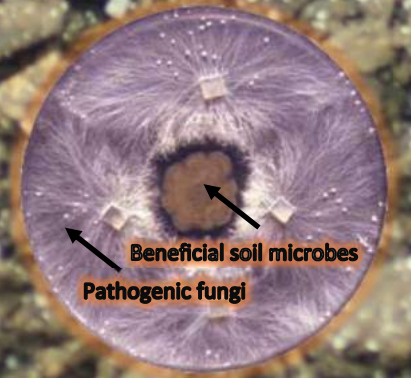
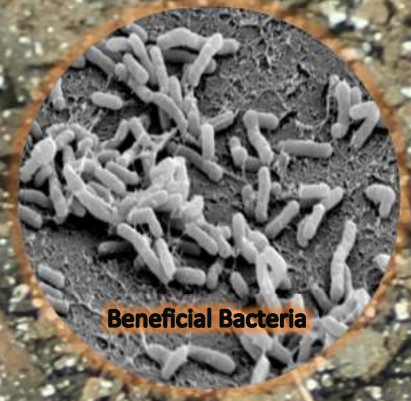


BIOLIFTER[®] PMX

Giving Life to Potting Mix

“A revolutionary approach to lifting and balancing the microbial diversity in Potting Mixes and growing media by enhancing biological health to counteract the effects of Nitrogen Drawdown & leaching”



LANGLEY FERTILIZERS

Biolifter® is an innovative product, for which the manufacturing process involves the use of proprietary **Microbial Balancing Technology (MBT)**. Microbial Balancing is a radically different approach to restoring the natural balance of biological activity by incorporating a suite of well researched beneficial microbes and essential natural minerals into potting mix. **Biolifter®** mini-prill fertilisers contains a biologically coated, specifically engineered, mineral base comprising of most of the essential and natural micro nutrients in potent quantities, together with a scientifically balanced suite of well researched, and trialed, Australian Cultured beneficial soil microbes.

All the nitrogen in **Biolifter®**, being in a water insoluble form to counteract Nitrogen Drawdown effects, remains available in the potting mix through microbial decomposition and mineralization processes. The Carbon to Nitrogen ratio in this form of nitrogen is 1:1, and therefore provides an ideal balance of food and energy for microbial activity.

Biolifter® ensures that it effectively and efficiently delivers the organic feeding of energy rich carbon and nitrogen through microbial activity and also maintains the balance between beneficial and pathogenic microbes. Therefore **Biolifter®** can assist in ensuring plants grown in this media will develop and maintain a healthy immune system.

Background:

Potting mixes are mainly designed for use in nurseries - for the containerized growing of plants. Fertility, drainage, aeration, optimum pH levels and texture are primary considerations when formulating potting mixes.

Minerals (nutrient elements), **Microbes**, **Mulch** (organic matter), water and air are the main components that build potting mix. Good potting mixes will continuously supply plant roots with water, air and nutrients in balanced proportions. Plant growth may suffer if any component is out of proportion. Although many factors play a part in growing plants successfully, a high quality potting mix is vital for success in any nursery.

Composted organic material added to potting mixes are considered to be of utmost importance and therefore key to their quality. Composted sawdust, ground wood, rice hulls and bark from coniferous trees are the main components of potting mixes. However, composted pine bark is also used widely in Australia as major constituent.

During the composting process of these materials, **compost stability and maturity** are key parameters that dictate compost quality and help to determine its suitability to different crops.

The more stable a compost is, the lower the microbial activity in the compost. This decreased microbial activity reduces the degradability of organic material. Organic material becomes more stable as it moves through the various composting phases. Compost is said to be highly stable when it has a low level of microbial activity, under optimal conditions of temperature, aeration and moisture.

The maturity of compost is achieved by allowing sufficient time for the composting process to continue through a lower temperature maturation phase. This ensures the decomposition of various toxic chemical compounds that are produced during the degradation of organic materials. These natural toxic chemical compounds can usually be eliminated by composting or ageing, however, it must be ensured that green organic compost is fully matured. The inclusion of immature compost into potting mix can be detrimental to plant growth and health, as it may contain plant pathogens, toxic levels of ammonium, nitrogen or toxic chemical compounds. It can also cause nutrient drawdown, particularly of Nitrogen.

Nitrogen Drawdown in potting mix occurs when added organic matter is not fully composted or there is the presence of a high proportion of an easily degradable carbon component, without an adequate amount of nitrogen in the organic substrates being added into the potting mix. Microbes that perform biological activities involved in the decomposition process within the potting mix consume nitrogen to break down this woody material. This, in turn, can reduce the amount of nitrogen that is available for supply to plants, resulting in reduced plant growth or even plant death. The Nitrogen Drawdown Index (NDI) gives an indication of the inducing microbial demand for nitrogen and, thereby, the stability of the potting mix. Mixes with an NDI close to zero will have the greatest capacity to drawdown nitrogen, while with an NDI close to 1, have little capacity to use nitrogen and are therefore considered to be completely stable. Semi-stable mixes typically have a $NDI > 0.2$ while fairly stable composted mixes will have an $NDI > 0.5$.

The **Microbial Balance** of potting mix is the first and most fundamental requirement for its performance in growing healthy plants. Compost added into potting mix is generally populated with three types of microbes: beneficial, pathogenic and neutral microbes. Beneficial microbes boost the immune system of plants and help fight disease. Pathogenic microbes spread disease and can also produce toxic substances.

Neutral microbes are involved in collaborating with both beneficial and pathogenic microbes and therefore assist in maintaining the natural balance required and responsible for performing different biological activities on various substrates within the potting mix - plant subsystem.

Composting is achieved through natural microbial balancing processes, which help in creating a good habitat for micro-organisms. The micro-organisms responsible for composting process are bacteria and fungi. Harmful bacteria and fungi in the compost can parasitize plants, however, they do occur naturally and are part of the natural eco-system. These destructive pests are usually genetically specialized for attack on plant tissue. However, they are considered to be weak competitors against naturally occurring beneficial micro-organisms and are therefore less able to withstand survival pressures which occur in a balanced system.

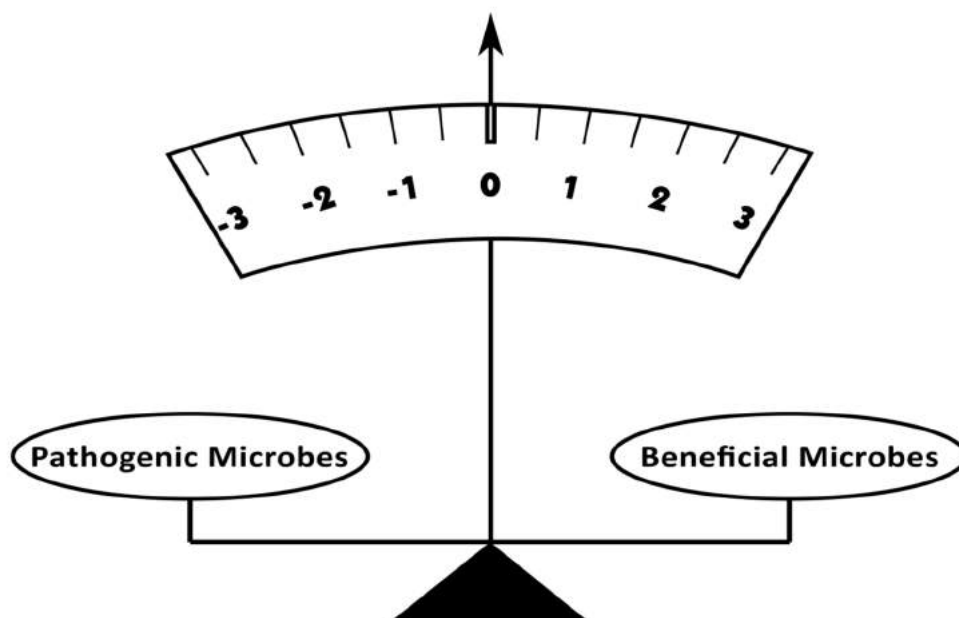
Bark based compost added to potting mixes, contains both aerobic and anaerobic microbes, each which comprise of beneficial and pathogenic microbes. The key to the functional performance of a potting mix, is maintaining the optimum balance between beneficial microbes (both aerobic and anaerobic), and pathogenic microbes. This is due to the fact that natural processes operate with both beneficial and pathogenic microbes when the system is in natural balance. An out-of-balance system, can lead to changes that can cause one or more types of microbes to become temporarily dominant over the others and consequently cause a disruption in natural balance. This may lead to an upsurge and outbreak of pathogenic pests. These pests in turn can contribute to the weakening of the plant's immune system, leading to a loss of its natural defense mechanism. Furthermore, this makes plants more susceptible to disease and thus increases the risk of plant loss.

It is essential that potting mixes are designed and managed with the aim of supplying a balanced supplementary food source for microbes so that they can produce a healthy and suppressive growing medium that will ultimately produce healthy plants. It is therefore critical to have the correct balance of nutrients and other mineral resources in potting mixes to ensure that microbes will survive and flourish. Nutritionally rich plants grown in healthy potting mixes can withstand attacks from pests and diseases more successfully.

A crucial function in the process of achieving this goal is "**microbial balancing**". Emerging technologies used in Microbial Balancing involve the addition of beneficial soil microbes and nutrients/minerals to growing media that is out of balance, or where there is an insufficient diversity of beneficial microbes to help sustain the natural balance between pathogenic and beneficial microbes.

Biolifter® is an innovative product, formulated and manufactured using a combination of breakthrough **Microbial Balancing Technology** and **Troforte® Technology**. This technology has been developed by Langley Fertilizers and is the result of over 15 years of research in soil biology and the vital role that beneficial microbes play by performing various complex processes to maintain soil health, and therefore grow healthy plants.

System—In—Balance *Biologically Sustainable and Healthy System*



Mode of Action:

A well researched and scientifically balanced synergistic suite of various beneficial soil microbes (probiotics) in **Biolifter®**, is specifically developed for both their individual and combined varied activities. Some of the microbial strains in **Biolifter®** may include *Agrobacterium radiobacter*, *Azotobacter*, *Azospirillum*, *Bacilli*, *Cellulosic fungi*, *Myxobacteria*, *Phosphobacteria*, *Pseudomonas*, *Streptomyces*, *Saccharomyces*, *Trichoderma* and *Mycorrhiza fungi* and other bacteria species which may be antagonistic to pathogenic fungi.

The unique biological coating incorporates these beneficial microbes on specifically engineered natural and nutrient rich mineral base. This base contains up to 60 natural minerals (ores) ensuring that these microbes remain viable and become active as soon as they come into contact with water. When added to the unknown heterogeneous microbial environment of a potting mix, the uniquely formulated mineral nutrients in **Biolifter®** provide a conducive environment for the beneficial soil microbes to interact synergistically within the protective coating. This allows them to multiply and gain strength using the mineral nutrients as a food source. They carry out a wide range of activities within the potting mix such as nutrient mining from the natural mineral ores, growth hormone production, decomposing organic matter to organic carbon and protecting beneficial microbes from pathogenic disease-producing bacteria by releasing antibiotics. Therefore, the addition of **Biolifter®** in potting mixes will help achieve the *Microbial Balance* between pathogenic and beneficial microbes, thereby enhancing the natural defense mechanisms of plants.

The nitrogen (N) source in **Biolifter®** is an aldehyde-urea condensation polymer product, and is in a **water-insoluble** form. Therefore, the Nitrogen loss from leaching when using **Biolifter®** is much less than any soluble nitrogen fertilizer. When this source of Nitrogen is combined with polymer decomposing bacteria in a conducive environment, it allows the beneficial microbes to multiply from their initial stages using this source of nitrogen and the other minerals provided in **Biolifter®**, as nutrient rich food.

The nitrogen component in **Biolifter®** is mineralized by microbes, especially aerobic microbes. This form of nitrogen, in synchronization with other essential minerals provided in **Biolifter®**, is incorporated into microbial cells and then metabolized into organic nitrogen. The incorporation of organic nitrogen under this metabolism, ensures the availability of nitrogen in the potting mix. Many microbes present in **Biolifter®**, are capable of utilizing this source of nitrogen as a sole source of energy, carbon and nitrogen.

Finally, most of the metabolized nitrogen and incorporated soil organic nitrogen, are converted microbiologically to plant available ammonium-N and nitrate-N and also to counteract the effects of *Nitrogen Drawdown*.

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