any calcium liquid additions you use. Oyster shell, bone and feather meal, dolomite lime and gypsum, and the liquid CaMg+ I use at 10 drops per gallon of pure water, are all good for calcium and cannabis. Avoid hard water, or using too much liquid calcium.
- **Manganese overdose (Mn).** The problem with manganese is it is usually in fluctuation as far as levels go in ground water. City tap and well water will sometimes be very high in manganese at certain times of the season depending on

rainfall amounts. If your pH dives for any reason and there are high levels of manganese present too, you can get a fast and deadly result in your garden. Always best to start with pure water I think, for so many reasons. Mn is present in mineral additions and I have never seen it deficient.





CHAPTER 11

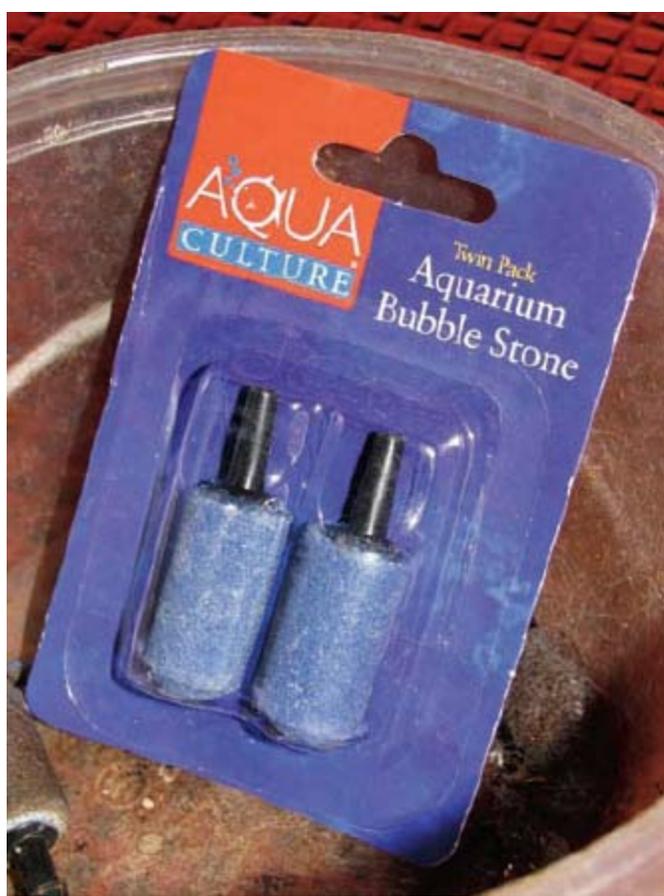
Teas

What Is A TLO Tea?

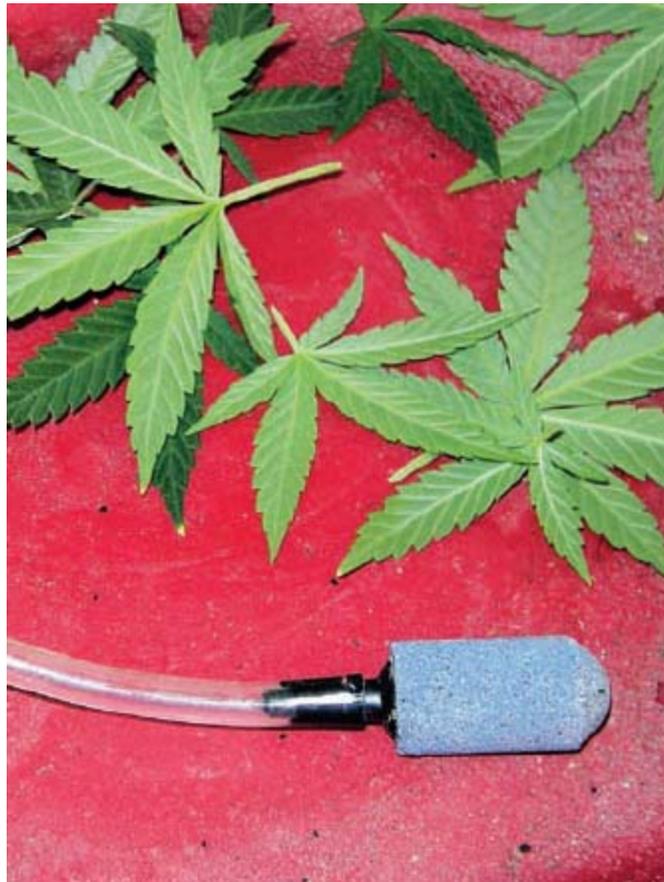
TLO teas are types of organic compost (or vermicompost) teas, also known as AACT (Actively Aerated Compost Teas). The term “vermicompost” is used to describe the sort of compost you get from using earthworms, as the final product will contain composted matter as well as vermicast, otherwise known as worm castings. Since I have my own earthworm farm I always use fresh vermicompost as my AACT inoculant. You see, my green friends, healthy compost and/or earthworm castings are just teeming with life: huge populations of bacteria, fungi, protozoa, nematodes, also minilife like soil mites and of course worms and their eggs that will hatch if the conditions are right. A “tea” is just some earthworm castings or compost rich with microbial life that is then bubbled in an organic solution of mostly water and some nutrients such as molasses and fish fertilizer that are added to promote a population explosion in the bubbling organic tea! The bubbling process can be achieved by using a cheap air pump, some air tubing, and an air stone.



Here is half a gallon of Activity Aerated Compost (vermicompost) Tea



You can make your teas bubble using air stones like these



Connect the air stones to some air tubing and place in the bottom of the tea container!

If you use compost, make sure it is *healthy* compost. Bagged compost and earthworm castings are

often all fine and good. Just make sure they haven't been sterilized, and if you see any living worms in the castings, then you can assume with high confidence that it will be great for your purposes and full of microlife. Let's look at a few of my favorite tea recipes.

REV'S TIP

Teas should foam up after several hours. If they foam up immediately, this is not a sign of massive life present, but actually a sign that there are fish emulsion, and/or yucca products present. Teas that spawn massive life tend to foam up after about 10 hours in a room where the ambient temps are in the low 70s (F). I use teas about twice per month on my plants, made as in the recipes below.

For all the following tea recipes, always use chlorine/chloramine-free, high-quality water, and for my personal garden I bubble my teas in a ½- or 1-gallon pitcher, but I always dilute the final teas with either a ½ or 1 gallon of good water, respectively doubling them before use. With all the following teas I will give ratios for bubbling/ aerating 1 gallon, which ends up as 2 gallons of tea just before usage in my gardens.

THE 3-DAY ALL-PURPOSE TEA

Day One

- 1 tablespoon kelp meal
- 1 teaspoon high-nitrogen bird/bat guano
- 1 tablespoon all-purpose dry organic nutrient
- 1 tablespoon all-natural molasses

BUBBLE FOR 24 HOURS

Day Two

- ¼ cup liquid Big Bloom by Fox Farm (or something with similar N-P-K ratios)
- 1 teaspoon liquid fish fertilizer
- ½ cup fresh, healthy living compost, or earthworm castings; first choice here is living earthworm castings
- 10 drops CaMg+ by General Organics, or something comparable with no EDTA logos on the label and no added iron.

BUBBLE FOR 24 ADDITIONAL HOURS

Day Three

Strain with an ordinary kitchen strainer, because we LOVE all the smaller particles of stuff in TLO just like the microbeasties love them!

Dilute and use; never attempt to adjust pH on a finished living tea, and never add anything but plain, pure water to the tea. Always stir the tea between applications, so the miniscule organic matter gets distributed evenly to all plants.

Never attempt to store a tea; use it all immediately. Try to not expose teas to direct powerful lights like sunlight, but this goes for grow lights too. Larger plants usually shade their containers well enough even under HID lighting.

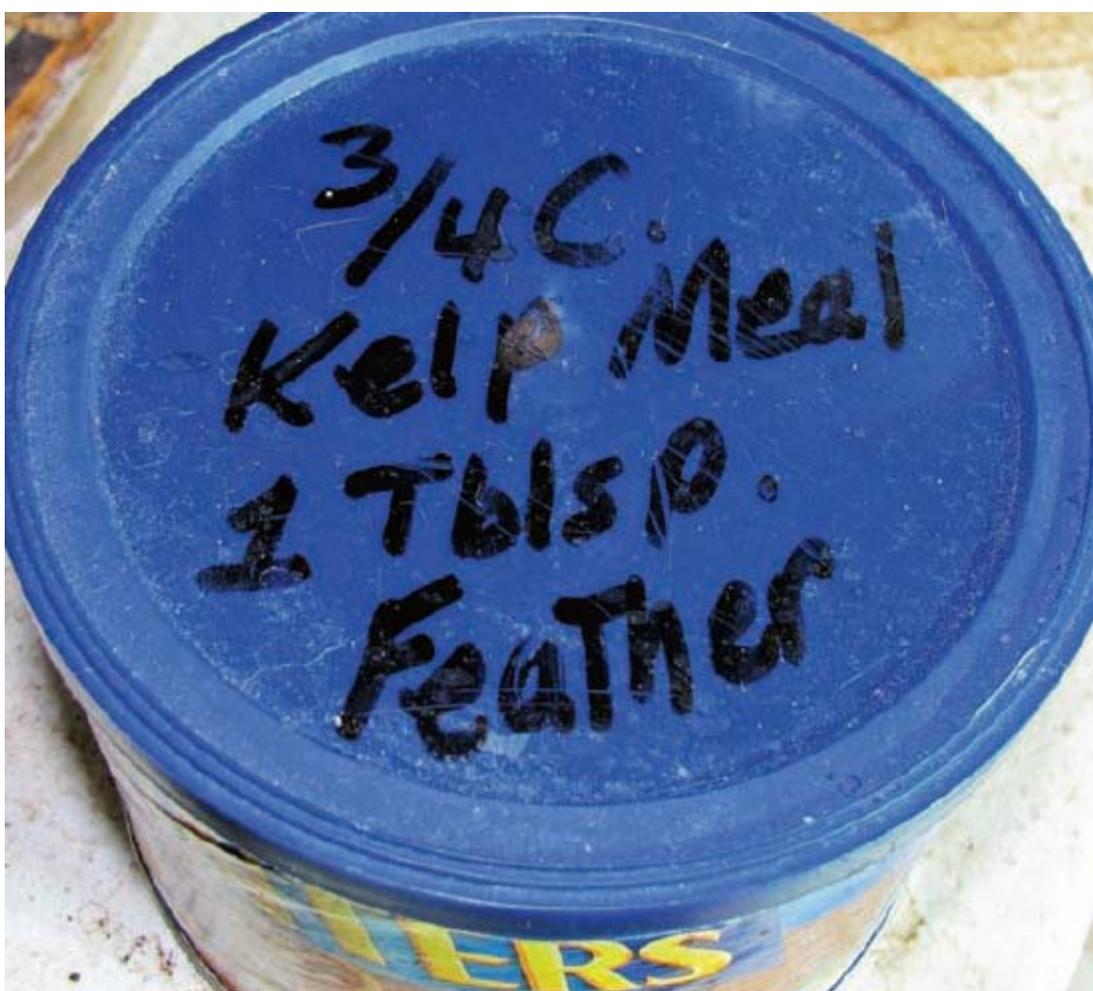


It's always a joy to see worms living happily amongst the microlife in your containers



This opaque customized Rev tea bubbler is light shielded to protect the contents

Ultraviolet light (UV) really hurts the microlife in your teas, so always keep that in mind; just like roots and earthworms, they detest light, and in the case of the microbes, it kills many of them. Sunlight is the worst, and direct sunlight will really make your tea weak in life compared to even shaded sunlight. HID grow lights are pretty bad too, especially the “Blue” types that I like to use. Ambient temperatures when making teas should also be around those that are comfortable to people; 70–80°F. is perfect I think. You can see in the picture that my tea bubbler is shaded. I painted the pitcher with flat black paint then reflective silver all-latex-based paint. I then used that little red plastic plate as the lid. Always set your tea bubblers on some type of plate or tray to catch spillover liquids from the teas foaming over the top, as this almost always happens.



This is a super special custom TLO mixture

That mixture of kelp meal and feather meal is a special TLO custom mix just for teas. When you read the addition of kelp meal to any tea recipe in this book, you can safely assume it is actually this mixture: $\frac{3}{4}$ cup kelp meal to 1 tablespoon of feather meal.

Also I would like to point out here that if you have your own earthworm farm, your leachate worm tea is a fantastic inoculant for the AACT TLO teas you are bubbling. The leachate contains vast populations of a wide variety of microbial life. If you feed your worms like I do, your leachate tea will be über-high in PPM with dissolved minerals, so just a teaspoon of leachate in a whole gallon of bubbling tea is enough to inoculate it with booming life waiting to happen!

REV'S TIP

The biggest problem I see people having with teas is they start treating them like nutrient solutions and overdose the plants with them. They are like nutrient solutions to some degree, but they are also so much more. Try out my suggested ratios before deciding to modify them and I think you will see the true TLO power of the teas.



To strain your finished tea, get a simple kitchen strainer and a pitcher



Place the strainer on top of the pitcher so none of the tea will be spilled



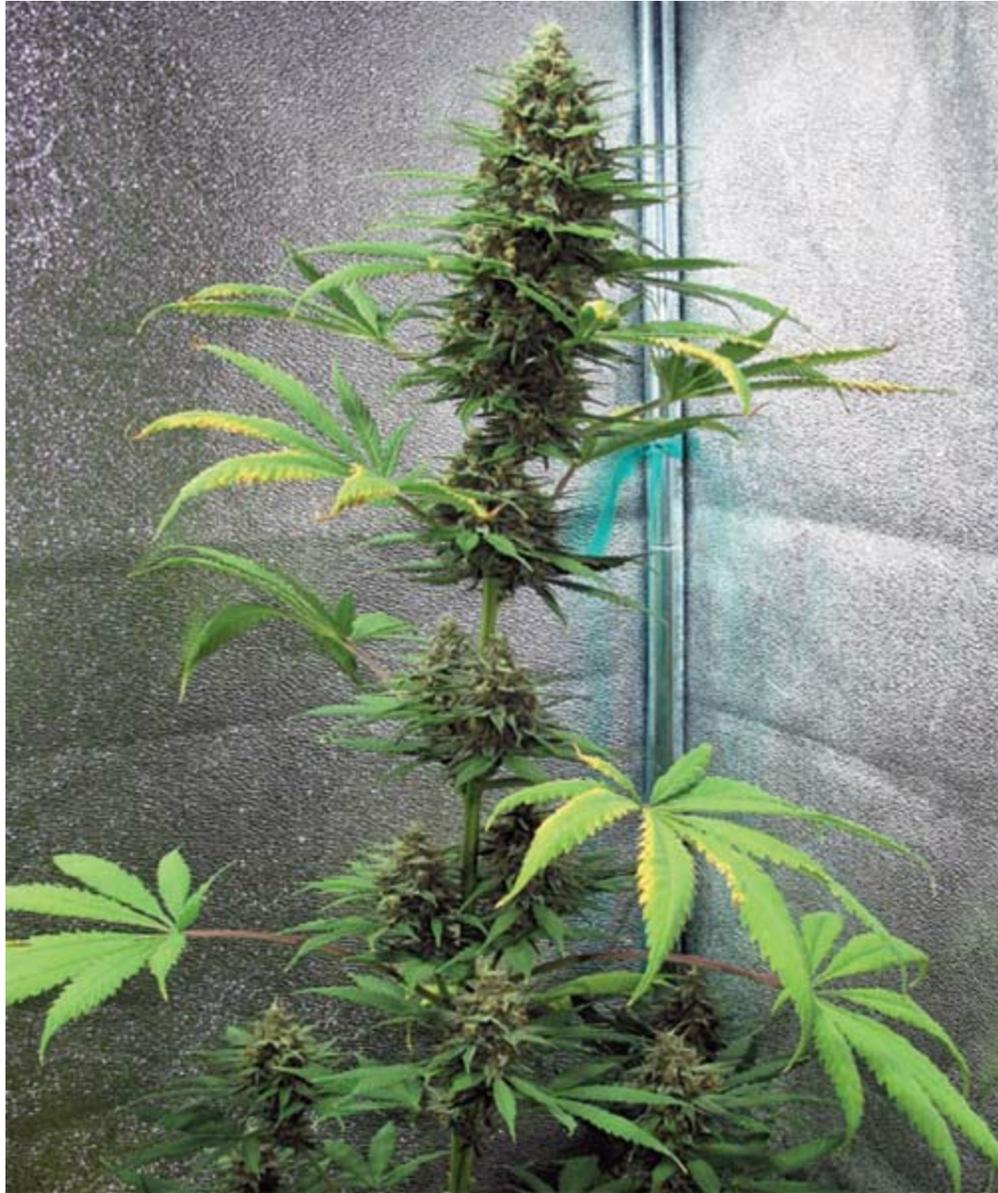
Grab your finished tea and pour it slowly through the strainer



The larger pieces of matter will remain in the strainer

Types Of TLO Teas

You can alter your tea ingredients to accommodate different growth stages of your plants, from seedling through flowering. Towards the very end of flowering, you will likely want to ease up on your molasses usage due to the high Mg content. Any stored Mg left over in the plant will smoke a little hot and harsh. This is a judgment call, and a magnesium deficiency is easy to spot; any grow book will probably have details of a magnesium deficiency. Cannabis needs a lot of magnesium, and the trick is to allow her to run out, or almost run out, of Mg only at the very end of her life cycle. The last week before harvest, you love to see the nitrogen and magnesium all getting used up. This kind of timing leads to the highest quality of TLO smoke attainable in my experience, and that is really something.



A flowering tea can help your babies to grow to this sort of size—and naturally!

The following recipes are made in 1-gallon containers, for diluting with an additional gallon of water before use. All water should be as pure as possible and chlorine/chloramine-free. You can bubble a tea for 24 hours, or a week, or even more. I like mine best at either 1 or 2 days and storage of teas has never gone well for me, so I don't recommend it.

FLOWERING TEA

For use from the start of flowering to halfway through

1 tablespoon all-natural molasses

20 drops CaMg+ by General Organics, or comparable liquid mineral supplement

1 tablespoon dry, all-organic, all-purpose fertilizer (with N-P-K ratios close to 5-5-5)

1 tablespoon kelp meal

1 teaspoon dry, high-nitrogen bat or bird guano (with N-P-K ratios close to 12-8-2)

1 teaspoon dry, high-phosphorus bat or bird guano (with N-P-K ratios close to 0-5-0 or 1-10-0)

1 teaspoon liquid fish fertilizer (with N-P-K ratios close to 5-1-1 or 3-3-0.3)

¼ cup Big Bloom by Fox Farm

BUBBLE THIS FOR 24 HOURS THEN ADD

½–1 cup fresh compost or earthworm castings

BUBBLE FOR AN ADDITIONAL 24 HOURS

Strain with a regular strainer, dilute with pure water, and apply, remembering to stir it between plants, so that all the plants get an equal share of the tiny particles of organic matter that will tend to sink fairly quickly in a tea. That's the golden part of the tea right there, besides the microbial life. The above tea is a 2-day tea, and the castings/compost is added during the second half of the bubble time, so the liquid can get equalized for greater survival rates of the life in the castings when it hits the tea solution. A lot of time making teas and looking at samples through my microscope has led me to believe this is the best approach for enhancing tea life.

SEEDLING AND FRESHLY ROOTED CLONE TEA

2 teaspoons all-natural molasses

1 teaspoon liquid fish fertilizer

1 tablespoon alfalfa meal

1 tablespoon kelp meal

½–1 cup fresh compost or earthworm castings

1 teaspoon dry, soluble kelp or liquid seaweed

10 drops CaMg+ by General Organics, or comparable liquid mineral supplement

BUBBLE FOR 24 HOURS

Strain, dilute and apply the tea above. This is a really great 1-day tea recipe that also works well on true landrace genetics from exotic lands, as they usually prefer a lighter touch when it comes to feeding.



Maxicrop dry soluble seaweed is great for use in the Seedling/Clone tea above

VEGETATIVE HIGH-POWER GROWTH TEA

- 1 tablespoon all-natural molasses
- 1 tablespoon kelp meal
- 1 tablespoon alfalfa meal
- 1 tablespoon dry all-purpose fertilizer
- 2 teaspoons liquid fish fertilizer
- 2 teaspoons dry high-nitrogen bird or bat guano
- 1 teaspoon dry soluble kelp or seaweed

BUBBLE FOR 24 HOURS THEN ADD

1 cup of fresh earthworm castings or fresh healthy compost

¼ cup composted steer (or composted barnyard) manure

BUBBLE FOR AN ADDITIONAL 24 HOURS

Strain, dilute and apply the tea above. This 2-day tea is super powerful and if your soil mix is light on calcium in any way, then you will also want to add some liquid calcium supplement or add some dry calcium to the tea in the form of bone meal or oyster shells. Don't add any magnesium because the molasses is covering that for you. Always remember to stir your tea between applying it to each plant, so all the small particles of TLO goodness can be spread out evenly to all the beautiful cannabis ladies.



This tea is small and concentrated to be diluted before use

FINISHING TLO TEA

For use at the end of the life cycle—just before harvest

1 cup earthworm castings or compost

¼ cup Big Bloom liquid bloom nutrient from Fox farm (or similar N-P-K liquid)

1 teaspoon kelp meal

1 teaspoon all natural molasses

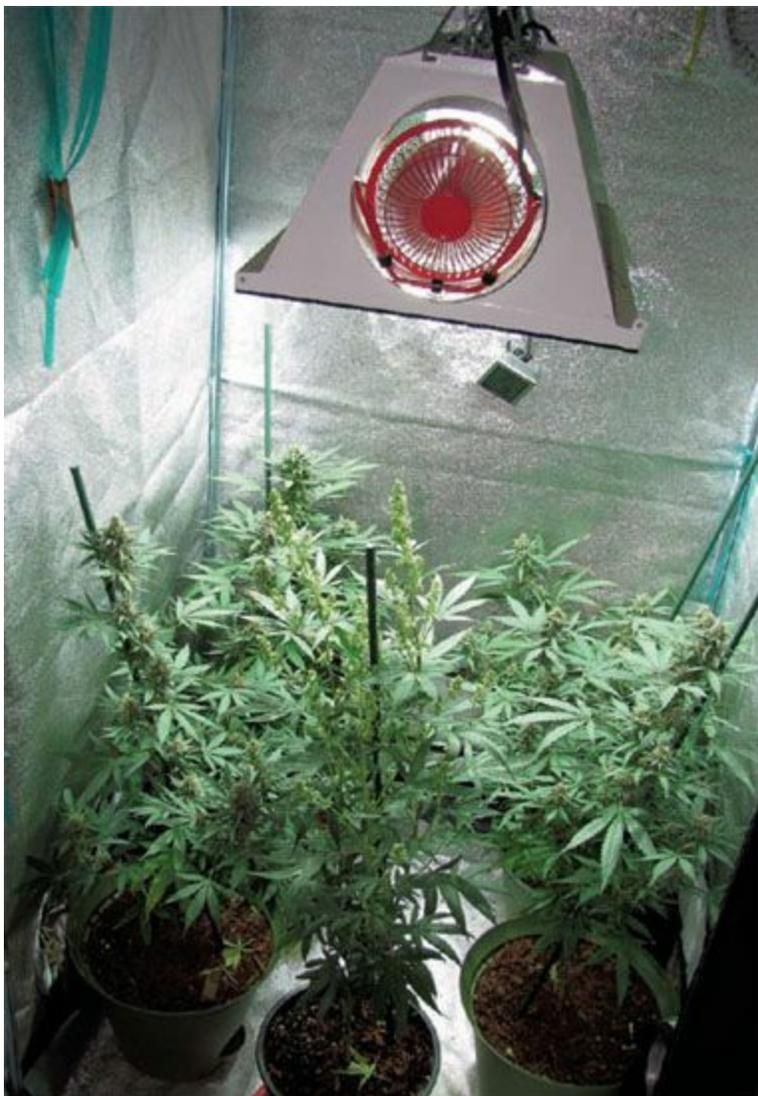
BUBBLE FOR 24–48 HOURS

Strain, dilute and apply the tea above. I normally apply this type of tea when the plants are

about 2 weeks from finishing. Any watering during the last 2 weeks is done with pure R/O filtered water with nothing added. This is the indoor TLO version of the autumn rains! You can always customize your own TLO teas as well, just be careful not to overdo the liquid or dry nutrient additions. Any 1-day tea can be bubbled for 2 days, or even 3; however, don't bubble a 2-day tea for only one day or the beneficial effects will be lessened to some degree. The rule is this: you can bubble more than the stated times, but not less!

REV'S TIP

You sure don't need to suspend any bags of organic matter in your tea solution; that's more how a regular cup of drinking tea would be made. I have found it far better to just let all the matter be freely added to the solution be stirred by the bubbles. A simple kitchen strainer can be used at the end of the tea-making process, because all those tiny particles are amazing organic matter that is awesome for your plants!



An indoor TLO grow op doesn't have to be huge or complicated. This grow tent is a great choice.

THE KEY TO A PERFECT TLO LIVING TEA

There is no single tea recipe I could give you that would be “the best” because they are either living teas or they are not living teas. Now there are a couple ways to go about this, and if you have something like Great White microlife inoculate, you can sprinkle a very (very) tiny amount of this into the tea, and the bacteria in this product will colonize the tea. What you are missing in this type of a tea is diversity, including things like nematodes, protozoa, and others. Fresh water fish aquariums are another great source of some diverse microlife and a small amount of this type of water can be added before your tea “brews” as well; as long as the fish are all healthy and chemical free.

Making (or brewing/bubbling as I also call it) living teas for your TLO garden is a snap! All you need is an inexpensive aquarium air pump (Walmart \$13.00 USD) some air tubing/line, an air stone and a container for bubbling in. This container should be opaque if possible. You can use teas every other time you water if you want to, as long as they aren't too crammed full of liquid nutrients.

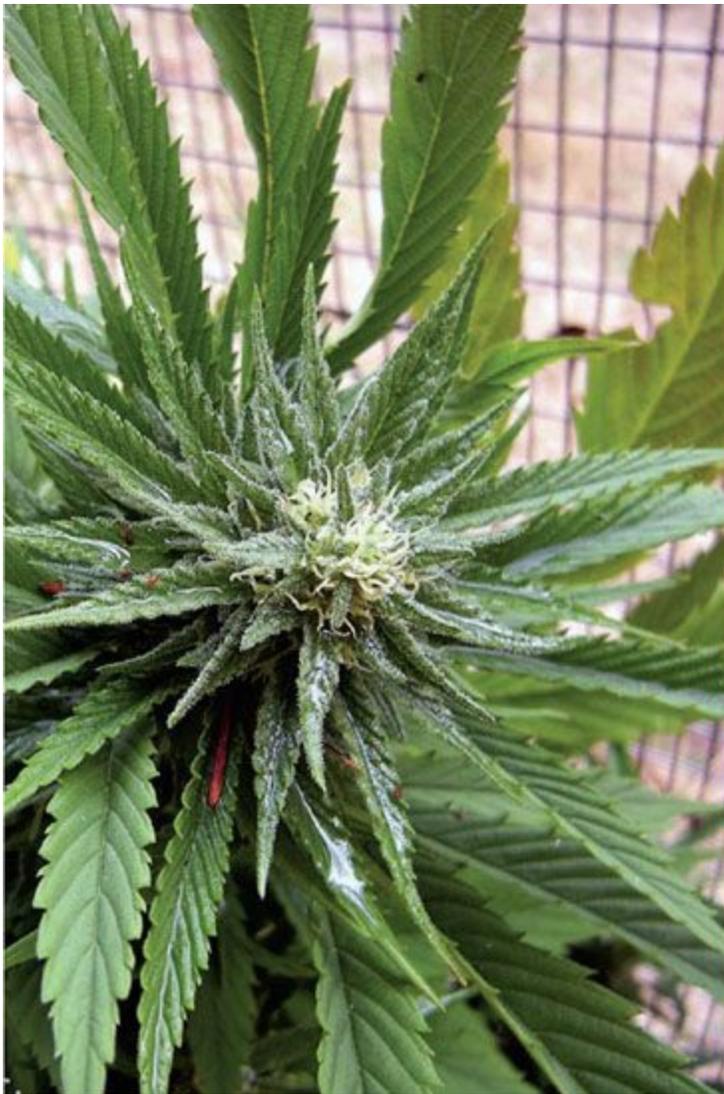
The following are a few “don't do” type pieces of advice:

- Avoid using anything but good pure water when making your teas (chlorine/chloramine free).
- Don't go insane using too much kelp/seaweed, and/or molasses because overdosing is fairly easy.
- Don't overload with liquid nutrients. This is the number one issue most beginners have.
- When applying your teas to the plants make sure to stir up the tea between each plant to ensure even distribution of all the nutrient rich particles; these particles will fall to the bottom quickly.
- You can bubble your teas 24 hours to 72 hours at least, but don't make a habit of going much longer, because as the food runs out many of the good microbeasties will die off.
- Don't forget to scrape down the sides of your tea bubbling container before using the tea because bacteria love to stick to things; it is what they do. I love my Betty Crocker frosting spatula for this job.

The following is a partial list of great tea additions, in per gallon of water amounts:

- ½–1 cup of living earthworm castings
- ¼–½ cup of Big Bloom liquid bloom nutrient by Fox Farm
- 1 tablespoon of kelp meal and/or alfalfa meal
- 1–3 teaspoons of liquid fishy fertilizer (I like Organic Gem, & General Organics brands here)

- 1 teaspoon dry bird or bat guano (high nitrogen varieties are best)
 - 1–3 teaspoons of liquid molasses (all natural and unsulphured)
 - 1 tablespoon of dry all purpose organic nutrients (I like Organicare Pure, and Happy Frog All purpose here)
 - 1 teaspoon liquid or dry soluble kelp/seaweed (Maxicrop and Humes brands both work well)
 - 10–20 drops of CaMg+ liquid calcium and magnesium supplement by General Organics (if using R/O, distilled, rain, or low PPM water sources)
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CHAPTER 12

Troubleshooting

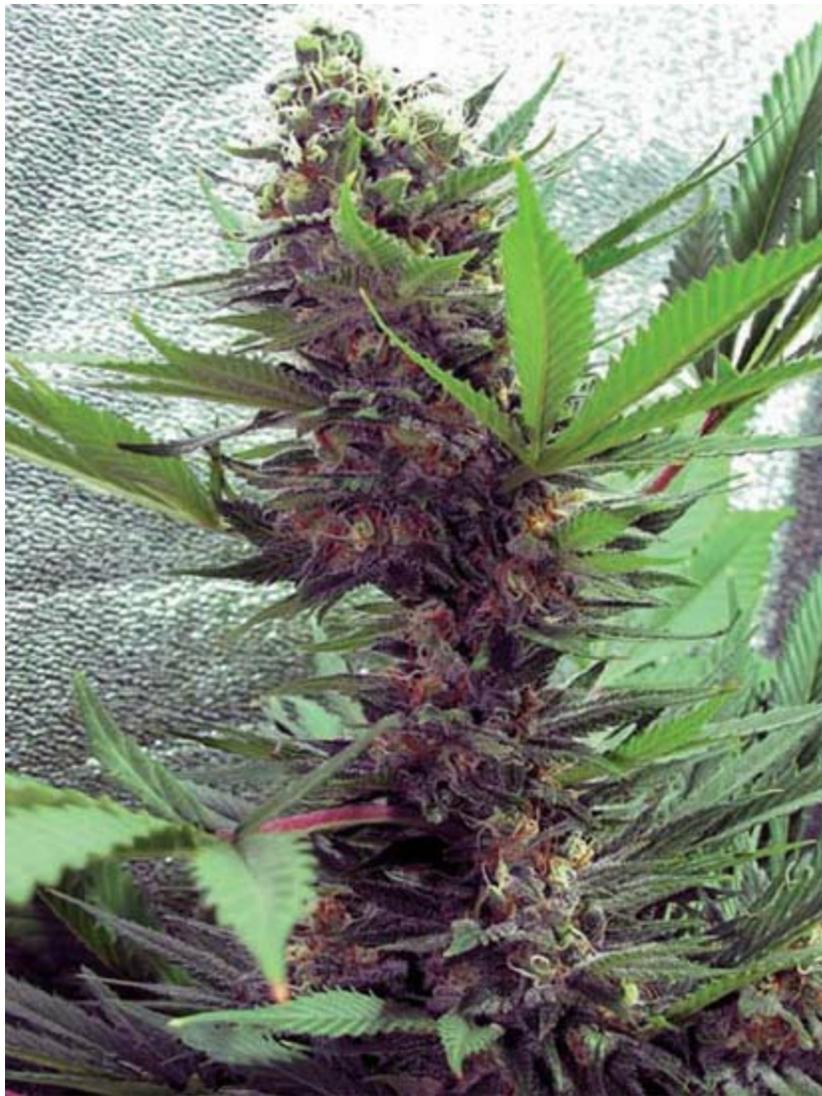
Now, every grower likes to tell you that they have no problems with aphids, or grey mold, or humidity in their grow room. This just isn't true; all growers find themselves stumbling over one problem or another, no matter how fantastic they are at what they do. With that in mind, I advise all of you to read this troubleshooting section well. This is the section in which I will cram a ton of preventative measures that will save you time, money, and frustrations. First, we are going to discuss some pH meters. I highly recommend you get a decent soil testing pH meter. It doesn't have to be a top of the line type, but it shouldn't be the cheapo version either. For troubleshooting, a soil testing pH meter is your best friend, because if your soil mix gets way out of range for some reason, and you learn that from your meter, then you can fix it. If you don't have a meter, you have to play a guessing game that often makes things even worse.

Soil Testing pH Meters

I like my meter with a longer probe so that I can test pH at deeper levels, and this one has a 12-inch probe—big enough for anyone! This comes in pretty handy especially if you recycle soil, because once the raw organic matter has been broken down in the recycled mix the pH will rise. If I am in a hurry to use some soil mix that is still cooking, I will check the pH and once it gets up above 6.0 I feel it is fine to use it. I have had a few great growers tell me about how worthless soil testing pH meters are, and now that I have had mine for several years, I think I understand their opinions—though I do not agree. PH metering requires some skill, both to use and maintain properly. Never ever use steel wool on a pH meter; always use those plastic scrub pads and clean paper towels. You must thoroughly clean and wipe down the meter probe before and after using, every time.



I use a Control Wizard soil pH testing meter and I love it!



TLO grown running perfect pH!

If checking a container with a plant in it, make sure you know vaguely where your spikes are at, because they will run different pH ranges than the rest of your soil mix. Always make several checks in a row, reading each one, and this will really help you see the true reading zone of your mix. I keep my meter in its package so it is not just hanging out in the air, as it does react very slowly with regular air over time. I recommend keeping it in some kind of sealed container or freezer bag for these very reasons. Also, never use any kind of cleaning fluid, or alcohol on the probe; only water if necessary.

To tell you the truth, if things are set up right in TLO growing, you rarely need to concern yourself with pH meters of any kind. However, while you are learning to grow TLO style, or even just organically in a soil mix, I highly recommend you get yourself a halfway decent soil pH testing meter. It will really help you to narrow down many problems immediately, rather than months of trial and error testing for what is wrong.

For Liquid pH Testers Hanna Brand Rules

As long as you are not mixing up mad organic liquid fertilizer blends all the time, you probably will only rarely have any need for a liquid pH testing meter. Again, as above with the soil meter, these are nice to have if you can afford one. Hanna brand meters are the only brand I will ever get (for testing the pH of liquids) if at all possible. They are bulletproof, and they stay calibrated for the greater part

over long time spans. Don't worry about a liquid pH meter if you are going to grow the TLO way, you really won't need it. I mostly use mine these days to troubleshoot other people's garden troubles.



This is my very favorite Hanna brand liquid pH testing meter

These are handy for reading new water sources, or giving you an idea of how liquid fertilizers affect the pH of the nutrient solution. Many people new to TLO growing will inadvertently use a liquid organic fertilizer that is full of organic acids for chelating nutrient elements. These types of all-natural/organic liquid nutrients can really take pH levels down far, which will adversely affect microlife, in my experience. If you can afford it, a liquid pH meter will save you time and money by having it, and I would always go with Hanna brand for a liquid pH meter.

Totally Dissolved Salts (TDS) Meters

TDS meters used to be pretty expensive but lately they have come way down in price and you can get a fine one for \$30, no worries. These meters read in PPM (Parts Per Million) and can give you a relative idea of the levels of dissolved minerals in a given water source. So say if your tap or well water reads 300 PPM on your TDS meter, then that is über-hard water that's full of dissolved calcium, magnesium, and other elements. You would find it almost impossible to grow TLO-style in containers indoors with water that high in salts. However, if your tap or well water was more like 60 PPM then you would have much better chances of that water working well in your containers indoors.



TDS meters are inexpensive and handy—so get one!

I use mine to check things all the time. For example, I would use it in my organic teas to measure amounts of certain liquids I add sometimes such as CaMg+ by General Organics, which is a mineral supplement. I will add this to my tea-making water before adding anything else, and I will add it until my TDS meter reads 60-70 PPM, which is about 11 drops per gallon. My reverse osmosis water is less than 10 PPM just out of the filter, and that is great for TLO growing in containers. I will check my pure filtered water too from time to time to make sure my reverse osmosis membrane is still working well. I recommend you get one of these if you can, because they are very handy and inexpensive.

Recycling Soil Mixes with high ratios of peat Moss

High ratios of peat moss in a bagged soil mix often work well for cannabis growing, and I have certainly used plenty of them in the past with good success. When you are planning to recycle your soil mix, though, you should probably reconsider these high-peat mixes and avoid them. I have noticed that, for some reason that escapes me, the pH just wants to drop hard and fast when you recycle this type of soil mix. I theorize that it gives the fungi a bit too much help somehow and they tend to dominate the container soil mix, and of course whenever they take over like that they love to drop the pH way down low. After having this problem persist and mess up a few plants I decided just to avoid using anything with any big ratios of peat moss in it and the problem was solved.

Over Compaction and Anaerobic problems

In containers, it is especially important that you understand the whole compaction dynamic. Using a living soil mix as we do in TLO growing, it is imperative that you grasp the whole concept of organic matter breaking down, in other words decomposing, or cooking, as I like to call it. Something like coconut coir fiber added to your soil mix will indeed help to aerate it at first. Then, in the highly bioactive TLO soil mix, it begins to break down rapidly into smaller and smaller particles, on its way to becoming humus, and compacting more and more the whole time. Anaerobic conditions can set in and living roots will die if this happens. Plants will die an ugly death. Using something like bark mulch in the bottom of your containers for aeration will do the same thing, and this mulch will likely become anaerobic fairly quickly in a living TLO soil mix. Use perlite, my very green friends. That is your prime aeration amendment in TLO container growing and your rule of thumb if winging it is to use about 33% perlite; so if I had 3 gallons of TLO soil mix, 1 gallon of it should always be small, nugget-sized perlite.



Recycling soil mixes with lots of additives can throw up some issues

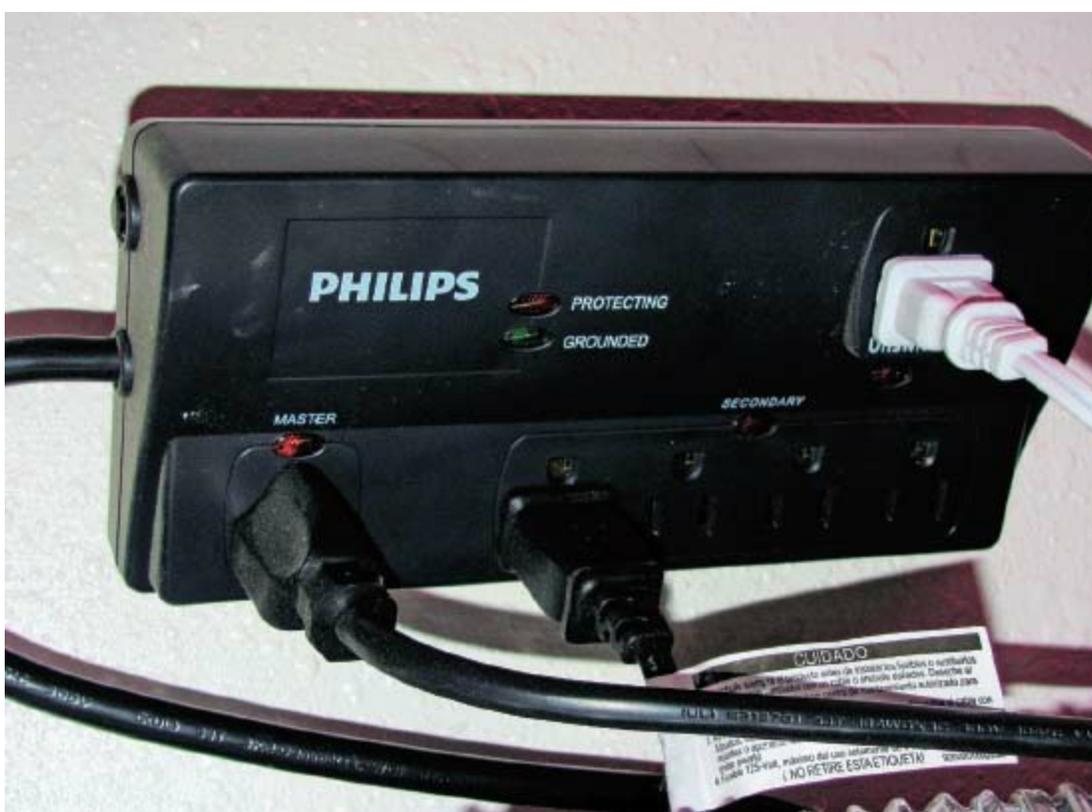
REV'S TIP

On the Fly TLO Quick (No Cooking) Mix—On the fly you can make a really great and fast soil mix for TLO and it's really simple. 1 part perlite, 1 part earthworm castings, and 1 part good bagged organic soil mix (with Mycorrhizal fungus if possible). Then add about 1 tablespoon of dry all-purpose, all-natural fertilizer with even N-P-K numbers, like 5-5-5 for example, per gallon of soil mix. It makes a bad-ass mix that requires no cooking, so don't add anything else; even something like alfalfa meal or any manure/ guanos would be a mistake here with this mix.

Lighting Sources, Lighting Habits, and Bulb Life

Sure, you can run the whole grow and flowering using fluorescents, even compact fluorescents, but you will be disappointed by comparison to using a real growing light. I recommend the Eye Blue MH bulbs for full term and flowering. TLO gardens just don't do as awesome under HPS lamps in my experience, and even just a good MH works well too. With the indoor garden lighting industry just exploding, by the time you read this book there may already be some type of superior lighting available, but for now, my recommendation is go for the Eye Blue MH bulbs.

Please use timers and I highly recommend digital timers if you have the wherewithal to program them correctly—in other words, don't be really baked while programming digital timers for your gardens. This way, even with power outages, all your equipment stays right on schedule thanks to the battery backup in these timers. These are super easy to find for 400 watt lamps and are also easily affordable. While you are at it, get true surge protectors for your lights and it will keep them operating at full potential for a longer time. Not just a power-strip, a SURGE PROTECTOR! Be wary of the LED lights on these; they should be blacked out with electrical tape or otherwise not allowed to shine their lights during the dark cycles of any flowering plants, or else hermaphrodites could result.



A surge protector is a great investment and can help keep you and your home safe



Always cover any power lights or LEDs on any electrical equipment in your grow room, to stop hermies appearing

I run MH bulbs for 1 year before I replace them. HPS bulbs can go 1.5 years in my experience before needing to be replaced. Make sure to use some type of record keeping about the date on which you first fired up your bulb. I use a simple piece of masking tape on the hood with the date marked using a Sharpie. Also computer programs like Outlook have calendar programs with reminders, and your phone usually has a scheduling application for reminders. You can always go with the most

reliable and just mark it on a larger type calendar in the grow room itself.

REV'S TIP

I get my Eye Blue 400 watt bulbs at Plantlighting Hydroponics online at: http://www.plantlightinghydroponics.com/eye-blue-metal-halide-lamps-c-375_596.html.

Grow Room Temperatures and venting

This is a big deal! This is one of those classic things that will come back and bite you in the ass around flowering time if you do not address it in the beginning. Using TLO methods, you do not have any need to bring the bulbs in super close to the plants. I always keep a minimum distance of 18 inches and more like 24 inches really, using 400 watt lamps. It's all good; don't worry about trying to squeeze every bit of growth out of the plant by jamming a bulb down her throat, so to speak. In my experience, by having the light this far away you won't sacrifice anything in yields, as long as your lights are in good shape. TLO growing works better with your lights backed off a bit from what you would run them at using something like hydroponics with CO₂ additions to the air. Too much heat is a very bad thing during late flowering and temperatures at the plant tops when lights are too close are often 10°F or more, higher than the growing room temperatures. This can result in "bolting" which is a type of super stretch brought about by temps too high at the plant tops and will result in airy buds and can cause hermaphrodites as well if the temps are too hot. Bolting can really get crazy with HPS bulbs too close, and those particular bulbs seem to catalyze the bolting effect, as far as I have seen.



A digital thermostat controlled switch is used for cooling or heating the grow room

Generally speaking, between 60–90°F is a good range of temperatures, and the temps in my room go from about 86°F. with lights on, and about 64°F. with lights off. Beware of the temps at the plant tops during times of higher temperatures! This can cause big trouble and unless you check it, you won't know for sure. Be proactive here and please just take my advice and check it.

It is hard to overdo your venting, and fresh air is key. I don't like to supplement CO₂ when growing TLO, but if I had trouble bringing in fresh air I would consider lightly amending the air with CO₂ from a tank, using a timed, intermittent release regulator valve. If you are ever messing with CO₂ additions always pick yourself up a CO₂ detector—like a smoke detector—so you don't pull some ultimate stoned move and kill yourself. When you read things like “air exchange” and “fresh air” or “exhaust fans” in growing books, don't dismiss them because this is a huge keystone piece of your TLO grow if you want it to be super natural, and I have a feeling you do. Always pull your air through rather than pushing it whenever possible. This makes such a huge difference you will be blown away (if you'll pardon the pun). Any halfway decent grow shops will have nice venting fans for sale, and I like Dayton and Elicent brands for reliable fans. I have never seen either one of these brands fail after many years of use, and the Elicent fans are also super quiet when operating.

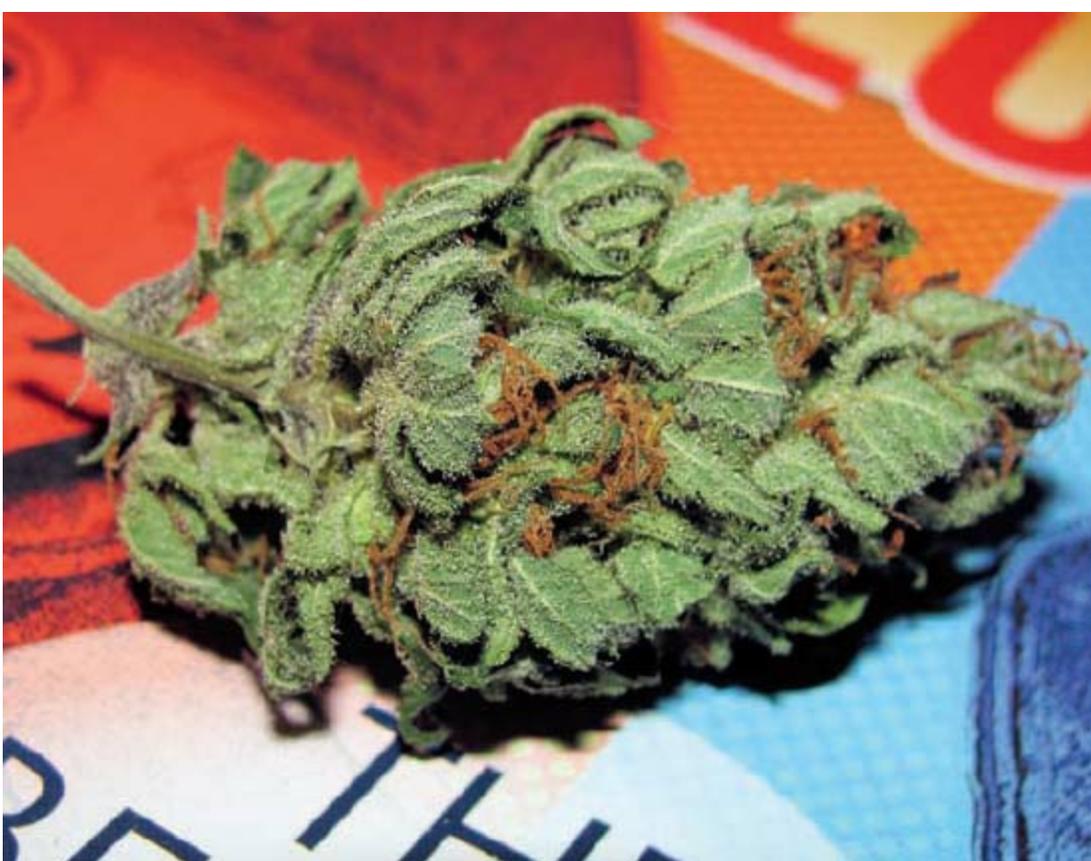


Purple striping on the stems can be a sign of absorption problems

Cannabis is pretty well equipped to handle some high temperatures, but it is not that good at handling temps when it gets too cold, and she will have troubles absorbing potassium and phosphorus if the room temperature gets below 60°F and you will start to see the telltale signs of absorption problems, with purple striping up the stems from the lack of potassium (K) being absorbed. Everything is still all right at this point, but it is a flag for you to see that your temperatures need to come up a bit.

Nutrient Deficiencies and Starvation

If you are doing everything but the spikes, then your plants may be starving. With so many plants being grown and bred using synthetic (force-fed) nutrients, these kind of genetic qualities are mostly “unknown” because the whole dynamic of synthetic growing is to force-feed a ton of nutrients, which then only allows the roots to absorb a very small percentage of those nutrients. The rest must be flushed away or it will cause lockouts. Growing all naturally using TLO, you get to actually see which plants (or strains/genotypes) more efficiently absorb, store, and use the nutrients available to them. Some plants are hogs for things like potassium and nitrogen for example, while some may have a hard time absorbing or metabolizing these nutrients, when compared to other strains or individual plants. If you are a breeder, why on earth would you not want to know these things? Also, if you kill or fully piss off your Myco fungi with high-phosphorus liquid flowering nutrients, your plants will likely begin showing signs of deficiencies of P and K (and often N too) and will force you back on to the liquid nutrients to finish them. Now this can be done all organic, but the final results will be a step below what is possible using TLO—see for yourself before you rush to judge this.



Pure, perfectly grown TLO bud is paradise!

Usually, deficiency symptoms are all too often a sign of nutrients actually being locked out, from pH-related mistakes. These mistakes include using too much molasses or kelp/seaweed amendments, using hard well or city water with a super high pH, or using a pure water source with liquid organic nutrients that are full of chelating organic acids. Now a little bit of humic, fulvic, or ascorbic acid is all right, but if the liquid nutrient causes your nutrient solution pH to dive really low and hard, it will sometimes give the fungi a little too much of an advantage and they will take over the container soil mix; these fungi are not the Myco fungi, rather they are other “indigenous” opportunistic feeders that prefer more dense (dead) organic matter to feed on, like rice, bark, kelp, etc.

REV'S TIP

Surprisingly, you can starve TLO container plants fairly easily by underestimating how much the microlife need in terms of nutrients and resources. Remember you truly are feeding the soil mix, because it is living. Nitrogen and calcium, along with oxygen, are all required very heavily by the microbeasties. That's why I like to make my teas almost at suggested ratios of the nutrients, and when I make a flowering type tea, it is common for me to use full recommended amounts of Big Bloom and Fish Fertilizer in a tea for these very reasons.

This seems to be one of the hardest things for many to wrap their heads around, because if you don't understand the dynamics, it seems fine to add a little synthetic nutrient. That couldn't be more wrong, my green friends. If you pollute your soil mix with ANY synthetic nutrients, that soil mix will no longer be able to support super natural levels of microlife, due to the dehydrating qualities of those synthetic salts. As soon as your soil begins to dry out a bit the salts hyper dehydrate the microbial life. So avoid using anything with synthetic EDTA or anything like it, ever, on your TLO soil mix.

If you do make the mistake of using some synthetics on your container plants, the only way I know of to recover healthy plants to harvest is to either stay on the synthetics for the duration—yuk—or, switch over to some kind of heavily chelated organic nutrient like Earth Juice that uses large amounts of organic acids to make nutrients absorbable for the duration.

Avoid being fooled when trying out new products, and there are a ton of tricks they use to fool the ignorant and make them think they are using organic methods, when in reality, they are not. Read all labels very carefully and call manufacturers if you have any doubts. Ask them directly if they have any synthetic salts present in the product.



Synthetics galore. Beware!

Here's a partial list of a few things that are *NOT* good for TLO growing:

Fox Farm

Tiger Bloom, Grow Big, Marine Cuisine, and American Pride all have synthetics in them. Their Big Bloom on the other hand, is one of my all-time favorite things to use, especially in teas. Their Happy Frog line seems all natural to me, and I myself use several of these dry products.

Botanicare

Any of their liquid products have synthetic salts, with the exception of the Organicare division of theirs, which does have a few nice products that are safe for TLO growing last time I checked.

Earth Juice

While these products are usually all natural, they are also normally full of organic acids for chelation, and will really dive your pH and piss off a lot of your microlife, especially the Myco fungi, it seems to me. Something like Earth Juice nutrients can be a lifesaver if you mess things up and kill or piss off your microlife. You'll just need to go with that liquid feeding dynamic, and I would also want to add some CaMg+ by General Organics to that blend as well.

Miracle Grow

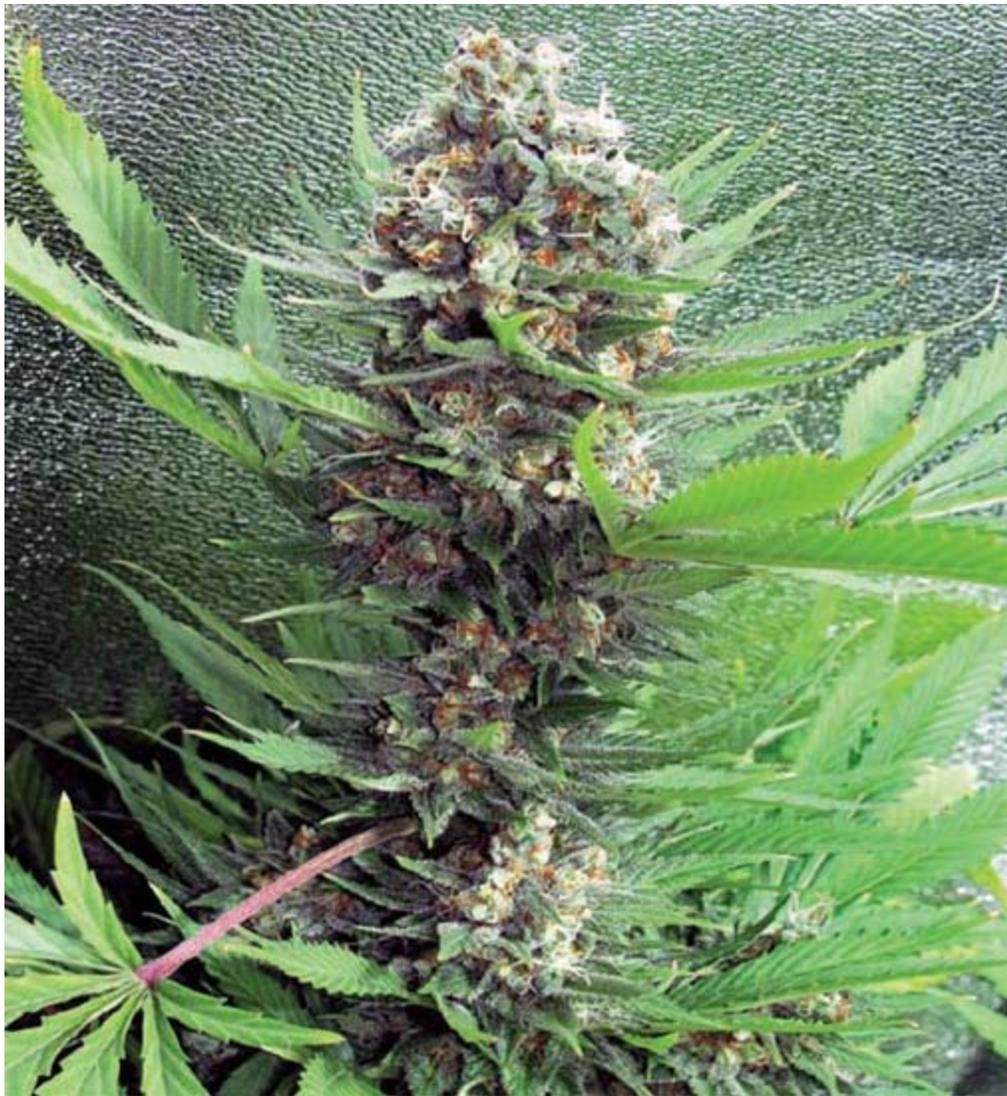
Their "All Organic" soil mix seems all good to me from reading the label thoroughly. In the world of synthetic growing, Miracle Grow is unacceptable really, and its refinement levels even as synthetics go must be really low. I base this on how insanely harsh MG grown weed smokes, even with a good flushing. Same goes for Shultz, and others.

Roots Organics

These guys are all good to go for TLO growing, but you just need to be careful with a couple of their liquid products that seem to be chelated pretty heavy duty with organic acids. From my experience with many of their products I think they are high quality and truly all natural.

Mycorrhizal Fungus Concerns

Plenty of you reading this who think you are all organic and are using the Mycorrhizal fungus religiously are wasting your money. Here's why: any time you pour a liquid flowering fertilizer that has any real amount of available phosphorus (P) in it onto your plants, you mess with your Myco fungi in a negative way. This causes them to stop doing what they do best, and that is bringing the plants lots of lovely P and other minerals too. Through many years I dialed in my Myco fungi effectiveness, and I am at the point now where I can actually see when the Myco "bite" the roots and take hold. The whole trick here is not killing the Myco fungi, or pissing them off to the point where they go dormant—in other words we don't want our Myco fungi rendered useless. Global P is the enemy here, my green friends.



Mighty myco fungi makes big flowers



Great White is a fine myco and bacillus inoculate



An Actively Aerating TLO tea

Teas and P are awesome, as long as there is a little calcium around, because the P will lock up with the calcium, but this can be reversed by the mighty Myco fungi. By the time you use the tea, most of the N and P are mostly unavailable either from becoming immobilized in the actual microbial bodies or being locked up into insoluble compounds, such as calcium and P. Just make sure you don't use something with a high P content because this could cause other problems from too much P locking up with calcium. If the number is say 3 for the P, like in a 3-3-1 N-P-K ratio, then I feel safe using it at half the recommended strength in my teas. This is how you want to deliver some P, not super available and globally using organic acids like Earth Juice uses. There is nothing wrong with Earth Juice products; they just are for "Soup-Style" organic growing, not TLO growing.



This is a carbon filter cartridge replacement

I found out the hard way to not use any kind of barley products or extracts. These have a very

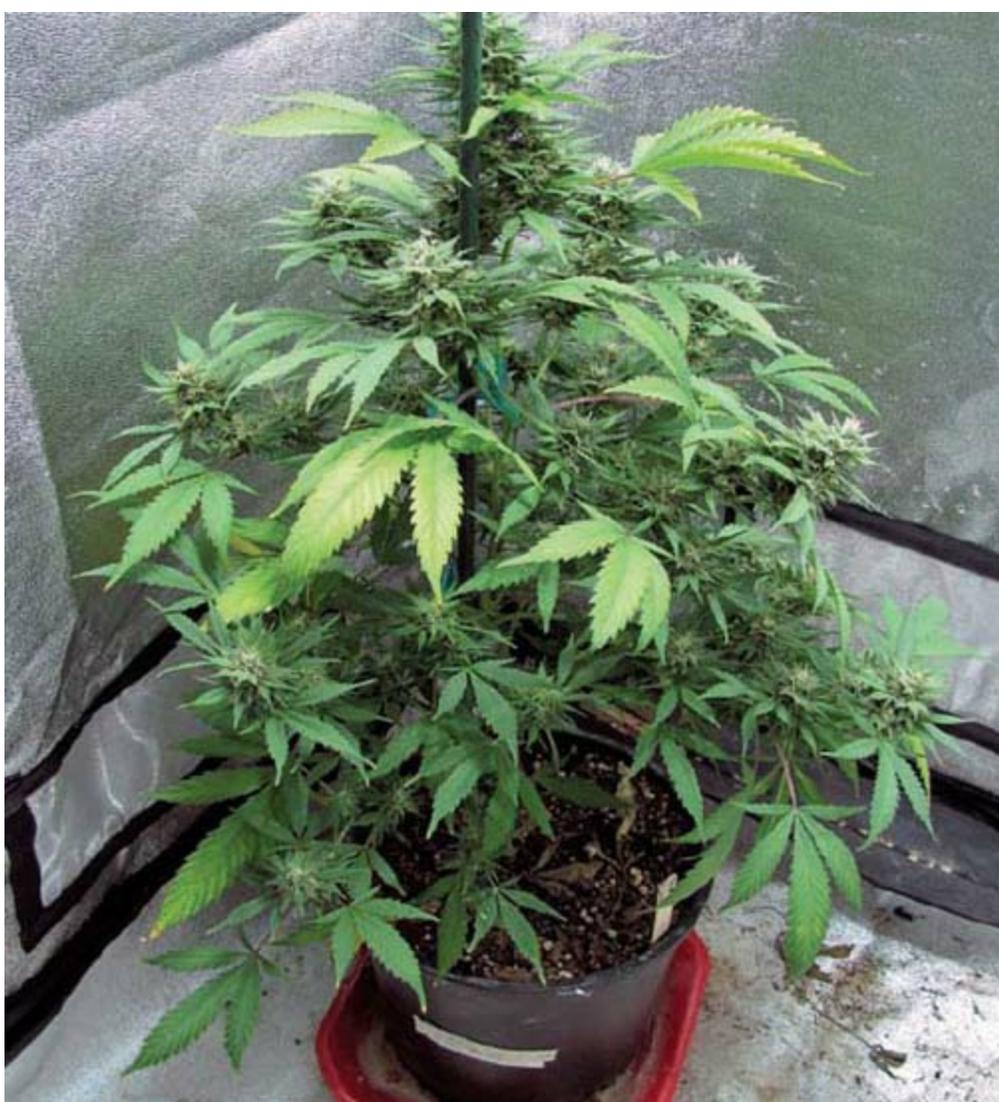
noticeable negative effect on all the good fungi including the all-powerful Myco! I later read that homeowners who have water features on their properties, like ponds and whatnot, often use little bundles of barley to fight algae and fungi build up. Last but not least by any means, DO NOT USE CHLORINATED WATER! As well as chlorine there is a new compound called chloramine and it doesn't just bubble out, so you NEED to filter this out with activated carbon filtering. Chlorinated water just has no place in TLO growing.

Hydrated Lime

I would never recommend using this in TLO container growing because it kills anything living it comes into contact with on a microbial level, until it fully decomposes/cooks. It can also easily take your soil mix pH up way too high, so always use Dolomite lime for TLO container growing. However, any lime needs to be cooked before growing in the soil it was mixed with, so remember this even when using Dolomite lime.

Overwatering

This is a big deal, my green growing brethren. Overwatering probably kills more plants than anything else when it comes to indoor container gardening. Houseplants too, man; people kill a ton of houseplants this way, believe it or not. Too much water in a growing container is always a bad idea—now drill that into your head and always err on the side of caution. This is especially important within the first couple of weeks after any transplant.



This flowering TLO plant has been overwatered

A day before your plants will wilt from need of watering, the lowest couple sets of leaves will droop a bit for a whole day. Now you for sure don't want to take a plant into full wilt any time during flowering, and especially after the halfway point. This could easily cause many plants to express hermaphrodites and end up making seeds that will also likely grow hermaphrodites. Just take a little time to learn to look for that expression of the lower couple sets of leaves drooping a bit, as this is the for sure "water-by" date marker! I don't let my containers get this dry, but here and there I do it to all of them. I have just trained myself to look for the droop, so I am never too late with water.

REV'S TIP

The first half of the flowering cycle is commonly where many people will overwater their container plants. Living soil mixes can hold a lot of water if they are operating like they are supposed to. Anytime I transplant, I like to water thoroughly but then I let the plant go until I see just a little drought stress, before watering again. Drought stress starts to show in the lowest largest leaves first, and they will sag for a whole day before the rest of the plant will go limp. Overwatering can easily cause air to be scarce, so microlife populations diminish, and nitrogen locks out or turns to gas if the problem

goes anaerobic. Learn to watch for those bottom leaves drooping, because this is when to water container cannabis, and small skills like this make giant differences.

Overwatering does bad things and it encourages anaerobic microlife to come on to the scene. It also tends to remove a decent amount of nitrogen from your containers; as the microlife start to drown they grab air from the plant roots and from the nitrogen. This converts the nitrogen into a gas, and it very literally floats away.

Salt related Issues

Too much of the “bad” salts can really make your TLO learning experience a living hell. Salt problems usually kill plants, but not quickly, rather slowly and ugly. We will go through all the directions I know of that this can come at you from, but always be switched on to this, because sea salt and sodium are both OMRI rated, but are not really good for container plants in any real amounts. All salt-related issues look fairly similar and affect the tips and edges of the leaves. The first and most common place this comes from is your water source, and if you have any real amounts of dissolved minerals (salts) in your water—like in city tap, or well/spring water—this can build up in the root zone of your container plants. This will have at least two bad results that I know of: first the salts will tend to dehydrate the root zone for water when the container dries out a bit, and second, those built-up salts will change the pH locally in the root zone, effectively locking out absorption of micronutrients. Of course the best way to avoid this issue is to use pure water, like reverse osmosis filtered, rain, or distilled water. The other way is a counter-measure: you must flush the hell out of your containers about every other week to leach those built-up salts out of the containers.



This shows some salty cannabis issues in TLO containers

REV'S TIP

The synthetic salts used to chelate nutrients in synthetic fertilizers are especially deadly, even in very small amounts, in a TLO container, due to the fact they hyper-dehydrate the microlife as the soil mix starts to dry out. Nothing is more anti-TLO than killing off your microbeasties! Don't use synthetic crap, ever, on your TLO containers.

Coconut coir fiber is another way unwanted levels of bad salts can come into your TLO container gardens, and this one will really put a damper on your yields and growth rates too. Sea salts and high potassium salts are notorious in coir coconut fiber. Botanicare has an already expanded version of coconut fiber they call "Cocogro" that is well rinsed and works great for TLO container gardens; actually this is what I use in my grow. Optionally, you can flush the hell out of your coconut fiber before use, but you really need to flush it through well, and several times. Alternately you can use good, bagged compost that is really woody and chunky in place of the coconut fiber in the TLO soil mix. Whatever you do, do not underestimate the negative impact this will have if you choose to ignore this info.



Cocogro well-rinsed coconut fiber for TLO

I often add a little CaMg+ liquid magnesium and calcium supplement to my water and to my teas, because cannabis really loves both of these secondary nutrients, but you just have to be careful not to overdo it. I just use my TDS meter to get my water up around 60 PPM and I never have any build-up issues. Don't use this additive if you are using more than a tablespoon of molasses per gallon in your teas, because molasses adds a decent amount of magnesium, and a little too much magnesium really causes big problems in containers. Don't get me wrong, because cannabis loves and needs decent amounts of magnesium, especially during flowering. However, you need to keep your magnesium levels on your mind so you don't go overdosing them, and this could happen if you were to use a lot of molasses and CaMg+ at the same time.

Softened water is the last deadly thing on my list of salty offenders in TLO gardens. Softened water sucks for container or any other kind of gardening if you ask me. It is often way, way too salty! Now softened water is awesome if you normally have hard water and you hook up a reverse osmosis (R/O) filter to your softened water source, because this will make your R/O membrane/filter last a really long time compared to if you had your R/O filter hooked up to a really hard water source. But never use softened water on your plants!



Never use softened water on your plants

Low Humidity and High Temperature Gardens

If your gardens run up in the high 80s (F) or hotter, and your humidity is often below 45% your cannabis plants can go through a ton of potassium (K), and I think they actually sweat it out. If you have really good circulation in your garden, as you should, this can just exacerbate the problem. Now many indoor gardens have to run low humidity because they are infected with powdery mildew, but if you are not infected, then feel free to toss a humidifier in your gardens to maintain around a 50–60% humidity level, like I do, and this will really help you with heavy duty K usage. Otherwise, just keep your K in mind always, and know that things like kelp and seaweed stuff, as well as molasses, greensand, and good, all-purpose dry fertilizer with a good K number are all good ways to make sure the K keeps flowing in your garden. When I used to see this in my grows in the olden days when I had powdery mildew and ran my humidity down around 30% I would just use soluble seaweed in my teas, and sometimes even when I just watered. Again, as with anything, don't go insane with using seaweed extract or you will cause yourself problems with things locking out, like nitrogen!

REV'S TIP

If you are plagued with powdery mildew, you can bring in a dehumidifier and run your humidity down between 35–45%. This will help slow down the mold a lot. Running a low humidity will also cause your plants (and microbeasties) to go through a lot of calcium, and your plants will also use a lot of potassium in

low humidity environments—especially with good air movement. Keep in mind that plants can only absorb calcium and potassium slowly and steadily, so if you go too dry, you will normally experience a potassium deficiency. This in turn will almost always become a calcium issue as well.

Nuking Your plants With Nutrients

This can happen with organic liquid nutrients easily, as well as dry nutrients if you apply them too heavily, and/or if you do not cook raw organic nutrients first into your soil mix. If you suspect you have done this with liquid nutrients, flush the container thoroughly as fast as you can, and cross your fingers. If you have done this with dry nutrients then it is almost always game over for those plants. Always cook any dry organic nutrients first into your soil mix before exposing living roots to that soil mix. Also, in TLO growing you should only very rarely have to add liquid nutrients from a bottle, unless it is in a tea, in which case those nutrient levels should be low anyway.



This plant has been totally nuked with nutrients

REV'S TIP

Locally you can find a lot of things like molasses, rice, and often inoculates like mycorrhizal fungus; just make sure they are not older than 1.5 years from being packaged. Health food stores often have stuff that would surprise you, as well as feed stores, and this is where I source my alfalfa, crushed oyster shell, steer manure,

and perlite. You can also usually find perlite in Home Depot type stores as well, so ask in the outdoor gardening section.

RESOURCES FOR BUYING TLO ADDITIONS

- <http://www.purewaterproducts.com/> This is my one stop shop for everything involving water filtration needs. Pure Water Products has always given me top quality at fair prices with awesome customer service. I am not compensated in any way to say this!
 - <http://www.planetnatural.com/> Planet Natural has a lot of great products, especially composters and earthworm farms, for indoors and outdoors. They tend to get orders a little wrong from time to time, but they are great with the customer service and have always fixed their mistakes fast and professionally for me.
 - <http://www.americanag.com/> American Agriculture is one of my all time favorite places to shop for TLO stuff online. They ship many products free to the USA and have a pretty nice selection of Down to Earth products, as well as Great White inoculant, powdered oyster shell, and much more.
 - <http://www.organicgem.com/> Organic Gem liquid fish fertilizer is the best I have ever used and especially in teas. I also like General Organic's squid and fish liquid fertilizers too. Awesome nitrogen that is very microbeasty friendly, along with a good dosage of phosphorus, iron, and mucho trace and micronutrients.
 - <http://www.humes.com/> As your TLO skills grow, so will your appreciation for these dry products. Awesome microbeasty food, and some cool exotic organic contributions from yucca. I just love the Gardener's Blend in teas, at about 1 teaspoon per gallon.
 - <http://alisorganics.com/Humate-Soil-Conditioner-HUM.htm> Humate is humic shale ore, and this stuff is great during the recycling phases. I also love it to add to my worm food in small amounts. It tends to drop pH a little bit but this is no real worry when used the way I use it. The good fungus really loves this stuff in your soil mix and they may even live in the granules, or anchor to them.
 - <http://www.gardeniq.com/store/product/Soft-Rock-Phosphate,187,94.aspx> Here is where I get my soft rock phosphate micronized (solution grade) and for a personal TLO garden this is like a 10 year supply; so while shipping is a bit spendy, in the big picture it all works out good. Great phosphorus and many other great mineral elements and this is always included in any of my soil-mixes before cooking them.
 - <http://www.little-giantpump.com/> Best water pumps ever, period. For cloners I like pumps that never fail, I give you Little Giants!
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CHAPTER 13

Where to Find Additions for TLO Growing

I get several of my really exotic things online, and other things locally in my hometown or very nearby. You can find a lot of things at local feed stores that supply local farmers, and crushed oyster shell is a favorite thing to supply your live chickens with calcium, so you just need to rinse these off to remove any residual sea salts, and they are normally really inexpensive. I get a 50 lb. bag for something like \$7 at my local feed supply shop, and I use it all the time. I also get my granular rock phosphate from this same place, along with all my growing containers, and most of my guanos and other Down to Earth products.



You should be able to find some products at your local grow shop

Local hydro-type stores are another place you can usually source some things you need for indoor TLO growing, like microbial stuff in bottles, expanded Cocogro coconut fiber, and often things like Fox Farm's Big Bloom liquid, bulbs, meters, and dry nutrients that are actually organic too. Have a look around in yours and get what you want to, but bear in mind that this source is normally the most expensive.

Some things that I have to buy online are the more obscure additions like my powdered soft rock phosphate, my favorite Gem brand liquid fish fertilizer, and several other things. Don't substitute stuff all willy-nilly without knowing exactly what you are doing or you could cause yourself huge problems. You wouldn't want to do something like replacing the soft rock phosphate with additional dolomite lime, for example. This would likely end up killing your plants due to too much magnesium

in your soil mix, which is always a bad thing. There are many mistakes to be made by subbing out things with other things, and not knowing what you are doing. Always be very sure about this if you end up doing it. Here are some great sources for the things you'll need, including places online that have always been super helpful to me.



Here are some Down to Earth microlife inoculates

Microbial Life in Bottles

You can get Great White online at: <http://www.americanag.com> from American Agriculture, and it is free shipping in the USA. One of the big concerns in TLO growing is that the mycorrhizal (Myco) fungus is alive and viable, so I don't mind paying a little money to get a high quality Myco fungus. If you are using fresh living earthworm castings and/or are recycling your soil mix, then you have a whole bunch of beneficial bacteria, fungi, nematodes, and protozoa already present in your living soil mix. However, you always need to add the Myco fungus, and I use Down to Earth brand granular Myco fungi with both the Endo and the Ecto versions of the Myco. I do this just in case the Ecto do play a role in the game with cannabis, even though it is widely accepted fact that cannabis uses the Endo type of Myco fungus only. I just like to have my finger in both pies.

The Great White is a high-quality microbial amendment, and I have never even heard of any not working great. It is a tad expensive, but worth it I think. The Great White has it all: bacteria, fungi,

and Myco fungi. The American Agriculture website (above) is a real handy place for me, and I source several things from there myself. I always like to back myself up with the Myco by using both the granular version, which I place right under root balls during transplanting, and using a soluble version about 10–15 days after any transplant. The bottom line here is that you need the Myco. You depend on them big time in TLO container growing, so make sure they are fresh and viable.

BioZome is another great product with life in a bottle. Go to: <http://www.biozome.com> and read up on these amazing specialized microbeasties. I use this product in my recycling soil bin religiously. It's not imperative to use this, but if you have the curiosity to try something really cool and effective, give it a whirl and see what you think. I am a loyal BioZome user myself. This product does not contain Myco fungi.

Ground Oyster Shell

This can also be acquired at <http://www.americanag.com> from American Agriculture. This stuff is just fantastic, and puts a real decent amount of great slow-release calcium into the container soil mix. It also works great as a pH buffer and it helps to keep the other soil mix fungi from becoming too dominant as it really helps out the good bacteria, due to its influences on the pH and its porous nature. The ground oyster shell is a finer grade than the crushed version and I use both versions all the time, especially in my earthworm farm and when recycling soil.



Ground oyster shell can be acquired from American Agriculture

Crushed Oyster Shell

I get my crushed shell locally from my feed store, and being on the coast makes this product very accessible to me, so get this crushed shell if at all possible. If you just can't, then use a bit more of the ground shell in the TLO soil mix. Shipping is free from American Agriculture for a 6 lb. box anywhere in the USA, which is nice.

Humic Shale Ore (Humate Soil Conditioner)

You can get this online at: <http://alisorganics.com>. Just search the word "humate" and it will take you straight to it. I source mine locally, and many nurseries actually carry Down to Earth products. If not, you can usually convince them to start stocking something you will buy regularly, or at the very least they will special order it. Paying for the shipping gets a little pricey. I have made up batches of the TLO soil mix not using this product, and both times I did it I noticed a slight drop in vigor and plant size/growth rates. I'm sold on it, but if you just can't find it anywhere, you can leave it out.

Prilled Dolomite Lime & Powdered Gypsum

I get both of these locally, and any good nursery should carry both. Granular gypsum will work too; just add an additional 50% or so to the recommended amounts in the TLO soil mix. Prilled Dolomite Lime is fantastic, and the prilled form is just a pelletized form, usually reddish brown, and it will be granular looking and say "Fast Acting" on the bag. The granular type of dolomite lime that looks like rock salt will also work fine here too, it will just not be quite as well as prilled. Avoid the solid little rocks of dolomite lime, and this will not say "Fast Acting" anywhere on the bag.

Soft Rock Phosphate Powdered & Granular Rock Phosphate

Soft Rock Phosphate (SRP) and Rock Phosphate (RP) are fairly tricky to source. I get my powdered SRP at: <http://www.gardeniq.com>. Click on "The Online Store" button, go to Nitron Industries and you will find it listed there. Granular RP is a bit tougher, but better nurseries should carry it, and they can certainly get it. If you can only get the SRP then do that, but the RP is really a great addition so try to source that one as well.



Store your soft rock phosphate in a watertight container



Perlite is one of the more widely available TLO soil mix additions

Perlite

Hydro shops and grow shops both usually stock this one. Higher end nurseries and even the Home

Depot I used to live near carried this product. You will usually find it in 4-cubic-foot bags for around \$20, and you can find it in smaller bags too in places like Fred Meyer or in Kmart type stores in the gardening section. Also, with a little bugging you can easily get a local nursery to carry some or order it in for you. You need this addition, so go to whatever lengths you need to, because nothing I know of can replace it in container growing with a living soil mix. The microlife eats everything else too fast, like coir fiber and even shredded bark. Vermiculite will not sub out for perlite, so please don't make that mistake.

Greensand

This one can be hard to find in certain places, but fear not, because you can get it online in a 7 lb. box for about \$10 with free shipping from American Agriculture. But for real, any good nursery should carry this one. Cannabis loves her greensand, so do what you need to do to get some of this. In a living soil mix it has many benefits beyond potassium and iron. I also add greensand to my earthworm food.

Compost & Earthworm Castings Teeming with Microbeasties

Fresh compost will always be the best, but you have to be sure the person making that compost knows a bit about what they are doing. Bagged compost is all fine and good, just avoid sterilized versions, and you should be able to find this one easily at any nursery. Earthworm castings are a little harder to find, and lately I have seen these “designer castings” that are outrageously priced and are actually 50% coconut fiber. Full of life for sure but dayum they're expensive! Check your local nurseries and have them order worm castings for you if you can't find them because shipping will be a lot of money for a 20 lb. bag. Avoid sterilized versions of these, and live worms in the castings indicate all is well! I would just go ahead and pull the trigger on a small home earthworm farm, they really are “the shit” and since I got mine I have even started eating healthier to make sure my worms get good scraps. A double-whammy of benefits.



Look at these beauties! Live worms in your castings show that all is well—but there probably won't be this many!

Home Earthworm Farms And Red Wiggler Worms

I can't recommend one of these more highly, and you can get them in a few places online like: <http://www.homecompostingsolutions.com/>. That's actually where I got mine, and another good version is the 3600 Vermicompost System. Click on "Products" on the homepage and have a look. You can also get your Red Wiggler worms here, and you really want these specific worms for TLO growing. Earthworms from your garden will not like these farms. Warning: there may be a few gnats or fruit flies buzzing around near one of these, so if you are a bug-phobic person (or an entomophobe, to give you your proper name) you should consider this. There are no bad smells as long as you add perlite and oyster shell to the worm food—a lot of perlite is a huge key to making these little earthworm farms super natural!



My worm farm is actually inside my TLO indoor garden!

Simple Style TLO and Apartment Style TLO

A Simple TLO Soil Mix to Get Your Feet Wet

You can just use the base mix from the TLO soil mix (below) in this book. This doesn't even require any cooking time. You can also use any good bagged soil mix like Fox Farms, or Gardner & Bloome, and just cut it with about 25% small-nugget perlite. You can super simplify spikes as well, and for your high nitrogen spikes use 1 part blood meal to 2 parts kelp meal. For your flowering spikes use 1 part steamed bone meal to 1 part kelp meal, or 1 part high P bird/bat guano to 2 parts kelp meal. Get a good all-purpose type fertilizer like "Pure" granular by Organicare for layering, and you are set to rock and roll. How easy was that? Now this is just to check it out, but I assure you if you pull off a good and actual TLO harvest done right, you'll be into it deep just like me and many others.

BASE MIX

- 2 gallons quality organic soil mix (or good organic recycled soil mix)
- 2 gallons thoroughly rinsed coir (coconut fiber) or woody chunky compost
- 2 gallons perlite (small-nugget size)
- 2 gallons earthworm castings (fresh earthworm castings, and/or fresh compost works too)



Make use of every space when growing indoors

If you are going to do it then do it right and make sure you aren't inadvertently adding any synthetic salts from synthetic-style nutrients. This will kill the microbial life, and will befoul the final product, so do it right and see the real difference.

In really small living spaces like apartments, you can improvise in a lot of ways. Totes, plastic kiddie pools, cheap shower curtains and tarps can all be used in small spaces to mix, recycle, and store things. Right now I am growing using tents in a very small extra bedroom, and an outdoor shed where I do my recycling and all that, but if I didn't have the shed I could still pull it off. I could even pull it off with using just a closet and a cloner someplace if I had to. It is nice to have the room for sure, but you can make TLO work really smoothly even in smaller personal growing spaces, and a spare bedroom and part of a garage are about perfect for a personal garden. TLO is very flexible, and you could set up huge greenhouses or warehouses on dripper systems, or fire up a couple of grow tents in your garage.



No matter what size your grow space, connoisseur bud like this can be yours!

RECOMMENDED FURTHER READING FROM THE REV

Teaming With Microbes

This was written by Jeff Lowenfels and Wayne Lewis. One of the greatest books I have ever read, it really comprehensively explains what “all natural” really means; a must read in my opinion. It’s all about teas and how the plant really runs the show, and it’s full of useful and mind opening information. A must have for TLO enthusiasts and all natural-style growers everywhere.

Marijuana Botany

This was written by Robert C. Clarke. This is also a must have, and it covers everything from simple to complex, start to finish. Comprehensive and great for referencing subjects fast, if you do not have this book and you love to grow cannabis, I advise you to score this puppy now! You’ll thank me.

The Cannabis Grow Bible

This was written by Greg Green from Green Candy Press, and is the one I always refer peeps to when they want a general all about and how-to guide when growing cannabis. I think this book is awesome.

The Soul of Soil

This book is a great eye opener and full of fascinating information about soil. It’s not really about indoor gardening at all but it is outstanding and comprehensive, and it’s sure to enhance your perspective in your own gardens indoors and out.

Earthworms Eat My Garbage

This was written by Mary Appelhof and is a must read in my opinion for TLO recycling related info. You want a worm farm you say? Get this book my green friends, and it will really open your eyes to the world of worms, which is the entire world; at least how the world works. There is an amazing amount of info about building and maintaining your own indoor worm farm like mine.
