Geophysical Research Abstracts
Vol. 20, EGU2018-2430, 2018
EGU General Assembly 2018

Towards a sustainable microbially mediated P plant nutrition

Maria Vassileva (1), Vanessa Martos (1), Bettina Eichler-Löbermann (2), Elena Flor-Peregrin (1), and Nikolay Vassilev (1)

(1) University of Granada, Spain (mvass82@yahoo.com), (2) University of Rostock, Germany

Phosphorus is an essential element for all living organisms but it is often the most limiting nutrient in soil-plant systems. Although most agricultural soils have large amounts of inorganic and organic P, these are immobilized, bound in soil, and only a very low concentration of P is available to plants. For this reason, frequent application of soluble P mineral fertilizers is needed although the efficiency of P fertilization is low - around 10% to 25%. However, their excessive use provokes pollution, leading to accelerated P losses and eutrophication of freshwater, estuarine, and marine environments. Excess use of P chemical fertilizers also affects biodiversity in soil, with consequences on food security and human safety. When assessing the importance of P plant nutrition, the decline in biological fertility and loss of microbial biodiversity in many intensively cropped soils should be noted, which is caused by overuse of mineral fertilizers and pesticides and depletion of organic matter. To solve all these problems, we report some potential biotechnological schemes based on P solubilizing microorganisms. One of the most attractive possibilities include the development of formulated biofertilizers containing single P solubilizers or double microbial products containing P solubilizer and nitrogen fixing microorganism, P solubilizer and mycorrhizal fungus. Similar approach includes combinations between P solubilizer and plant growth stimulating substance such as plant extracts, algal extracts, humic acids, etc. Such biotechnological products can be introduced in soil in free form or embedded in polysaccharide carrier (immobilized) systems. Another alternative possibility to enrich disturbed soils poor in P is to develop soluble P bearing liquid biofertilizers produced in repeated-batch fermentation processes using immobilized P solubilizers. Both possibilities have their advantages and disadvantages and their application depends on the type of soil and plant characteristics.