

Exquisite Mighty Bio Inoculant

Foreword

To meet the ever-growing demand for crop yield and the swelling population, chemical fertilizers and pesticides have been used as a key measure for quite a long time in agricultural production. The green manure has been abandoned and farmyard manure has been ignored. More and more chemical fertilizers have been applied and the production cost of agriculture has doubled and redoubled. The excessive use of chemical fertilizers causes soil sealing, and fertility diminishing. The leftover chemical fertilizers and pesticides have seriously affected the quality of agricultural products and people's health, causing environmental pollution. The overuse of fertilizers has damaged the original soil's micro-ecological balance and deteriorated the diseases spread by soil.

The basis of agriculture is soil and microbes, which are active ingredients for soil development. From the standpoint of sustained agricultural development, and good eco-environment establishment, we propose a scientific fertilizer addressing measure, that is to apply organic, inorganic, and microbial fertilizers in a balanced and rational way to keep a high and stable yield.

Brief Introduction of Mighty Bio Inoculant

Mighty Bio Inoculant is a kind of plant growth promoting rhizobacteria (PGPR). Based on the inter-dependent and interaction theory between soil microbes and plant photosystem, Mighty Bio Inoculant is a dormant active bacterial product made from predominant strains through advanced fermenting and concentrating technology suitable for rhizosphere soil. The product can reproduce beneficial microbial bacteria, realize the target of regulating the rhizosphere nutrient environment and restore the original soil eco-balance.

Function Mechanism of Mighty Bio Inoculant

The root is the source of plant growth. Water and nutrients required for plant growth are mainly absorbed by the root. The surface of the root is the hyaline membrane which conducts metabolism, the area where varied microbial bacteria act luxuriantly. The bacteria form a bacterial cover around the root. The bacteria are great in number, quick in reproduction, and strong in activity. They select and regulate the root's function in secreting and absorbing nutrients. In the microenvironment of rhizosphere soil, if the beneficial bacteria hold sway, the inroads of pathogenic microbes will be restrained and the crop will grow rapidly. Otherwise, the soil activity will drop, and diseases spread by the soil will occur.

After applied to the crop's rhizosphere soil, the beneficial microbes contained in the Mighty Bio Inoculant revive and breed rapidly. They occupy a good position, absorb nutrients and oxygen, restrain the secretion of active substances, and form a biological protective screen around the root, preventing the breeding the inroads of harmful bacteria groups as well as preventing the growth of rhizosphere pathogenic microbes. As a result, soil-born diseases will be reduced and the disease-resistant ability of the crop will be strengthened. At the same time, these beneficial bacteria groups will produce various plant-growth substances in the process of breeding and metabolism. This will promote the growth of roots, absorb sufficient nutrients and foster luxuriantly. Besides, through symbiosis among the microbes, the product can increase the number and activity of beneficial bacteria such as nitrogen-fixing bacteria, phosphorous decomposition bacteria, and potassium decomposition bacteria, quicken the decomposition of organic materials and transfer of effective nutrients, improve the rhizosphere nutrient environment, heighten soil nutrient supply level and utilization rate of fertilizer.

Comprehensive Efficacy

- keeping microbial communities in plant rhizosphere soil in balance -- increases plant disease-resistant ability. Forming biological defense in root region inhibiting deleterious rhizosphere microorganism from invading and colonizing. Decreasing soil-born disease.
- stimulating the plant to grow -- increasing plant production. Excreting plant growth hormone, stimulating root system to develop, increasing the ability of nutrient absorption.
- improving plant rhizosphere soil nutrient condition -- increase rhizosphere soil potential fertility

Increasing beneficial microbe quantity and activity, accelerating inversion progress of nitrogen, phosphorus, potassium, and organic matter decomposition. These comprehensive functions of Mighty Bio Inoculant cannot be achieved by using chemical fertilizers or manure.

Product Safety Characters

- Passed through Food and Drug Administration (FDA) documentary queries on health influences of bacteria involved, certified bacteria used by Mighty Bio Inoculant product are all non-pathogenic bacteria.
- The oral toxicity test done under EPA requirements and Federal Hazardous Substance Act proved the following facts:
 1. No abnormal behaviors and physiological reactions were observed following incubation or during the two weeks observation period.
 2. There were no deaths of tested animals.
 3. All organs and tissues appeared normal.
 4. No further oral test is required.

Therefore, the sample meets the specification outlined in Federal Hazardous Substance Act.

- A test was carried out to evaluate the ability of the test article to induce genetic damage as detected by the Salmonella/microsome assay (Anes test), The results proved that there was no evidence of a dose-related mutagenic response and genotoxic.
- Safety test on mice by intraperitoneal injection.
- The rabbit's eyes irritation test done under EPA requirements and Federal Hazardous Substance Act proved this sample can be considered non-irritating to the eyes.
- A skin sensitization test showed the product is not considered a sensitizer. The product is pure, safe, non-toxic, and has no residue. It can not induce latent pathogenic hazards and environmental pollution.

Characteristics of Bacteria Species

1. The strains chosen in Mighty Bio Inoculant product are suitable to the production technical conditions, characterized by good stability, easy to be stored and transported, with a long valid period, other liquids and peat microbial fertilizers do not have these advantages.
2. The variety of bacteria belongs to facultative anaerobe, which means the bacteria can breed with or without oxygen, and adapt to the different soil environments. The strain has good activity and a certain competitiveness advantage in rhizosphere field adhesion.

Application Scopes

Suitable for grain crops and cash crops such as rice, maize, vegetables, flowers, fruits, sugar cane, pineapple, pepper, and root crops.

Application instructions:

Method 1: Using sufficient water to dilute the product, irrigate crop root area soil evenly. After the seeds sprout, apply the product for the first time in the nursery and for the second time after transplanting.

Method 2: Use sufficient water to dilute the product, then, apply to the root area of the crop mix with 30 to 50 kilograms of organic fertilizer thoroughly, and apply to the rood area of crops.

Method 3: Do not use it together with germicide, the sprayer mist be cleaned thoroughly before use.

Effective Application Measures

- **Water Rate:** microbes prefer to live in a moist environment and the water condition of soil plays a great role in the microbe's growth and breeding, proper rate of water can promote growth and reproduction, increase rhizosphere field adhesion of certain inoculated bacteria in deep layer soil. The water rate used to dilute Mighty Bio Inoculant shall be able to bring the product completely into the rhizosphere soil.
- **Repeated Application:** The soil itself contains a lot of microbes and these microbes compete severely for nutrients. Therefore, the repeated application can supplement the living number of Mighty Bio Inoculant bacteria and make sure the continuous play of their efficacy.
- **Early Application:** Mighty Bio Inoculant is a dormant gemma powder different from quick-acting fertilizer and pesticides, gemma in Mighty Bio Inoculant needs time to revive, breed, and reach a certain quantity. This gemma cannot play an active role unless they have formed a group of a greater number.
- **Interval Period and Application Rate:** For the crops with a short growing period, Mighty Bio Inoculant shall be applied early and in short intervals. For those crops with a longer growing period, the application frequency shall be added.

When applied to the soil with low nutrient content, it is better to use Mighty Bio Inoculant together with certain organic manure or fertilizer.

More Mighty Bio Inoculant products should be used where soil-spreading diseases are comparatively severe or in farmyard manure with miscellaneous bacteria applied.

Definition of Related Terms

Rhizosphere refers to the area close to the root whose physiological and physical features are affected by the root. The rhizosphere can be divided into three parts: internal rhizosphere, surface, and external rhizosphere. Internal rhizosphere refers to the cells of the root components. The surface refers to the root surface; the external rhizosphere refers to the area around the root. The number of microbes in rhizosphere soil is many times higher than in other areas.

Rhizobacteria refer to the bacteria living in plant rhizosphere soil. It can be divided into three categories according to its functions to the crop: beneficial, harmful, and neutral. Those bacteria that promote plant growth are called plant growth-promoting rhizobacteria (PGPR).

Interaction Between Root and Rhizobacteria: A plant root not only absorbs nutrients from the soil but also secretes the nutrients created by the leaves into the soil. During its growth and development course, the rhizosphere creates continuous shedding of the root cap, hair, and skin, which become a source of nutrient for rhizobacteria.

Rhizobacteria do not only breed by absorbing root secretions, but also generate amino acids, nucleic acid, vitamins, and plant hormones to supply nutrients to the rhizosphere, promote the decomposition of organic materials, and transfer the nutrients not easy to be absorbed by the crops. Besides the antibiotic substances secreted by some rhizobacteria can restrain the damage caused by pathogenic microbes.

Disadvantages In Merely Using Fertilizer and Organic Manure

- Improper use of fertilizer may burn the plant root. Excessive utilization for a long time will change the soil's physical and chemical features causing soil sealing and acidification.
- Nutrients in plants applied with only chemical fertilizer are not balanced and have low disease resistance; the leftovers caused by excessive use affect the crop's quality.
- Chemical fertilizers are usually applied in a large area and at a great rate, fertilizers in the area out of reach of the roots are washed away; some fertilizers may be solubilized into an element that is not easy to be absorbed, resulting in low effective utilization rate.
- When organic manure is applied, the organic materials not well putrefied contain too many miscellaneous bacteria and are easy to cause soil-borne diseases.
- Soil disinfestation is usually conducted by chemical germicides, which reduce the number of beneficial bacteria while killing harmful bacteria.

Function Mechanism of Mighty Bio Inoculant

Accelerate Crops Growth

The test was carried out on the plant growth promoting the role of the bacteria used in Mighty Bio Inoculant by bacteria ferment liquid. The result shows that Mighty Bio Inoculant can promote and stimulate plant growth and development. Obvious improvement can be seen in the rate of emergence, plant height, and dry weight of 100 plants. It demonstrates that Mighty Bio Inoculant can secrete plant auxin substances during metabolism. Such plant auxin can stimulate the development of the crop root system and the division of plant cells. Therefore, it can increase plant nutrient absorption ability and make leaves grow greener and mature earlier.

Inhibit And Antagonize and Pathogenic Microbes In Soil

The tests conducted by University shows that Mighty Bio Inoculant can restrain pathogenic microbe growth and varied crops. It functions in the following ways:

1. After application to the crop's rhizosphere soil, the beneficial microbes contained in Mighty Bio Inoculant revive and breed rapidly. They occupy a good position, absorb nutrients and oxygen, restrain the secretion of active substances, and form a biological protective screen around the root, preventing the residence and invasion of harmful microbe.
2. During Mighty Bio Inoculant's strain breeding process, it can secrete many active substances to control and restrain the growth of rhizosphere pathogenic microbe. It has the function of biocontrol.

Bacteriostasis experiments proved that Mighty Bio Inoculant has an obvious deterrent to the following pathogenic microbes:

BACTERIA:

- *Clavibacter michiganense*
- *Erwinia carotovora*
- *Erwinia chrysanthemi*
- *Pseudomonas solanacearum*
- *Pseudomonas syringae*
- *Xanthomonas campestris*
- *Erwinia Carotovra* subsp. *Carotovra*
- *Xanthomonas campestris* pv. *Oryza*
- *Pseudomonas syringae* pv. *lachryans*

FUNGUS:

- *Aspergillus*
- *Phytophthora parasitica*
- *Bipolairs* sp.
- *Phytophthora cactorum*
- *Cephalosporium* sp.
- *Pythium aphanidermatum*
- *Chaetomium* sp.
- *Pythium ultimum*
- *Colletotrichum Magna*
- *Rhizoctonia solani*
- *Fusarium oxysporum*
- *sclerotium rolfsii*
- *Phytophthora cinnamomi*
- *Verticillium albocitrophthora*
- *Verticillium* sp.
- *Phytophthora citricola*
- *Verticillium dahliae*
- *Fusarium oxysporum* f.sp *niveum*
- *Pellicularia sasakii*
- *Phytophthora parasitia*

3. Improve nutrients environment around crop root. A comparison test was conducted on the plots applied with Mighty Bio Inoculant and other fertilizers. The result shows that Mighty Bio Inoculant can increase the number of beneficial microbes in the soil (there is an interdependent relationship between them), upgrade the supply level of nutrient substances in the soil and improve the soil's physical and chemical characteristics.

Watch:

<https://www.youtube.com/watch?v=iHGS6ApNBgM&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=27>

<https://www.youtube.com/watch?v=MIREaT9hFCw&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=12>

<https://www.youtube.com/watch?v=CZNanlXMxk4&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=13>

<https://www.youtube.com/watch?v=XapUm5n1zuM&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=15>

https://www.youtube.com/watch?v=pesqtODu_XM&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=17

<https://www.youtube.com/watch?v=403sT9CGRI0&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=19>

<https://www.youtube.com/watch?v=A8qTRBc8Bws&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=20>

<https://www.youtube.com/watch?v=8ugaL6wsXME&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=22>

<https://www.youtube.com/watch?v=nvAoZ14cP7Q&list=PLwrv89nRos0hSB2YIWB4mo9RntCe8xOU4&index=24>