Geophysical Research Abstracts
Vol. 20, EGU2018-8007, 2018
EGU General Assembly 2018

Crop rotation strategy influences soil chemical-biochemical properties, plant-root growth and fertiliser use efficiency in organic farming

Elga Monaci, Serena Polverigiani, Michele Bianchelli, Rodolfo Santilocchi, Marco Toderi, Paride D'Ottavio, Costantino Vischetti, and Davide Neri

Università Politecnica delle Marche, Dipartimento di Scienze Agrarie, Alimentari e Ambientali, Italy (e.monaci@staff.univpm.it)

Organic agriculture is inherently perceived as a viable practice to improve soil fertility. Nonetheless, given the wide range of practices used within organic farming (i.e. distribution of organic amendments and/or cover crops and/or crop rotations with annual and/or perennial legumes), the net accumulation of organic carbon, soil microbial activity and nutrients availability are expected to largely vary, suggesting the central role of the cropping system strategies. Indeed, on the basis of crop rotations, soil conditions can substantially differ and differentiate for the adaptation and development of the plant-root system and for the suitable release of nutrients from organic fertilisers.

In this study we investigated the main emerging differences on soil chemical and biochemical properties, nutrients status, organic fertiliser use efficiency and plant-root system growth induced by two contrasting cropping systems in the regime of organic agriculture.

The impact of 13-years alfalfa-crop rotation and annual crop rotation was evaluated on the build up of soil organic carbon, soil metabolic activity and the amount of nitrogen released from an organic fertiliser allowed to be used in organic farming. We also studied the response of root morphology and yield of the plant-root system of durum wheat.

Results showed that the level of soil fertility and the plant-root system behaviour differed in soil under the two crop rotation systems being the alfalfa-crop rotation able to store higher amount of organic carbon, to foster soil microbial activity and to increase root density and the yield of durum wheat. We also observed a different use efficiency of the applied organic fertiliser in terms of the released amount of available nitrogen.