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THE NOVEL OF USING CYANOBACTERIA AND *Azotobacter* AS BIOFERTILIZER FOR WHEAT CROP PRODUCTION

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ABSTRACT

A pot experiment was carried out at the experimental greenhouse of the Faculty of Agriculture, Mnsoura University, Dakahlia, Govemorate, to study the effect of *Azotobacter* and/or cyanobacteria inoculation each individually and/or both in combinations under three nitrogen levels (zero N, 1/2 full N recommended dose and full N recommended dose) on wheat (*Triticum aestivum* L.) variety Sakha 93. Some soil biological, physical and chemical properties were also studied. Results indicated that the dual inoculation with both cyanobacteria and *Azotobacter*, generally enhanced wheat plant growth and increased wheat grain and straw yields, NPK uptake by grains and straw, available NPK in soil at three stages of wheat growth (vegetation, panicle initiation and at harvest). As well as the soil biological activity was positively enhanced due to the dual inoculation with both cyanobacteria and *Azotobacter* combined with 1/2 N dose only especially at the second stage (panicle initiation). In this concern, this treatment led to increase the soil dehydrogenase activity, CO_2 evolution, soil microbial community represented by total bacteria count, total cyanobacteria count and *Azotobacter* count. However, the priority was for the second stage (panicle initiation) and the treatment of ½ N + cyano + Azoto compared to the other tested treatments and/or stages.

In conclusion, much attention should be paid to understand the mechanism of dual inoculation with both cyanobacteria and *Azotobacter* that positively affected wheat production and improved biological and chemical characters for the inoculated soil.

INTRODUCTION

Previously, Alexander (1971) reported that *Azotobacter* needs to a simple organic carbon source for its biological activity to fix nitrogen, so it gets into proto-corporation relationship with cyanobacteria formally called blue-green algae, especially *Nostoc* and *Anabaena* to take carbohydrates (resulted from photosynthesis process made by cyanobacteria) that lead to increase the amount of fixed nitrogen by both microorganisms. Recently, and about the same relationship Tantawy (2006) proved that dual inoculation with *Azotobacter* and cyanobacteria combined with 1/4 N dose increased significantly the soil biological activity, which leads to the production of plant growth promoting regulator (PGPR) substanoes and consequently the amount of fixed nitrogen, available NPK in soil and both maize grain and stover yields over the other tested treatments received single inoculation. However, many authors reported that inoculation with *Azotobacter* and/or cyanobacteria are capable of growing and introducing many active substances, which induce the growth and production many crops. Kumar *et al.* (2001) mentioned that *Azotobacter chroococcum* has the ability to be phosphate solubilizing and phytohormone producing when inoculated to