Abstract

From the Sea to the Field: The Case Study of the Mycobiota Associated to the Marine Sponge *Haliclona fulva* and Its Interest as Biocontrol Agent Source for Agriculture [†]

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Abstract: Oceans and seas represent a largely unexplored environment, especially at the microorganism level. Among them, marine fungi are particularly interesting since they exhibit a high diversity and an incredible ability to produce new secondary metabolites that may have a biotechnological interest. In the present study, as part of the Interreg Alcotra FINNOVER project (2017–2021), the goal is to isolate and identify fungi associated to the Mediterranean sponge *Haliclona fulva*. The obtained strains were further evaluated for their ability to inhibit plant pathogens thanks to the production of active secondary metabolites. Natural strategies based on microorganisms (strains, compounds) have gained an increasing interest in plant protection. They are promising alternatives to some conventional agrochemicals that are banned due to concerns regarding health and the environment. The isolation of fungi was achieved from three specimens of *H. fulva* collected in the same area of the French Riviera. The homogenized sponges were plated on a seawater medium and on potato dextrose agar. The individual colonies were isolated in pure culture and identified (morphological check and sequencing of genomic markers). Overall, 118 different strains were isolated. The use of two different media guarantees to isolate a higher number of strains, but no significant difference was observed in the species isolated from the two culture conditions. The most abundant genera were *Penicillium*, *Trichoderma* and *Cladosporium*. However, the common core mycobiota of the three sponges was represented by *Parathyridariella dematiacea*, *Rousoella padinae*, *Trichoderma atroviride* and different strains of the genus *Kalmusia*, including new species. Several species isolated from *H. fulva* were exclusive of the marine environment and were never or poorly studied for their biological activity. A selection of these fungi (62 strains) were tested for their ability to inhibit the growth of three important plant pathogens. Preliminary results showed that 34%, 43% and 43% of evaluated strains clearly inhibited *Botrytis cinerea*, *Phytophthora capsici* and *Sclerotinia sclerotiorum*, respectively. In conclusion, the mycobiota of *H. fulva* was characterized by a huge diversity, including species that are currently studied to be described as new ones. The preliminary results of the biological activity showed that despite the unusual environment studied to find new biocontrol agents for agriculture, several fungi exhibited a promising activity against three major plant pathogens.

Keywords: marine fungi; sponges; natural products; bioactivity; biocontrol

Supplementary Materials: The poster presentation is available online at <https://www.mdpi.com/article/10.3390/BDEE2021-09466/s1>.