Alfalfa Response to K at Various pH levels

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Potassium function in forage legumes

- Enzyme Activity
- Carbohydrate Production and Transport
- Stomatal Activity
- Balances Anionic Charges
- Links to Increased resistance to disease and lodging

Potassium forms found in soil

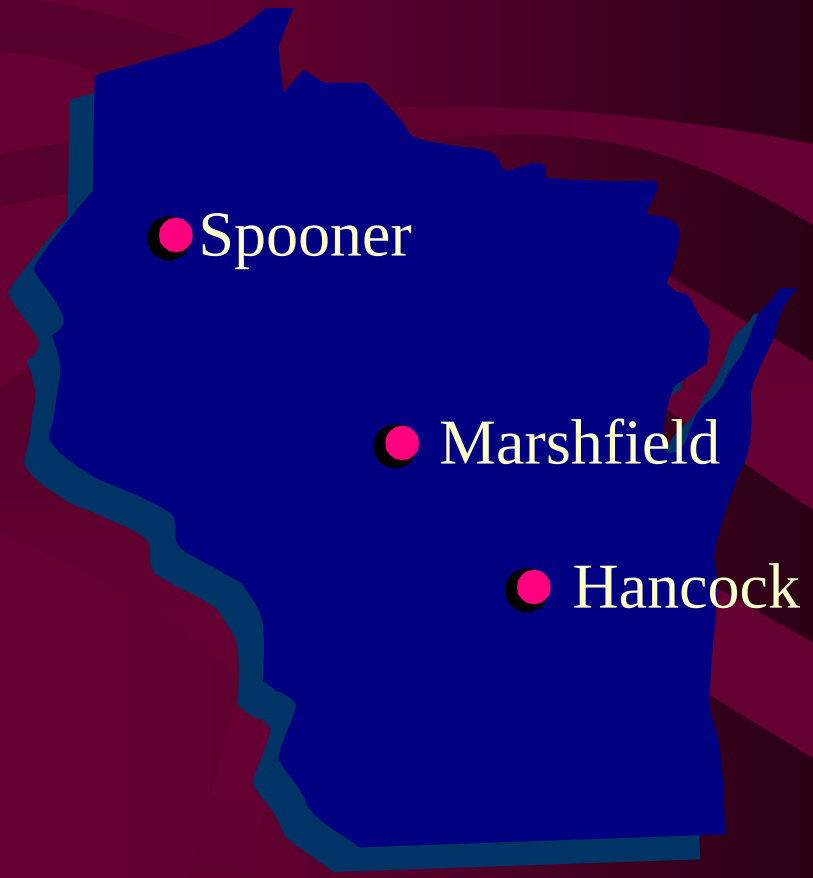
- Unavailable – Crystalline structure
- Slowly available – Clay minerals (buffer capacity)
- Readily available – Exchangeable

Objectives:

- The primary objective is to examine the interactive effects of liming and K_20 levels on yield and tissue cation levels.

Plot Locations

- Hancock
- Marshfield
- Spooner



Plot information

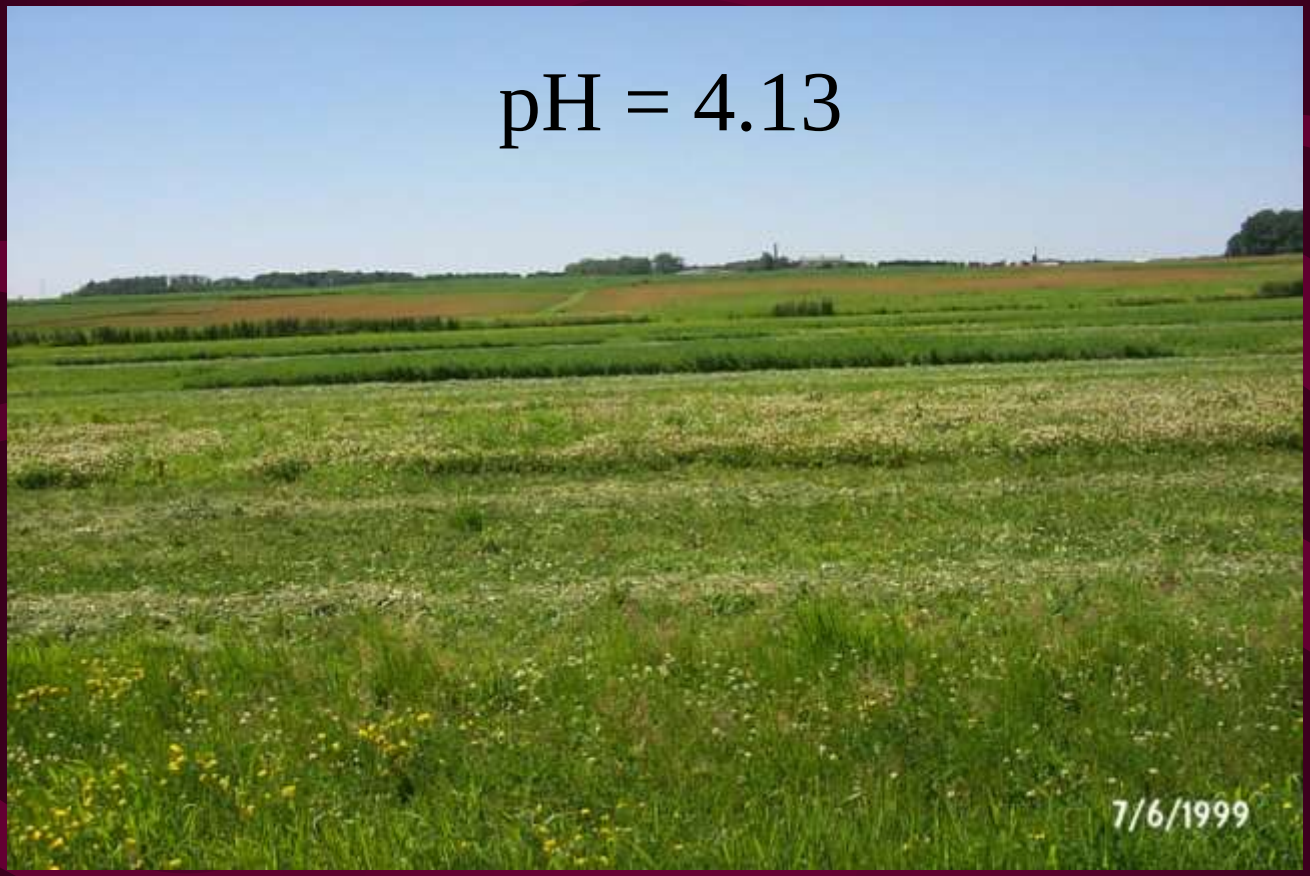
- Marshfield – Seeded 1997
  - 3 cuts 1998* & 1999
- Spooner – Seeded 1998
  - 2 cuts 1998*, 3 cuts 1999
- Hancock – Seeded 1998
  - 2 cuts 1998*, 3 cuts 1999

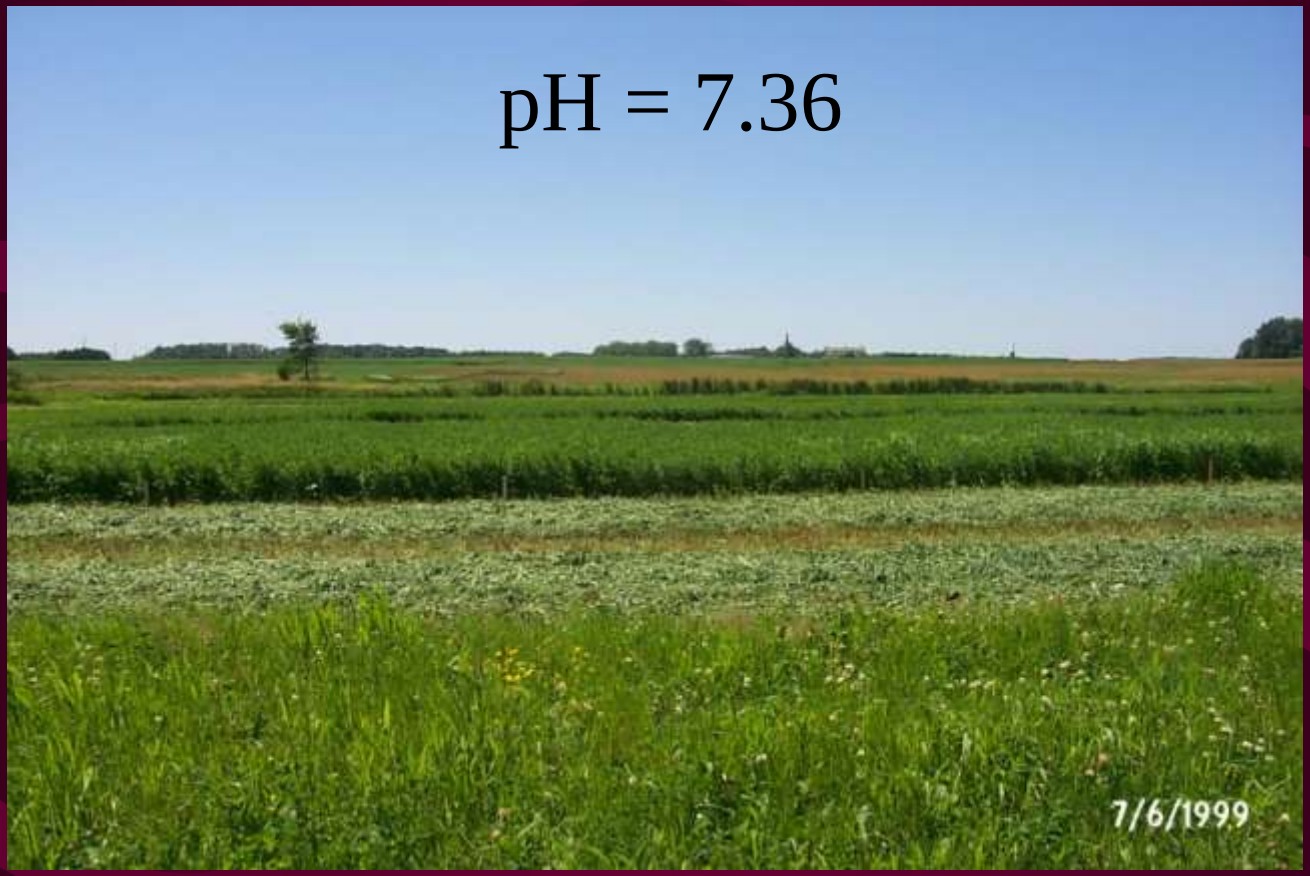
*1st cut discarded due to high weed content

Treatments

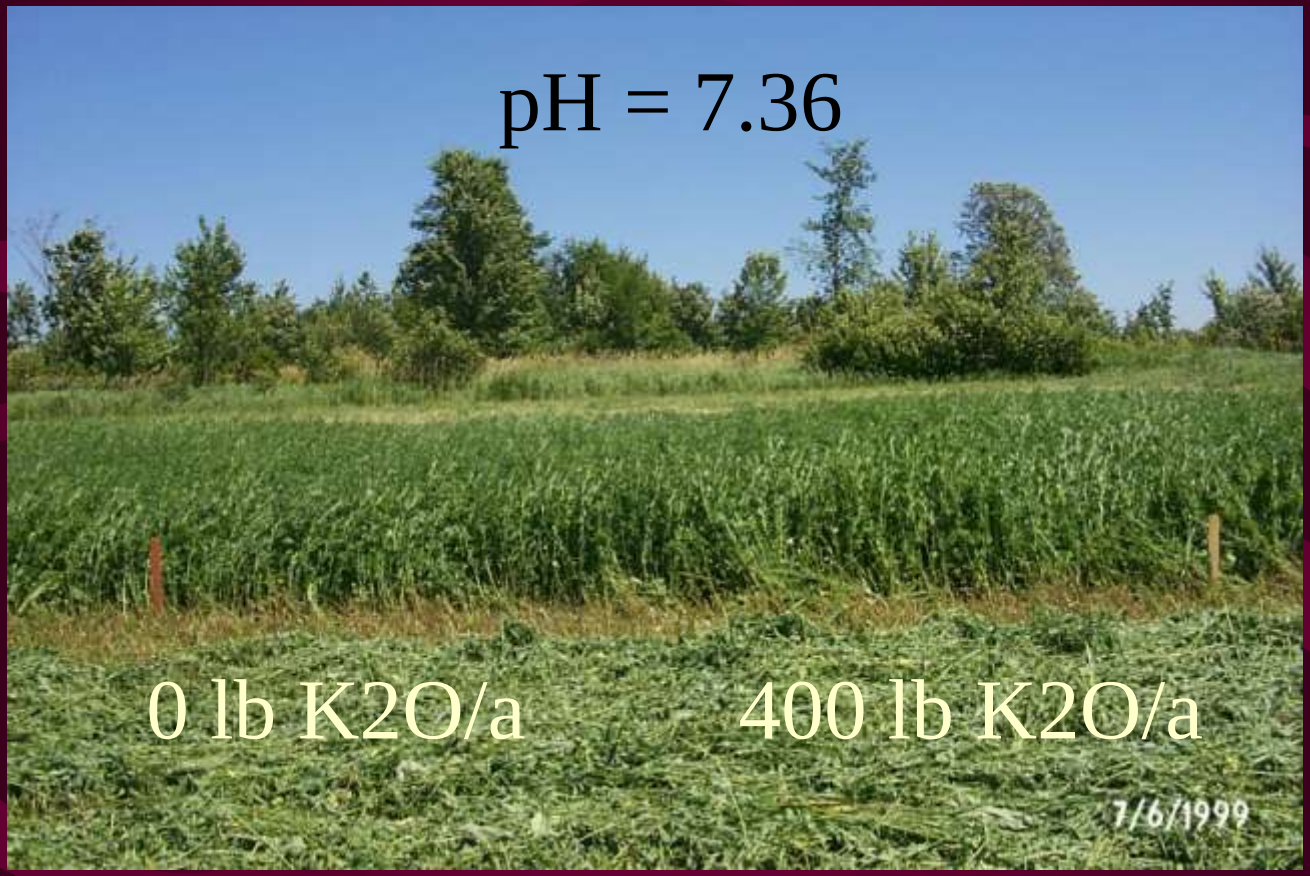
- Four K_20 levels – 0, 100, 200, 400 lbs K_2O/a/year*
  * Applied after first cutting
- Target pH levels
  - Marshfield: six levels – 4.8 - 7.3
  - Spooner: five levels – 4.7 - 6.7
  - Hancock: eight levels – 4.5 - 7.0

Low pH treatment

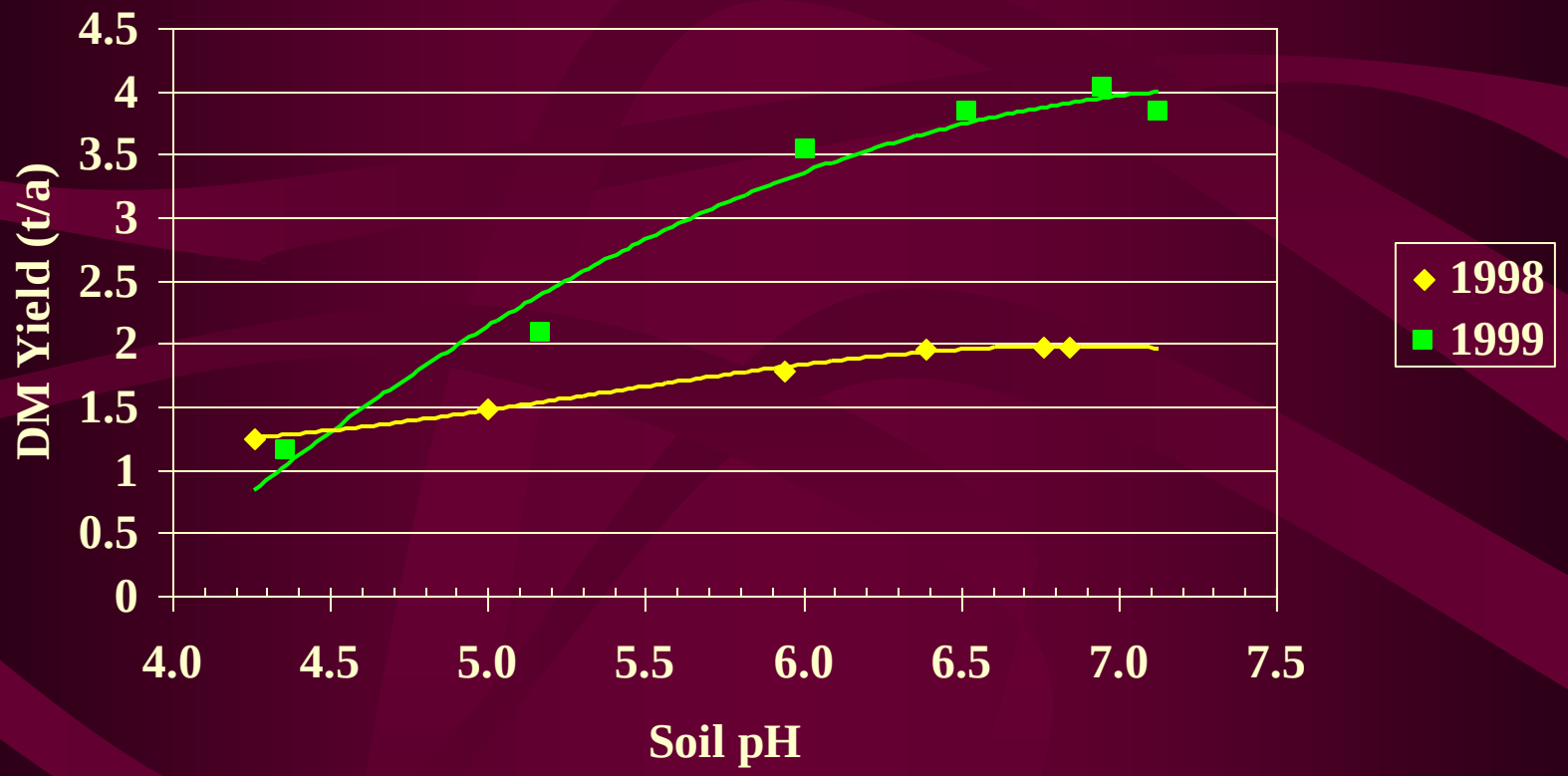



pH = 7.36
7/6/1999

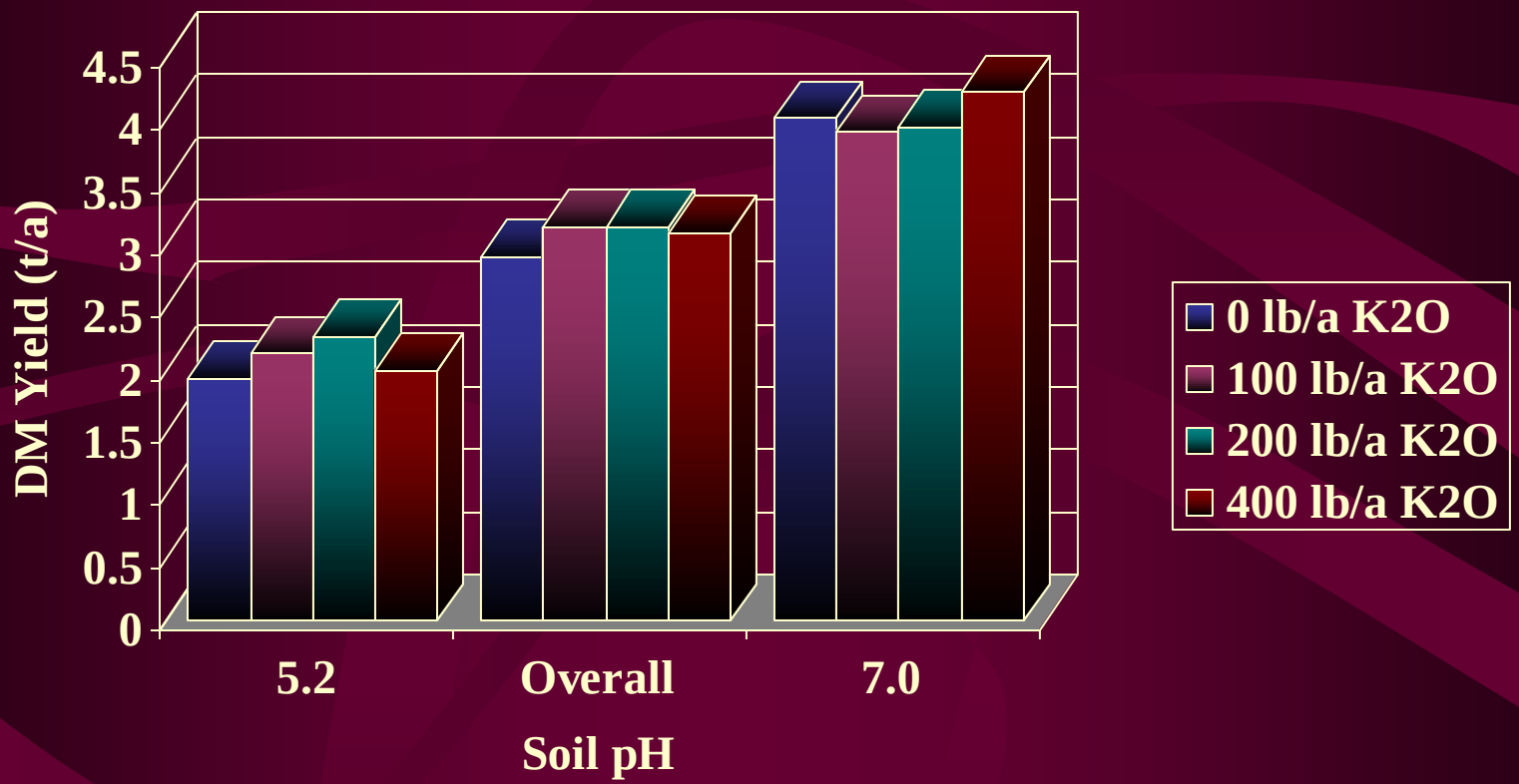
K treatments within a plot



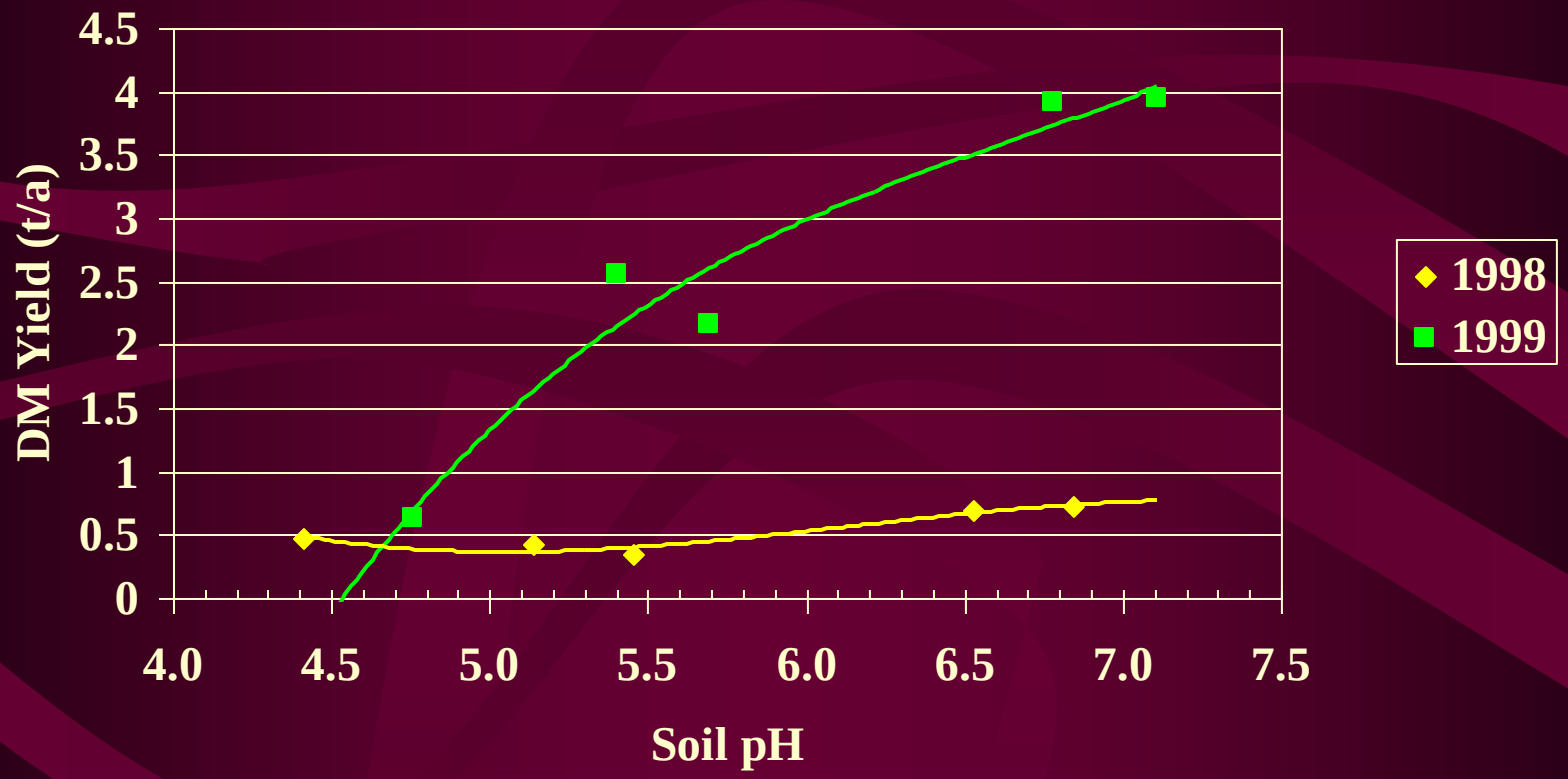
Marshfield


DM Yield (t/a)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
Soil pH
1998
1999

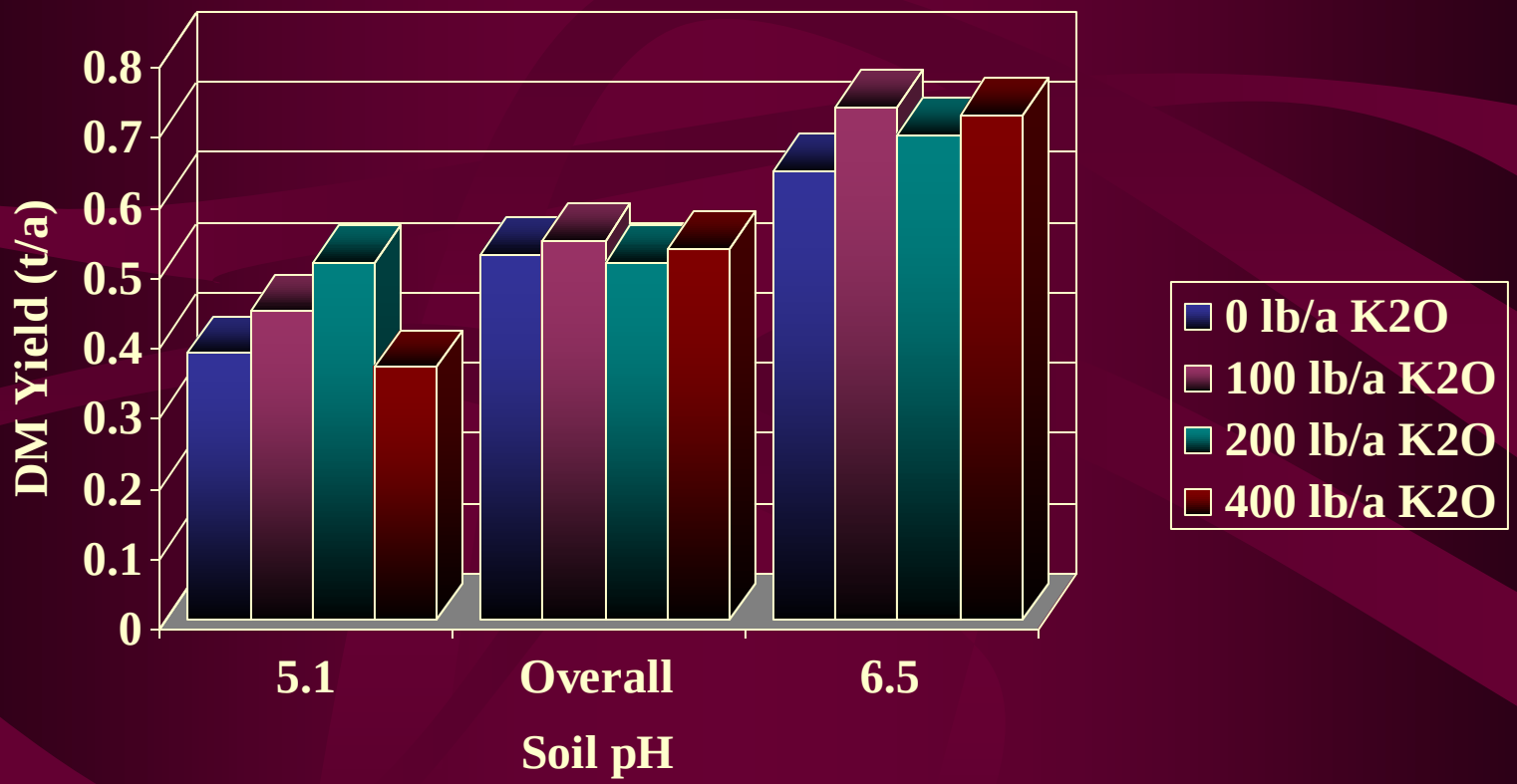
Marshfield 1999



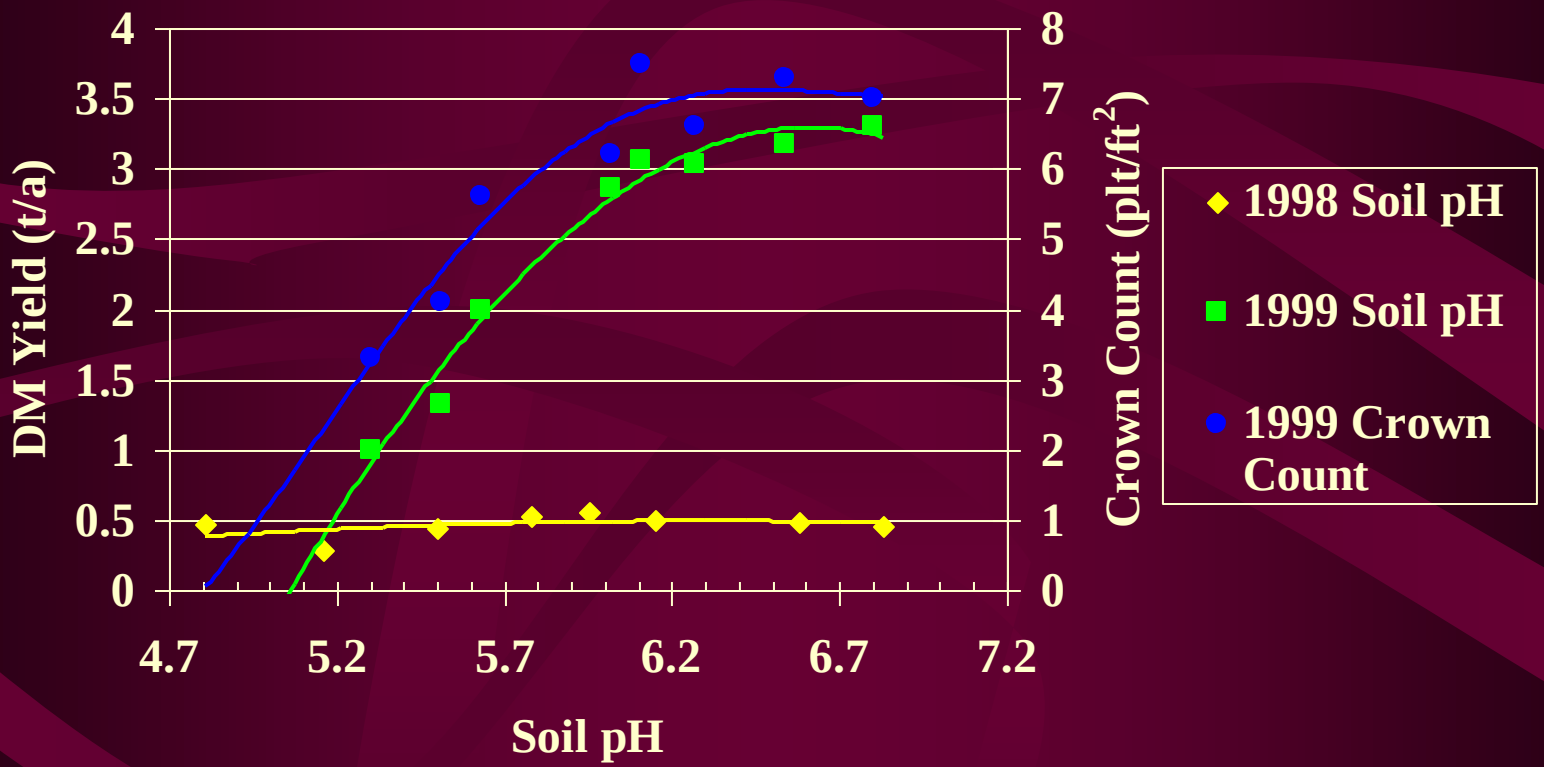
Spooner


DM Yield (t/a)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
Soil pH
1998
1999

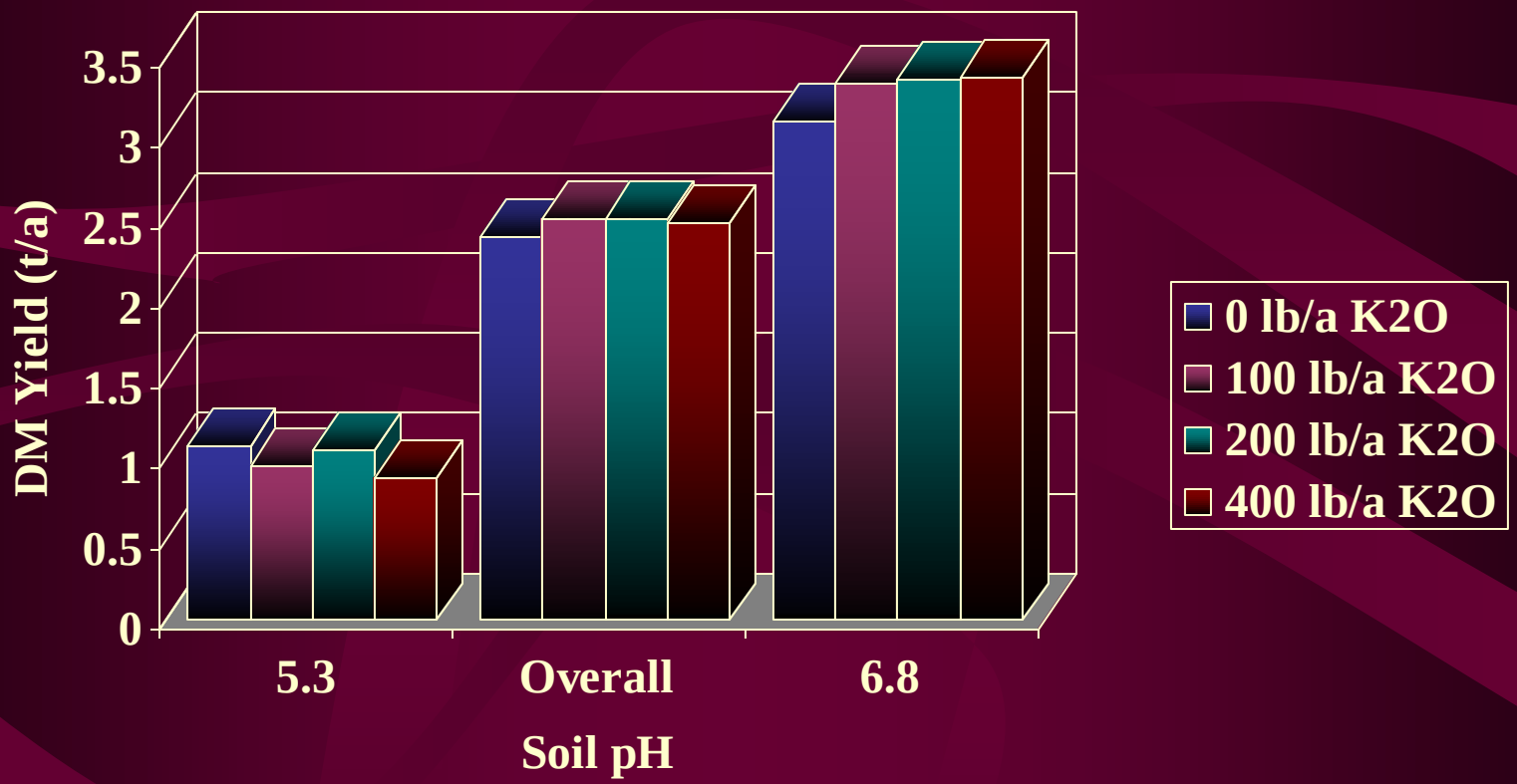
Spooner 1998



Hancock


DM Yield (t/a)
4
3.5
3
2.5
2
1.5
1
0.5
0
Crown Count (plt/ft2)
8
7
6
5
4
3
2
1
0
4.7
5.2
5.7
6.2
6.7
7.2
Soil pH
1998 Soil pH
1999 Soil pH
1999 Crown Count

Hancock 1999



Summary

- Soil pH had a significant effect on alfalfa dry matter product in nearly all cuttings

- The magnitude of the yield response in 1999 ranged from:
  - 525% - Spooner
  - 250% - Marshfield
  - 230% - Hancock

Summary, cont.

- Annual K_2O applications generally:
  - had a positive influence on alfalfa yield at near optimum pH levels
  - had a negative influence on yield at the very acid soil pH levels when applied at 400 lbs K_2O/a/yr
- When soil acidity is not limiting yield, alfalfa can respond to additional K_2O
- Expect more response in subsequent years as background K levels are lowered