DIAGNOSIS OF SOIL QUALITY AND EVALUATION OF THE IMPACT OF VITICULTURAL PRACTICES ON SOIL BIODIVERSITY IN A SOUTHWESTERN FRANCE VINEYARD

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Abstract:

Context and purpose of the study - The soil plays a pivotal role in the agroecological transition processes, due to its numerous implications in production support, water regulation, air and nutrient supply, and its function of reservoir for the major part of planet biodiversity. Therefore, soil quality and adequate soil management are key levers for an ecologically and economically sustainable viticulture. Gascogn'Innov (2017-2022) is an Operational Group funded by the European Innovation Partnership for Agriculture. As such, it gathered winegrowers from the south-west of France (Gascony), scientists, advisors and technicians, around a project focused on the biological functioning of viticultural soil and the design of better-adapted technical paths for soil protection. The Gascogninnov project aimed firstly at acquiring references on the biological quality and biodiversity of wine-growing soils in relation to viticultural practices. It secondly intended to test a method for integrating soil bioindicators data into the management of farming systems.

Material and methods - A set of indicators of soil biological quality was evaluated in the project: microorganisms (bacteria and fungi abundance and diversity), fauna (nematodes and earthworms abundance and diversity), physico-chemical characteristics, soil structure assessment and degradation rate of organic matter. The implementation of soil quality indicators was carried out by the wine growers themselves in a participatory approach. Based on a network of 13 plots that have been subject to an initial diagnosis in 2017, several agronomical practices aiming to improve soil fertility were tested to redesign the cropping system (for instance plant cover, organic matter inputs, reduction of herbicides, mineral fertilizers). System redesign was made in collaboration with winegrowers and an interdisciplinary group of experts (agronomists, biologists). Several indicators were measured on vine and soil at each vintage to assess vine health and productivity. At the end of the project (2021), a final diagnosis was carried out.

Results - Gascogn'Innov allowed to create a regional database on the quality of wine-growing soils, which permitted to evaluate the effect of practices according to soil types. Especially, decreasing the intensity of tillage and increasing the duration and diversity of grass coverage tended to increase the abundance of all the organisms studied. This project confirmed the value of using soil biological quality indicators to drive the sustainability of practices, but also highlighted the key-role of expertise, in both agronomy and soil biology, to help winegrowers to understand and to appropriate their soil quality diagnosis.

Keywords: Soil biological quality, biodiversity, vineyard, viticultural practice, grass cover.