



Optigrow produces the oldest and most successful compound used in fertilisation and soil remediation in history.

Over 50 years of research show how effective this compound is and it can be found in all the healthiest soil ecosystems on our planet.

It is a compound that physically, chemically and biologically stabilises soil, stimulates further plant growth even when plants are already receiving optimal nutrition.

Consistently improves seed germination, enhances root development and seedling growth, and increases plant productivity and health.

It has been proven to effectively control or regulate, pests, fungus, disease, soil toxicity and chemical imbalance.

It is a compound that exists in all healthy soil and if you as a farmer, are suffering from an unhealthy soil, your soil in all likelihood, is lacking it.

#### **Optigrow produces Opti-cast.**

Commonly known as vermicast or earth worms castings, produced primarily for Mpumalanga's fruit, nut and vegetable industries.

#### **So what exactly is vermicast?**

Vermicast is a thick black compound produced by earthworms, a living fertiliser and soil rehabilitator that is highly microbially active.

It makes available nutrient more plant available, microbial activity makes minerals and micro nutrients otherwise locked away in mineral sand, soluble, making them available to plants.

The microbial activity and physical structure of vermicast stabilizes chemicals and minerals within the substrate keeping nutrient available more consistently and for longer and helps stabilize moisture levels in soil leading to reduced drain away.

*Established in 2010 with the sole goal of the production of worm castings, numerous side projects have evolved and given life to Optigrow.*

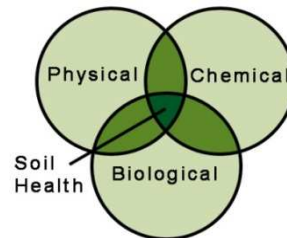
*The Optigrow family continues production and sales of its Opti-cast worm castings, with the additions of its farming division and tree nursery.*

## How does vermicast work?

Worm castings work in a multi faceted approach.

It is a natural process that supports all the elements plants and trees need for sustained healthy growth, encompassing

- Physical property.
- Chemical state.
- Biological activity.



With these three in check, trees and plants have the best environment for healthy growth.

Optigrow works with farmers like you to breathe life back into struggling soil, to reintroduce the missing puzzle piece that modern agriculture is only now realising it has lost, to decrease chemical fertiliser costs, increase yield, increase quality and control disease and pests.

We aim to help rebuild your soil by the reintroduction of organic methods, integrating into and working with your current chemical fertilisation schedules to better the results you aim to achieve. And all this we endeavour to do within your current budget.

## Your Soil



Certainly not simply a sterile growth medium.

Soil is a complex web of mutualistic and symbiotic interaction, complex relationships between plants and animals both big and microscopic.

It is the backbone of our food system; your greatest asset and greatest resource.

It is comprised of two main components, mineral sand and organic matter, but that is not the whole picture.

In order to support plants, soil health is based on three components.

It's that Physical, Chemical and Biological structure.

The three structures within soil that vermicast works to naturally repair.

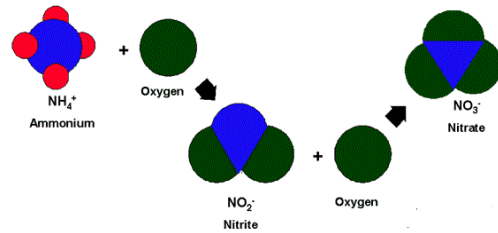
The *Physical structure* of soil is what holds moisture in place so that roots don't become either too dry or too wet. Holds chemicals in place so they are available to plants without being washed away.

*Chemical structure* is having a readily available supply of all the nutrient plants need to grow and thrive, but most importantly in plant available formats that plants can readily absorb.

And finally the *biological structure* of soil.

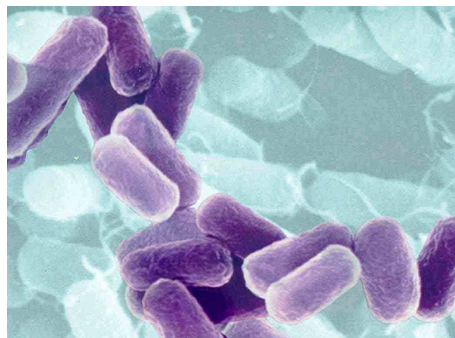
Probably the most important component in soil. It is the microbial activity within soil that works on the chemical nutrient and micronutrient, to convert it into the plant available formats plants require.

Earthworms do not create nutrient they simple refine it from their food source and convert it into a format that is the most efficient form for plants to take up.



During the process organic matter passes through the worm's gut, it undergoes physio-chemical and biochemical changes by the combined effect of earthworm and microbial activities.

Castings are coated with mucopolysaccharides and enriched with nutrients. The biota introduced to the soil in vermicast or leachate (worm tea) can work away out of sight, releasing the minerals that are already there.



Castings can be as much as 1000 times as microbially active as conventional compost, with compost being higher in ammonium, with castings being higher in nitrates, the more plant-available form of nitrogen.

With the introduction of vermicast and its biota, availability rate of nutrients like P, K, S and Mg, are all increased.

Castings are an excellent media for harbouring N-fixing bacteria, also trapping free nitrogen from the atmosphere.

**Nitrogen fixation** is a process by which relatively inert atmospheric molecular nitrogen ( $\text{N}_2$ ) is converted into ammonium ( $\text{NH}_4^+$ ) freeing up the nitrogen atoms to be used in other ways for in the case of castings, to be converted to nitrates.

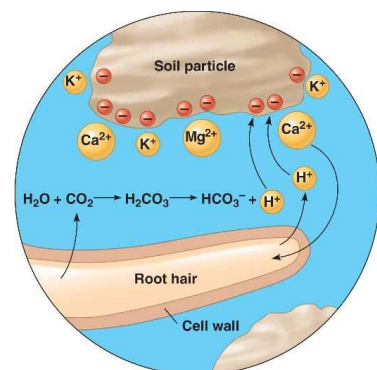
Nitrogen is essential in agriculture as it is required to create the basic building blocks of plants. Earthworms directly cycle this nitrogen by excretion in their casts, urine and mucoprotein and nitrifying and nitrogen fixing microbes are all found established in worm casts.

Several valuable compounds are also produced through the earthworm and microfloral interaction, which included vitamins such as B12 and plant growth hormones (gibberellins).

### Cationic exchange is important in your soil, but what is it.

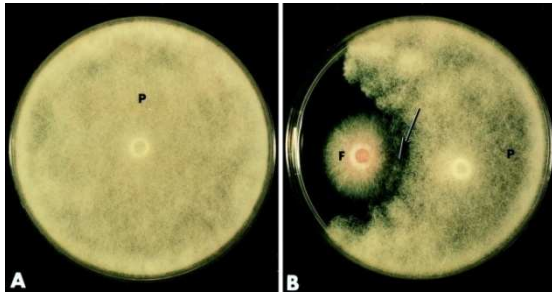
Trace elements are attracted to castings and readily bond to it in the same way that opposite poles of a magnet attract each other.

Everything in nature has an electrical charge. Some charges are positive, cations, and some are negative, anions. Organic vegetative matter is anionic and, because castings are highly vegetative matter, it is strongly anionic. Most trace elements are cationic.



Castings act like a sponge using their charge to hold trace elements in place increasing bio availability of that nutrient for when plants need it.

Plants have a stronger pull than the vermicast and can therefore draw the trace elements away from the vermicast and into their roots.



There are extensive studies regarding disease attacks on crops. Results consistently show with small applications of worm castings, the incidence of disease is significantly suppressed.

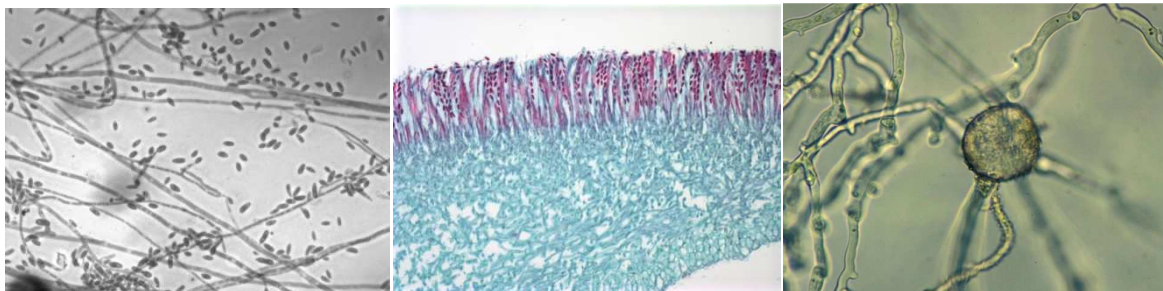
(by *Pythium* on cucumbers, *Rhizoctonia* on radishes, and by *Verticillium* on strawberries and *Phomopsis* and *Sphaerotheca fuliginea* on grapes in the field.)

Earthworm movements act to disperse not only microorganisms important in food production but also root symbiots that form mutualistic associations between fungus and the roots of a vascular plant.

In addition microbial antagonists of plant pathogens and pest microorganisms are also dispersed, microbes that eat or destroy other plant pathogens or pest microorganisms.



Researchers have found that instances of fungus can be controlled with the use of worm castings. Studies showed a generous application of vermicast was required but clear improvement showed in less than 30 days.



Vermicast has been found very effective in combating *Phytophthora* in macadamias. (*Phytophthora nicotinae*, *fusarium oxysporum*, *sclerotinia sclerotium*, and *sclerotum cepivorum*.)

### Insects?

So what about those pesky insects and how does vermicast effect them?

Chitin is a compound that makes up the main component of the exoskeleton of insects.

Chitinase is the naturally occurring enzyme that breaks chitin down into chitosan.

worm castings contain enzymes known as various forms of chitinase of which insects have a strong aversion.

Worm castings activate multiplication of the chitinase-producing bacteria found naturally in plants.

The natural level of chitinase found in most plants is not sufficient to repel insects.

When the chitinase concentration is low, insects are not repelled.





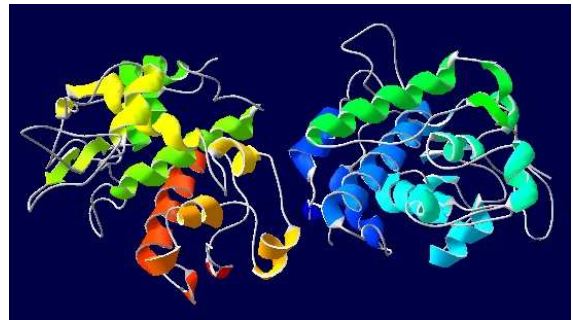
With the use of worm castings, the level of chitinase is multiplied to a repulsion level.

The increase in the chitinase level on small plants to a level sufficient to repel small insects occurs in a few weeks. The increase in the level of chitinase in large plants sufficient to repel the insects takes longer.

To better demonstrate.

The level of the chitinase enzyme for effective repellence is in the range of 1 million cfu/gdw (Colony Forming Units/ gram dry weight).

Worm castings level of the chitinase enzyme production shows concentrations of chitinase in the range of 54 million CFU/gdw.



This concentration is over 50 times the estimated level for repellence and the likely reason why ants refuse to cross a layer of worm castings.

Worm castings can effectively repel insects that feed on the internal liquid of various plants. These include a large array of insect pests including white fly, aphids, spider mites, fruit flies, and other nectar-sucking insects.

Studies with white fly infested hibiscus plants treated with worm castings were free of all white fly residue and cocoons in about two months.

White flies from neighbouring plants, which had not been treated, would fly around the treated leaves but not land on these leaves.

**Soil toxicity and chemical imbalance** are other issues farmers face with soil degradation caused by fertiliser and pesticide use in the absence of healthy ongoing soil management.

Earthworms have been found to be a viable method of removing toxins from soils and enhance the remediation of agricultural lands polluted by chemicals like DDT.

Earthworms can live in highly contaminated soils. They are generally tolerant to many chemical contaminants including heavy metals and organic pollutants in soil and can bio-accumulate them in their tissues.

Earthworm species like *Eisenia fetida* have been found to through the use of a special detoxifying layer in their gut and specific metal binding proteins, remove and isolate toxic heavy metals such as (Cu, Cd, Pb, Hg, Zn, etc.) and also lipophilic organic micropollutants from soil.

Chemical contaminants are absorbed through their moist body walls and mouth and are either bio-transformed or biodegraded, rendering them harmless in their bodies.

This makes earthworms perfect for soil remediation in both agricultural and industrial settings.





### **India.**

Due to high chemical costs, there has been a large move to farming with earth worm castings.

In turn a lot of data has emerged and studies have consistently shown

- water reduced for irrigation as castings over successive years improved the moisture holding capacity of soil.
- PEST attacks where reduced by at least 75% in crops applied with castings.  
Cauliflower tested 95% 'disease free.'  
Bananas found Late Fungal Blight reduced by over 95%.
- Reduced termite attacks.  
Reduction in weeds.  
Faster seed germination with rapid seedlings growth and development.
- An increase in yield.  
A greater numbers of fruits per plant in vegetable crops.  
An Increased numbers of seeds per ear in cereal crops and larger, heavier and better quality.
- Flower production (commercial floriculture) was increased by 30-50%.  
Flower blooms were more colorful and bigger in size.  
Better quality and taste of fruits and vegetables  
Longer shelf life over twice that of the control.

### **United States.**

An Iowa State University study (13 years) farming strawberries found:

- Healthier berries and soils.  
Improved pollination success.  
No need for pesticides to maintain crop yields.

### **South Africa**

A Free State commercial apple farmer found a change in international export regulations, specifically for chemical residue levels and a shrinking list of usable chemicals drove their search for alternative techniques. The use of worm castings and tea in their apple production system found;

- Improved fruit quality.  
Reduced input costs.  
Improved the soil and tree health in orchards.  
Earthworm activity evolved mineral soil into rich healthy soil with the earthworms managing the environment.  
One-third reduction in irrigation water.  
Increase in root growth.  
Increased nutrient uptake resulted in healthier, stronger apple trees.  
Incorporating earthworms increased yields from 15 to 25 t/ha depending on variety.

### **Where to start?**

Arrange a consultation today so we can discuss your needs, current soil state, infrastructure and appropriate method of application.

**Implementing** earth worm castings into your current application regime, unlike using chemical fertilisers alone is with a specific process and goal in mind, the organic rehabilitation and optimisation of your soil.



**Time scales**, we advise planning for 1 to 3 years of application, twice annually, dependent on your existing soil condition and working towards a healthy sustainable rebuilding of your soils natural functions.

**Our aim** if for an ongoing working relationship with our farmers to get their soil to optimum condition and keep it there, we encourage our farmers to include a high quality compost in their feeding schedule, if they would like to take advantage of the added benefit of baby worms and cocoons in Opti-cast.

**Results** are commonly seen quickly but with Opti-cast the benefits lie in the steady and ongoing results, unlike the stressful feast and famine peaks and troughs experienced with chemicals.

**In time** you will see the levels of chemical fertilisers required reduce until a point where casting application can be scaled right back and chemical application can remain greatly reduced. Where after a schedule of composting can be used to maintain your soil with worm castings only being applied in problem areas.

This equates to a huge potential cost saving to farmers in the long run.

As with all things, soil remediation is a process, but with fantastic benefits.

### **Application**

For best results, we advise an application of 2l of vermicast to established trees, twice a year.

1L for established small trees and shrubs, twice a year.

100 to 250ml for seedlings on planting, variety dependent, snugly around the root base.

- We do however advise 2L when planting new trees.  
The reason for this being that it is the most opportune time to get earthworm castings at and in contact with the root base of the tree, having the ability to have its maximum benefit in root development and the outward rehabilitation of the soil.
- Young trees are at their most vulnerable and castings at the root base will work towards supporting the young tree and giving it a strong healthy start crucial for later yields.

Worm castings are a powder, but can be applied in two ways.

Applied manually in its powdered form (Opti-cast) or used to produce Vermileachate or worm tea (Opti-feed) that can be sprayed as a foliar feed or incorporated into a fertigation system.

- **Opti-Cast** can be applied manually, applying in the case of a sprayer or dripper between the spray/drip head and the base of the tree or wetzone.
- **Opti-feed** can easily be percolated in tanks, aerated to encourage microbial bloom and delivered through a fertigation system, manual sprayer or crop sprayer.  
Foliar feeding is highly beneficial both for nutrient and pest resistance benefits.

**Supply**, Opti-cast is supplied by the cubic meter in 40dm bags (40l).

- Per cube this equates to 500 trees, 1000 shrubs or 4000 seedlings.

Calculate your cost per block or hectare based on this.

Opti-cast is a compound that starts the regenerative process immediately, application can start at a farmers earliest convenience, where after it can be incorporated into your existing schedule.

We look forward to working with you towards a healthier and more consistent soil environment.

Reduced stress in your plants with stronger structural growth and root systems.

And of course a longer yield period with larger, healthier, higher grade crops.

Call us today to see how we can help you.