Phytodepuration applications

Mycorrhiza fungus cannot be grown in pure culture, since they are obligatory symbionts. They are therefore produced in symbiosis with their host; infection of the host plant can take place two different ways:

- using already mycorrhized roots
- using isolated spores of the mycorrhizosphere

Inoculation, used fresh, notably increases mycorrhization abilities and times of the young seedlings when it comes into contact.

If the chances of natural inoculation is low or ineffective, introducing new mycorrhiza can be a valid strategy, especially during transplantation or in areas where change in land use has reduced mycorrhiza development (eg due to agricultural practices like enrichment and use of pesticides or leaving land uncultivated).

This is why interest towards mycorrhization in agricultural use has grown over the last few years - the best nutrition mineral (especially phosphatic) is translated into major plant growth ("effect growth"), particularly in soils low in mineral elements. Mycorrhized plants are often more competitive and bear stress conditions better in comparison to plants that are not mycorrhized. It has also been shown that mycorrhiza increases plants resistance against Phytopathogenics.

Mycorrhiza intervene in controlling telluric radical pathogenics via different mechanisms:

- competition for infection sites
- competition for nutrients
- synthesis of toxic mixtures (antibiotic)
- variation in mycorrhizosphere composition
- weak activation of plant defence mechanisms, in an "alarmed" state
- induction of systemic and located defence type systems
- physical barrier around the root.

It is important to observe that bio-protective action is effective when mycorrhization is well present, since most Pathogenic fungus develops more quickly than mycorrhiza.

Hypertrophication of the root system causes precocious development of plants with consequent increase of vegetal biomass and then early blooming and maturation.

Fungus in turn, thanks to symbiosis, is able to complete its own life cycle, and in the case of ectomycorrhiza, form fertile bodies.

In agriculture, all of this favours replacing heavy traditional chemical fertilising and synthesis composts with organic, more ecological fertilising, through restoration of the original mycorrhization conditions. The benefits of this method would be double, in terms of produce as well as environmental impact.

It appears evident then that this mycorrhization technique on phytodepuration systems can result in notable advantages.

Inoculation of mycorrhiza and PGP bacteria in the soil where seedlings have been transplanted in the horizontal sub-flow phytodepuration section can bring the following benefits:

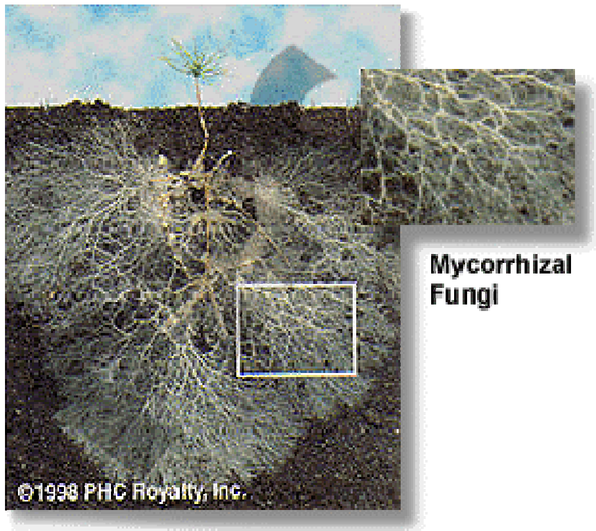


Fig. 1. Fungal hypha development following mycorrhization of a plant

(a) diminution of transplantation stress, thus greater probability of taking root;

(b) precocious development of plants and greater "growth effect", that also results in more diffused root growth, which leads to great ability to explore and more available surface for bacterial action (as can be seen in fig.1);

(c) ease in absorption of nutrient elements from ground and more intense assimilation of N and P (together with more exploration of the ground by the roots and fungal hypha), also thanks to PGP bacteria action;

(d) increase in respiration rate and, therefore, greater effectiveness in transporting oxygen from the aerial parts to the plant's root system;

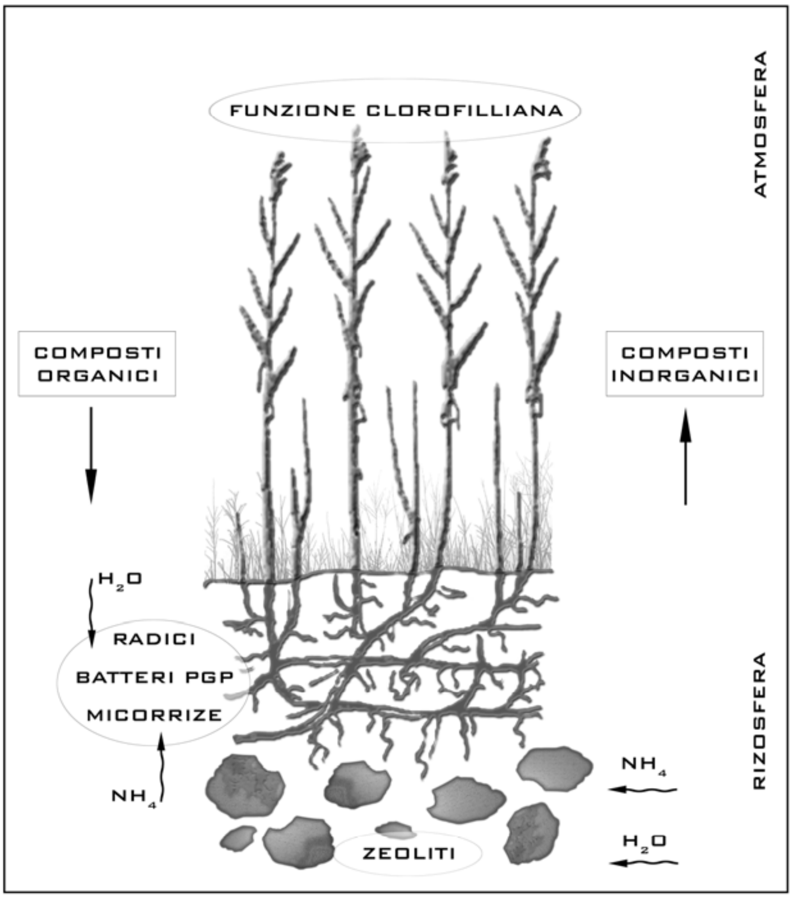
(e) demolition of organic pollutants entering with the incoming liquid waste that represent the substratum of growth for PGP bacteria.

Fig. 2 shows interaction between various components of the ecosystem analysed.

Fig. 2. Summarised diagramme

NUOVO MODELLO DI ECOSISTEMA DEL SUOLO CON INNOVAZIONI TECNOLOGICHE:

radici, batteri PGP, zeoliti, scorie BFS



NEW MODEL OF SOIL ECOSYSTEM WITH TECHNOLOGICAL INNOVATIONS:

roots, PGP bacteria, zeolites, BFS waste

CHLOROPHYLLOUS FUNCTION

Organic compost

Inorganic compost

Atmosphere

Rhizosphere