PAK. J. SOIL SCI., VOL. 10 (1-4), 1995

EFFECT OF NITROGEN FERTILIZER RATES ON DRY-MATTER YIELD AND SYMBIOTIC NITROGEN FIXATION BY FABABEANS

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ABSTRACT

This field experiment on fababean was conducted with three rates of N (20, 100 and 200 kg/ha) as urea (labeled with 5%, 1% and 0.5% ^{15}N a.e. respectively) and barley was grown as reference crop. Results showed that fababeans receiving lower N level were efficient symbiotic fixers, deriving 84% of their shoot N through symbiotic fixation. Although higher level of N fertilizer resulted in less N_2 fixation, fababeans receiving 200 kg N ha^{-1} were still able to fix sufficient N_2 indicating that fababean Rhizobia were tolerant of higher soil N. The results also showed that fababeans appeared to preferentially feed from combined inorganic soil and N fertilizer(urea) rather than symbolically fix their needs.

INTRODUCTION

There have been many studies of the effect of combined N on the physiology of the Rhizobium/legume symbiosis. It is established that large amounts of applied N reduce root-hair infection (Munns, 1968; Dazzo and Brill, 1978), nodule number (Dart and Mercers 1965), nodule mass nodules than fababeans receiving no supplemental N.

The purpose of this experiment was to study the effects of fertilizer N levels on the dry matter yield and N_2 fixation of fababeans.

MATERIALS AND METHODS

This field experiment was conducted at Seiberadorf, Austria. The soil was a calcareous (pH 8.5 in saturated paste), silt loam, from alluvial origin, with abundance of coarse fragments (gravel size) on the top-layer and having organic matter content of 2.96%. Broadbean, cultivar Wieselburgers was grown as legume crop and barley as reference crop.

The experimental design comprised five randomized blocks, each containing 3 treatments. *Vicia* and barley were sown side by side forming one treatment and barley also received the same level of fertilizer N as *Vicia*. Plot size for each crop was 1.5 m^2. Each plot contained 6 rows with 30 cm spacing of *Vicia* and barley. The seedling rate was 8 cm for Vicia and 4 cm for barley. Fertilizer N was applied in