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Using the Reserves of Macro and Microelements from the Soil by Means of Mycorrhizae

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ABSTRACT: Farmers and Agricultural Experts are Under Pressure to Increase Crop Yield Due to the Rising Demand for Food and the Shrinking Amount of Arable Land. To Increase Agricultural Output, This Has Resulted in an Overuse of Chemical Pesticides and Fertilizers. The Symbiotic Relationship between Rooted Plants and Arbuscular Mycorrhiza (Am) is one of the Earliest Known Symbiotic Relationships in Nature. About 80% of the Species of Terrestrial Plants are colonized by A Fungus Called Arbuscular Mycorrhiza. In Exchange For Carbon Sources, These Plants Take Nutrients from the Earth and Transfer Them to Hosts Plants. Indeed, Am Fungi Play a Significant Role in Sustainable Agriculture by Protecting Plants From Biotic and Abiotic Stressors. Due to the Negative Effects of Chemical-Based Fertilizers, the Am Fungi are Crucial for Biofertilizers Because of These Characteristics.

KEYWORDS: biotechnology, mycorizae, wheat, roots

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INTRODUCTION

Mycorrhiza itself should be understood as a result of the joint activity of numerous internal factors of the host plant, the fungus and the soil. Thus, the relationship between mycorrhiza formation and plant nutrition, especially carbon, is often considered particularly important. The intensity of the moonlight, otherwise, plays an important role, being trans-linked to the synthesis of carbon hydrants, which are of great importance in the formation of mycorrhiza, according to the experiments. If the light is reduced, the impact of the mycorrhiza is reduced, the impact of reduction it can be excluded if usable carbon hydrants are added to the soil. In particular, the amount of nutrients in the soil impacts the effective formation of mycorrhizae, especially nitrogen and phosphorus.

Throughout history, the development of agricultural production has been under the influence of natural, technical, economic and social factors. Natural conditions, being the most important factor that has always influenced the evolution of agriculture. Today, more than ever, nature demands its rights, through increasingly severe climate changes at the global level, forcing us to develop sustainable agricultural exploitation technologies, friendly to the environment, which will come to the aid of ecosystems shaken by intensive exploitation. A technique that complements and maintains a natural environment as healthy as possible is the fertilization technique that includes biotechnological products based on Mycoryzae. Analyzing Romanian agriculture, which has soil fertility as the most important factor, but the original, native soil fertility has evolved over time, under the action of biophysical factors and the intervention of human exploitation. The development of modern processing technologies added artificial fertility to natural fertility, which led to the weakening of ecosystems. In a less sustainable form, chemical techniques, fertilizers, pesticides lead to the degradation of the environment, hence the need for the development of Agricultural biotechnologies.

Mycorrhiza formation occurs even with root fragments that can maintain their vitality for a long time. The host plants influence the formation of symbiosis through their rooting secretions, they can have an inhibitory or exciting effect on the symbiotic partner. The following stimulating substances can be found among this root secretion: vitamin B1, aneurin, biotin, purine derivatives, pyrimidine and amino acids.

Mycorrhizae are fungi that form mutualistic symbioses with plant roots, providing them with nutrients and food necessary for growth and development. Mycorrhiza-based products are used in intensive agriculture to improve soil quality and increase plant productivity.

The expected productions for the development of a sustainable agriculture cannot be based on the nutritional elements provided by the environment. Fertilization technology is based on two classes of nutrients: macroelements and microelements, both showing the same degree of importance in obtaining a sustainable production. The class of macroelements has 3 major nutritional elements and the class of microelements is made up of 6 major elements, which plants need to complete a healthy vegetative cycle. The terminology of macroelements and microelements, respectively, does not represent nutritional importance to the plant, but strictly the quantities needed for a plant to produce the maximum. Both macroelements and microelements are equally important, being key elements in the biochemical processes carried out in the plant growth cycle. Macroelements are N (nitrogen), P (phosphorus), K (potassium), and microelements are Ca (Calcium), Mg (Magnesium), S (Sulfur), Fe (Iron), Mn (Manganese) and Zn (Zinc). adding another series of microelements: Ni (Nickel), Mo (Molybdenum), Co (Cobalt), Cu (Copper), B (Boron), etc. which plants need in relatively small quantities, but which are essential to life. These elements are part of the component of many enzymes that catalyze biochemical processes.

MATERIALS AND METHODS

The symbiotic relationship between Glomus intradiceps and wheat is manifested by the formation of a mycorrhizal collet between the wheat roots and the fungal filaments. In this collet, the fungi provide the plants with nutrients, including nitrogen, phosphorus and other minerals, obtained from the soil, while the plants provide the fungi with carbohydrates produced through photosynthesis. This mycorrhizal collet can grow and develop in the wheat roots, thus improving its ability to absorb nutrients from the soil. In addition, mushrooms help to improve the structure of the soil, reducing its compaction and increasing the permeability of water and air. Therefore, the symbiotic relationship between Glomus intradiceps and wheat can lead to better growth of wheat, with higher productivity and increased resistance to water stress and pests.

Glomus intradiceps is a species of ectotrophic mycorrhizal fungus, which forms mutualistic symbiosis with the roots of some plants, including wheat (Triticum aestivum). In this type of symbiosis, the fungus Glomus intradiceps provides plants with food by fixing nitrogen from the air and, in return, receives carbohydrates from the plants, which are used for growth and development. It is important to mention that there are other species of mycorrhizal fungi, including other species of the genus Glomus, which can form mutualistic symbioses with plants, including wheat. These species can vary depending on factors such as the biotope, the climatic conditions and the host plant. Therefore, it is important to precisely identify the species of Glomus intradiceps and to check its compatibility with wheat before using it in the culture.

The soil taken into analysis from the geographical area of Muntenia, Romanian Plain, more precisely Berceni commune, Ilfov county is located within the physical body 150 noted as soil profile P1. The soil profile P1 framed as argic cherniosome presents a profile of the type Amp-Am-AB-Bt-Ck, being formed by loessoid deposits. The groundwater is located at a depth of over 5m. The soil was formed by an illuviation process of the clay from the upper horizon.

Experimental work was carried out both on the field of the experimental field and in the collaborating laboratories of Agricola Berceni SRL. It was used to multiply the Glomus intraradices fungus, on a nutrient broth type solid culture medium. After Multiplication, they were stabilized in suitable solutions, later arriving on the sample land cultivated with the wheat host plant. In the experimental field, two experimental wheat plots were established. One plot was cultivated as a control, while the second plot was cultivated and treated with mycorrhizae. For the establishment of the wheat culture, the technology according to this culture was executed, without producing a rebate from any operation. The abiotic factors that have an impact on mycorrhiza were studied. The light. The energy source of the symbiont fungus is in the plant and depends directly on the way it carries out its photosynthesis process and on its ability to translocate the products of photosynthesis to the root (Varma, 2008). The lack of the light source produces a restriction for the development of the fungus, so its evolutionary process is slowed down, sporulation no longer occurs, and the expansion of the mycelium in the soil and in the root is reduced. Temperature. From the point of view of the processes of spore germination, root penetration by hyphae and their proliferation inside the cortical cells, temperature can be a factor with a limiting effect (Gavito et al., 2005). soil pH. The efficiency of the fungus-plant association is determined by the adaptability of the fungal partner to a certain soil pH level. The pH affects both spore germination and their development. The relationship between

soil pH and the effects of mycorrhizae depends on the host species, the type of soil, the forms of phosphorus and the species of fungi involved Salinity. In the case of high salinity, a decrease in the production of propagation structures (propagules) and in the colonization of vesicular-arbuscular fungi was observed (Pfeiffer and Bloss, 1988).
A well-developed root system means a good capacity for the absorption of nutrients from the soil followed by the sustained development of the aerial part of the plant, the increase of the vegetative mass and the final increase of the quality of the harvested vegetables. The addition of phytohormonal solutions can add to the growth of the plant.

In most types of mycorrhizae, the movement of carbohydrates, produced during photosynthesis, is done from the host plant (autotrophic partner) to the symbiotic fungus (heterotrophic partner). In the case of absorption of nutrients from the soil, the transfer has an inverse direction, from the fungus to the host plant (Jakobsen 1999). The contribution of vesicular-arbuscular fungi to the assimilation of nutrients is the absorption of nutrients (especially phosphorus) from the soil, with the help of extraradicular hyphae - especially from those parts of the soil to which the plant did not have access. The hyphae of the fungus act similarly to the absorbent hairs on the root of the plant; After comparing the diameter of the absorbent hairs (5-20 µm) with that of the mushroom hyphae (3-7 µm), the absorbent hairs would gain the cause, but comparing the length and density of the mushroom hyphae with that of the absorbent hairs - the fungus would be , because it exceeds the possibilities of expansion of the plant by 10 to 100 times more

RESULTS AND DISCUSSIONS
The benefits of biotechnological applications of mycorrhizal products in intensive agriculture include:

Nitrogen fixation: Mycorrhizae, including Glomus intradiceps, can be used to fix nitrogen from the air and provide it to plants, thus increasing productivity and crop quality.

Increasing plants' resistance to stress: Mycorrhiza-based products can help increase plants' resistance to stress caused by factors such as drought, cold, overload, etc.

Improving soil quality: Mycorrhizae can contribute to improving soil quality by stimulating root development, nitrogen fixation, production of enzymes and hormones, etc.

Reducing the use of chemical fertilizers: The use of products based on mycorrhizae can reduce the need for chemical fertilizers, which can reduce the negative impact on the environment and human health.

The fungi of the genus Glomus, including Glomus intradiceps, form mutualistic symbioses with plant roots by means of mycorrhizal hyphae, which penetrate the roots and extend through them. In this process, fungi use enzymes to fix nitrogen from the air in the form of ammonia (NH_3) and nitrites (NO_2^-), which are then converted into organic compounds, such as nitrates (NO_3^-), used by plants as sources of nitrogen. In this way, Glomus intradiceps mushrooms provide plants with the nitrogen necessary for growth and development, in exchange for carbohydrates and other nutrients provided by plants. This symbiosis is beneficial for both plants and fungi, which are protected by the growth and development of plant roots and by access to sources of energy and nutrients. It is important to mention that the process of nitrogen fixation is dependent on many factors, including soil pH, the availability of other essential nutrients, such as phosphorus and potassium, and climatic conditions. Therefore, it is important to monitor these factors and control them adequately to ensure an efficient symbiosis between Glomus intradiceps and host plants

CONCLUSIONS
The following is a simplified example of the nitrogen cycle in nature: Nitrogen in the air is fixed by fungi and cyanobacteria, transforming it into nitrogen compounds such as nitrates and ammonia. Plants absorb these nitrogen compounds from the soil and use them to build proteins and other substances necessary for growth. Animals eat plants and accumulate proteins and other nitrogenous substances in their bodies. When animals defecate or die, organic residues with nitrogen are released into the soil. Fungi in the soil break down organic residues and release nitrogen in the form of ammonia, which can be fixed again and used by plants. The process continues, allowing the transfer of nitrogen between different components of the ecosystem. It is important to mention that this natural circuit can be disturbed by human activities, such as the excessive use of synthetic fertilizers or soil pollution. This can have negative effects on the health of ecosystems and on agricultural productivity

Nitrogen-fixing fungi are species of fungi that have the ability to bind nitrogen from the air and transform it into nitrogen compounds usable by plants. They associate with the roots of some plants, forming beneficial mutual symbioses. Fungi receive organic substances from plants and give them nitrogen in the form of nitrogen compounds. Nitrogen-fixing fungi are important for agricultural productivity and ecosystem health. For example, in nitrogen-poor soils, they can be used to provide plants with additional nitrogen, reducing the need for artificial fertilization. There are several species of fungi

The general conclusion of the research is to identify the intake of nutrients brought by mycorrhiza for wheat cultivation. The mycorrhizal relationship leads to the solubilization of minerals, the production of plant growth stimulants and the control of pathogens. The cumulative benefit brought to the plant leads to a high production by substituting chemical fertilizers

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