

NH₄:NO₃ Ratio



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It's ammonium (NH₄⁺), NOT ammonia [NH₃(gas)]

1) How are NH_4^+ and NO_3^- measured?

- 2 M KCl extraction
- Colorimetric analysis



2) How does Composting Affect the $\text{NH}_4:\text{NO}_3$ Ratio?

- We start with Manure Nitrogen
 - Organic N
 - 20-80%
 - $\text{NO}_3\text{-N}$
 - very little
 - $\text{NH}_4\text{-N}$
 - 20-80%



2) How does Composting Affect the $\text{NH}_4:\text{NO}_3$ Ratio?

■ $\text{NH}_4\text{-N}$

- Volatilizes as NH_3
- Immobilizes into organic N
- Could nitrify to NO_3

■ $\text{NO}_3\text{-N}$

- Denitrification to N_2O (if it's too wet)
- Could leach

■ Organic N

- Mineralizes to $\text{NH}_4\text{-N}$ and then nitrifies to $\text{NO}_3\text{-N}$

■ OVERALL

- Volatilization and immobilization of NH_4 in first 60 days followed by mineralization and nitrification
- The $\text{NH}_4:\text{NO}_3$ ratio drops during composting.

Classification System

	Class I	Class II	Class III	Class IV
NH ₄ :NO ₃ Ratio	<4	<6	N/A	N/A

3) How does Compost Management Affect the $\text{NH}_4:\text{NO}_3$ Ratio?

- Length of Composting Period
 - NH_4 concentration decreases in first 60 days
 - NO_3 increases later

- Feedstock Selection
 - Feedstocks with lower initial NH_4 levels result in composts with higher NO_3 levels
 - Choosing feedstocks with lower NH_4 levels could be helpful
 - e.g., aged manure

4) How does $\text{NH}_4:\text{NO}_3$ Affect Plants and Soil?

- Plants can take up both NH_4 and NO_3
- BUT plants adapted to acid soils prefer NH_4
- AND plants adapted to alkaline soils prefer NO_3



Some Plant Problems

- Too much NH_4 , like in a fresh poultry manure, can burn plants
- Too much NO_3 late in the season can damage crop quality



Excess NH_4^+ Trouble

Some NH_4 improves growth, BUT too much...

- Inhibits uptake of other cations (positively charged nutrients)
 - Ca
 - Mg
 - K

This is especially detrimental when $\text{pH} > 7.5$

- Diminishes root numbers and length
- NH_4^+ uptake reduces soil pH in the rhizosphere (not in the bulk soil)