Nitrogen Management in U.S. Sugar Beet Production

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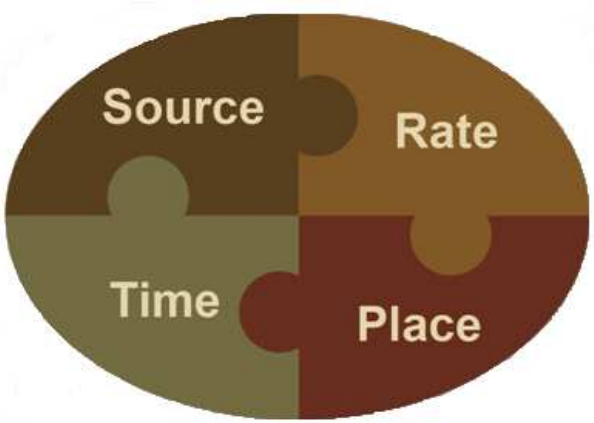
4R Nutrient Stewardship

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Goal:

- Optimize crop yields
- Maximize producer profits
- Maximize N use efficiency
- Minimize NO_3 leaching, N gas losses

Research and Management Collaboration

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- Improved in N use efficiencies
- Improved in N rate recommendations
- An important knowledge gap: Mineralization
- Further refinement of N rate recommendations

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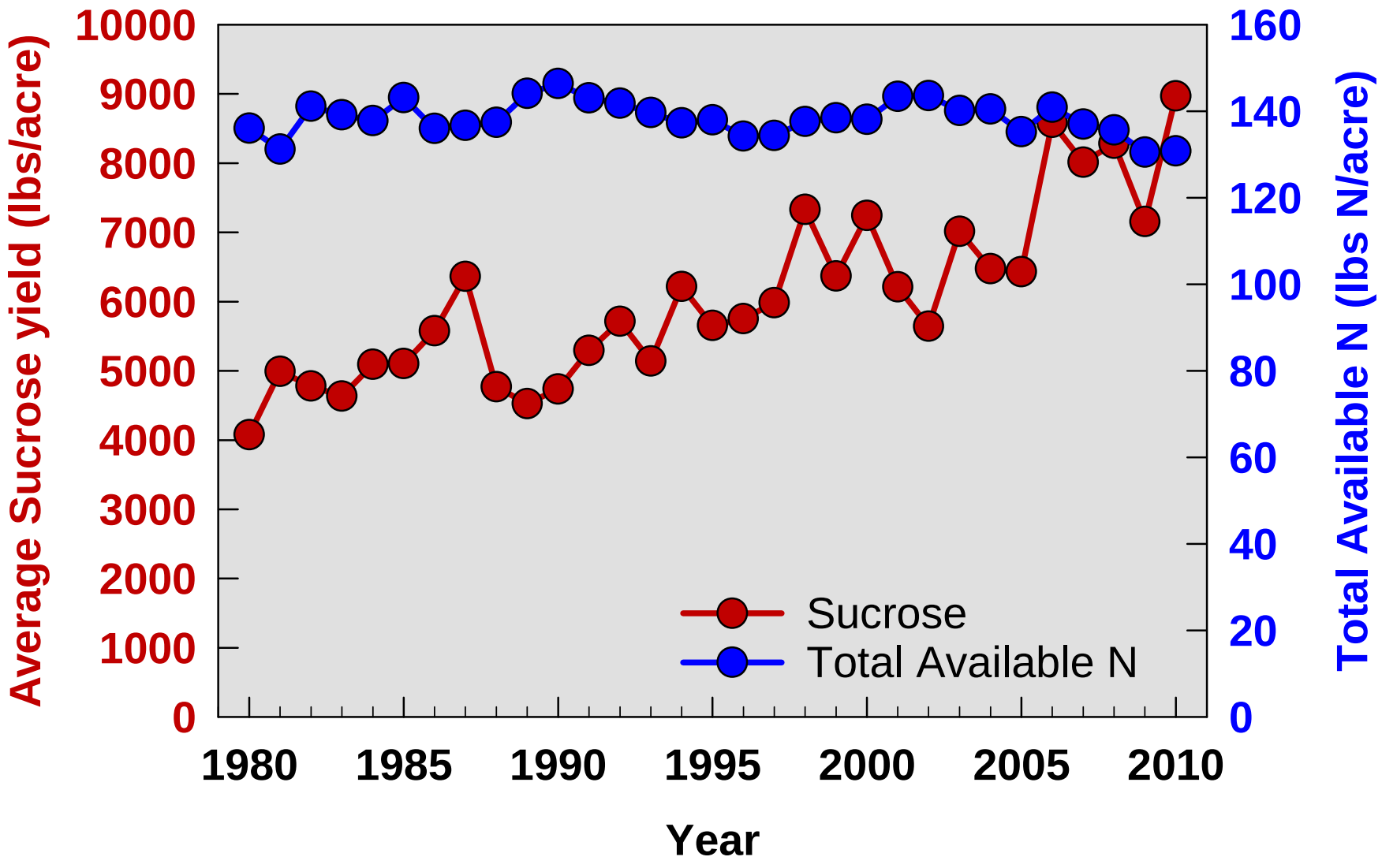

Yield vs N Rate – American Crystal Area

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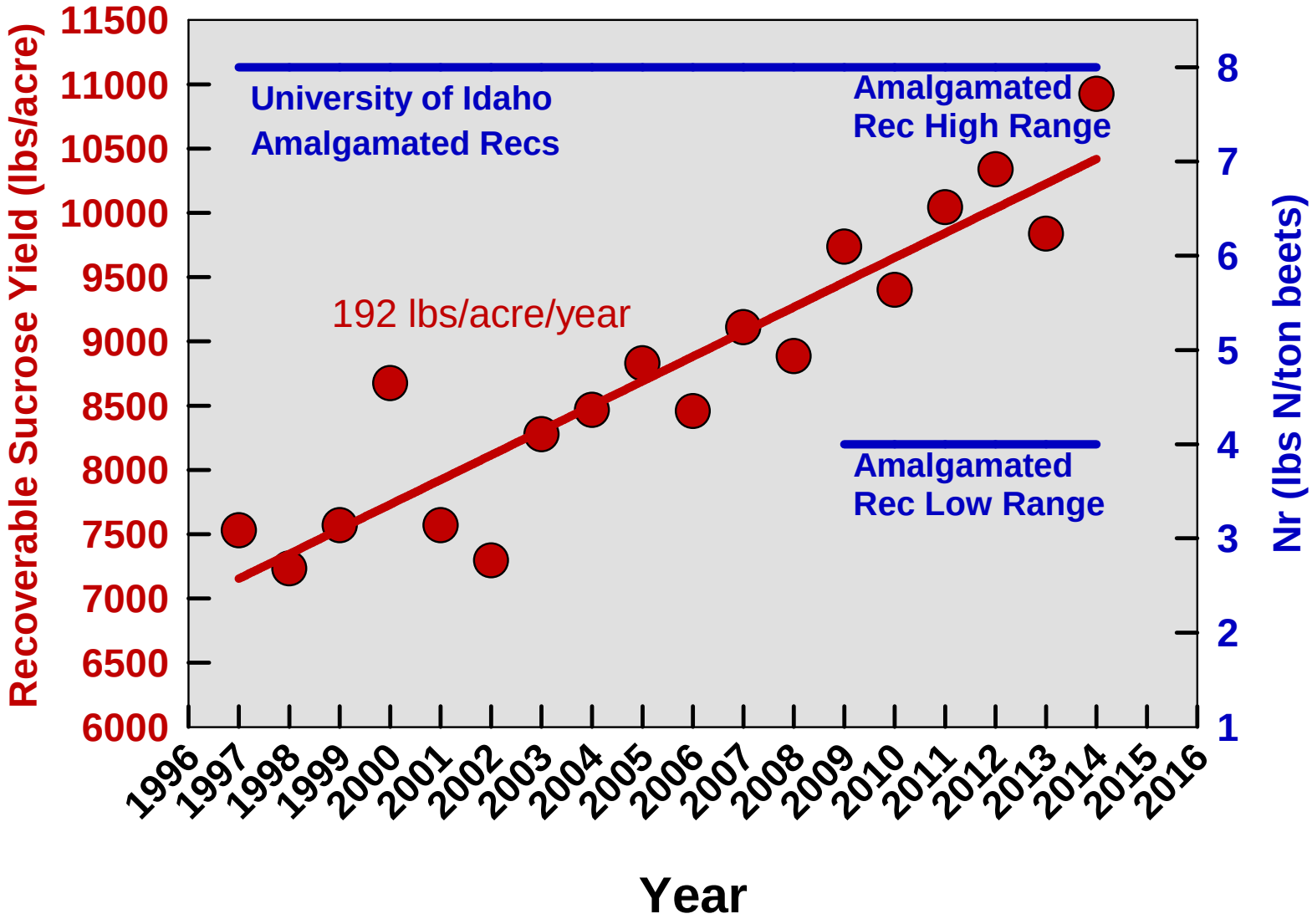

Yield vs N Recs – Amalgamated

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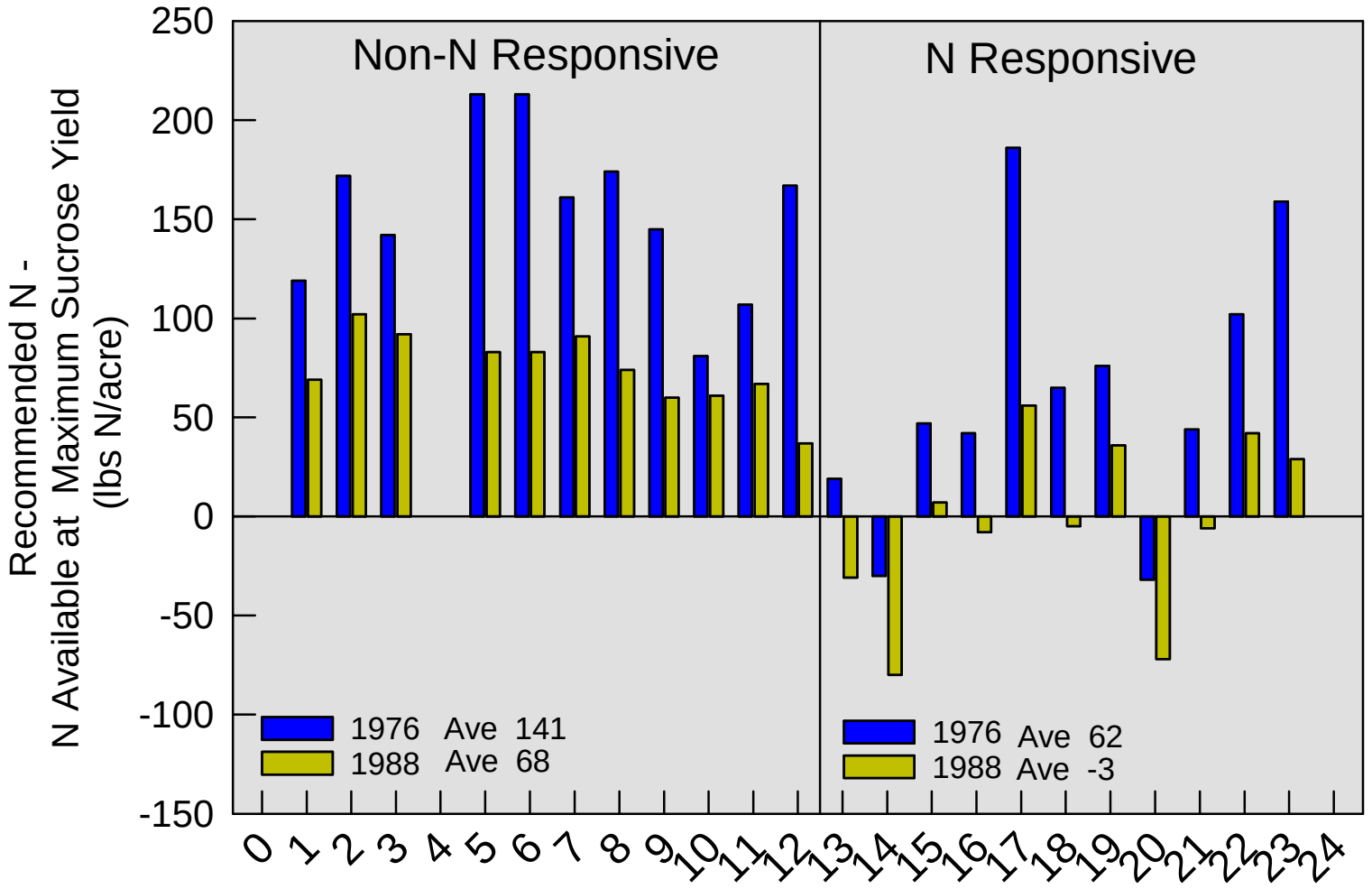
- N Rate Study with various rates including a 0 N fertilizer check.
- 23 site years
- 1984-1987
- North Dakota
- Spring Soil NO3-N, 0-2
- Maximum Sugar Yield (statistically)
  - If no difference in yield, site labeled as **non-responsive**
- Determined the recommended N needed from published 1976 and 1988 recommendations (Univ. MN and NDSU).
- **N Recommended – N that yielded the greatest sugar yield**
- (+) amount of excess N from fertilizer
- (-) amount of N deficient to meet need.



Used 0-2 ft soil NO3-N

Moraghan, ND 1984-1987

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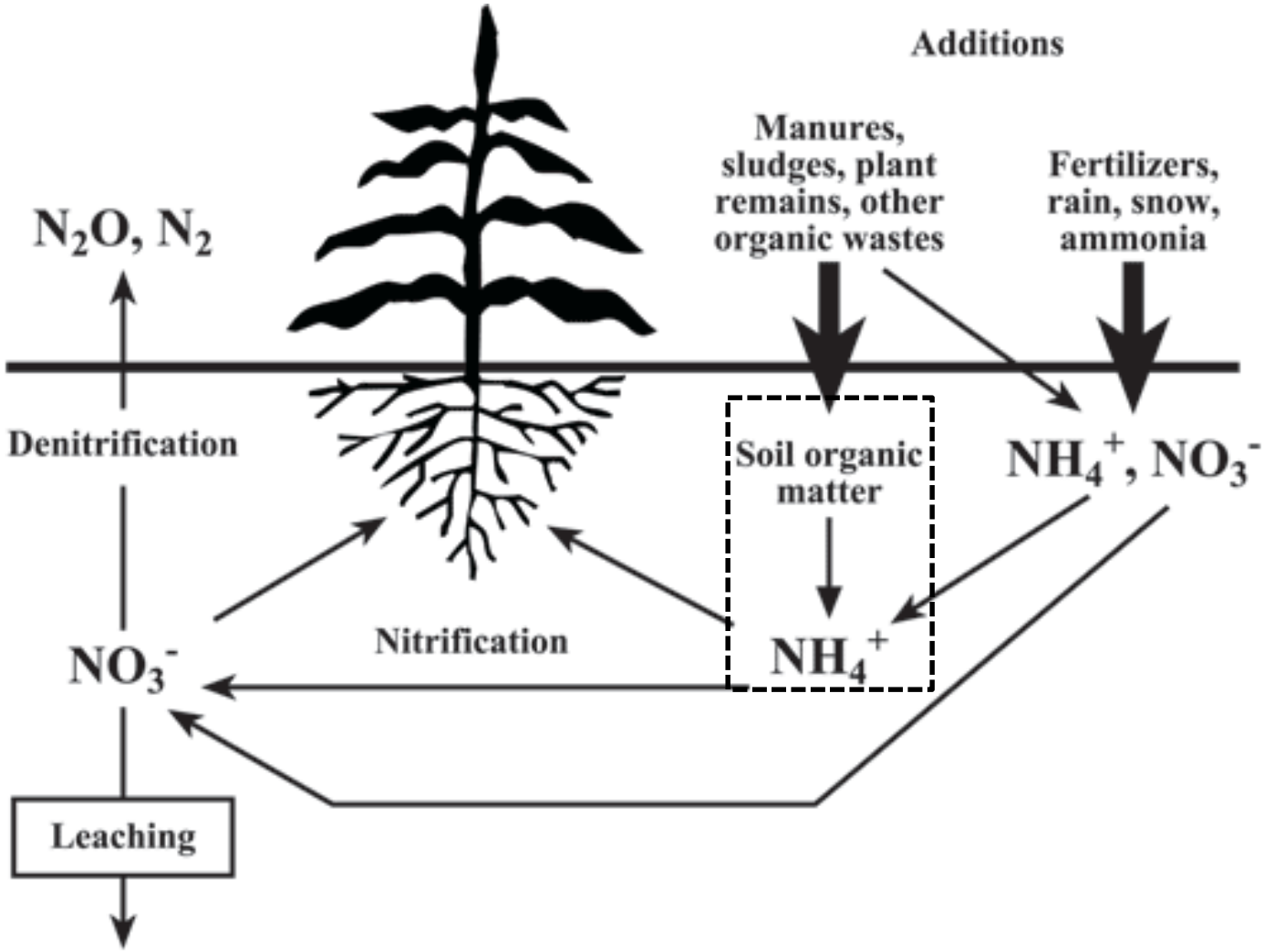

Nitrogen Cycle

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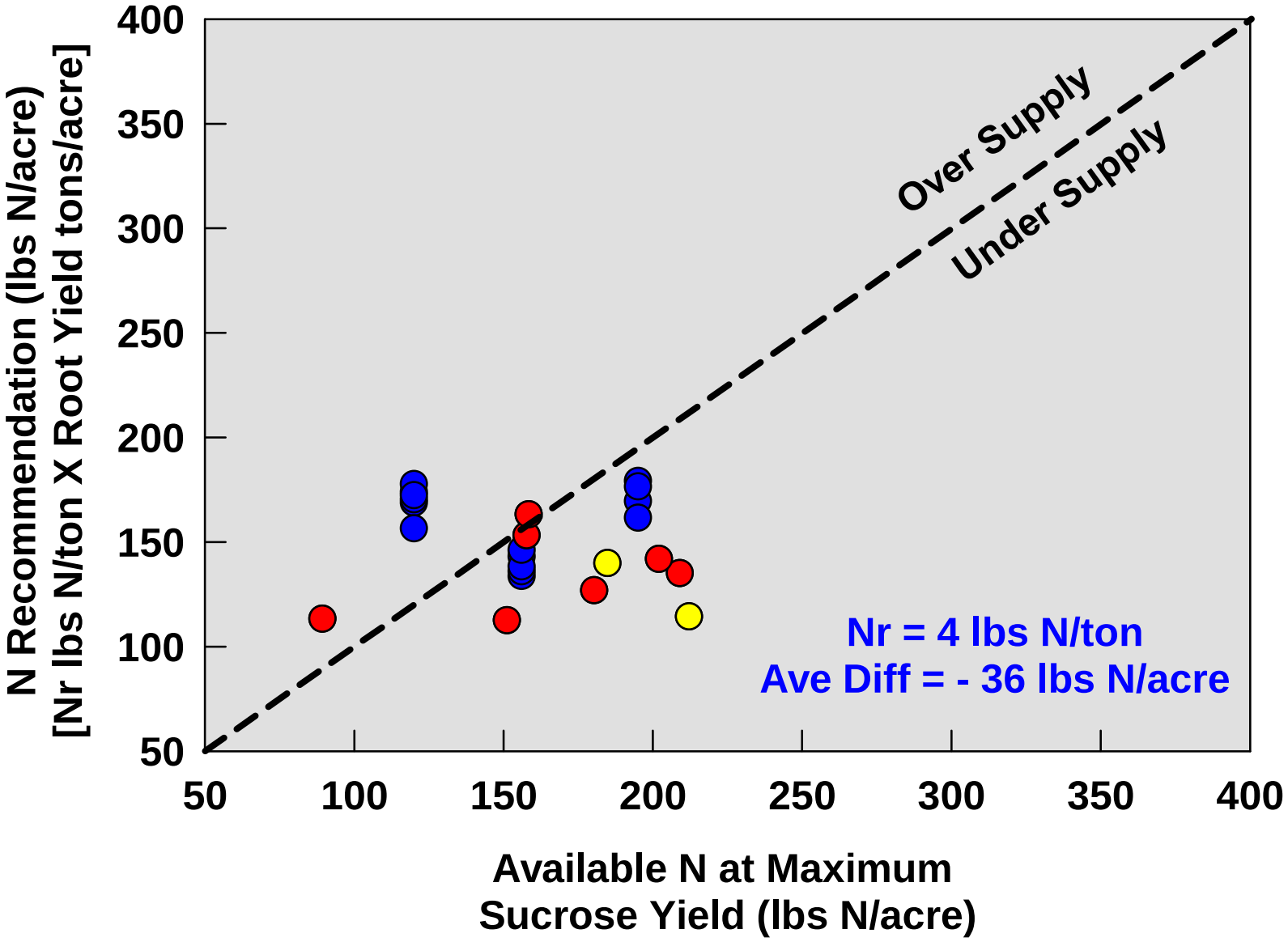
- N Rate Study with various rates including a 0 N fertilizer check.
- Dave Elison, Greg Dean, Paul Foote, Stacey Camp, David Tarkalson.
- 24 site years (year, site, variety).
- 2005-2010.
- Replicated 4 to 8 times.
- Spring Soil N, 0-3ft .
- Located across the sugarbeet growing area.
- Various soil types, sand – clay loam.

- Compared available N to achieve maximum sugar yield with N requirements of 4 lbs N/ton, 5 lbs N/ton, 6 lbs N/ton, 7 lbs N/ton and 8 lbs N/ton (Uofl rec).
- Determined the maximum sugar yield (statistically).
  - Maximum sugar yield was obtained at a rate greater than the check on **8 of the sites,** responsive sites.
  - **16 of the sites** were non-responsive. Maximum yield was assigned to the check yield.



Idaho – 24 Site Years 2005-10

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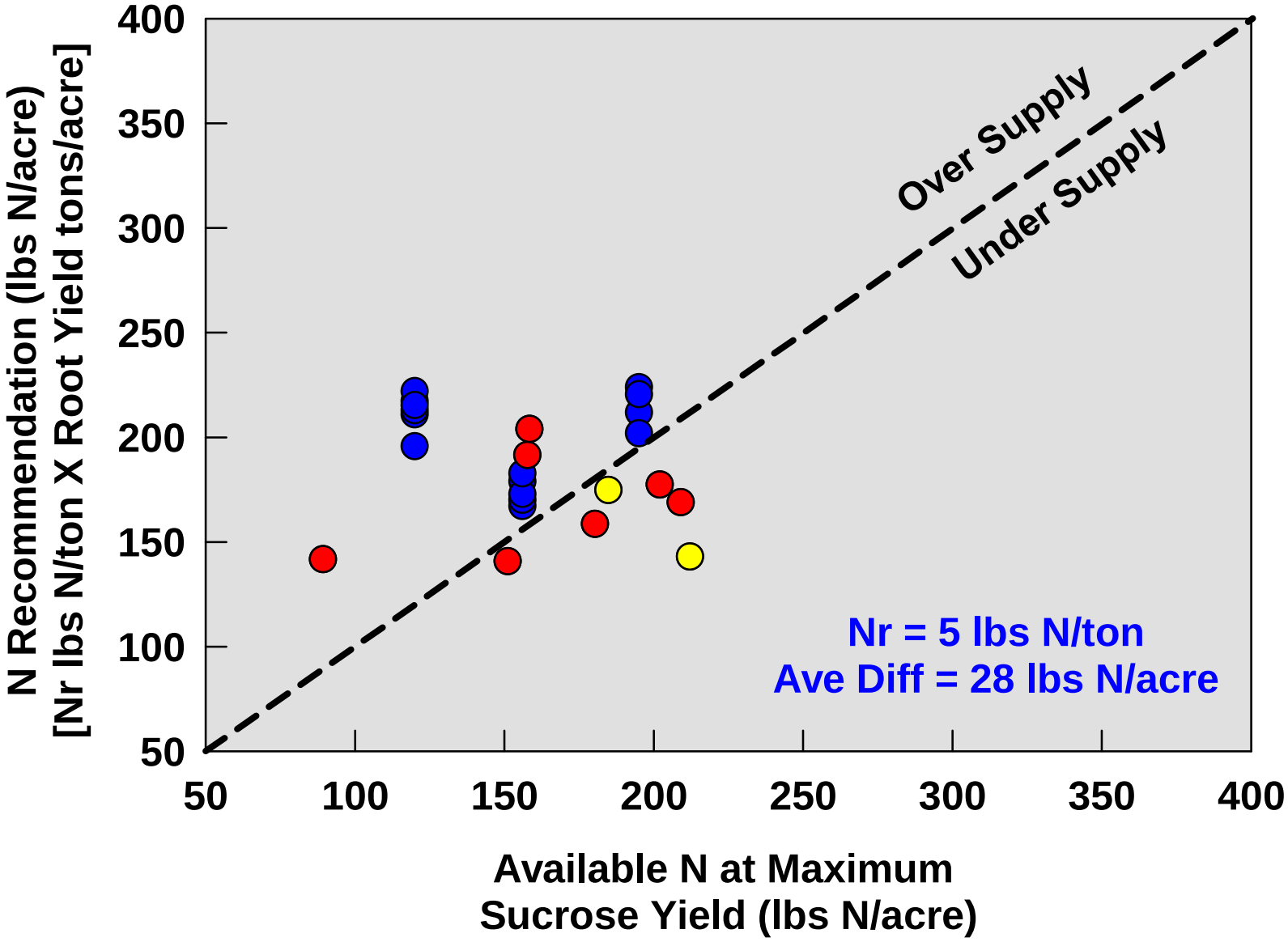

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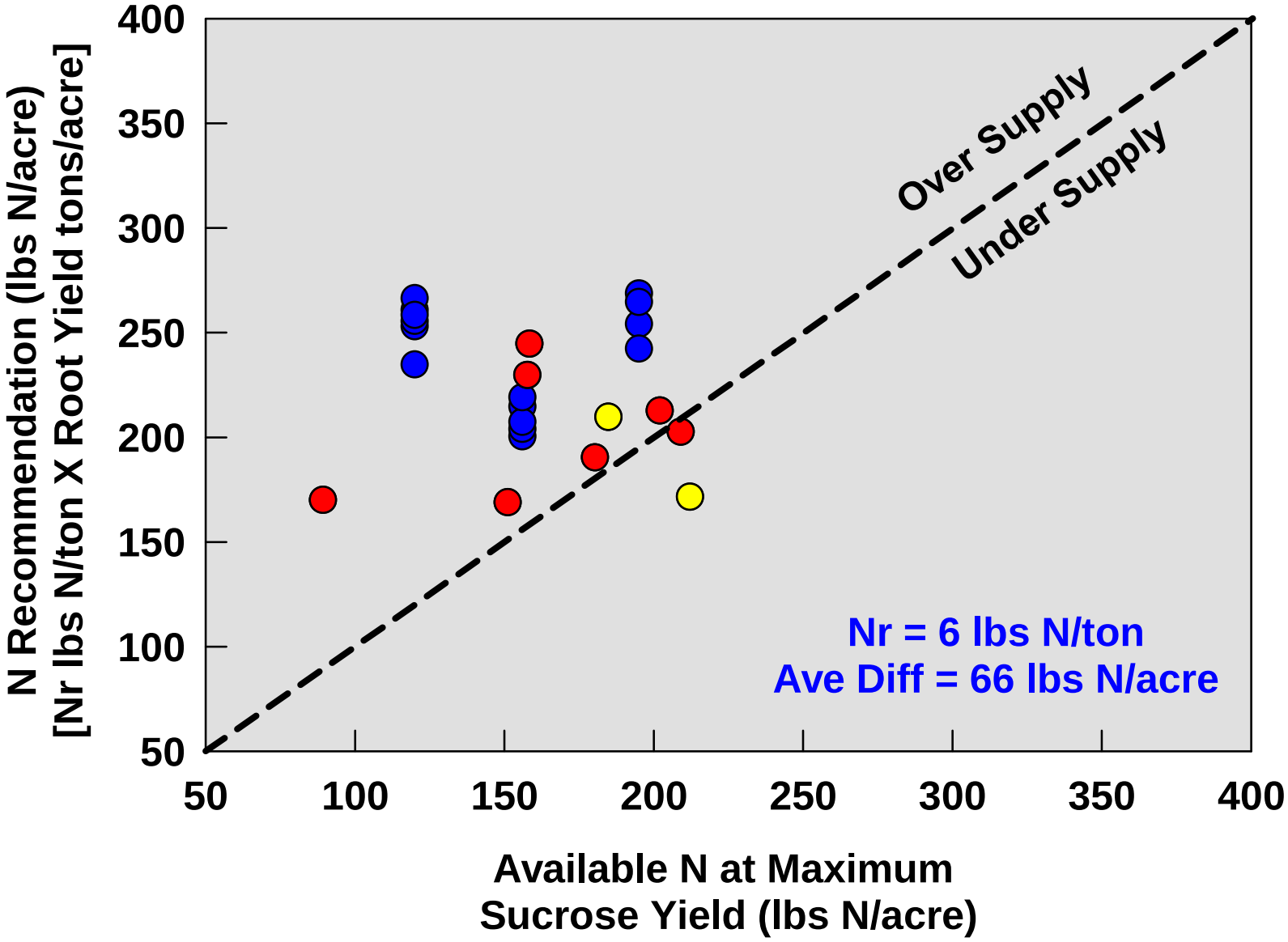

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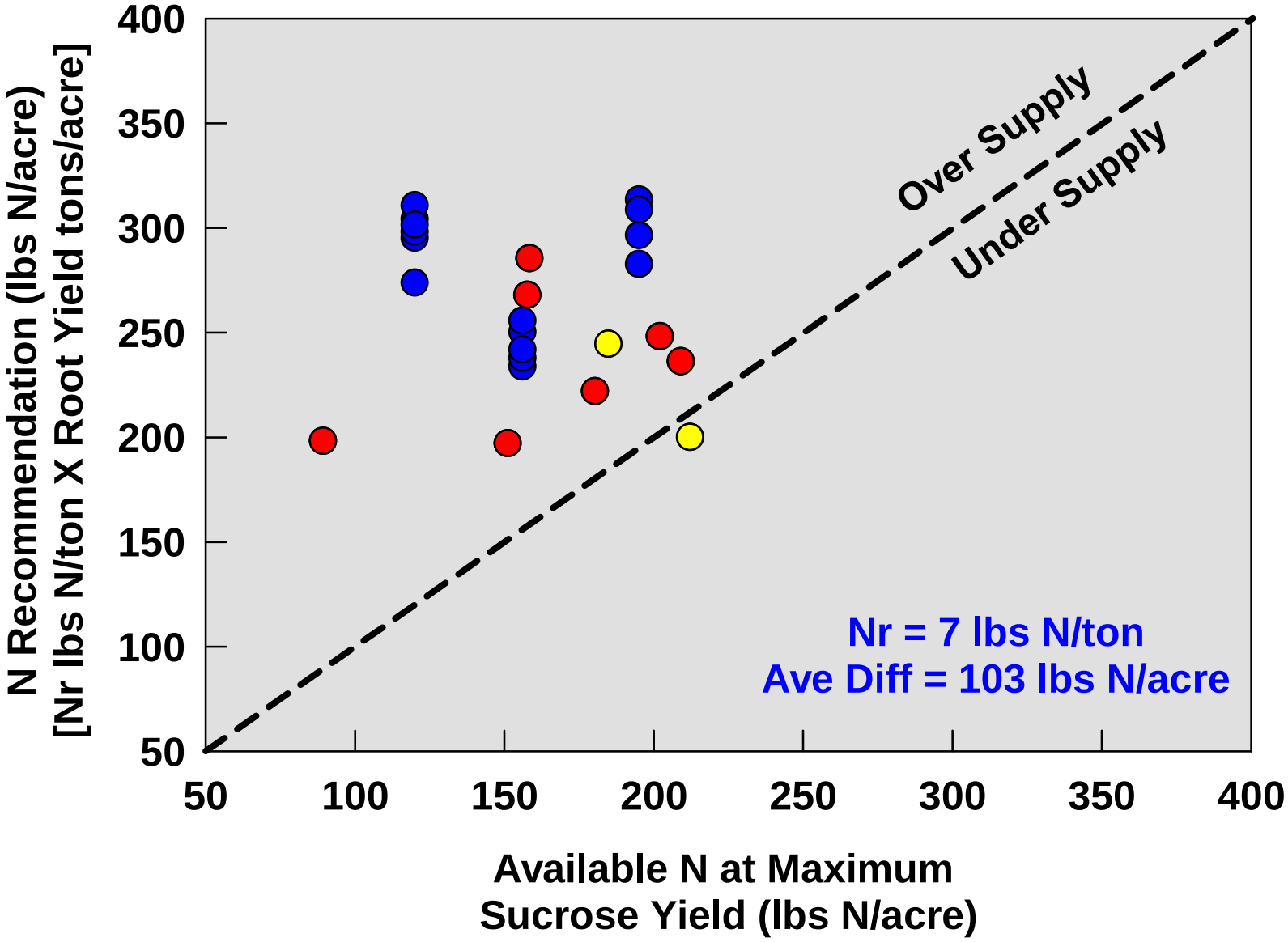

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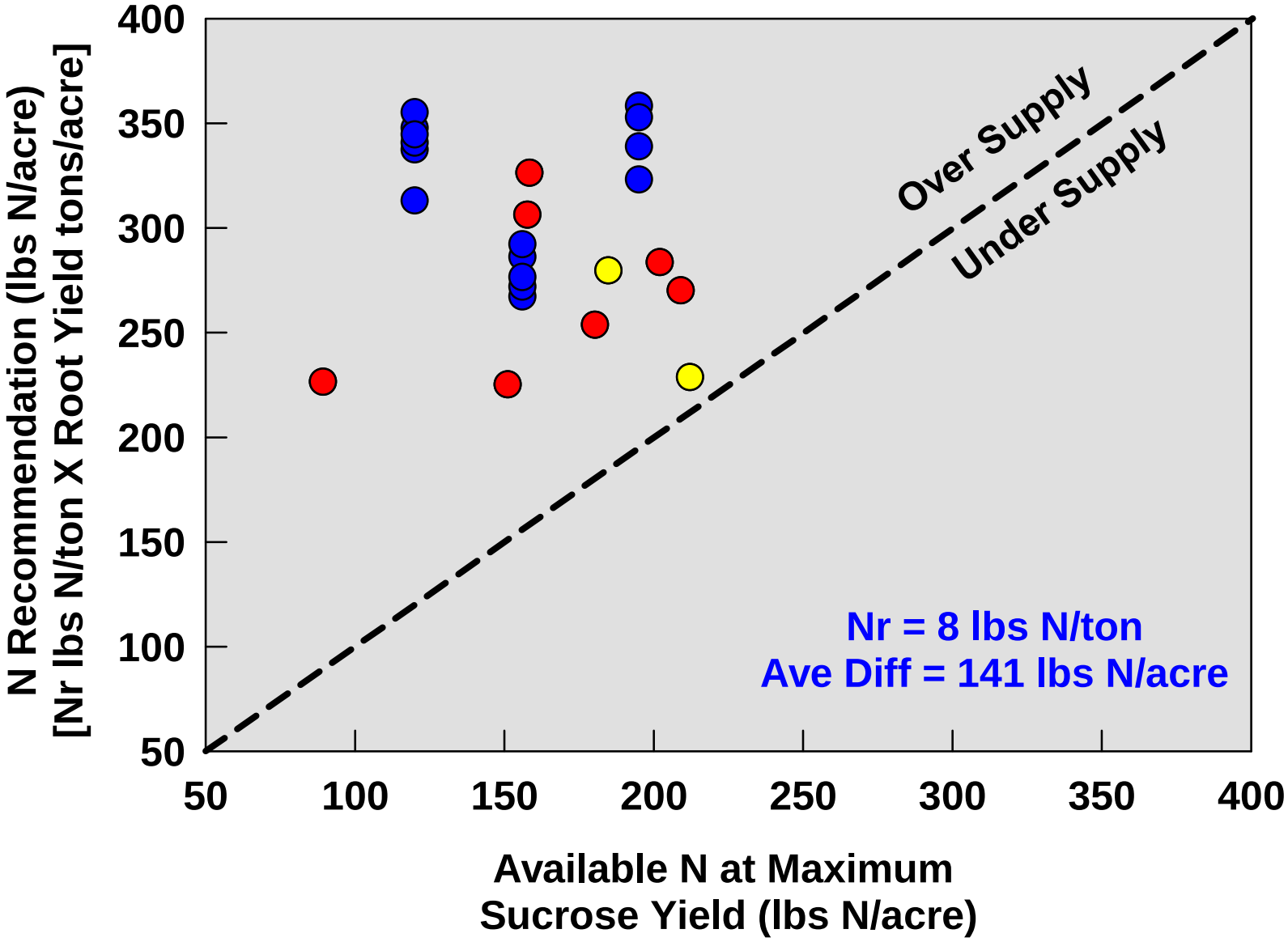

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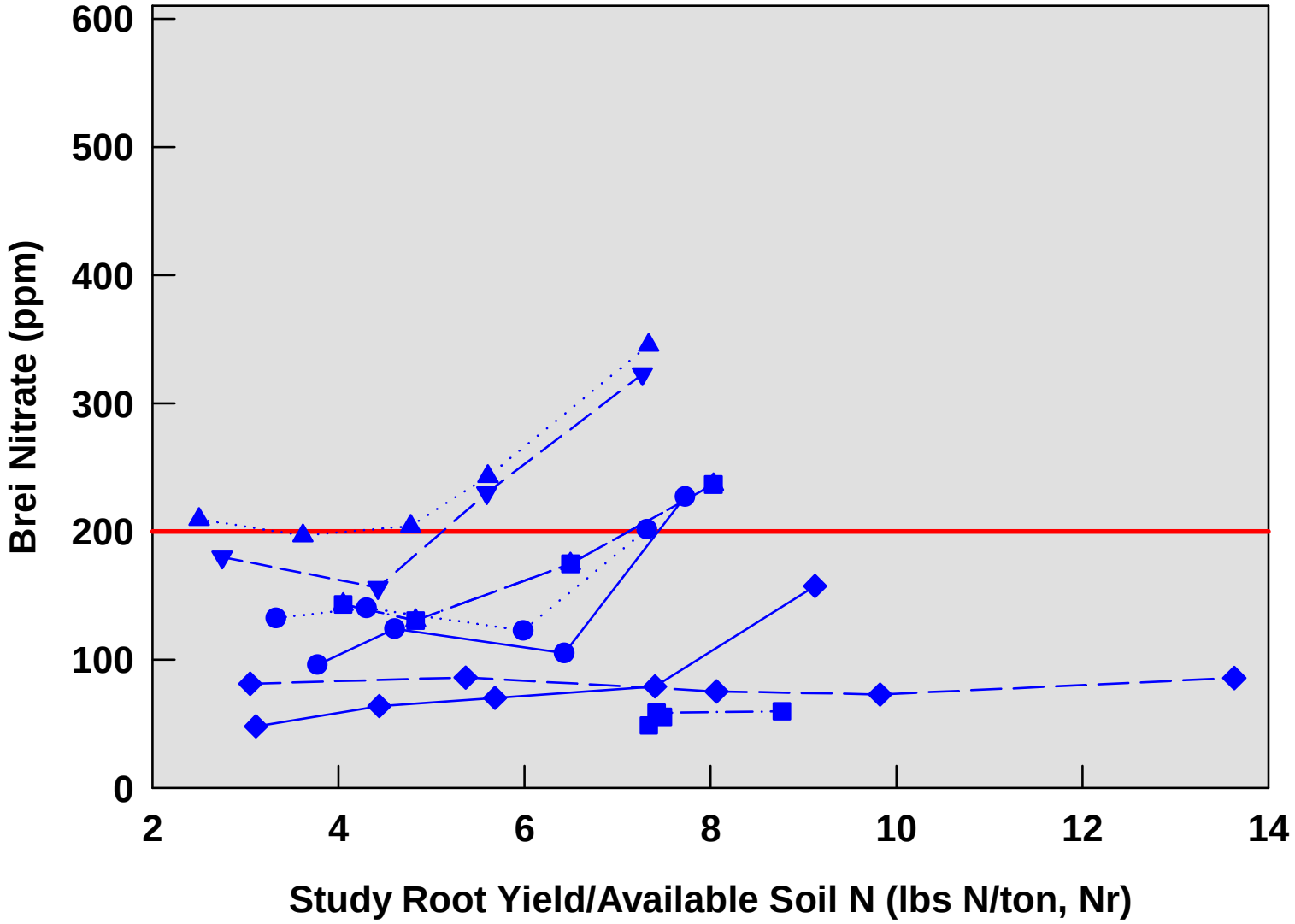

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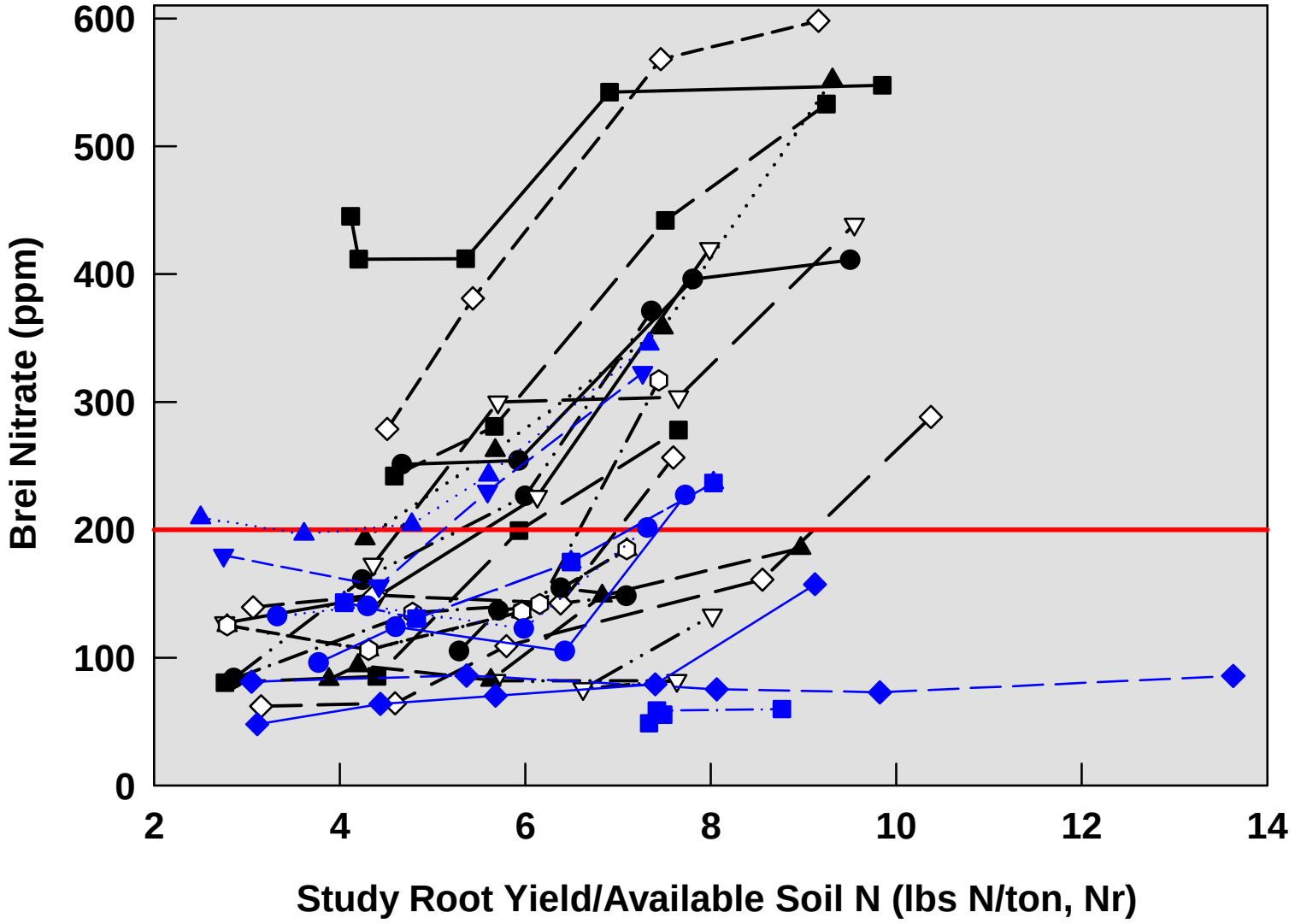

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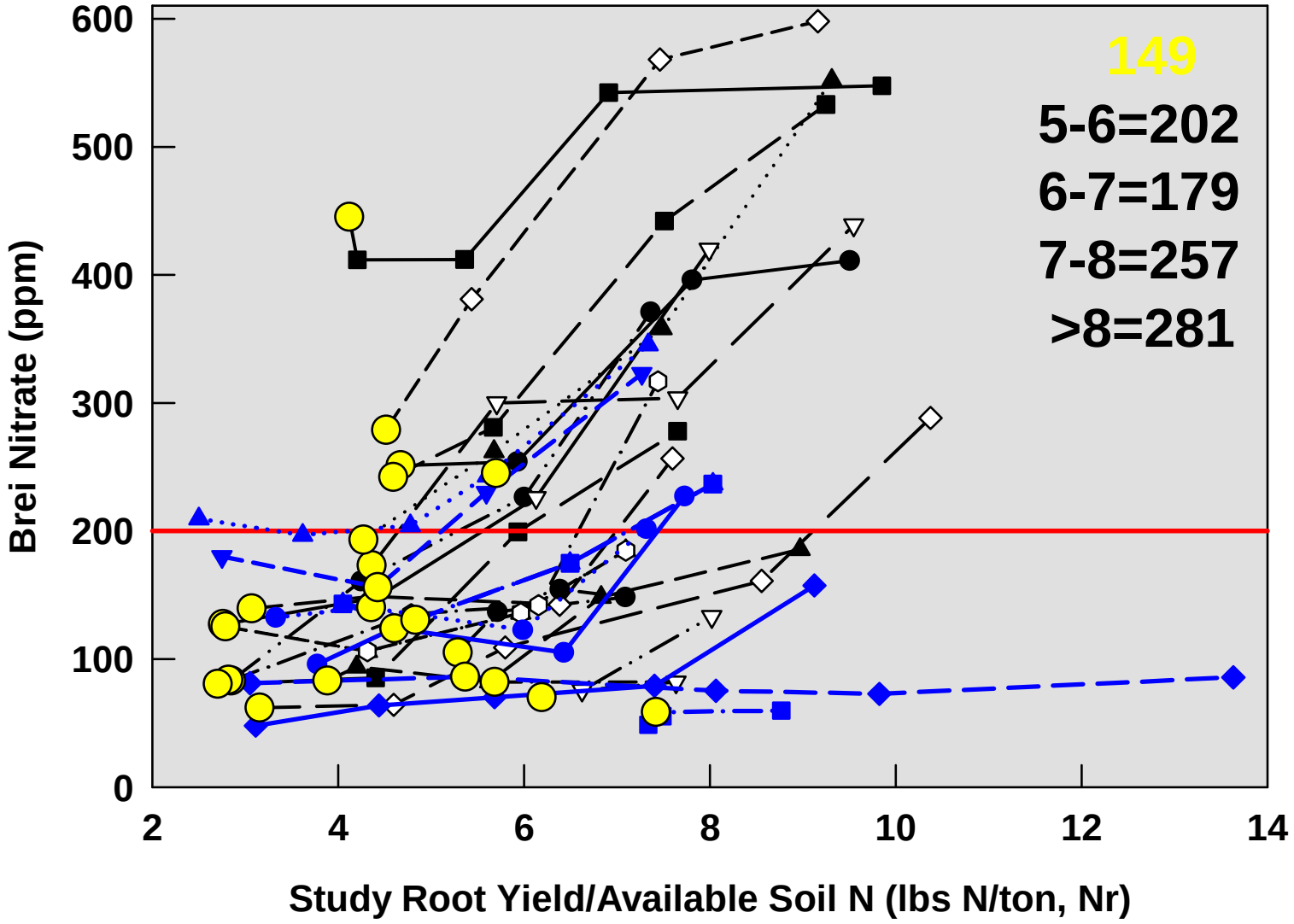

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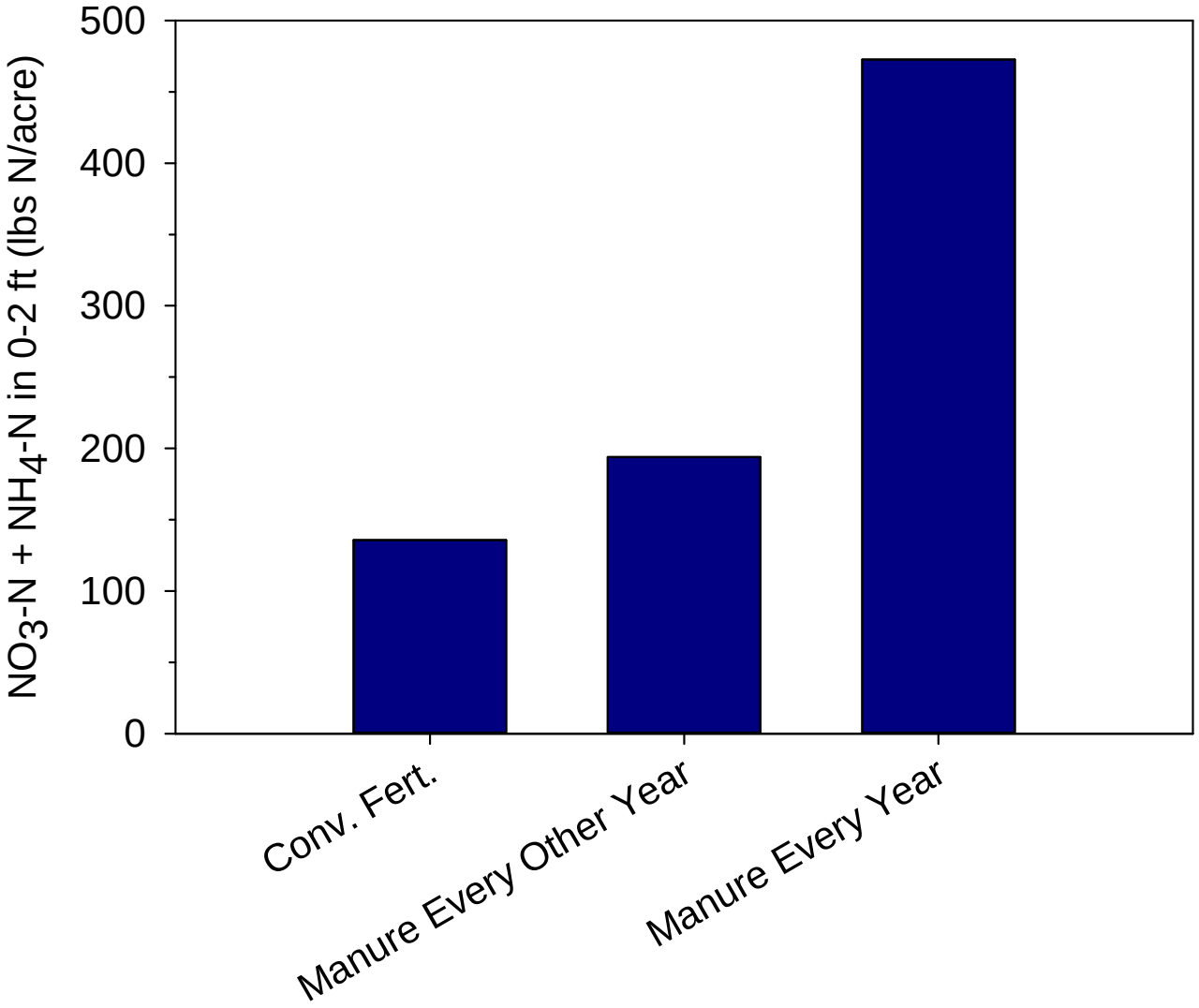

Effect of Past Manure on N Mineralization

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- N use efficiencies have improved
- N rate recommendations have improved
- We need to better understand the process of mineralization in our systems
- Research data supports growers in Idaho reducing Nr to around 6 lbs/ton

Conclusions

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