

SoildiverAgro project

Adoption of new management practices to increase crop production and quality



THE WHAT AND WHY

Biostimulants were not successful to increase crop yield and soil biodiversity and functionality in Mediterranean cereal fields

During the three years of experimentation, we rotated in SE Spain (semiarid Mediterranean climate): 1. Rye, from 12 December 2020 to 29 July 2021; 2. Wheat, from 1 December 2021 to 3 August 2022; and 3. Ervil, sown on 1 December 2022, but crop could not develop owing to extreme draught during winter/spring 2023. Following the local practices, the crops were established under organic rainfed management. Four different fertilization treatments were designed, where we reduced organic fertilizer to partially replace it by biostimulants: i) Organic fertilizers (pig slurry and compost) applied at the nutritional demands of the crop (F100); ii) The 50% of the rate of organic fertilizers added in F100 (F50); iii) F50 + the application of a formulation of nitrogen-fixing and phosphorus and potassium solubilizing bacteria; and iv) F50 + the application of a formulation of bacteria and non-mycorrhizal

fungi. The addition of biostimulants did not increase crop yields in any crops, but kept yields at the same level of full inorganic fertilization. Crop quality was not affected by the addition of biostimulants. There was no effect of biostimulants in prokaryotic, fungal and nematode diversity and composition. Functional gene abundance for genes involved in C and N cycles were not affected by biostimulants either. However, biostimulants addition led to decreased functional complexity of the nematode community. In conclusion, organic fertilisation could be reduced for cereal production under organic rainfed management with no negative effect on crop yield and quality, and soil properties. The use of biofertilizers was not successful to increase productivity neither soil biodiversity and multifunctionality.



1. Wheat harvest under rainfed conditions in SE Spain

KEYWORDS

Field crops, wheat, rye, vetch, rotations, soil, biodiversity, yield

AUTHORSHIP

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