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## Toppdressing Corn with Poultry Litter

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### Poultry Litter

"A friable mixture of bedding materials, fresh feces and urine, spilt feed, feathers, and water"



**Nitrogen in Poultry Litter (%)**



Urea  
Ammonium  
Undigested proteins  
Uric Acid

Uric Acid → Quick  
Undigested proteins → Slow

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NH<sub>3</sub>

Mineralization = 50-60% of N

(Bhanagar et al., 2022; Modified)

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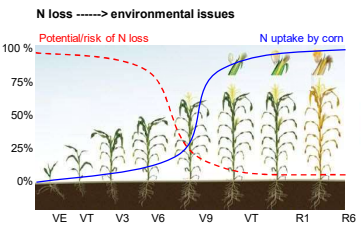

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### Management

**N loss -----> environmental issues**

Potential/risk of N loss

N uptake by corn

<4Rs of nutrient management>

Left: Jones, 2020; Modified (Right: MSU extension, 2019)

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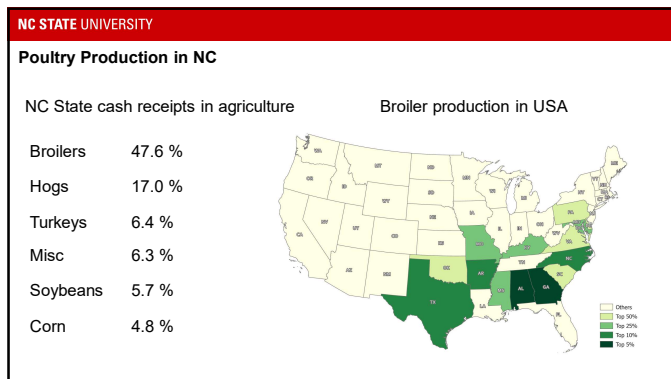
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- ### Rules around Manure Use
- Must be applied at agronomic rates
    - Current soil test report
    - Current waste analysis
    - To an actively growing crop, within 30 days of breaking dormancy, or within 30 days of planting
  - Must be covered if stockpiled for more than 15 days
  - Setbacks
    - 100' from well
    - 25' vegetative buffer from water body
  - No application during precipitation or to flooded, saturated, or snow covered ground

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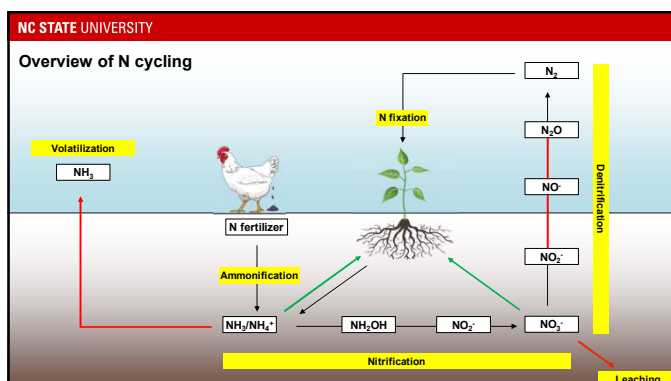
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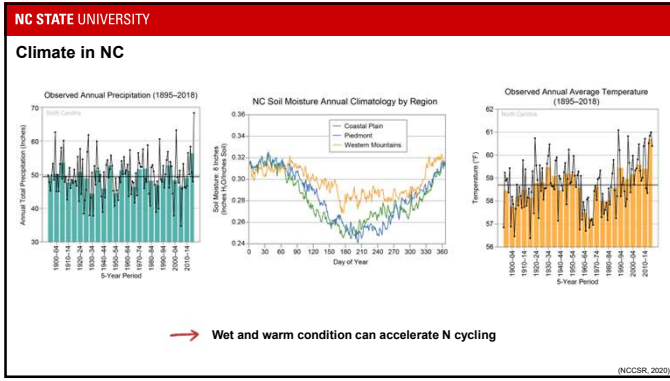
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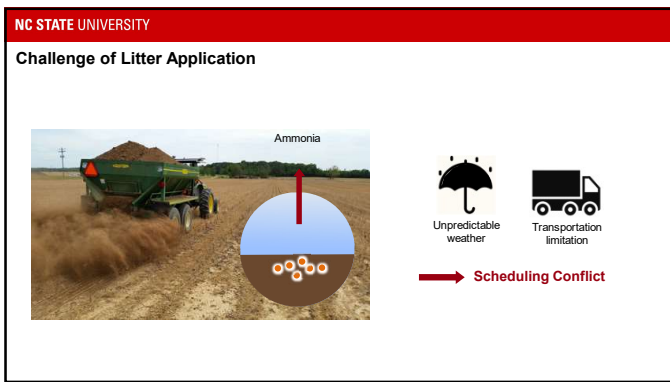
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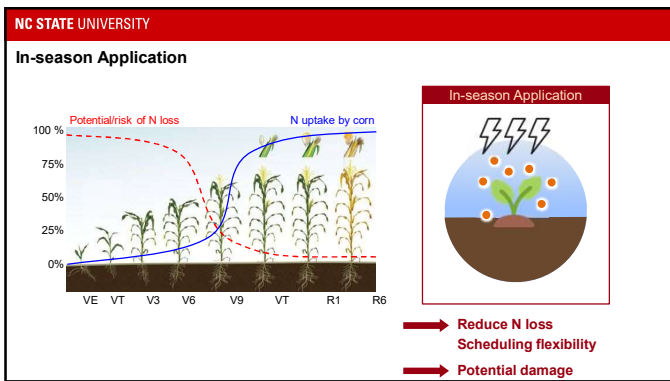
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**Objectives**

- 1) To determine the impact of in-season application of poultry litter on **yield and quality of corn**
- 2) To assess how different application **timing** and rate of litter application affect **ammonia volatilization** and **N use efficiency**

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**Experimental Design**  
Materials and Methods

- Year: 2023 and 2024
- Site: Coastal Plain and Piedmont (NC, USA)
- Poultry litter
  - Collected from broiler house
  - Topdressed by hand



Year	TN <sup>1)</sup>	TIN <sup>2)</sup>	P	K	Ca	Mg	S
2023	32.6	6.59	14.2	35.9	24.4	7.13	14.9
2024	29.1	5.80	12.9	33.2	29.5	7.89	16.3

<sup>1)</sup>TN: Total N  
<sup>2)</sup>TIN: Total inorganic N

- Timing: Planting, V2, and V5
- Application rate: 0, 2, 4, 8, and 16 tons/ac
- Randomized complete block design (RCBD) with 4 replicates

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**Sampling and Analysis**  
Materials and Methods

- Soil: Initial, Post-V5 (2w after the last application), Post-harvest
- Plant tissue: Corn leaf at R2
- NH<sub>3</sub> volatilization: Closed chamber method
  - 0.05 M phosphoric acid
  - 1, 3, and 7 days after each application
  - Combined data over a week for cumulative emissions
- Chemical analysis
  - NH<sub>4</sub><sup>+</sup>/NO<sub>3</sub><sup>-</sup>: Lachat Quikchem Flow Injection autoanalyzer
  - Grain N: Near-infrared spectroscopy (NIR)
  - Leaf nutrients: NCDA&CS Agronomic Services Division



12

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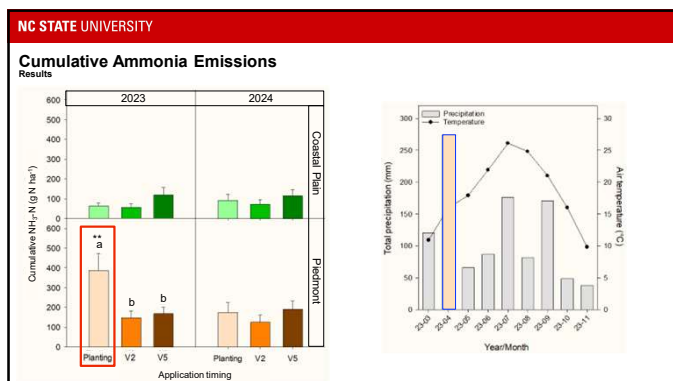
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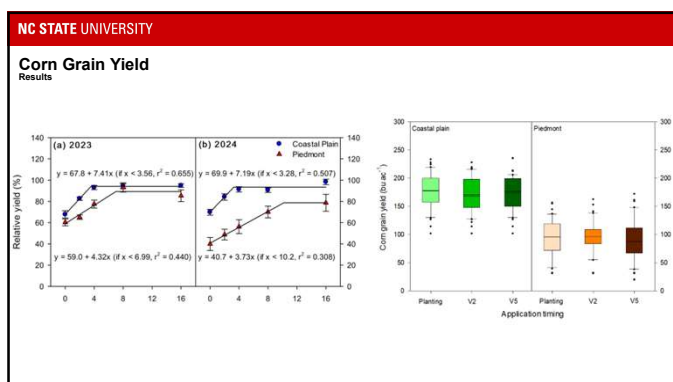
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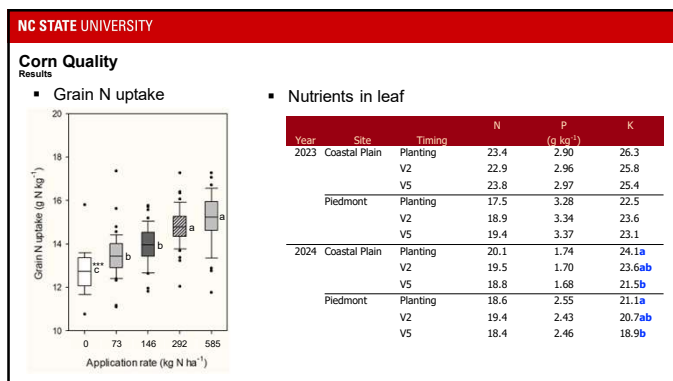
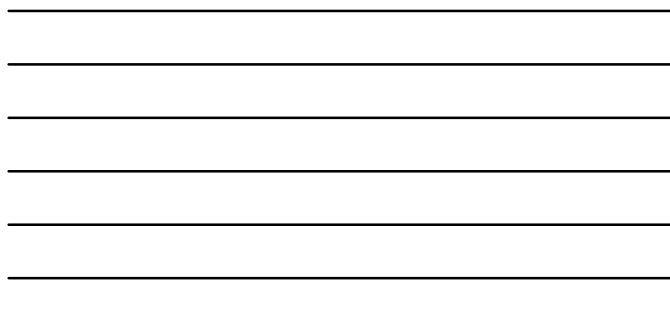
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**Key Results**

- 1) Application at planting had significantly higher ammonia emissions in 2023 at Piedmont
- 2) K in leaves significantly decreased in V5 compared to planting
- 3) No timing effect was observed in grain yield and grain N uptake

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**Conclusions**

- ✓ In-season application did not negatively affect yield of corn
- ✓ Different application timing did not significantly affect N use efficiency

**Next goal**

- To check for physical damage to verify the feasibility of in-season application of poultry litter

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**Comments? Suggestions?**

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