The OikoRhiza Line
of Mycorrhizal Fungi

The healthy rhizosphere is densely populated with fungi and bacterias, taking advantage of the root excretions consisting of sugars and aminoacids, organic acids and nucleotides, enzymes and vitamins, as well as growth stimulants and inhibitors. As the soil pH is reduced, the fungal flora increases. There is thus a highly selective effect on the microorganisms in general and the fungi in particular. The fungi mobilize mineral nutrients toward the plants and usually have the capacity of taking water from the soil, fixing nitrogen and defending the rhizosphere by means of antibiotics they produce. The mycorrhizae are by far the most productive and efficient fungi in performing such jobs.

The efficiency of the mycorrhizae is due to the very close relationship, a symbiotic relationship, they establish with the host plants, totally depending on them for their nutrition and survival. But the payment for this can be more than generous. Most plants welcome the symbiotic relationship with mycorrhizae, and only cruciferae and liliaceae appear to have no use for them at all.

Mycorrhizae not only increase substantially the root areas engaged in nutrient absorption, but also possess a much greater power to mobilize nutrients than the plant roots, thereby especially increasing the absorption of nitrogen and phosphorus. This can be attributed to the much greater area of contact with the soil, as well as to the capacity to make use of organic compounds to form mineral chelates and to fix nitrogen, be it directly or by means of nitrogen-fixing bacteria or algae with which they live in close association. However, mycorrhizae are always dependent upon the aeration of the soil. That is why the proper soil structure is important.

There are two types of mycorrhizae:

a. Ectomycorrhizae: As the name applies, mycorrhizae of this type penetrate very little into the roots, covering them with a dense film of mycelia, which are usually white but can also be dark-colored, whose thickness is between 0,02 and 0,04 mm. Ectomycorrhizae are only found in trees and shrubs where they populate the suberized and lignified roots, rarely covering the points of the radicles.

Thanks to the ectomycorrhizae, the woody roots which can no longer absorb nutrients become active again, thereby increasing the active surface of the root system, not only because of the part of the root system now activated by the mycorrhizae, but also because of the often very long extension thereof provided by the mycelia, which can now bring water and nutrients from afar, going well beyond the traditional reach of the root hairs.

b. Endomycorrhizae or VAM (Vesicular-Arbuscular Mycorrhizae): This type of mycorrhizae lives inside the roots is usually not visible to the naked eye.

Endomycorrhizae can be found in gramineae, leguminosae and most herbaceous crops. In addition, mention can be made of tobacco, potatoes, cotton, tomatoes, fodder crops and all cultivated plants.

The fungus penetrates a root when it is sufficiently strong to support it, leaving it when the growth is interrupted, for instance due to floods or drought. The fungus may survive in the soil and will reenter the root only when growth is resumed.

In the root cells arbuscules and vesicles are formed, the latter acting as storage organs, especially of fats, while the arbuscules are supply organs for the plant, permitting the plant to withdraw its nutrients therefrom. At the end of the period, the infected radicles die, releasing the mycorrhizae to the soil.

Under favorable conditions, endomycorrhizae will increase the vegetative growth of the plant, thanks to mobilizing nutrients (especially P, Ca and K), fixing nitrogen, and defending the environment of the root with antibiotics and other substances.

OikoRhiza “Conifer”

This product has been specifically formulated for use in conifer forestry operations. It contains live spores of the following ectomycorrhizae: 10 million spores of multiple strains of Pisolisthus and 4 species of Rhizopogon per gram. These spores are contained in a substrate consisting of seaweed extract and soluble humic acids.

Soil application: Dissolve the product in the required quantity of water for application directly to the soil, around the plants, or by injection to the root level of established trees.

- For (1-2 year old) plants <60cm: Use 1 kg of the product for 2,500 plants.
- For plants 60-120 cm: Use 1 kg to treat 1,200 plants.
- For plants >1.20 m: Use 1 kg to treat 600 plants.

Application in Seedbeds and for Transplants: The typical solution for the application in seedbeds and for the dipping of transplant roots is made by diluting 1 kg of the product in 25 liters of water.

Important: When using OikoRhiza “Conifers” it is recommended to reduce the customary NPK dose by 30%. The application of phosphate should be reduced even further: by 50-75%.

OikoRhiza “Eucalyptus”

This product has been specifically formulated for use in eucalyptus plantations. It contains live spores of the following ectomycorrhizae: 10 million spores of the most

active strain of Pisolisthus and 3 species of Scleroderma per gram. These spores are contained in a substrate consisting of seaweed extract and soluble humic acids.

Soil application: Dissolve the product in the required quantity of water for application directly to the soil, around the plants, or by injection to the root level of established trees.

- For (1-2 year old) plants <60cm: Use 1 kg of the product for 2,500 plants.
- For plants 60-120 cm: Use 1 kg to treat 1,200 plants.
- For plants >1.20 m: Use 1 kg to treat 600 plants.

Application in Seedbeds and for Transplants: The typical solution for the application in seedbeds and for the dipping of transplant roots is made by diluting 1 kg of the product in 25 liters of water.

Important: When using OikoRhiza "Conifers" it is recommended to reduce the customary NPK dose by 30%. The application of phosphate should be reduced even further: by 50-75%.

OikoRhiza-E (Endo-Mycorrhizae)

OikoRhiza-E is a product of great versatility for the use in virtually any crop susceptible to the activity of endomycorrhizae.
OikoRhiza-E contains endomycorrhizal (VAM) spores, minimum 50 spores/cc, of blended Glomus brasilianum, G. clarum, G. deserticola, G. intraradices, G. monosporus, G. mosseae, and Gigaspora margarita.

DIRECTIONS: (**General Note:** Mycorrhizal fungi spores require contact with plant roots to emerge from their dormant state. The inoculation goal is to create this contact).
Transplants: Best to sprinkle inoculant directly on damp roots or root balls at planting time, or scatter inoculant in plant holes. Apply at least 1 full teaspoon (or 5 cc) inoculant trees or vines.
Seeded crops: Dust dry inoculant on seeds or tubers at minimum of 1kg per hectare. Seeds may need to be very slightly dampened. (Note: Number of seeds per acre is not an important factor—they are only being used to introduce spores evenly throughout the field).
Seedling Trays & Potted Plants: Mix inoculant into water at rate of one-half cup per gallon (30cc/liter) and drench root zone soil. Monitor application to avoid wasteful run- through. Plants potted in heavy soil may need holes probed to avoid surface-sieving of spores. Keep mixture agitated – use within 24 hours.
Storage: Store in cool location or refrigerate. Do not freeze. Avoid direct sunlight. Product expires 24 months after shipping.
Fertilization, Fungicides, Insecticides: For maximum benefits, the use of lower-analysis gradual release fertilizers is recommended. Fast acting fertilizers (especially P) can harm mycorrhizal fungi. Avoid use of soil-drench or systemic fungicides, although

contact-type fungicides are generally not harmful. Insecticides and herbicides that do not kill the host plant are generally not harmful.

Safety: Mycorrhizal fungi are not considered hazardous to humans, animals, fish, or the environment. Persons allergic to fungus or molds should wear rubber gloves when handling. A respirator mask is always advised when working in dusty conditions. Avoid contact with open cuts. If material gets in eyes, flush with water — see a doctor if any irritation persists.