1. INTRODUCTION

Nitrogen is generally considered to be the most limiting nutrient in modern agriculture systems , because of the relatively high requirements of nitrogen for growing plants , simultaneously with the so many factors and mechanisms responsible for N loss from soil. Nitrogen is extensively used as a basic mineral fertilizer on all nonlegumious crops. Soil N retained in the exchangeable ammonium forms, mainly on clays could be considered as immobile but under most conditions, the mineral fertilizer N is converted to the nitrate form which readily moves with water probably out of soil profile. Accordingly , N in the form of nitrate can be transported from the soil into surface and ground waters, where it may lead to pollution and be health hazardous . Also, nitrate denitrification as well as the ammonium volatilization represent other two mechanisms responsible for N losses. The immobilization process of added mineral N may influence its utilization by plants.

Losses of N can occur early in the season before the crop growing and also after the growing season. Early losses may often be reduced by some management practices as delaying or splitting the applied fertilizer into several doses. The use of ammonium or ammonium forming fertilizers and nitrification inhibitors to delay the formation of nitrate nitrogen is expected to reduce N losses during the early period of the growth season. Losses by volatilization of ammonia can be practically eliminated by prober handling and placement of such NH_4^+ fertilizer . Utilization of nitrogen by soil microorganism, i.e , N immobilization may also account for some lack in fertilizer recovery by the crop and hence its efficiency. However, this microbial nitrogen usually is relatively small and like the nitrogen in crop roots and residues, is comprising a part of

soil nitrogen that is eventually recycled.

Nitrification inhibitors are potentially very important management tools for retarding the conversion of ammonium to nitrate, and thus providing ammonium N loss and more effective utilization of N fertilizer.

The nitrification process involves the convertion of ammonium into nitrate, usually by Nitrosomonas sp, which oxidises ammonium to nitrite, and Nitrobacter Sp, which oxidises nitrite to nitrate. When the first stage is inhibited, nitrification will be in turn depressed and as the second stage is inhibited, nitrite accumulates.

A more effective control of nitrification process, can take place through the use of various chemical inhibitors. Such treatments could result in ; 1. increasing N fertilizer use efficiency , 2. decreasing loss of fertilizer N from the soil - root zone through leaching and denitrification, 3. decreasing agriculture potential contribution to the eutrophication of surface and ground waters and 4. increasing the potential for fall application of ammonical fertilizers in regions where such practice is not feasible because of rapid nitrification and leaching .

In this study some attempts have been conducted to increase the efficiency of nitrogenous fertilizers , different methods and time of nitrogen fertilizer application with and without nitrification inhibitors were applied.

The effect of nitrification inhibitors with and without Azotobacter inoculation was also studied.