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BioLogik



we must replace what
we take from the earth

Groundswell[®] Continuous Fermentation



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VRM BioLogik® has developed a simple and effective organics processing methodology for solid and semi-dry organic material that allows stability, predictability and consistency and manages odour at every stage of the process.

The Groundswell® Continuous Fermentation process:

- Uses low cost, readily available materials and processing techniques
- Requires minimal infrastructure
- Is able to use existing landfill processing centre or farm machinery (e.g. small tractor with blade or front-end loader).
- Operates in exposed sites with no power and minimal water.
- Has a minimal labour and machinery requirement.
- Is a simple process that can be managed by existing waste management or farm labour without expert composting knowledge.
- Operates consistently with seasonally variable feedstocks.
- Effectively manages concerns about putrescibles including odour, vermin and flies.
- Ensures pasteurisation is able to occur (i.e. temperatures are reached and maintained for extended periods in order to meet all regulatory guidelines).
- Enables the conversion of organic waste previously disposed to landfill into a resource.
- Eliminates leachate concerns.

The Groundswell® process facilitates and accentuates the activity of naturally occurring photosynthetic reactions which are able to digest odour substances and enhance the digestion of organic material using natural UV and infra-red radiation.

Creating the conditions for these endemic photosynthetic reactions to flourish during processing simultaneously breaks down odour producing compounds such as hydrogen sulphide and allows other reactions which digest organic material and manage temperature and moisture.

The result is a complex interdependency of biological reactions. The process is perhaps more easily understood as being akin to a silage process but also stimulates the production of humic substances and pre-humic substances which are critical for stimulation of reactions in soil to which the resulting product is later applied.

The by-product of the Groundswell continuous fermentation process is HumiSoil®. To understand how HumiSoil® works for you, it is useful to have an understanding of the role of humus in soil.



What is Humus?

Humus is a complex and persistent mixture of brown or dark brown organic substances which results from microbial decomposition and a synthesis of plant and animal matter. Humus can also be generally used to describe an upper layer of topsoil which contains organic matter. The process in which raw organic matter is converted into humus supports the maintenance of beneficial microbes and helps store high levels of nutrients and organic acids in the soil. Humus also possesses extremely high absorption capability and can hold and release water and nutrients as needed. Where humus is present, soil structure is usually better and the chemical and biochemical reactions which allow plants to take up nutrients (the cation exchange capacity of the soil) are improved.

Humus is synonymous with good nutrition in soil and acts as a nutrient and energy storage facility. In nature, humus takes many years to form and soils which are rich in humus are normally very old. Unfortunately many of the processes employed in farming rapidly draw down on the nutrient and energy stores of humus in soil, resulting in a loss of humus.

What is HumiSoil®?

As its name suggests, HumiSoil® is an organically based product in which the biological reactions which result in the formation of humus have already been started. This pre-fostering of humus allows you to speed up the natural process of humus formation in your soil. HumiSoil® is a fully matured top-soil enhancer made from totally organic inputs which contains high levels of humic materials together with a range of other biological substrates.

A Revolutionary Breakthrough

Carbon is a key ingredient in the formation of humus. Carbon in soil is generally understood to come primarily from organic matter and is converted into humus by microbes. HumiSoil® also fosters a secondary process of carbon sequestration which draws CO₂ from atmosphere to directly create new organic material. It is important to note that this process is not the same as what happens when organic matter is composted. When material is composted, most of the carbon in the material is released back into the atmosphere as CO₂. The Groundswell® process in which HumiSoil® is made has been shown to foster carbon sequestration – meaning more CO₂ can be captured along the way as HumiSoil® is made than was there to start with! When HumiSoil® is applied to soil, this carbon sequestration process continues.

This unique effect – the preservation of carbon and energy stores and the formation of humus in organic material – results from natural biological reactions which foster photosynthesis deep within a pile of organic matter. These special reactions are able to use infra-red and UV radiation to complete photosynthesis and re-capture CO₂ which would otherwise be lost as organic matter decays. These very important reactions are then carried to the soil applied wherever HumiSoil® is.

How is it made?

HumiSoil® is made using the Groundswell® continuous fermentation process pioneered by VRM BioLogik®. In this process a range of reactions work to convert raw organic matter of many types into a product which has many of the characteristics of topsoil. An important part of this conversion activity is bacterial photosynthesis. Reactions responsible for bacterial photosynthesis thrive in the Groundswell® process and foster the fixation and mobilisation of additional carbon, nitrogen, phosphorus and numerous trace elements from their environment.

Soil benefits of HumiSoil®

HumiSoil® acts as a cossetting media which allows the establishment of important soil cultures in otherwise difficult circumstances. These organisms are responsible for fixing carbon and feeding energy, nutrients and water into the soil profile.

HumiSoil® assists in the stimulation of a range of beneficial fungi species which provide support to plants as well as performing important functions in the formation of soil particles and in the development of nutrient transfer cultures around the roots of plants.

A water reservoir – HumiSoil® fosters reactions which manufacture water. Additionally, HumiSoil® fosters humus development in soil which in turn helps to absorb and store moisture.

How does it benefit my crops?

HumiSoil® supports the development of naturally healthy soil. Healthy soil reactions have been linked with reduced incidence of disease outbreak as well as with much more efficient nutrient transfer to plants.

Specific functions of the beneficial reactions fostered by HumiSoil® include:

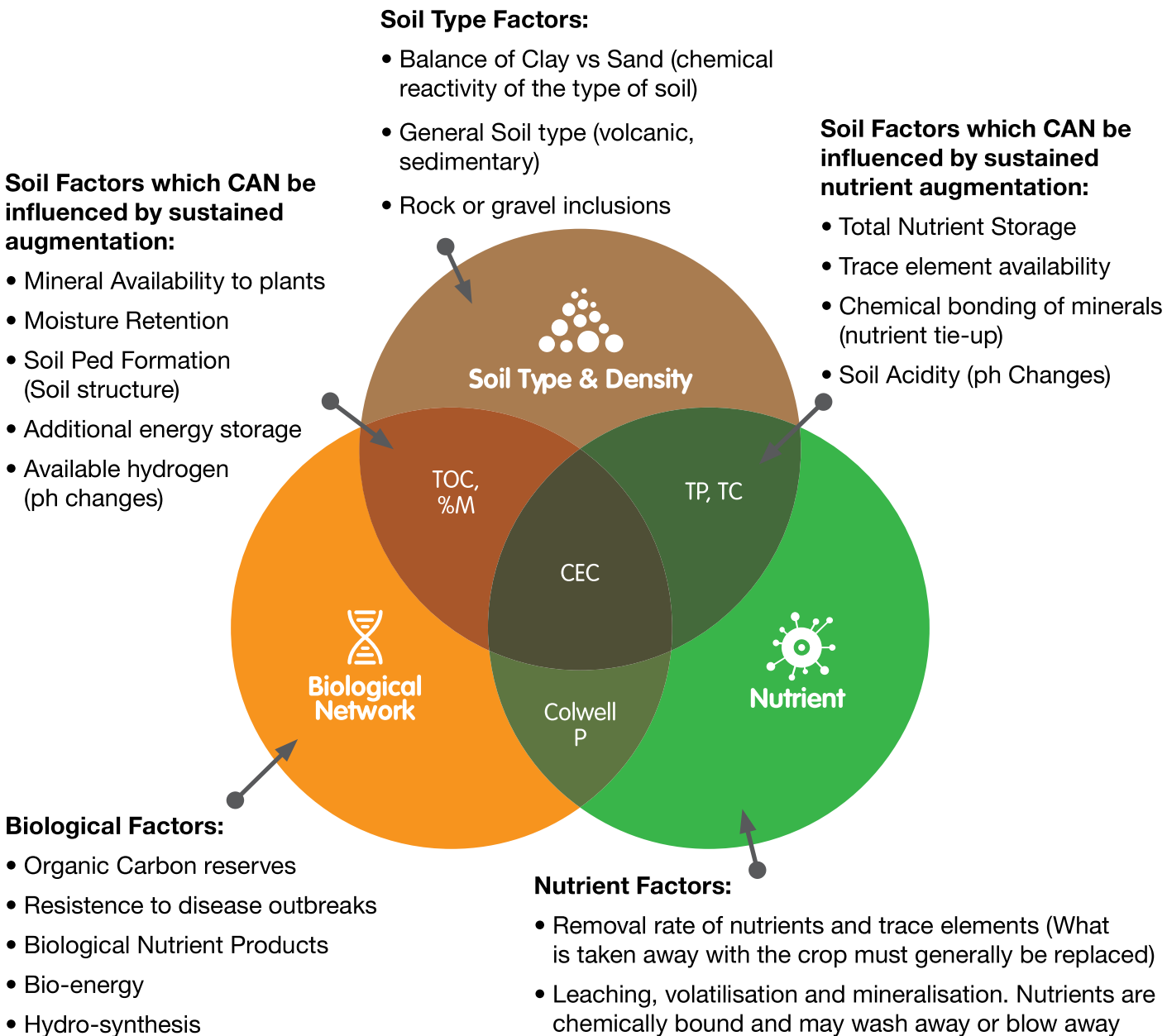
- Manufacture of water in the soil
- Fixation of Nitrogen from the air
- Mobilisation of Phosphorus reserves in soil
- Capture of CO₂ from the air and use of it to make sugars
- Manufacture of energy storage compounds like ATP

All of these functions help build a healthy soil and can assist plant growth.



General Principles of biological augmentation

The simple addition of organic matter will not necessarily provide these benefits. HumiSoil® specifically targets the hosting, incubation and deployment of soil-based natural biological reactions responsible for the benefits listed below.



Nutrient Factors which CAN be impacted by stimulation of biological reactions:

- Total Nutrient Availability against total nutrient stores (particularly P)
- Some Trace Element reactions (e.g Calcium & Boron)
- Sequestration of atmospheric sourced minerals (Nitrogen, Carbon, Hydrogen are key elements sequestered. Phosphorus, Potassium, and many trace minerals may also be sequestered biologically at some level)

N.B. Where severe nutrient deficiencies exist, biological reactions may not be able to quickly sequester all nutrients required for crop production. Healthy soil does contain all necessary nutrients but may take several years to re-form all nutrient reserves.

The table below compares and contrasts traditional Compost with HumiSoil® (product of the Groundswell® process) for their capability to provide a range of desired benefits.

Desired Benefit	Compost	HumiSoil®
Inclusion of Diverse Biological stimulants & reactions	No Compost typically contains low levels of biological substrates at end of process	Yes HumiSoil® typically includes high levels of a wide range of biological substrates at end of process
Stimulation of Specific cultures beneficial to soil	No Compost is typically created by organisms whose function is the degradation of organic matter rather than those whose function is the production of beneficial substrates	Yes HumiSoil® use is characterised by the appearance and proliferation of specific cultures of actinomycetes, bacteria and other organisms which are known to be beneficial in a soil environment.
Water retention	Yes (while it is in place as a mat on the surface of soil)	Yes (while it is in or on the soil and after a program of addition to soil surface)
Humus Addition	No Typically fosters very low on-going humification capacity when placed on soil surface	Yes Very high levels of humus precursor materials and nutrient retention for humus manufacture in soil are present in HumiSoil®
In-Soil Moisture Addition	No	Yes Specific reactions responsible for hydro-synthesis flourish in soil where HumiSoil® is applied.
In-soil Carbon Sequestration	No Fosters digestion and release of carbon substances. May act as an agent of carbon reduction in soil	Yes Specific biological agents of carbon sequestration flourish in soil where HumiSoil® is applied.
Nutrient Addition to Soil	No Nutrients are generally released to atmosphere by surface added compost	Yes Biological Nitrogen and Carbon Fixation activity is fostered by HumiSoil® addition
Soil Health and fungal disease suppression	No / Yes Very few fungal hyphae survive the composting process or are fostered by surface addition of compost in isolation. Over time, a blanket of composted material may be inhabited by beneficial fungi.	Yes A range of fungi species readily colonise HumiSoil® and are fostered wherever HumiSoil® is added to soil. HumiSoil® has a far greater retention and generation of moisture than compost which promotes diverse fungal activity.
Capacity to influence CEC	Yes / No Incorporating organic matter into the soil can help improve CEC. Compost left on the soil surface will not necessarily improve CEC	Yes HumiSoil® typically has a much higher intrinsic CEC than compost and contains a number of solubilised elements which contribute to improved CEC



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