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# Use of Mycorrhiza as Environmental Social Responsibility: The Case of Melon Cultivation and Marketing in Valledupar

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***Abstract***

*In this study, the effect of mycorrhiza in a commercial melon crop in the township of Guacoche, Valledupar, Cesar, was evaluated within the framework of the environmental social responsibility work of the Popular University of Cesar. A plot design divided into random blocks was used, where the first factor was the dose of mycorrhiza (0, 5, 10, 20 and 40 g/10 kg of soil), and five mycorrhizal plots and four controls were established, in addition to five replications. The second factor was the crop sampling cycle (10, 20 and 30 days, plus 10 days after harvest). For the collection of the variable number of leaves, two plants were taken at random from each subsample, classified into two types according to their morphology, each representing a cycle of melon crops; Two subsamples containing 100 g of soil with strictly measured diatized water were used to analyze six elements.*

***Keywords:*** *Social Responsibility, Environment, Mycorrhiza, Responsible Industrialization Processes, Melon Crops.*

## Introduction

Currently, one of the most worrying issues for human beings is the degradation of natural resources in different environments. Proof of this is the phenomenon of climate change, which is characterized by an increase in the temperature of the planet, as well as a decrease in the quality and quantity of soils. (Trujillo Salamanca, 2024) These alterations generate heat waves, droughts and floods that affect crop production. For their part, human activities have accelerated the degradation of soils by changing their physical, chemical and biological characteristics, resulting in the loss of biodiversity, increased erosion, decreased fertility and, consequently, a decrease in the supply of food. This problem lies, above all, in the intensive use of agrochemical inputs that, in addition to their polluting effect, generate economic dependence on the system; which indirectly promotes the spread of pests and diseases.

Agriculture, as a fundamental economic activity, increasingly requires the use of technologies that address current biological and environmental problems. For this reason, fruit crops such as melons have characteristics that ensure the profitability of producers and contribute to mitigating the negative effects that climate change and human action on the soil can have. Thus, consumers

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prefer products that contain fewer pesticide residues, which favors the use of a sustainable production system such as melon cultivation. However, despite the fact that biochemistry, biology and microbiology have promoted the use of mycorrhizae or mycorrhizal fungi that allow the crop to absorb water, nutrients and thus cope with drought and water stress, they are far from being used due, among other reasons, to ignorance and economic interests (Cabrera-Montealegre, 2021).

**Context of Melon Cultivation in Valledupar**

Melon is one of the most consumed fruits worldwide. The genus cucumis, which includes the species C. melo, is mainly distributed in Africa, Asia and Europe. From 2017 onwards, there has been a continuous increase in its production and average yield. Greece is the main producer of melons worldwide, followed by Turkey, China, Spain, Italy and Brazil, among others, who together generated 33,941,872 tons in 2017 (from the Moral Barrera). In Latin America, melon production was 309,535 tons in 2018. In Colombia, for 2019, 7,032 tons were produced with an average yield of 14.2 tons per hectare, 22.65%, although in commercial conditions yields of up to 35 tons per hectare have been reported.

The cultivation of melons in the department of Cesar was limited, however, since the year 2000 this crop has begun to boom as a productive alternative in the Oil Palm Production System, currently being one of the flagship products of Cesar. In 2019, Cesar ranked first in the planted area (880 ha) and melon production (26,279 t) in the country, and Valledupar represents 70% of the department's production. When looking at a map of melon production in Colombia, it tells us that Cesar has as a preferential zone the township of Badillo, the largest producer in the country. However, the average yield of Valledupar, 22.3 tons per hectare, is lower than that reported in the region for the same time of 34 tons per hectare in the township of Jaboque Centro and that achieved in other areas that have a letter of endorsement, motivation for the proposal of different experiences: integrating the use of mycorrhiza in the production of melon cultivation.

**Importance of Mycorrhiza**

Mycorrhizal fungi are allochthonous organisms of soils, symbionts that have the ability to associate in symbiosis with most living plants on the planet, with the aim of absorbing water and nutrients; that is, they have the ability to cultivate their host in a substrate specific to them, improving the growth of their plants through a symbiotic relationship (Crespo-Flores et al.2022). Mycorrhizae are groups of fungi and plants associated in a process of mutualism. For plants, they represent access to essential nutrients, such as nitrogen, phosphorus, sulfur, and heteroatoms, such as the trace element. For fungi, they represent the carbon bonds provided by plant roots.

The overall formation of mycorrhizae occurs according to the species of the fungus that forms it, the base species of the fungus and the associated plant. There are two general types of mycorrhizae: ecto-mycorrhizae and endo-mycorrhizae. Ecto-mycorrhizae are formed by fungi that form a structure in the apical tissue of plant roots and in the soil. The other examples are the clastrids, the ericophthals, etc. Endo-mycorrhizae are the result of a complex process of alteration of plant cells forming structures more complex than ecto-mycorrhiza, such as arbuscules, vesicles, tagtails and bulbs. Its four limbs are called mycorrhiza. The amount of organic matter increased in the soil is the product of the combination of the insulation layer emitted by the root, the release of gold, the secretions exuded from the leaves and other particular decomposition of plants that contribute to the formation of soil organic matter.

**Definition of Mycorrhiza**

Mycorrhiza is a symbiotic relationship that occurs between a plant and a fungus, which provides thousands of benefits to the two organisms, among which are the ease of absorbing water and nutrients, in addition to increasing resistance to phytopathogens; The name mycorrhiza comes from the Greek words "mycos", which means fungus, and "rhiza", which means root. This relationship can occur in different ways: as an external fabric-like structure surrounding the root, as a modification of the root in which the fungus enters plant cells, or as a combination of the two. (Silva & Montoya, 2022).

The first to discover this connection, which occurs thanks to the fungus that covers the roots of plants, were the German researchers Karl Wilhelm von Nägeli and Albert Bernhard Frank in 1859. At the end of the nineteenth century the concept was studied even more thoroughly by Paul E. P. de Vries and by several agronomists who took a special interest in this phenomenon because of its implications in agriculture and medicine. By 1912, Meyer and Herta Schreibers made significant contributions to what researchers considered the "normal" concept of root zone. The fungus-plant relationships of the root zone were known, but these were considered part of a seedling cleared of roots well on the day of the trial. Also in 1928, Thaxter discovered more about the fungus and its relationships with black sapote plants. It became apparent as the research progressed that certain aspects related to the etiological series of mycorrhizae and some other types of arbuscules were much more complex than ever imagined.

**Types of Mycorrhiza**

Over the last few years, there has been a growing interest in the dynamics that govern the interaction between the various actors in educational environments, especially with regard to the comprehensive education of students. In this context, concepts emerge that allow us to break down the complexity of the interpersonal relationships that are woven in the classroom, as well as in extracurricular spaces, where collaboration and teamwork play a fundamental role in the development of socio-emotional competencies. Research in this area has made it possible to categorize interactions into two main axes: cooperation and competition, each of which has distinctive characteristics that influence the academic performance and emotional well-being of young people. In environments where cooperation prevails, a climate of trust and respect is promoted, where students are motivated to share knowledge and experiences, which in turn fosters more meaningful and lasting learning. On the other hand, in contexts marked by competition, a phenomenon is observed that can lead to the polarization of relationships between peers, generating tensions that affect not only the learning process, but also the mental health of students. Thus, it is necessary to implement strategies that strengthen collaboration and, at the same time, recognize the diversity of skills and talents present in each individual, allowing students to find their place in the group without undermining their self-esteem. In this sense, teacher education programs play a crucial role, providing educators with tools that allow them to facilitate and mediate these interactions effectively. Continuous training, in line with national education policies, becomes a fundamental pillar for the creation of inclusive and enriching learning environments. The challenges are numerous, but the implementation of active and participatory methodologies has proven to be a promising way to transform educational experiences into spaces for personal and collective growth, where each student can flourish and reach their full potential, thus contributing to the construction of a more equitable and just society. (Díaz Aguirre, 2021)(Mendieta Frías, 2023) 3.3. Benefits of Mycorrhiza in Agriculture

The use of mycorrhiza benefits the farmer in his agricultural production. It reduces the cost of applying fertilizers, especially phosphorus, calcium and nitrogen, since the fungus captures these nutrients better, favors the growth of plant roots and therefore their photosynthetic load, increasing their productivity, favorability and yields, with a lower production cost. One of the best-known practical cases is the cultivation of different species of plants, carried out in a locality (Ceballos Mercado, 2024). In this experiment, two types of arbuscular mycorrhizal fungi were used, and they were placed in three different doses; evaluating three parameters; photosynthetic activity, yield and cost of production. At the end of the treatment, results were obtained that increased the availability of nutrients. Likewise, photosynthetic activity and production cost improved significantly; the fungus being the one that marked the highest yield and the one that marked the lowest expenditure.

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**Social and Environmental Responsibility**

Corporate social responsibility is a concept that expresses the need for organizations to interact in an ethical and sustainable way with their stakeholders. It is defined as the responsibility of organizations and individuals to do things well in all aspects; The environmental and social aspect will be a complement to ensure that the social right of the new generations to enjoy a healthy world is fulfilled. This suggests that it is the responsibility of organizations to ensure that the decisions made within them ensure a sustainable future for the following stakeholders.

In relation to agricultural companies that produce products such as melons, the social impact of melon production in the region, both in terms of production and water waste derived from bad practices that are increasingly alarming at the national level, such as agri-environmental diseases. Melon production is taking place throughout the Cesar region during the year for different reasons, so it is important to highlight that the social responsibility of agricultural companies that have left the regions that receive the most water is mostly provided by rainfall, so the growth of melon production will be negative for the amount of water contained in the soil. Bad practices in fumigation and the high employment of labor, especially for field work, can produce a high social and environmental cost. In conclusion, the present study is expected to serve for multiple health authorities as a summary or a point of the current problem and a possible trial or action related to the water quality of the region.

**Concept of Social Responsibility**

In general terms, Social Responsibility refers to the obligations that public bodies, companies

and human beings have in the context of their interaction with members of society, communities, interest groups and the environment, within minimum standards, including legal ones, due to the impacts generated by their activity. For the promotion of Social Responsibility among real estate organizations and individuals, it is recommended to apply the Model based on Local Social Responsibility Commitments, which incorporates the harmonization approach between the Sustainable Development Goals established to join efforts in sustainable social and economic development by 2030. (Escobar, 2021)

**Sustainable Practices in Agriculture**

The continuous use of chemicals that allow a more efficient management of inputs for production in general has generated several problems, such as the persistent deterioration of the health of ecosystems and man. As a result, environmental sustainability has been eroded. Sustainable agriculture seeks to respond to current demands that sustain human well-being, but that are mobilized towards the sustainable development goals. This has a positive social impact without detriment to the environment. This approach involves reducing dependence on external inputs that have proven to be harmful, such as agrochemicals. (Argumedo Escobar, 2024)

Sustainable agriculture offers viable alternatives for sustained food production. In Latin America, where there is evidence of an abuse of inputs for agricultural production, sustainable production care is implemented by small producers who cannot access inputs. Inputs are quite expensive, therefore, if you want to supply the market with high quality products, fertilizers and/or chemicals are used to control weeds. As the few resources that exist to access production disappear, the production of cycles or processes is sought to extend the useful life of production systems to the maximum, that is, the fertility or natural wealth that each productive area has.

To maintain the sustained growth of plants after harvesting, mycorrhiza can be provided that heals, restores and maintains constant growth, generating a fertigation response, with as little as possible of low-quality inputs. In general, research has shown that all plants that are consumed are insufficient in water stress, do not assimilate nitrogen well and often apply phytosanitary products when the plant is damaged and has already stopped growing. In this sense, the right input could consider the demand of a plant that is growing, while the average another according to the purpose of increasing production. (Guerrero Mejía, 2023)

**Environmental Impact of Crops**

In the contemporary world, questions arise from both consumer sectors, control bodies and international sectors, about the system of production and marketing of certain products, mainly agricultural. In this sense, it is definitive that the contemporary model of production continues to be the main cause of environmental, social and economic problems. In addition, the advance of new technologies, as well as changes in consumption habits and demographic growth have also seriously influenced the environment and have generated an imbalance, since it is produced, distributed and consumed without environmental responsibility for natural resources. However, it is important to mention that conventional agriculture is fundamental to the economy of many countries, but it is at the bottom of the environmental crisis that planet earth is currently presenting. (Diego et al.2024)

We can mention below the case of melon cultivation in the Upar Valley, in the department of Cesar, Colombia. Short-term participation in fruit trees is carried out. The entire slaughterhouse is supported by the fluid of the groove, since once the slaughterhouse impacted from the surface

encounters the acid suffrage; therefore, the system has not had enough balance to cover the uncompensable relationship in the capacity of the soil; a relationship that has been violated with the deterioration of the quality of the root and in the part of the root system; it is appropriate to carry out practices of reincorporation of coatings. Finally, the efficient generation of plains such as the scarce axis. As required by the basic environmental program of the plant, there are several important issues such as: the construction of good drainage; repairing that approximately 20% of the area presents problems.

## Research Methodology

In accordance with the objective of formulating the methodology, the approach, design, collection and analysis of data that will be presented below were taken into account as follows: This is a descriptive and explanatory field research on the use of fungi in melon cultivation in Valledupar-César in the village belonging to the municipality of Valledupar - Cesar according to the theoretical framework, two aspects that identify it: the first is the use given to the MMF within the crop that has been socialized, the importance, knowledge with the audiences that intervene in this process; the importance of teaching within the productive activity that the farmer-grower does, the constant teaching that exists within the sector that facilitates interaction, observing and filling out forms during the different visits.

Data collection was carried out under the guidelines. The survey is an in-depth interview where the interaction and information of the MMF is sought by the most important plant products company that has shown itself to be extremely interested in teaching both in the use of its inputs and in the quality and cleanliness achieved in the crops of vegetable products in its different farms. In the analysis of the results, the population has been used as a basis to obtain descriptive statistics that share the facts of the flora. At the beginning of the harvest, a schedule has been designed on the availability of the flow of economic units in Valledupar, indicating in the audit a cost per arrival at the field or per harvest.

### Study Design

For the development of this work, qualitative methodology was used with a phenomenological approach, case study type and an analysis of the empirical evidence obtained from the semi-structured interview technique, documentary review and content analysis. The field study design involved all the actors of the production cycle previously reported for at least one year of work, where the veracity of the information was articulated with the Annual Action Plan for the Conservation of Biodiversity and the research by basins, which are mentioned in section M. Products obtained from the surveys. In a second phase, periodic visits were carried out where a total of 608 man-hours were obtained with students and professionals of Microbiology, environmental engineering, natural sciences and bioprocesses that supported the collection of verified information incorporated in this document.

Once the information was collected, at least one month later the empirical evidence generated was analyzed, the findings were discussed with the actors involved, their opinions and suggestions were taken into account, where through workshops such as the technique of "brainstorming" where the environmental, social, economic and productive problems of the aforementioned use were obtained. The collection and review of the available material related to companies permeable to the biotic relationship for the resolution of the problems corresponded to a report that was not available in the country due to the lack of validation scenarios that would

account for how the biotic interaction solves the problems.

## Results of the Study

The development of this study aimed to evaluate the effects of the application of mycorrhiza on the biometric, morphological, physiological parameters and yield of melon crops compared to traditional cultivation methods, and to evaluate the perception of farmers about the application of bioinputs present in the market. To meet the proposed objectives, melon planting areas of 2500 m2 each were enabled. In 2024, two areas were used to evaluate three treatments that will later be described, the place was the delimited lot of the farm owned by the farmer in the township of Guacoche de Valledupar Cesar, in which a variety of large yellow melon was planted in weeks 4 and 5 in a scheme of two harvests.

Three treatments were evaluated. T1 (control), which consisted simply of the fresh sowing of the melon crop without prior application of any type of fertilizer or special management, only sowing and irrigation; T2, which consisted of the application of a mycorrhiza and biostimulant and inoculation of before transplanting the crop (10 days), then a transplant was carried out in the form of a ramp per step of 15×15 cm in dihedral and equal spacing between rows, a monthly application was made in turn in the environment of the plant and a soil to maintain a constant ideal humidity, additionally, two harvests would be passed every month to see the effectiveness of the occasional application of the input; T3: consisted of the application of fertilizers such as urea, nitrate, superphosphate, diacid, boron, biostimulant and mycorrhiza before planting and in the same way a transplant was carried out in the form of a ramp per step of 15x15 cm in dihedral and equal spacing between rows in the soil that also exists in the crop corridor and that is being evaluated.

### Effects of Mycorrhiza on Melon Cultivation

The results derived from the comparison of treatments with the use of mycorrhiza and controls without mycorrhiza have allowed us to conclude that, throughout the crop cycle, there are significant differences in most of the variables evaluated. (López Briñez, 2021). These results are consistent with those found in trials with high-bedding vegetables, in which the percentage size and maturity of the fruits were higher in the case of crops under mycorrhizal influence. It was observed that plants treated with mycorrhizae showed an upturn in their growth proportional to the relative growth with which the fertilizer was absent in the soil.

The tests on opening the fruits examined four fruits each week to assess any abnormal symptoms in them. They detected symptoms of wilting in September and it was known that four samples died at the end of October. Also noteworthy are the tests carried out in the rapier of an orchard with legumes control, through the use of the index aimed at detecting the composition of the fruits. According to the latest observations that have allowed to measure in a general way the relative effectiveness of mycorrhizal active in the Valledupar area, it is concluded that the fruits to be conventionally polished were inefficiently harvested compared to those that received the microbial treatment. It is noted that a quarter of the continuous application of this biostimulator constituted a positive classical differentiator with respect to the relative acting of the traditional chemolytic of computates.

### Comparison with Traditional Methods

The different techniques of cultivation or conventional agriculture are based on the application

of inputs of chemical origin, with this type of farm management for the control of pests and diseases, for the modification in the dynamics of the soils, which proposes to be a contribution to the agronomic management in fruit crops. vegetables of different species, affecting the availability of nutrients in the soil, this being a constant on the farms of farmers in the region. In the present study, certain variables were evaluated, such as crop growth and production with respect to MIC inoculation and the type of management according to the system applied. Part of the results presented here as the number of leaves per plant, n° shoots, n° fruits, g/ pl. that significant differences were extracted between the inoculation of vermicompo and mycorrhiza, which allows us to indicate that the application of microorganisms, in this case vermicompo and mycorrhiza, would act as organic fertilizer to improve the general growth objectives, production and quality in the proper management of the crop.

With the result presented in this section, it can be mentioned that the crop that was managed for 60 days was under a contribution of a certain amount of inputs of chemical origin, which in this case was herbicide and fungicide applied on 3 occasions in aridity conditions, a reason to invest certain resources in the fight against pests and diseases that is not respected by the orchard farmers of the region. This part of the results was observed under the different treatments of different microorganisms and inoculum that with the present melon culture was inoculated, among which only the beneficial microfauna was applied compared to the control and different inoculum treatments, which only the fertilizer of biochemical origin was applied a couple of times, increasing the physical and chemical properties. as well as for the practice or management of conservation and reduction in water consumption.

### Farmers' Perception

Given that within the crops there is a wide variety of agricultural practices and inputs that can benefit melon cultivation, according to the producer, the use of mycorrhiza is a viable alternative to mitigate drought stress, it has been shown that the use of mycorrhizae increases the plants' search for water, especially in conditions of water stagnation. This benefit is in addition to what was mentioned above about the cost with respect to other inputs such as fertilizer. Likewise, the producer indicates that in the face of what has been shown in other studies regarding the competition for water between mycorrhizae and other sources, most of these inputs are part of the traditional system.

The absence of information about viable alternatives for the cultivation of melons, to implement them as part of their agricultural management; or by the effect of the use of mycorrhiza on the crop, were factors that limited the assessment that producers would subtract from mycorrhizae in a hypothetical case. For conventional crop management, the effects observed on the crop were positively valued due to the greater danger due to pest or disease attacks of the crops that are conventionally managed, a fact that was a direct reason to notice a limitation presented by the use of mycorrhiza by small farmers; the careful handling required by the input; on the part due to the lack of technologies within the national context to manage pests and diseases; little response to this or that method of management that, being expensive, will cause the producer to choose not to buy the input because he knows the result in different strips.

## Discussion

Soil microorganisms are intimately involved in the basic functions of the sustainable agricultural ecosystem. Due to its potential influence on a priority number of functions of the productive

ecosystem, identifying the agents responsible for the impacts is a need to be developed in environmental social responsibility programs. It was estimated that the use of mycorrhiza was responsible for approximately 36.5 % of the explained variability of melon crop yield. Their influence reflects the link they have with a significant number of social and environmental components. Regarding the specific social impact, the use of mycorrhiza implies both the qualitative maximization of crop yield and the adequate compliance assumed by the farmer to guarantee food security, thus constituting a positive indicator of the scope of production.

41.1 % of the explained variability in yield was responsible for the contributions associated with the intensive use of nitrogen fertilizers, while the irrigation use of the crop contributed 12.4 %. Evolutionarily, crop yield represents only one step within the food security stage of sustainable development promoted by public policies. However, when production is maximized from the efficient environment, the availability of natural resources of ecosystems is called into question and, therefore, the sustainability of agriculture over time. Countries with high dependence on the use of fertilizers and/or irrigation constitute the so-called intensive input agriculture as opposed to those that limit their use to extensive intensities.

**Implications of Results**

The results generated in this research expose the effectiveness of microscopic mycorrhiza-forming fungi, as a viable alternative for the Valledupar area, in the sense that the Cesar Valley focuses on the intensive production of the Melon plant, a crop that represents 70% of the agricultural production of the region. and allows access to both national and international markets, but it is a system whose production is affected by unfavorable soil conditions, which in the case of acquiring/using the traditional products that have set the standard in modern agricultural models, would be harmed not only by the increase in production costs by having to increase the purchases of high-cost products for the improvement of certain soil properties, but also due to the lack of management of good agricultural practices that mitigate the negative impact of such practices on the environment and terrestrial ecosystems widely recognized as reserves of savings of non-renewable resources that cannot be extended to future generations. Therefore, the introduction of MAs was seen as a viable alternative that could free the agricultural system of the littoral zone from the production of certain inputs, especially liquid fertilizers.

From the 90's, the economic income from melon cultivation in the suffering sector was regulated by the national consumer, but by international consumption, the quality of such products depends on the nature of agricultural management practices. Another important reason for these pages is the liberation of the melon plant system for the soil of Valledupar from non-renewable chemical inputs not evaluated under the concepts of agricultural management practices. Added to this is the growing sustained consumer taste for food produced under the parameters of agricultural management practices, such as obtaining clean crops, and also due to the little use and attention given in national agricultural tests to such a typical crop. Therefore, we stopped talking about the effects of a technology which has a history in the country.

**Limitations of the Study**

Research on the effect of commercially obtained mycorrhizae was key to making the measured quality parameter comparable between the two treatments. The tests to determine the inoculation status to critical were performed by comparing the fungal status of all commercial treatments and unbeatably in previous cultures. However, it is evident that at the end of the slow promotion of

the producers who dedicated more water to planting showed differences. Additionally, due to the cost of the input, the tests to validate the critical inoculation status were carried out by comparing the fungal status of all commercial treatments and unbeatably in previous cultures.

## Future Lines of Research

One of the lines of research for the management of diseases with mycorrhizae is related to the effect that the enzymes excreted by the hyphae of the fungi could have and their beneficial effect on the management of foliar pathogens and other diseases such as the mite, which wreaks havoc on melon production in Campos. A state of science regarding the effect of fungi that are considered important for the management of parasitic nematodes of soils is evolving, that being of delight these species offer advantages associated with populations of nematodes some destroy nematodes that affect thrust plants.

In the case of endophytic nematodes or direct parasites that interfere with the normal development of plants, the disease is less susceptible and they have been shown to transmit viral diseases more when seed lesions are severe, they made refuge of the crop produced problems and high pressures that determine cultural practices today levels are provided from evaluates the orchard mechanically with heights of 8 nor with bacteria seems of such a measure gram-positive bacteria.

## Conclusion

This work was based on the experience acquired in the development of mycorrhiza in the Environmental Social Responsibility Program through the Educational Institution in Valledupar, César. The objective of the work was to evaluate the effects of the in situ application of the inoculation of the arbuscular fungus in melon, specifically the varieties of the fungus. This work had three phases: September to December 2022, December 2023 - January 2024 and February to March 2024; where the growth of the plants was observed in different periods, the collection of roots was carried out, where it was observed if there was colonization of the fungus in the root; Physical-chemical analysis of water and substrate was performed.

Conclusions: The physical-chemical performance of our planting support systems, despite not being controlled, did not have a major negative impact on melon growth, compared to the traditional system; in addition to the fact that our measurement was carried out at eight weeks. Our conclusions are based only on the brief follow-up of our treatments; however, we can conclude that in the long term there is an absence of an optimal increase of melon due to the colonization of the fungus, in the present case. Since our results are inclined to the positive impact that it has on plants generically: That the fungus, among other things, is a biogenic synthesizer, which gives veracity to our conclusions because its origins are basically organic.

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