SOIL NITROGEN FIXING BACTERIA UNDER BIOFERTILIZER APPLICATION IN DIFFERENT TILLAGE SYSTEMS IN MAIZE AND SUNFLOWER CROPS

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Abstract

It is well known that chemical inputs are the main determinant of yields, but their impact is considerable, causing significant changes in the soil. Soil microbiota is a very important component of the agricultural ecosystem and is involved in nutrient cycling. Its structure and dynamics are easily influenced by tillage, fertilizers and crops. The aim of the present study was to observe the effects of different tillage systems combined with the application of inorganic fertilizers and a phosphorus-solubilizing bacterial fertilizer in different rates and combinations on nitrogen-fixing bacteria in the soil. The study was conducted in 2023 growing season at the Ezareni Farm from Iasi. The tillage systems were represented by conventional (CT) and no-tillage (NT). Sunflower and maize crops were fertilized with: NPK (20% N, 10% P_2O_5, 5% K_2O), phosphorus solubilizing bacteria (PSB) fertilizer containing *Bacillus megaterium* var. *phosphaticum*, applied twice, and Corona N foliar fertilizer (21% N), applied to 3 of the 5 treatment formulations. For the quantification of nitrogen-fixing bacteria populations (*Azotobacter* spp. and *Clostridium pasteurianum*), soil samples were collected four times and the method used in the laboratory was that of successive dilutions. During the growing season, an increase in colony numbers was observed in CT maize when treated with the manufacturer's recommended dose (10 l/ha) of biofertilizer in combination with foliar application of nitrogen. In contrast, in sunflower, the number of bacterial populations was higher in NT under biofertilizer treatment at the prescribed dose but without foliar fertilizer application. At the beginning of the growing season, *Clostridium* sp. is more numerous, but this is reversed 4 weeks after the second application of PSB, which corresponds to the flowering period of the plants, when *Azotobacter* spp. predominates. The results indicate increased populations of nitrogen-fixing bacteria in both the recommended and higher-dose PSB treatments, and in sunflower this is more evident in the no-tillage system.

Key words: soil, no-tillage, phosphorus solubilizing bacteria, *Azotobacter* spp., *Clostridium* spp.