Artemis & Angel Co. Ltd.
99/296 President Park, Sukhumvit 24, Klongtoey,
Bangkok 10110, Thailand
Tel.: +66-2-461-5164; +66-82-727-9273; +66-86-339-6038 Fax: +66-2-661-1752
E-mail: artemisandangelcoltd@gmail.com Website: www.artemisthai.com

What is a Bio-fertilizer?

Photograph shows the 1litre size of bottle.

What is a Bio-fertilizer?

1. Introduction to the Benefits and Activities of Bio-fertilizers

Bio-fertilizer is a 100% natural and organic fertilizer that helps to provide all the nutrients and micro-organisms required for the benefits of the plants. It contains a large population of beneficial micro-organisms that enhance the productivity of the soil and increase plant growth either by fixing atmospheric Nitrogen or by solubilising minerals in the soil, including those unabsorbable by roots, and by stimulating plant growth through the synthesis of growth promoting substances.

The term "bio" means living; so bio-fertilizers refer to living, microbial inoculants that are added to the soil.

Micro-organisms create a micro environment around the roots of plants that makes nutrients easily available to the plants and helps to retain water.

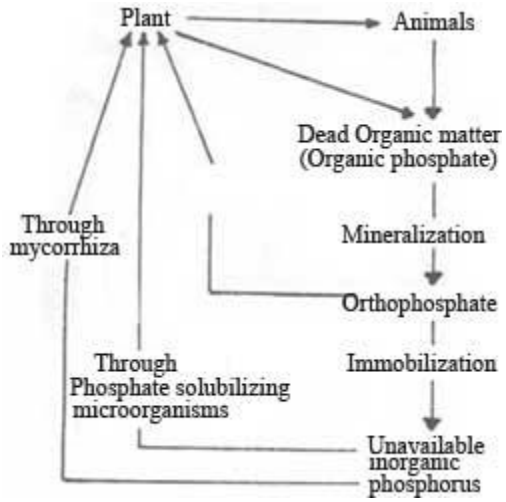
When you use chemical fertilizers and chemical sprays, however, most of these micro-organisms die forever, and as a result the soil loses its capacity to provide sustainable growth in the long term.

Bio-fertilizers can be used on the soil as a high quality organic fertilizer and as a corrector of pH, bacterial life, and texture. They have a relatively high nutrient concentration, and can be used to prepare the soil before planting. Bio-Plant, for example, is especially effective in soil preparation when mixed with organic matter. The micro-organisms feed rapidly on the organic matter and multiply rapidly. The organic matter becomes like a factory mass-producing micro-organisms, which spread out and fertilize the soil.

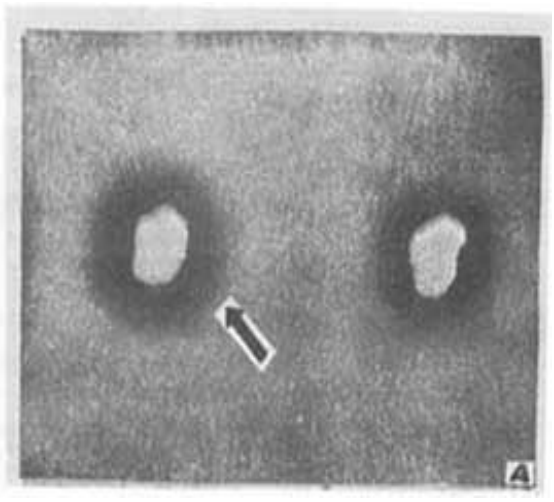
The advantages of using bio-fertilizers are enormous. Not only are they very economical, but they produce high agricultural yields.

Bio-fertilizers include phosphate-solubilizing microbes. Phosphorus is an important nutrient for plants. There are several micro-organisms which can solubilize the common sources of phosphorus, such as rock phosphate. They solubilise the bound phosphorus and make it

available to the plant, resulting in improved growth and yield of crops. Soil phosphates are rendered available to plants by soil micro-organisms through the secretion of organic acids. In this way, phosphate-dissolving soil micro-organisms play an important part in correcting phosphorus deficiency in the soil. They may also release soluble inorganic phosphate into the soil through the decomposition of phosphate-rich organic compounds. Bio-fertilizers can substitute almost 20% to 25% of the phosphorus requirement of plants.



The Phosphorus Cycle



Microbial Solubilization of Phosphate

Bio-fertilizers improve soil fertility and enhance nutrient uptake and water uptake in deficient soils, thereby improving the establishment of plants. Bio-fertilizers also secrete growth substances and antifungal chemicals, as well as improve seed germination and root growth.

The combined effects of phosphorus- and potassium-mobilizing micro-organisms and specific nitrogen-fixing bacteria enrich the soil and cost less than chemical fertilizers, which harm the environment and deplete non-renewable energy sources.

Bio-fertilizers decompose organic material and help to build up the micro-flora, which in turn improves the health of the soil, enhances the growth of plants and increases the yield of crops.

Soil that is rich in microbial life

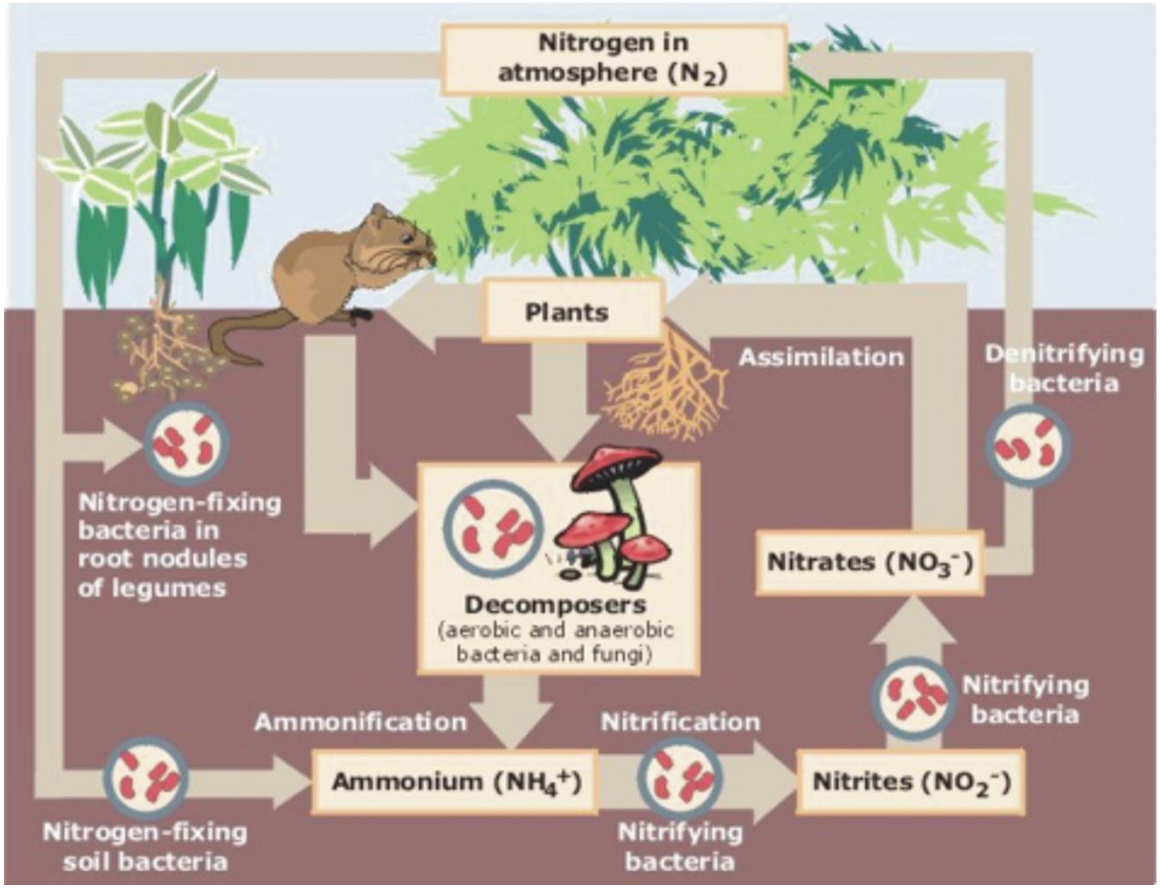
2. Some General Benefits of Bio-fertilizers Compared to Chemical Fertilizers

Bio-fertilizers, such as Bio-Plant and Pro-Plant, have strong advantages over chemical fertilizers. For example:

a. Chemical fertilizers supply an abundance of Nitrogen and depending on the kind, also Phosphorus and Potassium, whereas bio-fertilizers provide in addition to these major minerals, minor minerals, certain growth-promoting substances, such as hormones, vitamins, amino acids, etc..

b. Chemical crops have to be provided with chemical fertilizers repeatedly to replenish the loss of Nitrogen utilised for crop growth. One reason for this is that chemical agriculture kills off the microbial life that provides the plants with the Nitrogen they need, thereby making them dependent on chemical "fixes" of Nitrogen. Bio-fertilizers, however, supply the Nitrogen continuously through natural processes throughout the entire period of crop growth in the field under favourable conditions.

c. Continuous use of chemical fertilisers adversely affects the soil structure by killing off soil micro-organisms and thereby disrupting essential processes *(see diagram below)* that create fertile soil. Bio-fertilizers provide chemical soil the micro-organisms that restore these processes and thereby improve the soil structure.



d. Chemical fertilizers are toxic at higher doses. Bio-fertilizers, however, have no toxic effects. With the introduction of green revolution technologies modern agriculture is getting more and more dependent upon the steady supply of chemical fertilizers, which are products of fossil fuel (coal + petroleum). The excessive dependence of modern

agriculture on chemicals and the adverse effects being noticed due to their excessive and imbalanced use has compelled the scientific fraternity to look for alternatives. Bio-fertilizers provide a natural and effective alternative, and produce higher yields for a lower cost.

e. Bio-fertilizers are ready-to-use live formulates of beneficial micro-organisms, which on application to the seeds, roots, or the soil mobilize the availability of nutrients by their biological activity in particular, and help to build up the micro flora, which is turn improves the soil's health in general.

f. Certain micro-organisms harvest (fix) atmosphere nitrogen and convert it into ammoniac form, which in due course is made available to the plants or is released in the soil. Phosphate-dissolving micro-organisms solubilize fixed forms of phosphorus already present in the soil and make it available for use by the plants. Bio-fertilizers are also used for hastening the process of composting and for enriching its nutrient value.

g. Bio-fertilizers differ from chemicals fertilizers in that they feed your plants while adding organic material, microbial life, and major and minor nutrients to the soil. Soils with lots of organic matter and microbial life remain loose and airy, hold more moisture and nutrients, foster growth of soil organisms, and promote healthier plant root development. If only chemicals are added, the soil gradually loses its organic matter and micro-biotic activity. As the organic matter is used up, the soil structure deteriorates, becoming compact, lifeless and less able to hold water and nutrients. This results in increased amounts of chemical fertilizers needed to feed plants.

3. General Information About Bio-Plant and Pro-Plant

- Bio-Plant acts as a soil conditioner by stimulating microbial activity in the soil, which results in improved air-water relationships in soil, improved fertility, and soil that is less prone to compaction and erosion. Farmers who use it in their regular fertility program report increases in yield, quality, shelf-life, and resistance of crops to environmental stresses such as drought, extreme heat, and pests and disease problems., compared to chemical fertilizers.

- Pro-Plant contains a wide range of naturally chelated plant nutrients and trace elements, carbohydrates, amino acids and other growth-promoting substances. This blend makes it an excellent foliar fertilizer. It is a nutritionally complete fertilizer, which contains all the main major and minor minerals that plants need, and when sprayed properly onto the leaves the nutrients can be absorbed through the leaves and used at once by the plant.

- The Nitrogen in Pro-Plant is absorbed immediately because it is made from fish. The Nitrogen in fish is in the form of amino acids which plants take in and use directly, unlike in the case of inorganic fertilizers in which the Nitrogen needs to be converted into a usable form first.

- Additionally, because the micro-nutrients in fish are in a naturally chelated form, they are quickly and readily absorbed into the leaf surface. Foliar applications on a regular basis increase the health, vigour and yield of plants due to this easily absorbed additional nutrition.