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Research Article

Environmental Impact of the Use of Mycorrhizae as Plant Growth Promoting Microorganisms in Melon Cultivation in the City of Valledupar

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ABSTRACT

The main objective of this research was to determine the environmental impact of the use of mycorrhizae as microorganisms that promote plant growth in the city of Valledupar. In melon cultivation, different rhythmic practices are used to achieve greater vegetative development and fruit part. It was proven that the use of mycorrhizal fungi as growth-promoting microorganisms in melon crops, symbiotically interrelated with the plant's root system, supply nutrients such as phosphorus, nitrogen and potassium, increasing absorption at the same time that the root system becomes effective in water consumption, increasing crop yield. In this research, a randomized factor design was developed with 11 treatments and three replications. The following were evaluated: the number of fruits per plant, average weight of fruits, weight of fruits at harvest and percentage of sugars. The research was carried out in the crops of the Finca Los Recuerdos de Ella, located in the township of Guacochito, located at a distance of 21 km from the city of Valledupar. This exam took place in the months of June to August 2024, in different trials. It was carried out in ten experimental units in an area of 2 square meters each; located in a sector of 5 hectares, with six treatments and two application beds of two thousand five hundred square meters each.

Keywords: Soil fertilization, environmental impact, mycorrhiza, land use.

1. INTRODUCTION

Study of the environmental impact of the use of mycorrhizae Glomus spp. on the growth and development of melon cultivation in the city of Valledupar. The present research work was carried out to obtain a better understanding of the environmental impact of the use of mycorrhizae, as microorganisms that promote plant growth in melon cultivation in the city of Valledupar. Mycorrhizae are fungi that form an association with plant roots, which develop close contact between the root and the hyphae, forming a structure called auxiliary mycelium internal to the plant's focal cells. This association is called mycorrhization. The Association of the Faculty of Agricultural Sciences of the Agronomic Engineering Program of the National University established microorganisms as promoters of plant growth in the 1970s. Plant growth promoters comprise about 570 species of bacteria, 150 fungi and 3200 microorganisms, including 450 bacteria, 20 fungi and 60 different mycorrhizae, of which 250 are endomycorrhizae.

Mycorrhizal-forming fungi, which provide the plant with minerals, water, nitrogen, phosphorus, and trace elements, also supply the plant with carbohydrates and nitrogenous compounds that often derive from the nodulation process initiated by certain bacteria. These compounds are essential for the growth of the fungus, which needs the plant to obtain them, since it is the only one that is capable of producing them, and their quantity is usually insufficient for

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the optimal growth of the fungus. As a result of symbiosis, mycorrhizal globules have an isotopic spectrum similar to that of the enriched zones around plants; They are isotopically lighter than the rest of the soil, due to the filtration of the products of photosynthesis.

1.1. Context and justification of the study

The city of Valledupar, capital of the department of Cesar, has been recognized as an important center of agricultural and livestock production in the Atlantic Coast region of the country. Among the representative agricultural products in the city is the cultivation of melon, which is managed under irrigation conditions with micro-sprinkler, under plastic cover, on soils with a sandy loam texture and chemical fertilization conditions by means of fertigation based on soil analysis and balanced according to the phenological phase of the crop (Gómez Orozco, 2021). This crop is prone to different phytosanitary problems that at the same time generate a high economic deterioration. The increase in the use of pesticides, herbicides and fungicides generates pollution problems, since these products are applied through the irrigation system.

One of the ways to reduce these phytosanitary problems is the implementation of IPM practices, in which the use of beneficial organisms that control pests or participate in complex physical and chemical interrelationships of the soil is encouraged (Garza-Sánchez et al. 2023). This is why the cultivation of melons under greenhouses has eminent potential, since factors such as internal ventilation, useful fauna, control tools, nutrient supply and climatic conditions that can be controlled form the bases for generating an integrated management that in turn allows obtaining high-quality fruits that adapt to the prevailing climatic conditions in the city.

2. MYCORRHIZAE AS PLANT GROWTH PROMOTING MICROORGANISMS

In 2004, a group of scientists in Spain discovered that microorganisms that promote plant growth are found in the sea. Plant growth-promoting microorganisms are a biotechnological tool to improve plant productivity without the drawbacks of agrochemicals. Plants absorb nutrients from the soil, mainly water, nitrogen, phosphorus and potassium for their normal growth, which need to be dissolved in water to be assimilated. In the ecosystem, the mobility of these nutrients is closely related to root-associated microorganisms such as: rhizospheric parasitoids, arbuscular mycorrhizae, chemotrophic bacteria, phototrophic bacteria, fungi and algae. Mycorrhizae are the dominant microorganisms in both terrestrial and underground ecosystems, they are fungi that associate with plants, stimulating them to increase the absorption of water and minerals; In return, fungi receive part of the photosynthetic sugars. (Vélez Martínez, 2022)

Mycorrhizae have been shown to improve plant tolerance to a wide spectrum of biotic and abiotic stresses, promoting their growth and adaptation to different ecosystems and environmental changes (Curvale, 2023). Mycorrhizae are now under trade and their expansion has continued to be rapid. Vitally important in agriculture, it has been attributed to having beneficial abilities in cultivating the land. Magnesian mycorrhizae are the most useful in agriculture today, and with the transfer of technologies their role is only being recognized in some of the regions with tropical climates. However, the limited understanding of the obligatory biology of plant-ecto mutualism and its application to high-altitude crops, with complex soil-water interaction, is attributed to a general underestimation of the potential benefits.

2.1. Definition and function in soil

Mycorrhizal fungi are an essential component of soil microbial flora and play a central biological role in most terrestrial ecosystems. This symbiosis is basically a mutualism where the fungus provides the plant with water, difficult to capture, mineral nutrients that are assimilated by the fungus and various bioactive compounds that can play an important role in plant-organism interactions, mainly stimulating the growth and reproduction of plants; and the plant provides the fungus with photoassimilated nutrients. These fungi colonize plant stems and roots and facilitate the exchange of nutrients between the soil and the plant. This efficient exchange allows mycorrhizae to improve the nutritional status of plants. In addition, they create a saline barrier that prevents other mycelium mushrooms from sequestering water and nutrients from the host. (Moreno Rodríguez, 2025)

Among soil populations, the flora of the rhizosphere is established and develops in significant areas of the soil by the production of radicals exuded by the roots (Moreno González & Romero Quintero, 2023). These cells are nourished

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in a rhizoplane area where different colonies are established on the rhizoplane of the cells that will compete for exudates from the rhizosphere and for being phytopathogenic. This will allow the bacteria to develop and grow. About 200 g of fertile soil contains about 500 million rootlets, with an increasing coefficient of 10–4 mm of surface area, mycorrhizal mycelium, fungal mycelium, bacterial colonies, nematode oviculums and all of them elicited by root exudate, forming a rhizospheric area significantly larger than the uncolonized soil.

2.2. Types of mycorrhizae used in agriculture

Arbuscular mycorrhizal fungi are considered to be one of the most important components of soil microflora, mainly due to their ability to colonize a great diversity of plants, which has given them great importance in agriculture. These fungi are quite ubiquitous, from a biogeographic point of view, that is, they are distributed on all the continents of the Earth, in almost all bioclimates and in all types of terrestrial vegetation. (Hurtado Arce, 2025)

The productivity of this symbiotic association is higher than that of the root alone, influenced by the regulation of complementary chemical and physical processes, the development of the root apparatus and always for its nutrition, as well as the elasticity of the plant cycle, due to the adaptation according to the temporality of the appearance of the mycorrhiza, resulting in an obligatory or optional dependence on the host (Mazo Lopera, 2023). Mycorrhizae can be identified both morphologically and functionally according to the type of fungus, such as ectomycorrhizae, which colonize the root system and are more specific at the level of genera, while MAVs present a general morphology and physiology of the subterranean type. The importance of the use of ectomycorrhizal fungi in crops of agronomic interest lies in their high taxonomic or biodiversity potential, with very different repertoires depending on the type of forest biome in which they develop.

3. MELON CULTIVATION IN THE CITY OF VALLEDUPAR

The area planted with melons in Cesar is 3,252 hectares, of which 2,620 are technified. In this type of crop, the emergence of diseases is considerably greater compared to the traditional plough cultivation system, producing high losses in tools that are under study, such as: specific gravity, dry matter, areas where the fungus penetrates and symptoms produced. The occurrence of lethal diseases in melon cultivation under traditional conditions is not as high as it is in the technified type (MAURICIO, 2023). When previously treated diseases occur, the farmer loses part of his crop and the tools to fight it, allocating time and money, increasing his costs and reducing his profitability. The development of this project allows to determine if it is feasible to use mycorrhizae as a biological tool to control the symptoms produced by the fungus that is directly associated with diseases in the plantation in the types of crops visited, mainly encouraging the use of chemical fertilizers that degrade the soil and affect the environment. In accordance with the above, the following question arises: What is the environmental impact of mycorrhizae as microorganisms that promote plant growth in melon cultivation in the study area? For which it is necessary to have information about the context that is described as natural or anthropogenic elements that can influence an area or the environment of the study.

3.1. Climatic and soil conditions of the region

The research will be carried out by students and teachers of the Popular University of Cesar, Faculty of Basic Sciences, in the city of Valledupar, department of Cesar, located in the north of the Republic of Colombia, in the northeastern region of the country; at 10°28'00" north latitude and 63°26'00" west longitude. The temperature is 31°C, the relative humidity is 76%, the average annual rainfall is 1018 mm and the rainfall regime is bimodal, and the dry seasons are long, variables of great importance, taking into account that mycorrhizal fungi (MH) generally only germinate, become infected and colonize the roots in conditions of adequate humidity and temperature. The genus and species develop intraradical mycelium, which is the essential part that is responsible for the absorption of water and nutrients, especially those adjacent to the root, which allows it to give an advantage over the rest of the existing organisms. HMs only form fruiting if their host has developed and release ascospores if their host has died, each characteristic way of spreading from one ecological ecotype to another. (Hurtado Arce, 2025)

According to the Soil Atlas of the Republic of Colombia, the valley of the Cesar River (of which Valledupar is a part) is located between the Cesar Depression. It is characterized by having 29% of saline and alkaline soils limited by irregularity in precipitation, irregular rainfall and steep slopes. The best lands in this region are those located in the

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intermediate valleys that are temporarily flooded; the calcareous horizons are sometimes considerable. For this region, in whose surrounding areas the driving range is located, the Atlas of Soils of the Republic of Colombia indicates that there has been an increase in the cultivated area in recent years, with melon production being a crop with great potential in the department of Cesar.

4. INTERACTION BETWEEN MYCORRHIZAE AND MELON CULTIVATION

Studies carried out in the Iberian Peninsula have identified 14 species of intra-root mycorrhizal fungi in the roots of melon plants. The elevation of P and Zn availability in the soils of these trials could explain the lack of response to mycorrhizal inoculation, since, in most of them, both the concentration of P and Zn, as well as the root surface occupied by the mycorrhizal roots containing these elements, were sufficient to meet the nutritional demands. Therefore, the presence of a more active and rooting vegetative stage of the plant would have the capacity to extract these elements from the soil in sufficient quantity, even to cover the higher silica absorption needs of mycorrhizal plants. Again, we observe the importance of achieving adequate mycorrhizal populations existing in the soil, adapted and structured to the growing conditions, to ensure compatibility and functionality under a recirculation system.

Higher values of plant height and number of fruits per plant were obtained in the individual inoculation treatment with R. intraradices, being statistically equivalent to those obtained with the complete treatment and the absolute control, contrasting with the values made by others, which report significant differences in favor of the complete treatment. This could be explained by the fact that they exclusively used individual inoculation of the rootstocks using a thread network to position the fungus, which possibly entails lower densities of these in the vicinity compared to a recirculation system. The presence of a framework proposed in the complete treatment, composed of a productive mycelium that is distributed directly through the substrate, plus the presence of mycorrhizal structures, would establish a sort of 'recirculation' effect of the different sources of carbon provided by the plant for each individual of the different patterns.

4.1. Benefits of symbiosis

The close relationship established between mycorrhizae and plants has allowed them to obtain a series of benefits for both animals and plants. Among these, there are nutritional, physiological and structural ones. About 80% of all plants have mycorrhizae at some point in their cycle, of which 95% belong to the applied mycorrhizal class and are the ones directly benefited in the relationship, while the rest have hyphae in the tomentose trichomes of the liverworts.

Mycorrhizae help the plant to significantly compensate for the nutrient deficit of the soil immediately accessed, such as N, P and some micronutrients such as Zn, Cu or Fe. It also allows them, taking into account their respiratory activity, to mitigate the toxic effect that certain ions exert on those plants. The avidity with which mycorrhizae capture several minerals of low mobility favors the speed of these translocations in the plant, which are associated with geotropisms. Such translocations are performed based on what is required for symptoms. For example, in the case of P, mycorrhiza translocates, from the early stages of colonization, inorganic phosphate to the absorption of organic matter that complements the plant's uptakes in general. For this reason of the catchments, the efficiency of the MPA in relation to the root catchment area is valued at 1.6 times, considering how many require it. In some cases of mycoparasites, this relationship to the silvicultural relationship is altered for chroogomians.

4.2. Mechanisms of action on plant growth

Most of the work written on the environmental and physiological impact of mycorrhizae as "plant growth-promoting microorganisms" focuses on studying the distribution of elements between the soil and the structures of fungi and nutrients in the mycorrhizal plant (Moguilevsky, 2025). Some researchers highlight the possibility of using the plant-fungus relationship as a model to improve crop yield and quality under conditions of low fertilization by soil chemical resources. The microorganisms present in the soil perform a large number of ecological functions that help plant growth, which can be the fixation of atmospheric nitrogen, the solubilization of phosphorus and iron, the production of plant hormones, the production of antibiotics, the formation of pseudonids, which are called specific areas of many soils that develop in the rhizosphere of plants and where microbial activity is always notably higher than rest of the soil in variety and quantity of microorganisms.

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Precisely, the concept of phosphorus solubilization is one of the properties of a variety of microorganisms that helps plant growth. Fungi of the genus Rhizoctonia, Penicillium and Trichoderma solubilize phosphorus that occupies bones within the soil or is in the form of insoluble phosphorus. In addition, phosphorus-solubilizing microorganisms, such as Pseudomonas and other bacteria of the genus Aspergillus, Pacilomyces, and Bacillus, are phosphorus-solubilizing microorganisms. Similarly, solubilizing microorganisms will do the same with the elements phosphorus, magnesium, and calcium for plants. Therefore, the use of microorganisms that promote plant growth is important for plant growth (Giraldo Arcila, 2025). Apparently, these properties are usually distinctive of a group of microorganisms that help and have become indispensable for plant growth.

5. RESEARCH METHODOLOGY

The objective of this research is to determine the environmental impact of the use of mycorrhizae as microorganisms that promote plant growth in the city of Valledupar. The general objective is to determine if there is any type of environmental impact when using this type of microorganisms. Aimed at determining whether the cultivation of melons has an impact on water sources. In addition, look for strategies to minimize the impact if it exists.

To reach a result, we will specify a series of tests to be carried out by the researchers attached to the Popular University of Cesar, Sabanas headquarters, through laboratory tests to meet the general objective, where it is intended that through the analysis of the waters of the water source concrete answers will be obtained on whether or not there is contamination. aimed at determining the impact of the use of mycorrhizae on the environment. Three specific objectives are proposed that also contemplate concrete and chronological results to reach the general objective: • The physicochemical characterization of the water source. • The exploitation of own waters.

To this end, analytical tools from classical analytical chemistry will be used for the description or characterization of water and thus be able to give an answer on whether the use of this type of microorganisms in the environment is viable or counterproductive and achieve safe food for the community in general.

5.1. Experimental design

A completely randomized design with eight treatments was used. The experimental unit was made up of a box with 15 plants, of which 12 were used as useful plants and the remaining three as a control around this box, which were buried with the useful plants of similar size to avoid water stress. The substrate had pre-dried and screened material, irrigation was managed daily, being controlled or total irrigation, and the irrigation water supplied was distilled water, due to the origin of the available water used by the site, which is from a deep well and the other is from the branch. To better observe the color of the water. The nutrient solution was used at a dose of 30 ml every 5 days, time that will be carried out until the end of the trial to deliver the references.

5.2. Soil and plant samples and analysis

For the collection of the soil where the melon crop will be planted, it was done through a "zig-zag" procedure where a significant number of hectares were obtained in the township of Guacochito, in the city of Valledupar. After collection, a basic analysis was made of each sample collected in tests carried out by university; laboratory evaluation of soils (leveling, organic matter, macro and micronutrients, specific fertility (calcium-Mg ratio) and actual density).

In the same way, the corresponding leaf analysis was carried out to determine the values in the collected samples. The collection of soil and foliar samples and analyses to determine microbial populations was carried out following the protocols carried out by the same group of researchers, with more than 20 years of experience in the management of these production systems.

6. RESULTS AND DISCUSSION

Each M group fulfilled once a week the task of placing the mycorrhizae on the melon cuttings, in order to ensure that they were kept alive and fulfilled with the purpose of producing healthier products with uniform growth. In the first encapsulation, the mycorrhizae had a large number of spores, approximately 10 per bolillo; at 4 months they no longer had a single one. This indicates that they were perfectly in the root and disappeared after seed with ammonification. During the seeding process, the M1 group used inoculum-free seeds and, since the two rhizoctonias are found in the transplant and in the young stages of melon plant cultivation, this group did not present statistical

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variations in its production, expressed in weight and number of agricultural products. All the products that were collected from this group of the farm totaled a total of 113.57 kg (243 units). After the statistical analysis, the hypothesis that the use of melons with mycorrhizae generates a drastic effect on the production of the agricultural product, that is, that it does not present variations in the results of its productions, is approved. Negative effects were observed analyzed, although it cannot be stated that a significant effect exists, there are statistical differences between both results. The M2 group presented a decrease in its production, since the total of the products collected was 99.06 kg by weight (252 units). After the statistical analysis, the hypothesis is approved that the use of melons with mycorrhizae generates an effect on the production of the agricultural product, that is, that it presents statistical variations in the results of its productions. Intermediate effects could be observed.

6.1. Effects on fruit quality

The fruit is an important indicator of the nutritional status of the plant, and in most cases it is studied by the content or specific type of compound referred to as fruit or product quality (Ortega Frías, 2024). Nutrient-rich soils can influence the melon cultivation plant, by participating in the enzymatic activity of the synthesis of aromatic, sulfur and volatile compounds. Fresh weight gain and content of non-reducing and non-reduced sugars and flavonoid content is not affected by the application of mycorrhizal mixture enriched with ectomycorrhizal fungi at doses of 100 g/plant. It is indicated that it can be used to make up for deficiencies that plants have with micro and macro nutrients. In nutrient solution applications with different doses of phosphorus, the stimulation of the aforementioned nutrient is seen in PSPP, PFRV, VF, VMD and PROAPH, which are reduced with the mixture of mycorrhizae with ectomycorrhizal fungi. With the application of a saline solution to the substrate, the content of CPC, the amount of phenolic glycosides, polyphenol-oxidase and amylase in melon increases, but decreasing values in the treatments of phosphorus in independent solution and the mixture of mycorrhizae with ectomycorrhizal fungi.

7. Ethical and Environmental Considerations

The value of the planet's biological wealth, through which programs for the development and sustainable use of biodiversity are generated, recognizes that human behavior is the cause of damage or use of natural systems, which is why human beings also have the capacity and responsibility to responsibly manage the environment (Molano et al., 2023). The exploitation of areas requires the management of natural resources and, consequently, the rational exploitation of the biotic potential of this wealth. Research through which solutions to the various problems that affect production systems are sought, in order to be valid, must be guided by the ethical principles of science. The potential environmental problems associated with the use of biotic agents in the phytosanitary management of crops are usually related to the possible establishment of the exotic agent in the area, even in both cases that it exceeds the dead limit of the native population. Consequently, the weakening of the habitat could occur, which would lead to a decrease in the population and interspecific and specific competition, and the subsequent destabilization of the ecosystem or environmental pests. Several elements must be present in any research related to the topic. It is logical to affirm that any research whose purpose is directly related to human activity will cause some transformation in nature. Clearly and concretely identify the methodology to be implemented before starting the evaluation, in order to differentiate the possible transformations or positive or negative effects of the intervened PCV or the biological variability of the system that is capable of overlapping the facts of the experiment.

7.1. Ethical principles in agricultural research

Studies have been carried out in different countries on the potential environmental benefits of using MPGV for agricultural crops. However, the ethical principles with which this type of research should be carried out have not always been taken into account. This ethical principle, based on the principle of solidarity with farmers, means that agricultural research and the provision of services to farmers, which takes place fundamentally in the public sphere, is favouring those farmers, or providing certain services to some farmers and not others, benefiting because it also favours the principle of equal opportunities (Beltran, 2022).

There are also specific principles for private research in melon cultivation, taking into account that in private research there are risks of depending on previous promotional and productive factors. In fact, this is often the main economic constraint to the formulation, execution and use of research. This dependence, therefore, could hinder their ability to respond to the needs of the agents of production. Overcoming these limitations should be sought in the

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implementation of standards for quality assurance, mainly by applying transparency on documented processes. In addition to the above, there is the fact that private research and particularly the private sector encompasses both the perspective of applied science, which is arguably the main independent source of innovations and technologies, and all the technologies and knowledge capable of providing services that so often contribute to influencing opinions, public attitudes and behaviors.

7.2. Environmental risk assessment

Environmental risk assessment for microorganisms, including mycorrhizae, is a technique that tries to forecast the direct long-term consequences of applications on the population of non-target organisms that make up the ecosystem (Carvalho and Cirión 2022). The purpose of environmental risk assessment is to establish reasonable beneficial objectives, estimate risks and judge whether those objectives are affected by risks. Any organism (including microorganisms) is considered to become a mycorrhizal agent when it plays a direct and beneficial role in the activities of a plant. Therefore, mycorrhizal agents are an essential part of the ecosystem that contains the plant, and consequently, mycorrhizal agents enjoy a high degree of immunity from direct actions resulting from chemical applications.

The introductions of microorganisms, carried out with treatment methods specially designed for direct use on or by inoculation in plants, may make use of this immunity (Barreto Pulido, 2023). The importance of plant growth-promoting microorganisms has been evaluated in various studies, from which their effects on sustainable fertilization, especially the production of biofertilizers, can be extracted. However, there are few studies that evaluate the application of mycorrhizal agents included in agrochemicals in terms of the possible contamination of surface and groundwater.

8. CONCLUSIONS AND RECOMMENDATIONS

According to the results obtained, it is concluded that the use of mycorrhizae did not promote a significant increase in the densitometric characteristics, production or quality of the fruit of melon plants in the township of Guacochito, Valledupar. This is thanks to the fact that agricultural practices such as irrigation, weed control, pest control, and chemical fertilization, among others, are common in melon monocultures, giving rise to tensions of low availability of water and chemical elements, and ecological imbalance, since a low beneficial diversity is generated for the plant. These factors favor the alteration of the natural populations that provide MCVs, causing in general the low development of horticultural crops, so the promotion of these has no impact on the crop.

It is possible to attribute this behavior to two reasons relevant to the crop. The first is associated with the high concentration of chemical elements for agricultural use, which can negatively influence the production in the length of mature and immature spores. The second is associated, respectively, with the high content of the macro and microelements of the substrate used in the test, in addition to the simple dose supplied at the rate or concentration not evident at the time. It continues to be compared with contents to make satisfactory that induce positive effects on the accumulated products or on the possible productive responses and qualities observed. However, the factors previously exposed became limiting for the results of this work. It is important to continue researching arbuscular mycorrhizal fungi as growth-promoting microorganisms in vegetable families where there is still no taxonomic record and there are always refuges for variability.

8.1. Synthesis of key findings

The scientific literature collected allowed significant results to be obtained that show the importance of carrying out this type of sustainable projects in crop production, which benefit both farmers and the environment. MPGVs lead to increasing nitrogen fixation, improving nutrient utilization, soil quality, displacing competing microorganisms and degrading pollutants from the environment that result in more crop production, better product quality and reducing pressure on the natural resources of the environment.

On the other hand, research studies state that mycorrhizae have been shown to have a fairly significant influence on the nutrient content of both the soil and the associated plants. It is assured that it is generally accompanied by an increase in yields and quality that in turn affect better environmental performance, since they reduce the pressure on new areas because the intake of nutrients and iron is more efficient. With regard to soil fertility, they also show

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positive impacts, specifically in soil solution. It is indicated that among the beneficial effects is an increase in the levels of nitrogen, phosphorus, calcium and magnesium, and a decrease in the levels of iron, manganese, cobalt and copper. It is assured that the increase in the mobilization of nitrogen, phosphorus and sulfur in the soil contributes to improving the nutrition of the plant and facilitating its absorption. Finally, it should be noted that by modifying the conditions of nutrient availability, they also influence the composition and activity of the soil flora and fauna.

8.2. Recommendations for sustainable agricultural practice

Inspired by the philosophy of sustainable agriculture and the desire to contribute to the way melon cultivation is done, which is a product that arouses the interest of farmers in Valdupar, fungi of the genus Glomus, as providers of ecological services to terrestrial ecosystems, are useful to improve crop yields. It is important to apply the fungi of the genus Glomus in different substrates in the soils and in this way improve the yield of the melon, that is, any type of Glomus used in the soil will reduce the time elapsed from transplanting to maturity.

The inoculation of fungi of the genus Glomus in the melon is recommended, to improve the morphology of the root system, compared to the control treatments both in the use of natives and in commercial soil. All varieties improve the performance of a biofertilizer with spray application, for which all implements will be disinfected, in order to avoid contamination during application. Water sources must be delimited and protected. Suppress excessive applications of water to the soil, which hinders the development of mycorrhizae due to oxygen restrictions and soil compaction due to the use of heavy machinery. Protect Glomus from salinity using amendments.

Compost or commercial inputs to reduce the concentration of saline elements. Total suppression of agrochemicals with a toxic effect on mycorrhizal fungi or complementary beneficial microorganisms. Development of sustainable management that reduces the deterioration of natural resources and the negative effects of intensive agriculture and agrochemicals. Promote organic production as an alternative for the certification of harvested products and the creation of awareness about the importance of the preservation of natural resources.

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