Importance of worm's in making compost and building our farm's soil health.

If you want to understand how important the humble worm is for our farms, our soils and life it self you only need to ask Charles Darwin. He spent over 40 years studying worms and wrote his last book on them.

"The Formation of Vegetable Mould Through the Action of Worms, with Observations on their Habits" .

A long title, but his message was simple. That we need to understand the importance of the humble worm in building the foundation on which life itself evolves - the soil. He wanted us to know that the worms under our feet are a Keystone species, without which we would not be here.

In his own words. " It may be doubted whether there are many other animals which have played so an important part in the history of the world, as have these lowly organised creatures "

To his own surprise his book on worms sold more copies before his death than " On the origins of species " the book for which he is renown.

At <u>Manna Organic Farm</u> (<u>https://mannaorganicstore.ie/</u>) we learned early in our farming journey how important worms are to rebuilding our soil and the the biology that lives in it. 15 years ago when we purchased our farm we had very few worms. If you dug a hole you might find one lone worm.

I remember when we were preparing the ground for the orchards, we brought in fifty geese. They did a great job in eating and trampling the grasses. They were very effective in clearing the ground. However what really surprised me was the quadrupling of the worm count the following year. In the end I

realised that the geese had created an ideal environment for the worms to thrive in by trampling the weeds and carbon back onto the the ground Also the partial digestion by the geese of the grasses and created a new food source.

I learned that if I provide a suitable environment they will come. Hence, I became a bit worm obsessed. I wanted to know more about worms and how can they help me transition my farm to a more nature based, resilient and regenerative system.

What do they do ?

Worms create both vertical and horizontal passageways in the soil. These passages allow for better water movement as well as oxygenating the soil. The worms digest, process and stabilise organic matter, incorporating it deep into the soil itself.

What do they Eat ?

While worms consume soil and organic matter . It is actually the bacterial, fungi, nematodes and a large array of distinct small creatures who are the primary digesters of organic matter. So we feed them by ensuring there is plenty of food stuffs for the wider biological community in the soil.

How many types of worms are there?

Its reckoned there are over 20,000 species of worms. Not all the worms are related. The main categories of worm are Flat worms , round worms and segmented worms.

In Ireland we have the common earth, the red compost worm and 26 other relations.





What environments do they live in?

Temp: 15 - 26 celsius ideal (will tolerate 0 - 35 celsius) Moisture: 80% ideal (will tolerate 60-90%) Ph: 7.0 ideal (will tolerate > 6 - < 9) Oxygen is essential compacted soils and anaerobic environments are detrimental to survival) They really do not like Ammonia and salts (Chemical fertilisers and raw slurry)

<u>Where did they come from, and how long have they being around ?</u> The ancestors of the worms we know today evolved over 500 million years ago. Check out this YouTube clip. (<u>https://www.youtube.com/watch?v=uUoTeob18QY</u>) for a better overview of their evolution.

Whats the biggest and smallest worm?

The Giant Gippsland worm can be up to a meter long and the largest worm recorded was found in 1967 in South Africa and measured in at a whopping 6.7m (21ft) in length.

While the smallest nematodes measuring as little as .5 - 1mm.

How do I encourage them?

If we firstly do no harm, to them or the environment they live in, worms will thrive. Unfortunately with almost a century of industrial and chemical farming systems humans have done a lot of damage. From the over-cultivation of the soil to the countless toxic chemicals that are used on the land we have severely effected our worm populations in all the shapes and sizes.

Manna Worm / Composting Cage.

The Manna WormComposting Cage Is a way of composting using worms in a cool, long maturation system. Its a system we adapted and integrated on <u>Manna Organic Farm</u> to make happier homes for our worms to do their work. It makes the best of the organic waste from our organic farm and store. We use the generated compost to enhance our soil by making compost teas and compost extracts.

The cage is rat proof and makes a great worm bin / composting system for your farm or garden. You can make it up and fill it in one go or you can add waste to the cage incrementally over time.

It's a simple design made from a roll of welded heavy gauge 25mm mesh 3ft high, which comes in a 30 m roll. A second roll of 4ft light gauge 25mm square mesh for the top and bottom reduces the over all cost, if you are making a few.

We went through a few prototypes from converted IBC tanks to white bulk bags. In the end we have a system that's easy to assemble, fill, dismantle and reuse.







Building your Manna Worm Composting Cage.

To make the side wall you cut the heavy gauge 25mm mesh into 3m lengths.

You then notch the ends of the section as above 4 squares deep so that they alternate and inter lock.



This allows you to easily open and close the cage when the unit is filled. This would allow you easy access if you wanted to turn the pile. You could unwrap the cage and and set it up net to it then transfer the compost to its new cage.

For the bottom and top sections you cut the mesh to 1.2m. Ideally for the top and bottom you use the 4ft roll and lighter gauge. Other wise 2 over lapped 3 ft sections would do but this will cost more.



Setting up and filling

Place the bottom section on the ground. I usually put down cardboard to keep down weeds and have a layer of wood chips under it. Ensure the ground is level so there's no gap for rats to get in between the wall and base sections.

Set up your wall centrally on top of the base, so the walls sit fully on the base with a bit to spare.

Insert plastic or metal pole through the hoops on the two ends of the mesh to hold it together.



Place a pipe with slots to allow air to move in the middle of the pile. I use 4" pre-perforated JVC black double-walled drainage pipe. Cut the pipe to the same height as the side wall so the top section of mesh will sit flat on top of the cage.

Add 6 inches of wood chips to the the base. This will also hold the pipe in place.

Begin adding your organic matter and/or food waste to create another 6 inch layer on top of the wood chips. I use vegetable waste from our shop and green waste from our farm. On our farm the waste is run through a beat pulper to cut it up into a consistent material size and shape which is easier to incorporate and prevents anaerobic conditions occurring in the compost.

Add another 6 inch layer of wood chips.

Then use a pike to mix the three six-inch layers of wood chips and vegetable waste together.



Then repeat adding layers of wood chips and food waste until you reach the top of the Manna Composting Cage.

Place the top section on to keep the rodents out and place an old pallet on top. If you had a level base there should be no gaps in the meshes.



When finished let it sit for a year. Ideal time for a full spectrum of biology to evolve though the seasons and create the next generation, especially our fungal allies.

We make compost teas and extracts from our Manna Compost Cages.

Because it is a cold system with no high temp spikes, weed and vegetable seeds could be a problem if used directly yon your vegetable beds. When we make our extracts we run them through a pillow case to ensure no small seeds are watered onto our growing beds.

If you gather your ingredients together and make a full cage in one go you will get the high temps to kill weed seeds. This will require you to turn the compost a few times in the first weeks to control the temperature. After that it's like a Johnson-Su bio-reactor that cools down and allows the biological cascades to evolve, reproduce and go into hibernation, ready to reawaken when applied to the soil in the right environment.

If your cage is drying out you can wrap a length of Mypex or a section of a white bulk bag around the outside of the cage to keep in the moisture during the summer.

The wood chips you use can be fresh, but it would be better to work from an old old pile settled next to the cage that has aged a bit. Aged wood chip that is resting on soil will be starting to decompose. Ideally your wood chip will have loads of fungal activity. We pre-inoculate our wood chips with Manna <u>Garden Giant Mycelium</u>.

Sheet composting with wood chips

If you use non pine wood chips or brash in pathways or a larger area to a depth of of 6-12" it creates a great home with plenty of food, moisture and oxygen to help your worms thrive. This is a slow method but in 3 years you can create a great soil amendment.

At Manna we also inoculate these wood chips with <u>Manna Garden Giant mycelium</u> to speed up the process.



It makes a great base ingredient for your Manna Worm Cage to mix with your vegetable waste.

If you want to learn more about Manna Organic Farm and Store. Follow us : Web: <u>https://mannaorganicstore.ie/</u> Instagram: <u>https://www.instagram.com/mannaorganicstore/?hl=en</u> Facebook: <u>https://www.facebook.com/MannaOrganicFarmAndStore</u> Youtube: <u>https://www.youtube.com/user/mannaorganicstore/videos</u> Twitter: <u>https://twitter.com/mannaorgncstore</u>