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Can Corn Leaves Uptake Ammonia Volatilized From Urea Applied On the Soil Surface?



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INTRODUCTION

Plants are able to uptake ammonia from the atmosphere through the leaves and can partially recover the N volatilized from urea applied on the soil surface. This study aimed to evaluate foliar uptake of ammonia derived from sidedressing urea application at different corn growth stages.

RESULTS

The percentage of volatilized N ranged from 23 to 68% of the applied, and these differences can be related to weather conditions. In both growing seasons, the values of nitrogen absorbed by leaves were 3.4, 5.5, 6.2, 9.0, and 14.8% for V4, V6, V8, V10 and V12, respectively, and approximately 89% of N absorbed was accumulated in the leaves and only 11% in the stalks. There was high correlation between leaf area and percentage of N absorbed by leaves ($r = 0.93$, $p \leq 0.01$), because the leaf area is the contact surface of the plant with ammonia in the atmosphere, supporting the hypothesis that the greater leaf area reflects a greater foliar absorption of ammonia.

MATERIAL AND METHODS



Corn
Piracicaba, State of Sao Paulo
Growing Seasons: 2011/12 and 2012/13
Randomized blocks with four replications

Treatments:

Sidedressing urea (labeled at 12 atoms % ¹⁵N) application at V4, V6, V8, V10 and V12 growth stages

- Urea application on trays containing soil (140 kg ha⁻¹ of N)

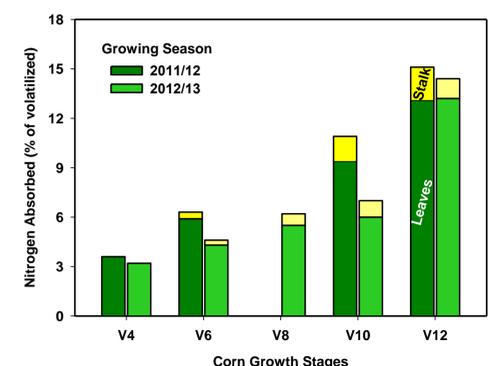
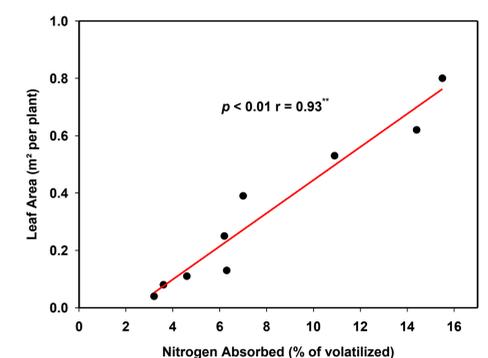
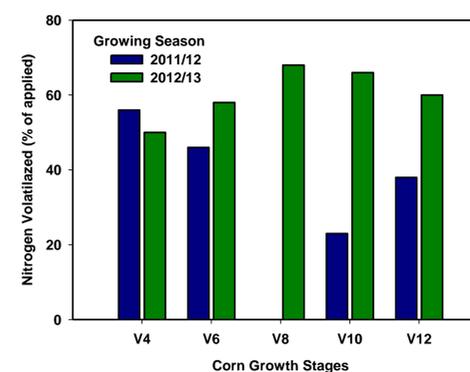
- Leaf area (LA) of plants was measured at each time of urea application



Seven days after urea application:

- Soil into trays was dried and analyzed for total N content and ¹⁵N abundance

- 16 plants near tray were collected, dried and analyzed for total N content and ¹⁵N abundance



Conclusions

Corn leaves absorb part of the volatilized ammonia from urea applied on the soil surface, reaching values of 15%.

The percentage of ammonia absorbed is directly related to corn leaf area.

$$N \text{ volatilized (\%)} = \frac{(^{15}\text{N applied} - ^{15}\text{N recovered in the soil})}{^{15}\text{N applied}} \times 100$$

$$N \text{ absorbed (\%)} = \frac{(^{15}\text{N recovered in the plant})}{^{15}\text{N volatilized}} \times 100$$

ACKNOWLEDGEMENTS:

