

## INHIBITION OF NITRIFICATION BY NITRAPYRIN AND ELEMENTAL SULFUR IN CALCAREOUS SOILS

(39)

Modaihsh<sup>1</sup>, A.S.; F.M. Alromian<sup>1</sup> and M.O. Mahjoub<sup>1</sup>

### ABSTRACT

Controlling nitrification of ammonium from ammonium-forming fertilizers (such as urea) could provide a useful tool to minimize N losses through leaching and/or denitrification. A column experiment was carried out to evaluate the effectiveness of nitrapyrin and elemental sulfur in inhibition of nitrification in a calcareous soil. Three soils differing in their CaCO<sub>3</sub> content (5.5, 18.3 and 31.8%) were utilized in this study. Each column was filled with 2.3 kg of air dried soil and water content was kept constant at field capacity. Columns were incubated at a constant temperature (30°C). Treatments included two levels of applied N (240 and 80 µg g<sup>-1</sup>), one level of elemental sulfur (3750 µg g<sup>-1</sup>) and one level of nitrapyrin (10 µg g<sup>-1</sup>). Leaching was performed by applying an amount of water equivalent to 20% of field capacity. After 6 weeks of incubation two replicates out of four were taken for analysis while the other two were kept for another 6 weeks. Data revealed that N recovered from soils and leachates was inversely proportional to either the CaCO<sub>3</sub> content in soil or the level of applied N. These findings were noticed at both incubation periods. Application of nitrapyrin or sulfur elevated NH<sub>4</sub><sup>+</sup>/NO<sub>3</sub><sup>-</sup> ratios in soil and leachates, however, the total amount of the recovered N remained unchanged. Because of the lower leaching fraction used (20%), the amount of N lost through leaching represented a very small portion of the applied N (only 0.51 - 2.68%). Thus the efficacy of nitrapyrin and/or sulfur in increasing the N recovery from soil was limited. The results suggest that sulfur may be used as a nitrification inhibitor similarly to nitrapyrin.

**Key Words:** Urea, Nitrogen balance, Nitrification, Nitrapyrin, Sulfur, Calcareous soil

### INTRODUCTION

The soils of the Kingdom of Saudi Arabia being a part of an arid and semi-arid region, are generally characterized

by a coarse texture and low organic matter content (Bashour et al 1983). Since N content is inherently low, heavy applications of fertilizer nitrogen are always needed to sustain higher crop yields. Recently, there is a growing concern that fertilizer N should be used as efficiently as possible to minimize economic loss and environmental pollution (Martinez and Guiraud, 1990). The low

<sup>1</sup> Soil Science Department, College of Agriculture, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia

(Received November, 1994).