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Effect of different bacterial strains on zinc solubilisation in maize

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ABSTRACT

Field experiment was conducted in Thaliyur of Thondamuthur block, Coimbatore district during 2006-2007 with maize crop as test crop. The result revealed that, among the main plot treatment, sources of Zn *i.e.* control (No Zn) and application of ZnO @8 kg ha^{-1}, application of zinc revealed higher grain and stover yield as well as higher zinc uptake in grain and straw. Among the subplot treatments, T_7- T_1 + *Pf-1 x FP-7 x Bacillus* (Consortia) @ 2.5 kg ha^{-1} registered a higher grain (6135 kg ha^{-1})as well as stover yield followed by the treatment T_8 (5927 kg ha^{-1}) while the control recorded the lowest. And the same treatment recorded 100 grain weight as well as cob length. The zinc uptake was high in grain and straw in the same treatments.

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Key words : Maize, *Pseudomonas fluorescens*, *Gluconoacetobacter diazotrophicus*, *Bacillus*, Grain yield and stover yield

INTRODUCTION

In Tamil Nadu maize is an important crop among the millets. It occupies an area of 40,569 ha with an average production of 1609 kg ha^{-1}. Maize is a staple food in north India while in Tamil Nadu it is mainly used as an ingredient in poultry and cattle feed. The average yield in maize is below the average yield obtained in northern states. Among the micronutrients, Zn is an important micronutrient limiting the maize production since only limited information is available on the effect of different bacterial strains on the zinc solubilization in maize.

Zinc is a micronutrient required in adequate concentrations by living organisms, but in many instances it exhibits toxic effects at relatively low concentrations. The role of zinc in the nutrition and physiology of both eukaryotic and prokaryotic organisms is widely appreciated, especially its importance in many enzymes. On the other hand, increased circulation of this element in the biosphere due to anthropogenic emissions may represent a source of toxic stress. Adverse effects of zinc on, for example, microbial biomass production, cyanobacterial proliferation and nitrogen fixation, have been observed in soils treated with metal-contaminated sewage and, as a consequence of alterations in soil microbial communities, effects on the yields of cultivated crops have become evident (McGrath *et al.*, 1995). However, microorganisms and their activities also have important roles in the biogeochemical cycling of this element. Bacteria can contribute to metal immobilization by several processes such as precipitation and adsorption. In contrast, microbial activity can cause leaching of immobilized metals in soils and sediments by releasing chelating agents or locally increasing the proton activity (Banks *et al.*, 1994; White *et al.*,1997).

MATERIALS AND METHODS

Field experiment was conducted in Thaliyur of Thondamuthur block, Coimbatore district during 2006-2007 to study the effect of bacterial strains on zinc solubilization in soil and their impact on yield and quality of maize. Recommended dose of fertilizers namely 135:62.5:50 N, P_2O_5 and K_2O kg ha^{-1} applied uniformly to all the treatments. The size of the plot was 2.5 x 4 m.

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