

Portugal

Links with research & innovation

Location

Cantanhede

Programming period

2014 – 2020

Priority

P1- Knowledge transfer & innovation

Measure

M16 - Cooperation

Funding

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National/Regional 79 232.11

(EUR)

Private 111 329.30 (EUR)

Project duration

2017 – 2022

Project promoter

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The EIP AGRI Operational Group FitoMicorrizas developed new sustainable cultivation strategies to produce mycorrhizae between native species of highly valued mycorrhizal fungi and plants.

Summary

The FitoMicorrizas EIP Operational Group aimed to increase the added value that can be created by the forestry sector in Portugal. Given the increasing demand for high valued edible mushrooms, the Operational Group worked on new production protocols for improving the propagation efficiency of mycorrhizal fungi that are of significant economic and environmental value. The operational Group analysed the mycorrhizal process on combinations of different plants and fungi to define the optimum concentration of phytoestrogens.



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Project Results

The Operational Group identified the most profitable fungal species in Portuguese forests, which include *Boletus edulis*, *Hydnum repandum*, *Lactarius deliciosus* and *Chantarellus cibarius*.

The Operational Group established optimised methodologies for mycorrhizal plant production between the *Arbutus Unedo* plant, and the truffle *Tuber borchii* and they achieved a mycorrhisation success rates of 20%.

Lessons & Recommendations

- ❑ The use of native species of plants to produce wild edible mushrooms along protection strips and paths, can have multiple environmental benefits in addition to the economic benefits for forest owners. The cultivation of mycorrhizas will lead to healthier forests thus reducing the impacts of forest fires, improving the protection of watercourses and biodiversity; as well as preventing soil erosion and improving forests' capacity for carbon sequestration.

In Portugal (and elsewhere in Europe) there has been an increase in the production of wild mushrooms as the product becomes a significant source of supplementary income. However, the forestry sector has not been able to respond to the increasing demand. Creating new cultivation techniques for native species of edible mushrooms would create added value and deliver environmental benefits in the forestry sector through the development of new products and the sustainable management of forests.

In this context, five partners established an EIP AGRI Operational Group to implement the 'FitoMicorrizas' project. The consortium is led by the 'Voz da Natureza' SME, who have expertise in mycorrhiza production, and includes the partners 'ESAC' and 'GreenClon', who specialise in the micropropagation and mycorrhisation of forest plants.

An increased number of mycorrhizal plants that reach adulthood will lead to a greater quantity of better-quality edible mushrooms.

Objectives

The main aim of this EIP Operational Group is to create new production techniques of wild edible mushrooms. This would allow forest owners and producers to increase their efficiency and achieve higher revenues through the sustainable management of forest systems.

Activities

The FitoMicorrizas project evaluated different mycorrhizae combinations of high valued fungi and plants. It also assessed the optimum levels of phytoestrogens which have a positive impact on establishing mycorrhizae. Phytoestrogens help improve the interaction between plants and fungi and create more favourable conditions for establishing a symbiosis between the two organisms. Examples of phytoestrogens evaluated include the Quercetin and Genistein. Quercetin stimulates the germination of spores and the development of the mycelium, (network of fungal threads developed around the plants' roots). Genistein is used to stimulate chemical substances favourable to the fungus-plant interaction.

The project evaluated the mycorrhizal of plants produced using phytoestrogens and analysed the

viability of the mycorrhizal fungi by monitoring the colonisation rate in the roots. The plants were successfully established in a nursery and kept there to acclimate the mycorrhizal plants that were later to be transferred outside. This methodology was initially applied and evaluated on *Arbutus unedo*, an evergreen shrub or small tree native to the Mediterranean region and western Europe, and the truffle *Tuber Borchii*.

The Operational Group is studying and developing protocols for the mycorrhiza of different combinations of plant species produced. A key output of the Operational Group will be to prepare a guide for the production and management of mycorrhizal forest plants. The guide will be available to all producer groups producing wild edible mushrooms.

Main Results

Further to the analyses of the main native species and their ecosystems; the most profitable fungal species identified are the *Boletus edulis*, *Hydnum repandum*, *Lactarius deliciosus* and *Chantarellus cibarius*.

The Operational Group established optimised methodologies for mycorrhizal plant production between the plant *Arbutus Unedo*, and the truffle *Tuber borchii*. The protocols describe the optimum production conditions and determine the optimal concentration of either quercetin or genistein. Based on the defined protocols, the Operational Group achieved a mycorrhisation success rates of 20% for the combination of *Arbutus Unedo* and the truffle *Tuber borchii*, depending on the host plant clone used.

Key lessons

The use of native species of plants to produce wild edible can have multiple environmental benefits in addition to the economic benefits for forest owners. Mycorrhizas allow plants to use different nutrients. Mycorrhizal fungi are also known for increasing the production and growth of the plants they are associated with, as well as for increasing their tolerance to drought, nutrient availability and mineral toxicity. They also offer protection against other pathogenic fungi. Therefore, cultivation of mycorrhizas will lead to healthier forests thus reducing the impacts of forest fires, improving the protection of watercourses and biodiversity; as well as preventing soil erosion and improving forests' capacity for carbon sequestration.

