



# WORM CASTINGS

WHERE MOTHER NATURE  
GETS DOWN TO BUSINESS



**What are Worm Castings?** Worm Castings are Mother Nature's soil enrichment of choice. This rich humus-like digested output of the worm includes a wide range of nutrients and microbial life that all types of vegetation require to grow. Worm Castings are one of the most natural soil enrichments available and more importantly are environmentally friendly, all natural, easy to use, and safe to handle, with a pleasant earthy aroma.

**What do Worm Castings do?** Worm Castings restore soil health in many ways.

- A source of organic matter with lots of nutrients and moisture-holding capacity. Worm Castings hold 9 times their weight in moisture, which is beneficial in drought conditions.
- Adds active microbial life to the soil, allowing it to slowly release and make the valuable nutrient and trace minerals more available to tender plant roots.
- Rich in growth hormones and vitamins, and acts as a powerful biocide against diseases and nematodes.
- A natural aerator, allowing oxygen to permeate the root zone to improve drainage and encourage root growth.
- Restores soil without fear of burning or harming tender plant life.

Restoring the soil makes nutrients more available to crops, turf applications and desired vegetation. This means there is less need for synthetic fertilizers and pesticides. Best of all, Worm Castings contain no toxins and are therefore safe to use without fear of ground water contamination.

## How are Worm Castings different from Compost?

Worm Castings are significantly better than compost. They are the result of carefully selected compost that is fully digested by worm. This makes Worm Castings an entirely mature product. It contains no pathogenic agents, and is considered a biological product which is convenient to handle.

Worm Castings contain a far more diverse microbial population than other composts. These micro-organisms play an important part in soil fertility. Not only do they mineralize complex substances into plant-available nutrients, but bacteria in the worm's digestive system also synthesize a whole series of biologically active substances including plant growth hormones.

## How do Worm Castings work?

Worm Castings are an all-purpose natural soil enrichment that is pure earthworm castings. It is 100% non-toxic and odorless. It is the product of aerobically composted vegetable scraps fed to earthworms, and free from weed seeds, toxins and pathogens.

## **Worm Castings improve Soil Structure in all Soil Types**

Worm Castings restore soil structure. The term “soil structure” is used to describe the way soil particles are grouped into aggregates. Soil structure is affected by biological activity, organic matter, cultivation and tillage practices. Soil fertility and structure are closely related.

An ideal soil structure is often described as granular or crumblike. It provides for good movement of air and water through a variety of different pore sizes. Plant roots extend down and soil animals – including small earthworms – travel through the spaces between the aggregates. An ideal soil structure is also stable and resistant to erosion. The clay-humus complex, in combination with adequate calcium which helps to bind the aggregates together, forms the basis of this structure. The glutinous by-products of soil bacteria and the hair-like threads of actinomycetes and fungi mycelium add to soil stability.

All tillage operations change soil structure. Excessive cultivation, especially for seedbed preparation, can harm soil structure. Working clay soil when wet leads to compaction and subsequent soil puddling. The soil is easily puddled by rain, easily eroded and will have poor aeration. Tillage, when too dry, shatters the aggregates. Soil structure can be enhanced by careful cultivation, growing sod crops and returning crop residues.

Worm Castings (organic matter) and the humification process improve structural stability, and can rebuild degraded soil structures. Therefore it is vital to return organic material to the soil and to maintain its biological activity, which helps to improve the soil structure.

## **How Worm Castings work with Soil pH**

Worm Castings act like a buffer for plants. Where soil pH levels are too high or low Worm Castings make soil nutrients available again to the plant. Compared to the soil itself, Worm Castings are much higher in bacteria, organic material and available nitrogen, calcium, magnesium, phosphorus and potassium.

## Soil Biology

Soil organisms play an important role in forming and stabilizing soil structure. In a healthy soil ecosystem, fungal filaments and exudates from microbes and earthworms help bind soil particles together into stable aggregates that improve water infiltration and protect soil from erosion, crusting and compaction. Macrospores formed by earthworms and other burrowing creatures facilitate the movement of water into and through soil. Good soil structure enhances root development, which further improves the soil.

Restoring soil structure helps reduce runoff and improve the infiltration and filtering capacity of soil. In a healthy soil ecosystem, soil organisms reduce the impacts of pollution by buffering, detoxifying- and decomposing potential pollutants. Bacteria and other microbes are increasingly used for remediation of contaminated water and soil.

In a healthy soil ecosystem, soil biota regulates the flow and storage of nutrients in many ways. For example, they decompose plant and animal residue, fix atmospheric nitrogen, transform nitrogen and other nutrients among various organic and inorganic forms, release plant available forms of nutrients, mobilize phosphorus, and form mycorrhizal (fungus-root) associations for nutrient exchange. Even applied fertilizers may pass through soil organisms before being utilized by crops.

A relatively small number of soil organisms cause plant disease. A healthy soil ecosystem has a diverse soil food web that keeps pest organisms in check through competition and predation. Some soil organisms release compounds that enhance plant growth or reduce disease susceptibility. Plants may exude specific substances that attract beneficial organisms or repel harmful ones, especially when they are under stress from activities such as grazing.

## Microbial Activity

Worm Castings stimulate microbial activity. Although earthworms derive their nutrition from microorganisms, many more microorganisms (such as bacteria, fungi and actinomycetes) are present in their feces or casts than in the organic matter that they consume. As organic matter passes through their intestines, it is fragmented and inoculated with microorganisms. Increased microbial activity facilitates the cycling of nutrients from organic matter and their conversion into forms readily taken up by plants.

Compared to synthetic fertilizer formulations, Worm Castings contain relatively low concentrations of actual nutrients, but they perform important functions, which the synthetic formulations do not. They increase the organic content and consequently the water-holding capacity of the soil. They improve the physical structure of the soil, which allows more air to get to plant roots. Where organic sources are used for fertilizer, bacterial and fungal activity

increases in the soil. Mycorrhizal fungi, which make other nutrients more available to plants, thrive in soil where the organic matter content is high.

## Water Availability

Worm Castings contain a high percentage of humus. Humus helps soil particles form into clusters, which create channels for the passage of air and improve its capacity to hold water.

The castings are in the form of tiny pellets which are coated with a gel. This crumblike structure helps improve drainage and aeration.

## Balancing Soil Nutrient

The ability of the microbiologically active Worm Castings to regenerate the nutrients from the atmosphere, organic matter and water allows them to replace those lost from chemical fertilizers by leaching, plant uptake and chemical reactions. In relation to moisture holding capacity and improvement of soil structure, chemical fertilizers have negligible effect, as they primarily consist of water-soluble salts. On the other hand, the aggregate nature of the Worm Castings has appreciable water holding capacity, and its use leads to restored soil structure and increases nutrient reserves in soil.

The presence of nitrogen fixing bacteria in Worm Castings means that nitrogen can be fixed from the atmosphere and converted to plant soluble nitrates.

Worm Castings are rich in humus, which contains essential plant nutrients and micronutrients. Moreover, these castings are also rich in vitamins, beneficial microorganisms, antibiotics and enzymes.

Worm Castings restore soil, will not wash out with watering, and will not burn even delicate plants. Worm castings have a very soil-like texture and all the necessary nutrients that plants, crops and all types of vegetation require. The castings slowly release nutrients when required by the plants. Castings are high in soluble nitrogen, potash, potassium, calcium, magnesium and many other trace elements. Worm Castings allow plants to quickly and easily absorb all essential nutrients and trace elements. Because the earthworm grinds and uniformly mixes the nutrients and trace elements into simple forms (1 to 2 microns), plants need only minimal effort to absorb these nutrients.

## SUGGESTED APPLICATION RATES

<b>Potted Plants, Seeds, Seed Flats</b>	<ul style="list-style-type: none"> <li>Use 1 part Worm Castings to 3 parts potting soil mix</li> </ul>
<b>Potted Plans, Window Boxes, Hanging Baskets</b> (established)	<ul style="list-style-type: none"> <li>Add 1 to 2 inches of Worm Castings to top of soil</li> <li>Mix in, taking care not to damage shallow roots</li> <li>Water well</li> <li>Repeat every 2 to 3 months</li> </ul>
<b>Lawns</b> (established)	<ul style="list-style-type: none"> <li>Use Worm Castings as a top dress at 10 lbs. per 1000 sq. ft.</li> <li>Apply twice a year – in spring and once again in late fall</li> </ul>
<b>Lawns</b> (new)	<ul style="list-style-type: none"> <li>Apply 10 lbs. of Worm Castings to 1000 sq. ft.</li> <li>Work lightly into topsoil</li> <li>Mix in grass seed</li> <li>Cover with shredded straw and keep watered</li> </ul>
<b>Roses, Trees, Bushes, Berries</b> (new or freshly transplanted)	<ul style="list-style-type: none"> <li>Mix 1 part Worm Castings to 3 parts soil</li> <li>Surround newly dug hole with mixture</li> <li>In the hole, spread root over a mound of the mix, and cover</li> </ul>
<b>Bushes</b>	<ul style="list-style-type: none"> <li>Use 5 lbs. of Worm Castings per 10 Bushes</li> </ul>
<b>Perennials</b>	<ul style="list-style-type: none"> <li>Work ½ cup of Worm Castings into the soil above root zone, taking care not to damage the shallow roots</li> <li>Apply in spring, early summer, and fall</li> </ul>
<b>Tables and Annual Flowers</b>	<ul style="list-style-type: none"> <li>Line bottom and sides of plant holes /seed furrows with 1 to 2 inches of Worm Castings</li> <li>Set plants/seeds in place and cover with soil</li> <li>During the growing season, side dress once every 2 months at a rate of ½ cup per plant or 1 cup per linear foot of row</li> </ul>
<b>Gardens</b>	<ul style="list-style-type: none"> <li>Apply 5 lbs. of Worm Castings per square foot</li> </ul>
<p><b>Note:</b> The release time for nutrients is around 4 months for continual release of nutrients. Repeat application is recommended at 4 month intervals. Application rates may vary depending on soil test results.</p>	

## Worm castings vs. Chemical fertilizers in Soil<sup>1</sup>

Criteria for Comparison	Chemical Fertilizers	Worm Castings
Macro Nutrient Contents	Mostly contains only one (N in urea) or at the most two (N & P in DAP) nutrients in any one type of chemical fertilizer	Contains all nutrients in sufficient quantities, i.e., nitrogen (N), phosphorus (P) and potassium (K)
Secondary Nutrient Contents	Not Available	Calcium (Ca), manganese (Mn) and sulphur (S) are available in required quantities
Micro Nutrients Contents	Not Available	Zinc (Zn), boron (B), manganese (Mn), iron (Fe), copper (Cu), molybdenum (Mo) and chlorine (Cl) are also present
pH balancing	Distorts soil pH, which creates saline and alkaline conditions	Helps control soil pH and corrects the salinity and alkalinity in soil
EC Correction	Creates imbalance in soil EC, affecting nutrients assimilation	Helps balance the EC to improve plant nutrient adsorption
Organic Carbon	Not Available	Very high organic carbon and humus contents improve soil characteristics
Moisture Retention Capacity	Reduces moisture retention capacity of the soil	Increases moisture retention capacity of the soil
Soil Texture	Damages soil texture to reduce aeration	Improves soil texture for better aeration
Beneficial Bacteria and Fungi	Reduces biological activities and thus the fertility is impaired	Very high biological life improves the soil fertility and productivity on sustainable basis
Plant Growth Hormones	Not Available	Sufficient quantity helps in better growth and production

<sup>1</sup> M.R. Morarka-GDC Rural Research Foundation;  
[www.morarkango.com/vermiculture/vermicast\\_specification.html](http://www.morarkango.com/vermiculture/vermicast_specification.html)