Living Material

~ What Is It - Where To Get It - How to Use It ~



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About This Guide – I originally released this guide back in 2015. It was, and still is, intended as a free educational resource for members of the Red Worm Composting (website etc) community. But if you know of anyone who might benefit from it, you are more than welcome to pass it around (make it available on your own site etc). My only request is that no changes be made to it (ownership claimed etc).

You may also want to check out the (2019) YouTube LM video I made: https://www.youtube.com/watch?v=RMKUrCozEV0

If you want to learn more about vermicomposting, or just generally stay in the loop with Red Worm Composting, you can sign up for the RWC email list here:

http://www.redwormcomposting.com/vermicomposting-newsletter/

If you have any questions/comments relating to this guide (or vermicomposting in general), feel free to drop me a line anytime: http://www.redwormcomposting.com/contact-us/

Introduction

Some years ago now, I started using the term "living material" quite a lot in my writing, and eventually concluded that I should put together an in-depth article/report explaining the concept in all the detail it deserves.

That is of course the purpose of this guide!

Right off the bat, you need to know that this is a term I came up with myself. Some followers of the RWC website *may* have adopted it, but I'm not really sure how widespread its use is. My point? Don't get obsessed with the term itself.

As you'll see, even in my world it doesn't refer to any one thing - but rather a collection of materials that have some similar, beneficial properties in common.

Others may use the term to refer to something *completely* different. So be careful out there!

Ok, so what better place to start than with a definition?

The Definition - Living material (LM) refers to any organic matter that has gone far enough through the aerobic decomposition process to be almost stabilized. Or - in the case of high C:N materials (which are pretty stable to begin with) - it can also simply refer to materials that have been allowed to rot for long enough to become well-colonized with microbes.

Clear as mud? That's what I suspected...

...so maybe it will help to let you know what it's definitely NOT.

What It's NOT - living material does NOT simply refer to any and all organic wastes that are starting to rot. If that was the case, aged food wastes would be included, along with plenty of other examples.

Don't worry if you are still a little (or a lot) confused. We'll be looking at some helpful examples later. In the meantime, look below for some helpful qualifiers.

Typically...

Living Materials will be:

Dark in color (but not always)
Earthy smelling (bare minimum, never, NEVER foul smelling!)
Absorbent
Loaded with aerobic microbes

You can think of them as a sort of "probiotic" for your worm bin. Or a form of "compost accelerator". Loaded with beneficial microbes (many of them decomposers), they help you multiply your efforts quickly.

Apart from the assistance with decomposition, the rich community of beneficials can also act as a sort of filter - sucking up noxious gases and liquids, and converting them into more worm-friendly compounds.

After reading all that...

If you're all set to run off to the nearest big box garden center and grab a bag of "compost", "manure" or, worse still, potting soil, let me urge you to cool your jets!

Some of those materials CAN at times offer benefits, or be helpful/useful in other ways, but they are usually pretty sterile. They can also have elevated levels of salts (potentially fertilizer salts in case of potting soil). So, definitely not the best for our beneficial microbes or worms.

A Wee Bit 'O' Backstory

My own fascination with LMs can be traced back to when I started 'playing' with aged horse manure as a worm food/bedding.

One of the things I noticed about the material, apart from the fact that the worms absolutely loved it, was that it had a *very* diverse ecosystem of invertebrates (basically, the little critters such as worms, insects, mites etc – that don't have backbones) - but none of them seemed to be excessive in abundance, as is often the case in a home worm bin. It was as though a perfect "balance" had been achieved.

I noticed that home systems with the aged manure added tended to do *really* well. Wastes broke down more quickly, there were virtually no odor issues, and there didn't seem to be significant outbreaks of any one organism (eg mites, fruit flies etc).

Over the years, as I tried out various other materials with similar properties (also with positive results), I eventually settled on the "living materials" term as a means of referring to them collectively.

Let's now look at some examples of LMs

Aged Manures - The term "manure" can refer to a very wide range of materials. Most of them are great for vermicomposting, BUT not all of them will make good LMs – at least not without some additional steps being taken.

Ideal candidates for LMs are manures that have **A)** been mixed with bedding materials (eg straw, wood shavings, saw dust etc) and then **B)** allowed to compost/age outdoors (exposed to the elements) for at least 3-4 weeks (usually longer).

Remember, we are not after a really rich food source (although many LMs will contribute to worm nutrition), but rather a material absolutely loaded

with beneficial aerobic microbes. The best LMs also serve as valuable habitat materials. (On a related note - further along I will make the distinction between what I refer to as "Primary LMs" and "Secondary LMs")

As alluded to earlier, my absolute favorite LM is (bedded) aged horse manure. This is a pretty fibrous poop (some serious science jargon for ya!) to start with, so when it is aged/composted with bedding materials like straw you end up with a very absorbent, bulky habitat matrix like no other!



It literally makes me smile when I think about it (you know you are a Worm-Head, when...lol)!

Wet manures, such as pig and cattle manure, can work as well – BUT it will (obviously) be even more important to mix them with an absorbent,

carbon-rich bedding material before letting them age/compost.

Rather than spend time going through all the various other kinds of manures, let me instead remind you of the key steps and key requirements for the "finished" product.

Manures should always be mixed with a bedding material and left to sit (preferably exposed to the elements outdoors) for *at least* 3 to 4 weeks. In the case of poultry manures, you may even want to soak them down first since they are often dry, and contain harmful salts.

A manure-based LM will be ready to use when it is...

Darker in color
Earthy smelling (important one – there should be no manure smell)
Somewhat crumbly (or fluffy) in texture
Fairly dry (not wet and muddy)

When in doubt, test it out!

Adding a small amount of the material in question to a well-ventilated worm bin (up near top ideally) should tell you relatively quickly whether or not it is worm-ready. If worms move into it, or at least congregate right underneath it, you are probably in the clear.

Honestly, doing some testing is NEVER a bad idea with a new aged manure mix, regardless of how confident you feel about it.

Ok – moving on...

Bulky Screened Worm Bin Material - This may be the most readily-available LM for the majority of readers, so it's important we add it to the list. What I am referring to here is anything that **A)** does not fully break down during one or more vermicomposting cycles (time from start-up to harvest), and/or **B)** ends up screened out.



These materials won't likely offer the same amazing habitat value as aged horse manure (although, old partially-decomposed bedding materials will be great) but they are still very valuable for mixing with food wastes and just generally helping the process along.

Material From Outdoor Composters – This is another one that readers are more likely to have access to (as compared to aged manure).

If you happen to have any sort of outdoor compost bins/heaps/beds that are remotely well-maintained, you should be able to find some nice, earthy-smelling stuff that would be beneficial for a worm bin.

That said, it is important to mention that outdoor materials may contain unwanted organisms such as fruit flies and gnats, so for some people it may not be worth the risk. Make sure you aren't taking LM from close to where fresh food deposits are being made!

Rotten Straw/Hay – Old straw and hay that has been left to rot for a long time can be an absolutely fantastic material for a vermicomposting system. Like the aged horse manure mix discussed earlier, these will offer excellent habitat value in addition to the other LM benefits.



As with most LMs, you are likely to introduce all sorts of other organisms to your worm bins/beds when using these - but since they aren't really rich materials, it is unlikely you will end up with anything problematic/annoying.

One other little caution – it is important to note that hay is a lower C:N material than straw (i.e. it has more nitrogen), so it's more like a manure, and should be treated as such. Make sure it is well-rotted before use (smells earthy etc...you know the drill).

Rotten cardboard - Cardboard that has been sitting in a warm, moist environment - especially if outdoors - will gradually start to break down. There is no hard and fast rule for when it becomes a valuable LM, but since it's already great as a bedding material anyway, it's pretty hard to go wrong!

As touched on earlier, one great source may be the old bedding in your vermicomposting systems that doesn't end up getting converted into worm compost. The advantage of this cardboard (vs something sitting outside, for example) is that you're basically guaranteed to end up with loads of microbes that are very well-suited for the worm bin environment.

Plain brown corrugated cardboard is my personal favorite – but I really like "drink tray cardboard"(egg carton stuff is virtually identical) as well. Both of these are very absorbent, and the worms seem to love them.

Rotten Wood Chips, Shavings or Sawdust - People often ask me about wood chips and sawdust as vermicomposting bedding materials. Since they are *very* resistant to break-down, and not very absorbent I usually try to discourage their use. Once rotten, though, these materials can be fantastic worm bin amendments.

For example, if you leave an old heap of wood chips (etc) to sit outside you'll notice that the material gradually becomes darker, and more earthy smelling over time as wood-rotting fungi are able to penetrate further and further, gradually rendering it more accessible to other organisms.

This process can be accelerated in the presence of a nitrogen-rich material

- so if you *do* have some chips/shavings/sawdust on hand you may want to mix them with richer wastes like kitchen scraps, manure etc before you leave them to rot.

In some ways the extreme resistance to break-down that woody materials possess can actually be a benefit. You can continue to screen and recycle them over and over, and *over* again (and like a fine wine, they will only get better with age! Lol)

Decomposed Fall Leaves – This is sometimes referred to as "leaf mold", and it's pretty fantastic material across the board. If you want a first-hand experience with the stuff (assuming you don't have an ancient heap of fall leaves in your yard), simply visit your closest deciduous forest and scrape away the upper layers of fallen leaves on the ground. You should find some beautiful, dark compost-like stuff just above the soil surface.

I am certainly not suggesting that you constantly raid natural habitats for LMs (although, collecting a little to get started probably wouldn't hurt). But if folks in your area are anything like those in mine, maybe large quantities of fall leaves get raked off lawns and then dumped in your local forests anyway (so you are just doing your part to clean-up their mess, right? lol)! Whatever the case may be, I highly recommend getting your hands on some of this stuff.

A great way to accelerate the break-down of fall leaves is to mulch them and mix them with a modest amount of grass clippings before heaping them up and leaving them to sit. A mulching lawnmower is a handy tool for the job. Rather than raking up your leaves, why not just attach the mower bag and run right over them!

Just don't forget the aging/composting stage! Fresh from the mower bag it will be more like a "food"(and you'll need to make sure your bin is well-ventilated since decomposing grass gives off ammonia gas very readily.

Old lawn thatch – Grass clippings themselves are far too potent to be used as a living material, but old dead grass – especially the stuff sitting in contact with the soil can work well. My only caution here is to make sure you don't end up with too much of the green stuff when you do your raking. Late fall and early spring (maybe winter in some locations) is a great time of year to collect this stuff since there is a lot more dead grass (and often not as much green grass).

This one won't be as amazing as some of the others mentioned, but for a shot of beneficial microbes, and perhaps some added habitat value, it's nothing to sneeze at (unless you are allergic to grass), and is *definitely* worth considering if you are low on LM options.

Rich Organic Soil – I am hesitant to add this one for fear of people thinking I'm suggesting they add a bunch of soil to their worm bins. This is definitely not the case. The ONLY sort of "soil" I would recommend is **A)** one made up mostly of rich organic matter (there should be very little, if any, sand, clay etc), and **B)** soil with absolutely NO inorganic fertilizer salts in it (remember my warning about the bagged stuff)!

If you happen to have a raised bed with some super-rich, loamy soil in it, and you are in a pinch for tracking down a source of LM, this material could likely work just fine for you.

OK quick review time...

Here are some questions to ask yourself when assessing a potential LM:

Has it been exposed to decomposer microbes?
Is it dark or at least fairly "dead" looking?
Is it fairly resistant to further break-down? (ie fairly stabilized)
Is it earthy smelling?

Is it fairly lightweight, crumbly or fluffy?

Hopefully, if you couldn't quite get a handle on the concept earlier, it is now starting to make a bit more sense!

If in doubt, give me a shout! :-)
http://www.redwormcomposting.com/contact-us/

How to Use Living Materials

Mixing LM With Food – One highly-recommended strategy is to mix your food wastes with LM before adding them to your system. You are basically coating the entire surface area of the wastes with beneficial decomposer microbes, so this will help kick-start the break down process – and attract the worms much more quickly. This also adds some absorbent buffer material, helping to avoid formation of anaerobic food pockets.

Ideally, you will have "optimized" the wastes in other ways first – things like chopping/grinding, freezing/thawing etc can really help to start the break down process, making it easier for the microbes to invade (in case of chopping/grinding you are giving them a LOT more available, unprotected surface area to become established on)

You can even get creative with your LMs by coming up with your own "Homemade Manure"recipes. Your worms will love you for it! ;-)

Habitat Inoculation/Augmentation – When starting up a brand new worm bin/bed, a great way to make the system seem more like "home" for the worms is to mix in a bunch of good quality LM. I normally recommend aging a vermicomposting system for a week or so before

adding the worms – but with LMs this usually isn't even necessary, since the beneficial microbe population will be well-developed right off the bat.

Adding LM to an existing system can be can excellent way to boost performance and greatly improve the habitat for the worms as well. And if your system has been giving off some foul odors, the good news is that LMs make great...

Odor (etc) Filters - Back in university I remember reading about the use of composts as effective bio-filters for various gases and liquids. I thought this was the coolest concept ever! But even if you are not a bio-geek like me, this should get you excited!

Try to imagine compost (and any good LM) as a sort of "super sponge", absolutely jam-packed with hungry beneficial microbes sitting there ready to munch on all manner of organic compounds – gaining energy by breaking them down into simpler forms (often making them more worm-friendly in the process), using them as building blocks for creation of even more microbes etc.

Later on (after starting the Red Worm Composting website) I discovered first-hand just how effective LMs - and the process of vermicomposting as a whole - could be for controlling odor. I had started up a rather naive (in hindsight) arrangement with a very popular local restaurant that had me picking up 100's of lbs of food waste from them each week, so I could "compost" them on my (modest suburban) property.

Needless to say, I quickly realized that I had bitten off a lot more than I could chew! It literally got to the point of me just digging holes in the ground and burying the wastes (and that is in fact how I stumbled onto my "vermicomposting trench"idea in the first place).

One particularly vivid memory involved me walking out onto my back deck and literally being hit with this unbelievable stench (heap up 30 lb of

broccoli and let it go anaerobic in summer heat to see what I mean – lol). Apart from my burying frenzy, I had attempted some *semi*-hot-composting in one of my backyard composters, and it just wasn't working at all.

On a whim (aka - in desperation), I moved a bunch of worm-rich material over from a large outdoor worm bin to see if that would do anything.

Long story short – the odor completely vanished within a day or so!

I had previously come across mentions from renowned (academic) vermicomposting expert, Dr. Clive Edwards, of activity of composting worms (and associated microbes) being excellent for odor-reduction. Now I had first-hand proof! :-)

Apart from mixing LMs with your food (as a preventative measure), a simple approach for a bin that is already stinking (or has a serious potential to stink), is to add a thick layer at the top. Voila – you have your own mini bio-filter!

"Primary" vs "Secondary" Living Materials

Much more recently (as I type this update in early 2020), I've started thinking in terms of "Primary LMs" and "Secondary LMs". Similar to the distinction I've made for bedding materials, this relates to their potential as a stand-alone material in a worm bin/bed.

Primary Living Materials are the LMs that offer a lot more habitat value. They are much more robust in structure – usually the result of having a significant proportion of C-rich materials (at various stages of decomposition) in them. As always, the "ultimate" example is aged, bedded horse manure. Assuming it's been allowed to age enough (as described earlier), and just generally, you're satisfied it is "worm-friendly" (via testing) – there is likely NO limit to the amount you can use.

It could be your sole habitat material (and likely be fantastic), or used in any other way I've described in this guide.

Apart from aged, bedded manures, *really* rotten (but remember – EARTHY smelling) versions of...

Straw/Hay
Shredded Cardboard
Wood Chips/Sawdust
Old Dead Grass (ideally longer grass)
Leaf Litter

...all have the *potential* to work well

The key (in order to be considered "Primary") is that the material be bulky, very absorbent, earthy-smelling, and something the worms seem to like via testing.

Secondary Living Materials are the ones better suited for use as a microbial "supplement" of sorts. Dark, earthy-smelling, often well-stabilized – but not really ideal as a main habitat material in your system.

For example, chunkier vermicompost (etc) screenings from an active system are great for mixing with typical food and bedding materials, and of course Primary LMs (although not really necessary), but won't be ideal as a habitat material for your worms.

Other really-stabilized composts will likely fall into this category as well.

Any LM that doesn't hold moisture well should also be considered a Secondary LM, since moisture-retention is very important for any primary worm habitat material.

There is some gray area here for sure. Certain types of "compost" - eg. "mushroom compost" - *might* work as a main habitat. But if the compost

or bulky compost screenings (actual compost chunks – not talking about the screened bedding etc) come from a worm bin/bed it is best not to use as main habitat since this is like making the worms live in their own wastes.

Conclusion

Hopefully this little report has not only helped to clarify what I mean when I use the term "living materials", but (more importantly) has made you much more interested in trying them out for yourself!

Other Resources That May Be Of Interest

If you enjoy my work, you might be interested in some of these additional resources:

RWC E-mail List – The Red Worm Composting e-mail list (technically a "Compost Guy" sub-list if you want to split hairs) is my main communication channel for all things worm composting related, so I highly recommend signing up for that if you want to stay in the loop about my vermi-shenanigans.

Compost Guy Ultimate (CGU) – This is a bundle of multiple educational products I have created over the years, including Easy Vermicomposting (not to be confused with Easy Worm Farming), the VermBin Series Plans Package (plans for a DIY flow-through system many people have built and loved), The Walking Windrow Project, Trench Vermicomposting, and Suburban Worm Farmer.

This is the one you want if you enjoy my educational content and style, and want to get more serious about vermicomposting/vermiculture.

Worm Farming Alliance (WFA) – This was originally an all-inclusive educational/community-driven membership, but has been streamlined to focus on what was always the best part – the community! If you want to rub elbows with others in the worm farming industry (all levels of experience), get top notch advice from professionals, and just generally reduce your learning curve, THIS is the one for you. To get the most out of this you need to join the private Facebook community – so it is not a great investment if you refuse to use Facebook. You also still get access to the old, original member's area where you will find plenty of evergreen worm farming content (the old forum alone, has lots of excellent information).

Easy Worm Farming – Producing and selling worm starter cultures is a (mostly under the radar) approach for earning income from worm farming – and one that basically saved my own small "real world" business quite a few years

ago. It's a great starter strategy, but also a great way to diversify your existing product line-up when you already have a business.
NOTE: This one isn't included with CGU (and shouldn't be confused with Easy Vermicomposting).

VermBin Series Package – This includes plans for a series of DIY continuous-flow (often called "CFT") bins - the VB24, VB48, and VB96. These bins offer a cheaper solution for quality castings production – and are well-suited for those with some DIY skills (or who have friends or family members who can help). Likely my most popular educational product over the years!
NOTE: This IS included with the CGU membership.

Professional Worm Growing Secrets – This is an eBook that features an in-depth interview with my good friend, and successful large-scale worm farm owner, George Mingin. George spills the beans on how he effectively raises loads of composting worms in a relatively small amount of space, and shares plenty of wisdom relating to getting serious about worm farming in general.

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Below are products/resources I am affiliated with. If you follow my link and make a purchase I may receive a commission, which helps to support my work. This never affects the price (in some cases you can even get a discount), and I only promote businesses and products I believe in.

Elite Worm Breeding – This is a course and membership community created by my good friend Larry Shier. It follows similar methodology outlined in Professional Worm Growing Secrets, but in greater depth and with Larry's own twists. Be warned – this is NOT cheap, but Larry has plenty of success stories shared by his students. If you use the discount code **RWC20** you can enjoy 20% off. And if you joined the Worm Farming Alliance you are entitled to 40% off (just get in touch after joining WFA and I'm happy to share that code with

you).

Urban Worm Company – Steve Churchill is a close friend (and also a managing partner in WFA). Some years ago he came up with his own single-compartment flow-through bag system called the "Urban Worm Bag". It is an excellent starter bin option for anyone who wants something more *fancy* than a basic plastic tub, and something much more effective than any of the popular plastic, stacking bins. **Steve is also a great source for composting worms if you happen to live in the U.S.**