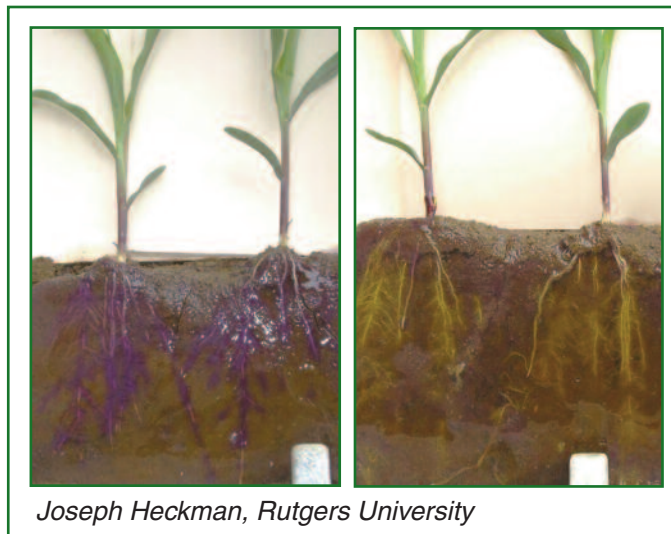


Honeywell Sulf-N® Ammonium Sulfate

Influence of N Form on Rhizosphere pH

Root box studies using bromocresol pH indicator dye demonstrated changes in rhizosphere pH when ryegrass and corn roots absorbed nitrate nitrogen versus ammonium nitrogen. The rhizosphere is the area of soil immediately surrounding plant roots. Absorption of nitrogen in the ammonium form lowered rhizosphere pH and absorption of nitrogen in the nitrate form raised rhizosphere pH.



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Project Details

- Initial studies were conducted with ryegrass plants and later repeated with corn plants.
- Plants were grown in root boxes with clear plexiglass fronts.
- After four weeks of growth, the root system was exposed and treated with fluids containing bromocresol purple pH indicator dye.
- Ammonium nitrogen was applied as ammonium sulfate (21-0-0-24S) plus a nitrification inhibitor. Nitrate nitrogen was applied as calcium nitrate.
- When N was absorbed as nitrate, the soil surrounding roots turned purple, indicating an increase in pH.
- When N was absorbed as ammonium, the soil surrounding roots turned yellow, indicating a reduction in soil pH.
- Rhizosphere pH differed from bulk soil pH by as much as two units.
- Color changes became visible within 10 minutes and were fully developed within 20 to 30 minutes.

Results and Discussion

- Root box studies demonstrate changes in rhizosphere pH resulting from root absorption of ammonium versus nitrate nitrogen.
- These results have not been replicated under field conditions; however, field research has demonstrated that acidification can enhance uptake of phosphorus, iron and manganese. In addition, take-all disease in wheat and summer patch disease in turfgrass have been found to be suppressed by rhizosphere acidification associated with ammonium nutrition.

Source: Heckman, J.R., and J. Strick. 1996. Teaching Plant Soil Relationships with Color Images of Rhizosphere pH. Journal of Natural Resources and Life Sciences Education. 25:13-17.

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