Geophysical Research Abstracts
Vol. 21, EGU2019-11085-2, 2019
EGU General Assembly 2019

Soil suppressiveness in arable fields under different managements across Europe

Gema Guzmán (1), Juan Carlos Rivas-Romero (2), José Luis Trapero-Casas (2), Cristina Estudillo (2), Miguel Montes-Borrego (2), Miguel Román-Écija (3), Carmen M. Haro (2), Concepción Olivares (2), Ignacio F. Girón (4), Engracia Madejón (4), Deborah Linsler (5), José A. Gómez (2), Carlos Camino (2), Juan A. Navas-Cortés (2), and Blanca B. Landa (2)

(1) University of Cordoba, Spain (gemaguzmandiaz@ias.csic.es), (2) Institute for Sustainable Agriculture-CSIC, Spain (blanca.landa@ias.csic.es), (3) University of Seville, Spain, (4) Institute of Natural Resources and Agrobiology of Seville-CSIC, Spain, (5) University of Goettingen, Germany

The microbial diversity of agricultural soils has gained importance as an indicator of soil health and related soil functions. Among the ecosystem services provided by soil microorganisms it is important to highlight the soil suppressiveness which is the ability of a soil to prevent/suppress disease development in the presence of a virulent pathogen and a susceptible host plant, interacting under favourable climatic conditions for disease development. The project SoilMan aims to study in detail the existing relationships between soil management, and how soil biodiversity in arable fields affect soil ecosystem services and its effect on productivity and sustainability. The starting hypothesis is that edapho-climatic conditions, combined with different soil management practices, will modify the microbial community composition and therefore the level of soil suppressiveness to soilborne plant pathogens.
Within the project SoilMan, long term experiments with crop rotations and under low (direct drilling) and high (conventional) tillage intensities were selected across Europe (Spain, France, Germany, Romania and Sweden) with wheat as a common crop in the rotation. Soil sampling from the top 25 cm was carried out during the springs of 2017 and 2018 at the same wheat developmental stage in each country and different soil physicochemical indicators were measured. A soil suppressiveness experiment with the model pathosystem V. dahliae/watermelon was performed using classical pathogenicity tests in growth chambers. Disease incidence and severity was measured weekly, and the final number of infected and death plants, for each treatment. Additionally, plant physiological variables including plant height and fresh weight, flavonoid, chlorophyll and anthocyanin leaf content, nitrogen balance index (NBI), leaf temperature and leaf reflectance within the visible and NIR regions were measured on all treatments combinations at the end of the experiment (3 months). Initial analyses indicated that both the type of soil, the soil management, and their interactions affected disease development. However, the effect of soil management was lower as compared to the soil type on disease variables. Leaf Chlorophyll and NBI showed little variation among soils and values were in general higher for non-inoculated plants. On the contrary, flavonoids showed great differences among soils, management systems and inoculation treatments.