



Garlic Fertility - Optimal Rates and Timing

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Topics for today

How do you grow great garlic?

What are the optimum fertility rates?

What is the optimal timing?

Growing Great Garlic



Quality starts with the seed

Seed is the first
source of fertilizer

Seed is the first
source of disease



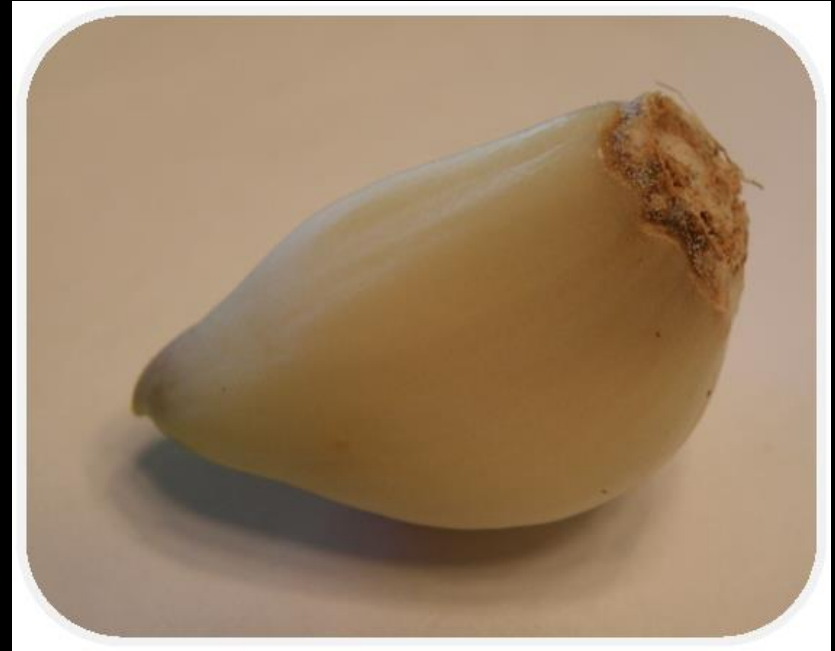


Choose disease and nematode-free seed



Image: George Abawi

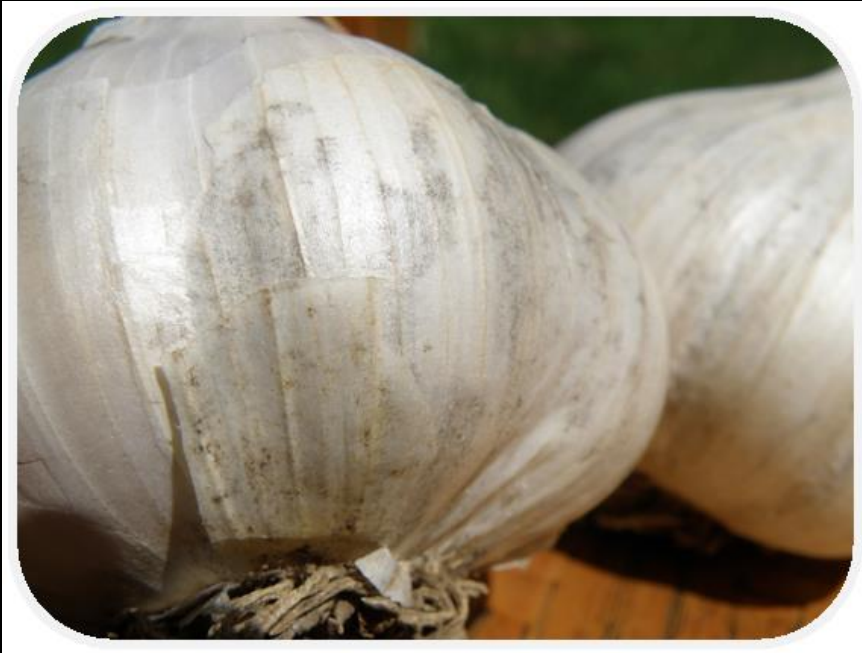
Fusarium



Images: Crystal Stewart

Fusarium bulb rot (left) and Fusarium basal rot (right).

Surface disorders



Embelissia



Aspergillus

Creating a good planting environment

Soil texture and structure affect planting depth

Timing of planting affects final bulb quality



To mulch, or not to mulch?



Image: Brian Fox

Anatomy of a great garlic plant

Healthy, vigorous
root system

Healthy, durable
leaves

Ok, but what about the fertilizer?

Garlic	Nitrogen (N) Lbs/A	Phosphorus (P2O5) Lbs/A					Potassium (K2O) Lbs/A				
Soil Test Results		Very low <3lbs/A	Low 3-6	Medium 7-13	High 14-40	Very High >40	Very low <50	Low 51-100	Medium 101-200	High 201-300	Very High >300
Incorporate at planting	0	200	150	100	50	0	200	150	100	50	0
Sidedress before emergence	25-50	0	0	0	0	0	0	0	0	0	0
Sidedress 2-3 times, 3-4 weeks apart	25-50 divided among sidedressings	0	0	0	0	0	0	0	0	0	0
TOTAL	50-100	150	100	75	50	0	150	100	75	50	0

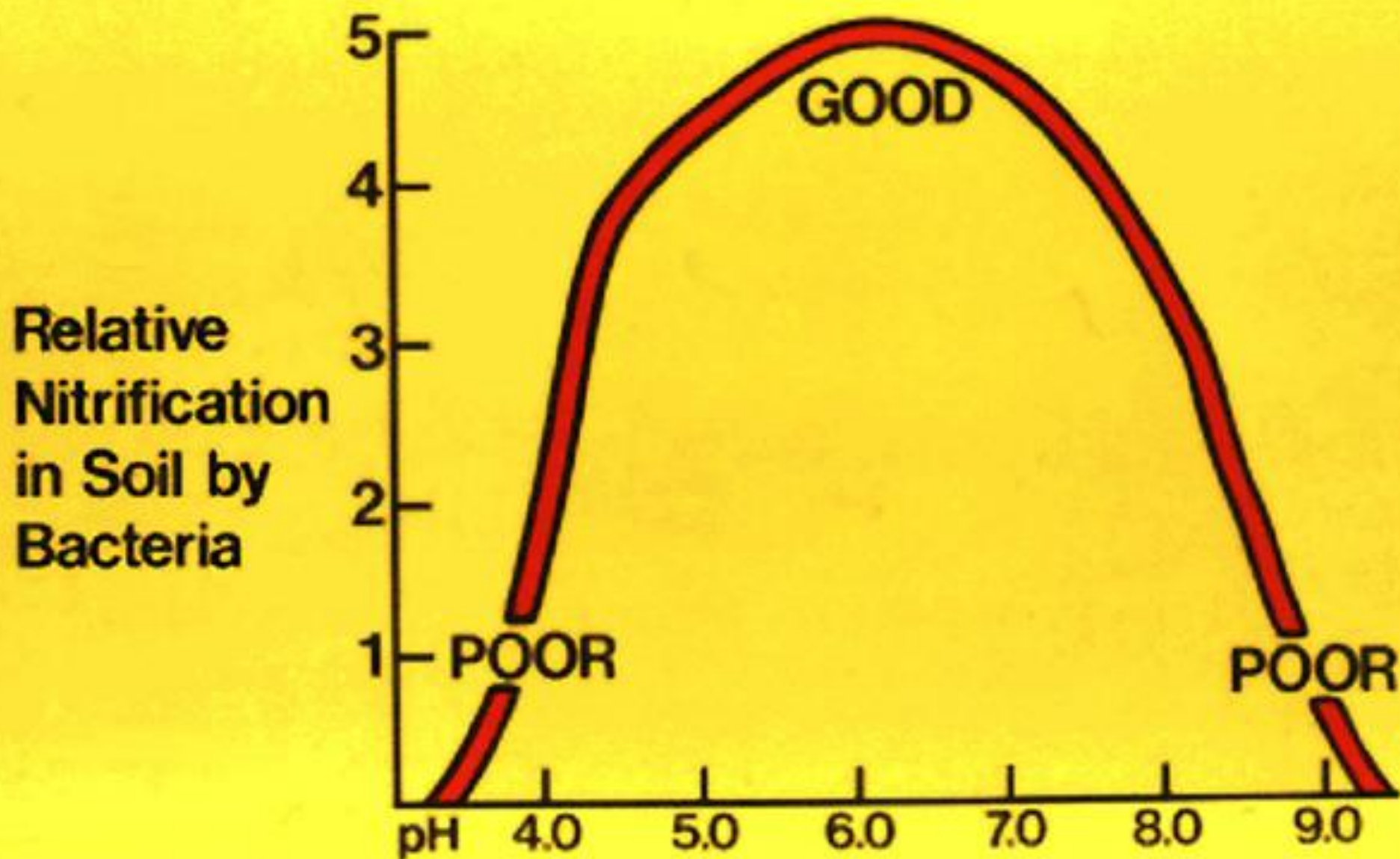
Source: Cornell Recommendations for garlic, used by Agro-One Soil Lab. Based on use of a Morgan extract.

Manage N to optimize shoot growth

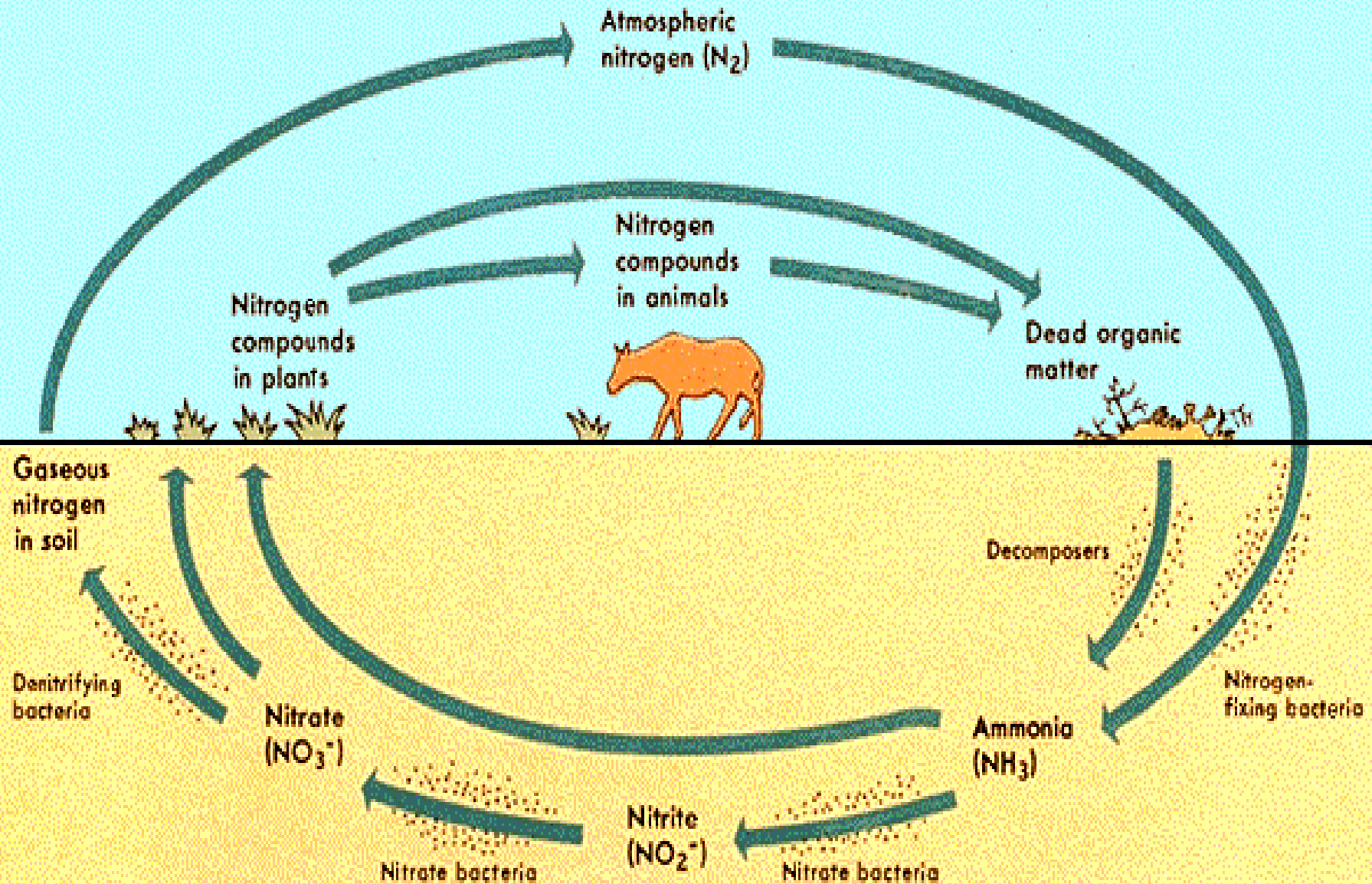
Timing—when does garlic actually use N to make shoots?

Rates—how much N does a plant need to optimize bulb size?

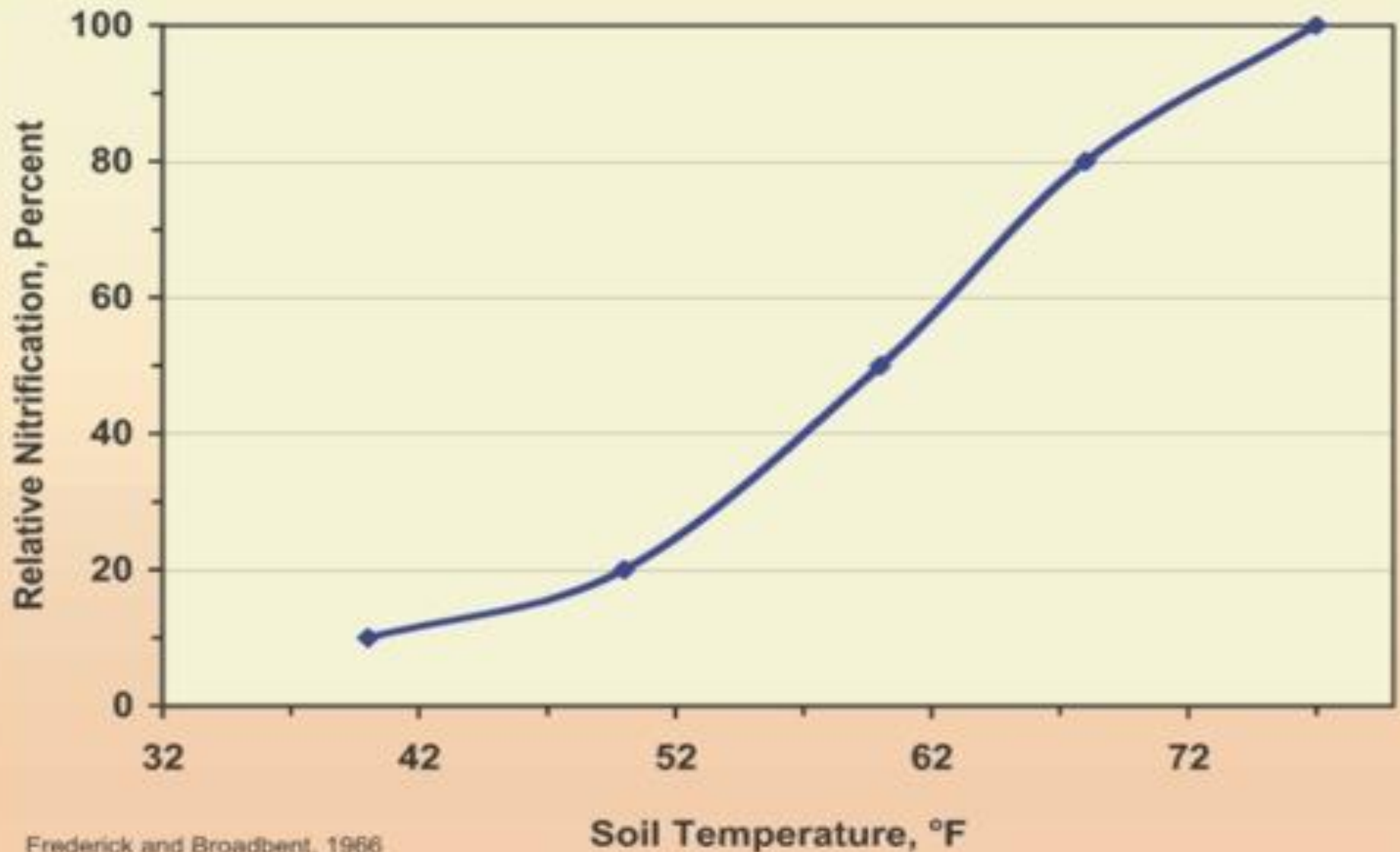
Relation of Soil pH to Nitrification



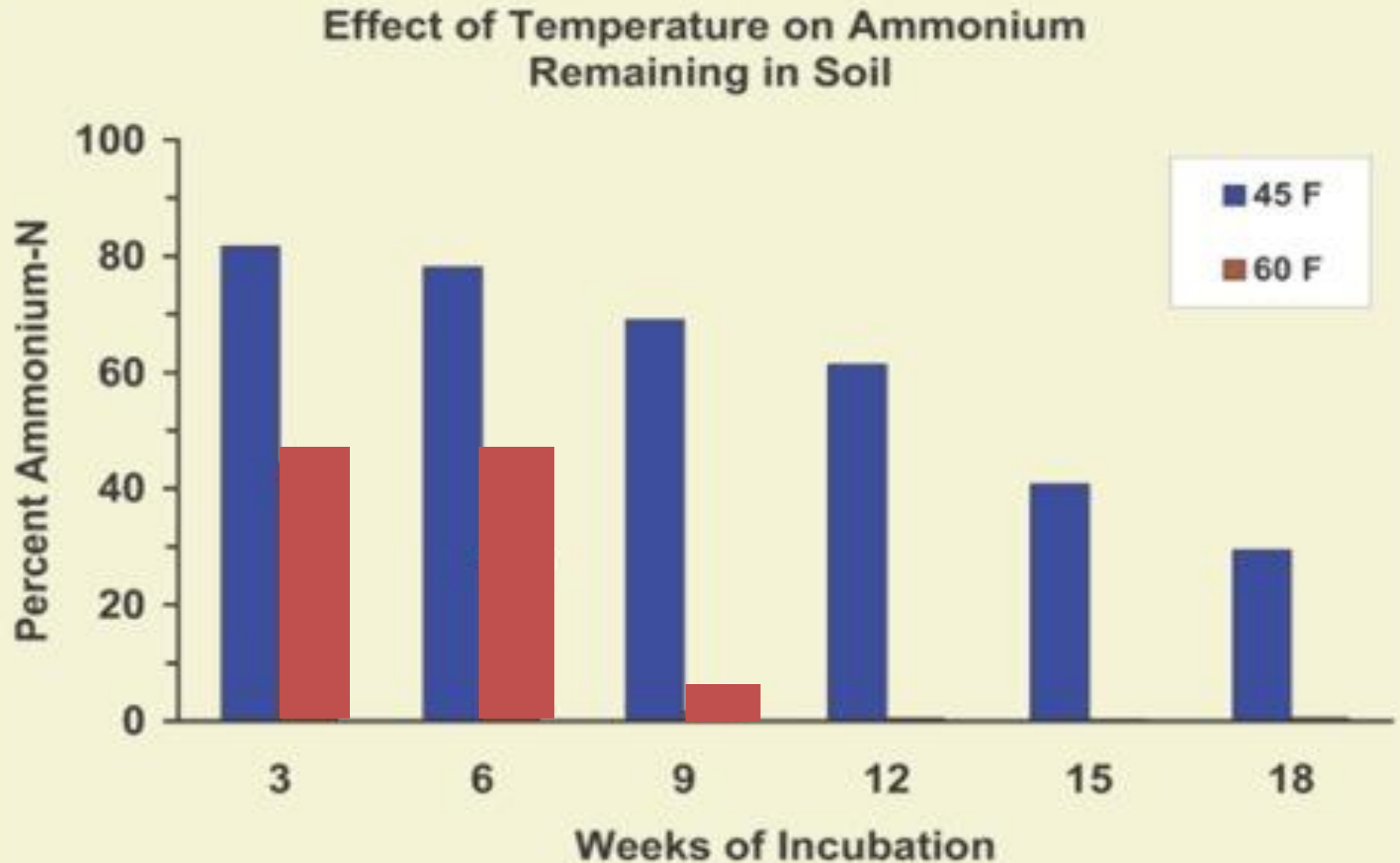
Nitrogen Cycle



Ammonium is converted to nitrate, process is temperature dependent, low <50F



Ammonium is converted to nitrate and is temperature dependent



Spring applied ammonium nitrate

N Rate (lbs/A)	Garlic Yield (lbs/A)
0	16,830
45	19,800
90	19,620

N Rate (lbs/A)	Garlic Yield (lbs/A)
0	17,280
45	18,700
90	18,500

O'Callaghan and Ellerbrock, 1998, 1999.

Leaf Number	Garlic Yield (lbs/A)
3	20,700
5	19,620
7	19,800
10	17,600

Leaf Number	Garlic Yield (lbs/A)
3	19,300
5	18,220
10	18,000

O'Callaghan and Ellerbrock, 1998, 1999.

Date	Leaf Number	N (lbs/A)	Garlic Yield (lbs/A)
3/31	3	90	22,000
3/31 & 4/23	3/5	45/45	21,600
3/31 & 5/12	3/7	45/45	21,200
4/23 & 5/12	5/7	45/45	21,000

Date	Leaf Number	N (lbs/A)	Garlic Yield (lbs/A)
4/3	3	90	19,800
4/3 & 5/3	3/5	45/45	18,900
5/3 & 6/3	5/10	45/45	17,500

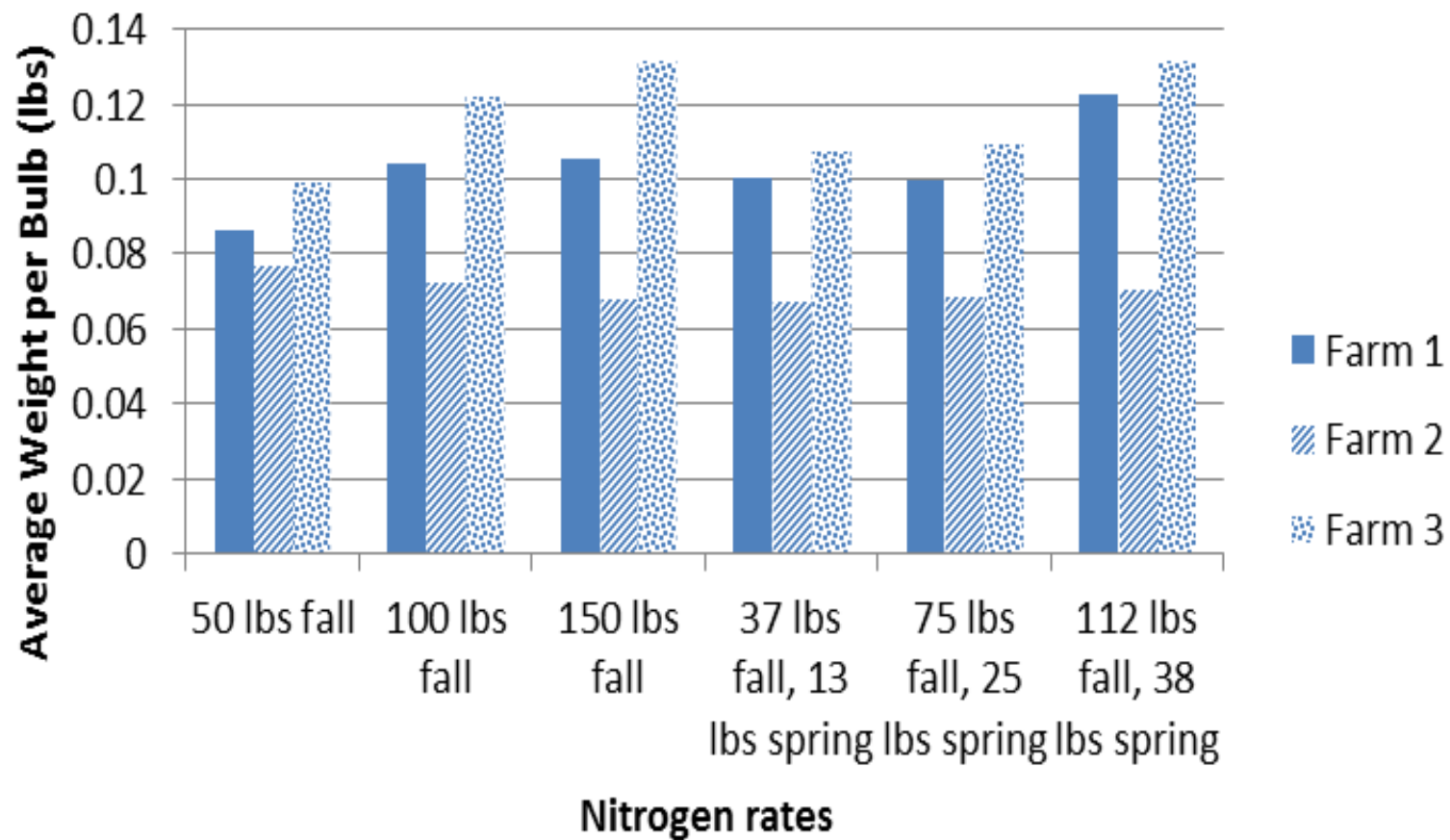
Fertility Trials Results, 2013



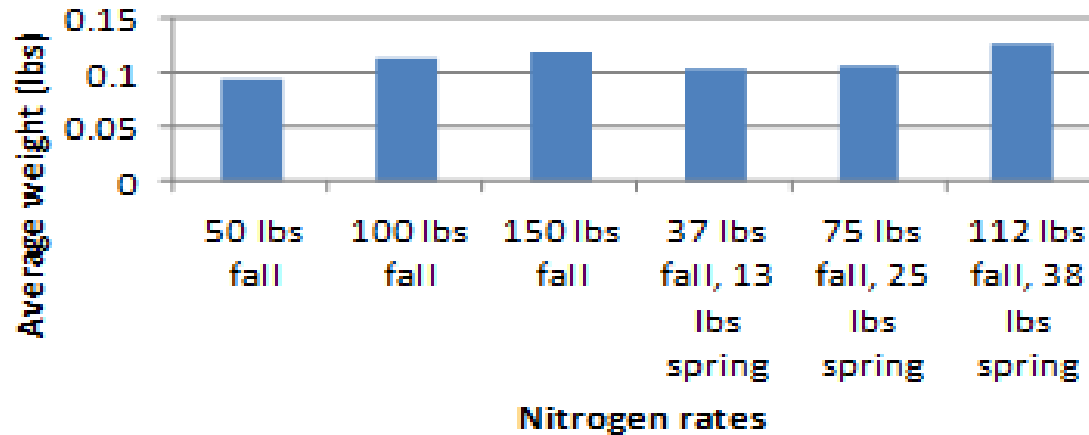
50 lbs total Nitrogen	100 lbs total Nitrogen	150 lbs total Nitrogen
All fall	All fall	All fall
75% fall, 25% quick split spring*	75% fall, 25% quick split spring	75% fall, 25% quick split spring

***All fertility treatments were organic**

Average weight per bulb versus N rates



Average Weights from Farms 1 and 3 Combined



Treatment	Average Weight
50 lbs fall	0.093
100 lbs fall	0.113
150 lbs fall	0.119
37 lbs fall, 13 lbs spring	0.104
75 lbs fall, 25 lbs spring	0.105
112 lbs fall, 38 lbs spring	0.127

Key conclusions:

Fall applications of slow release, organic N fertilizers can be extremely effective

Spring applications of quick release N do not need to be split

Spring N should be applied early

Weed control is as important as fertility



Questions?

