

Soil Fertility and pH in Pea Production

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Topics

- **Fertility recommendations**
- **Research update**
 - **Dryland**
 - **Recent green pea studies in the Walla Walla/Milton-Freewater area**

Nitrogen fertility benefits

Small nitrogen credit attributed to grain legume residues

Previous crop and dry yield	Credit (lb N/acre)
Peas >2500 lb/acre	20
Peas 1500 to 2500 lb/acre	15
Peas <1500 lb/acre	10
Lentils >1000 lb/acre	10
Alfalfa	50

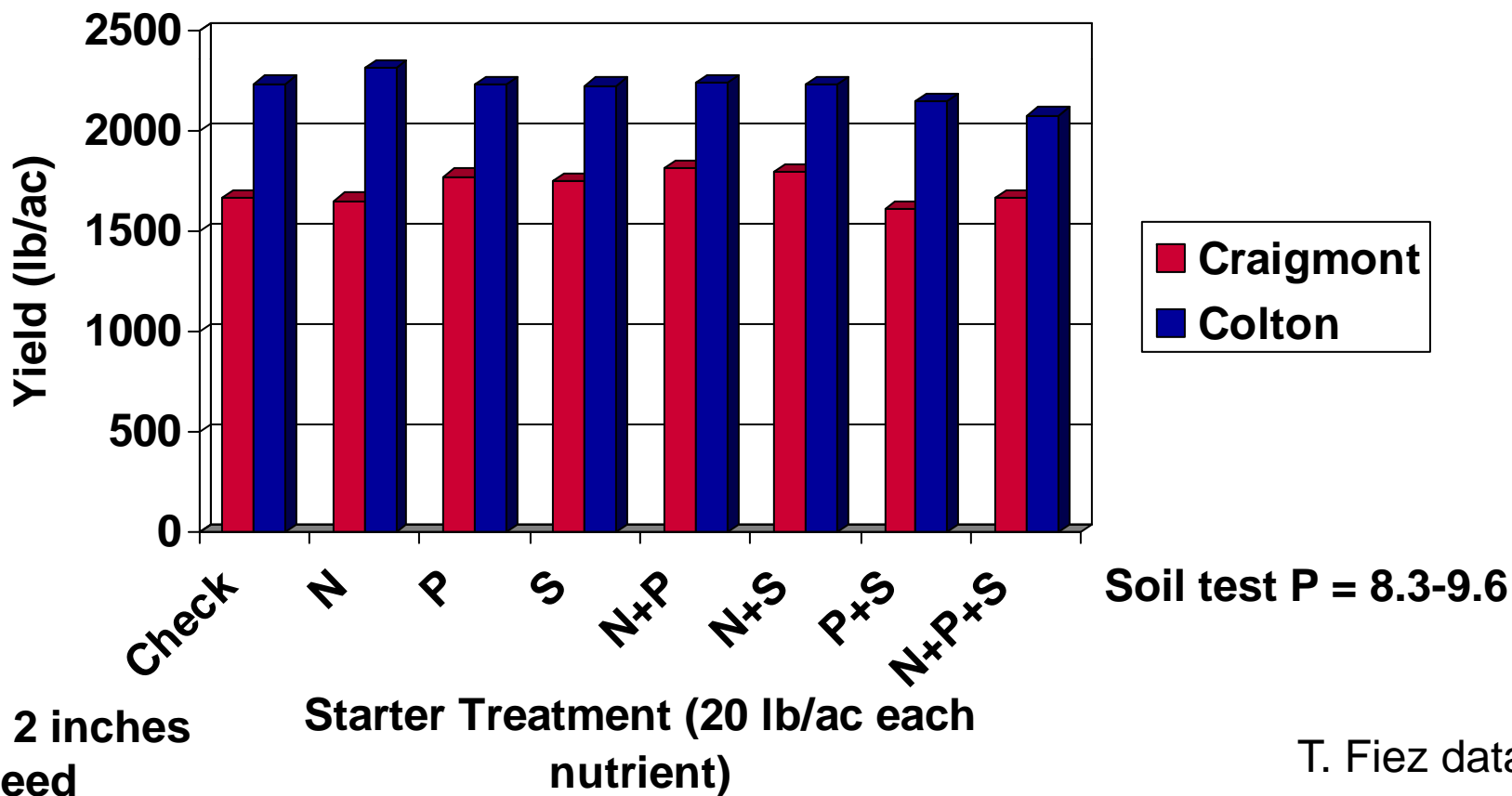
Dry pea fertility

- **University of Idaho fertility guides authored by R. Mahler**
 - <http://www.uidaho.edu/wq/wqfert/wqfertls.html>
- **Emphasize**
 - **Inoculation for fields without a history of same legume in last 3 years, or pH below 5.7**
 - **Soil test for phosphorus, sulfur, zinc and boron**
 - **Molybdenum when pH < 5.7 (seed treatment)**

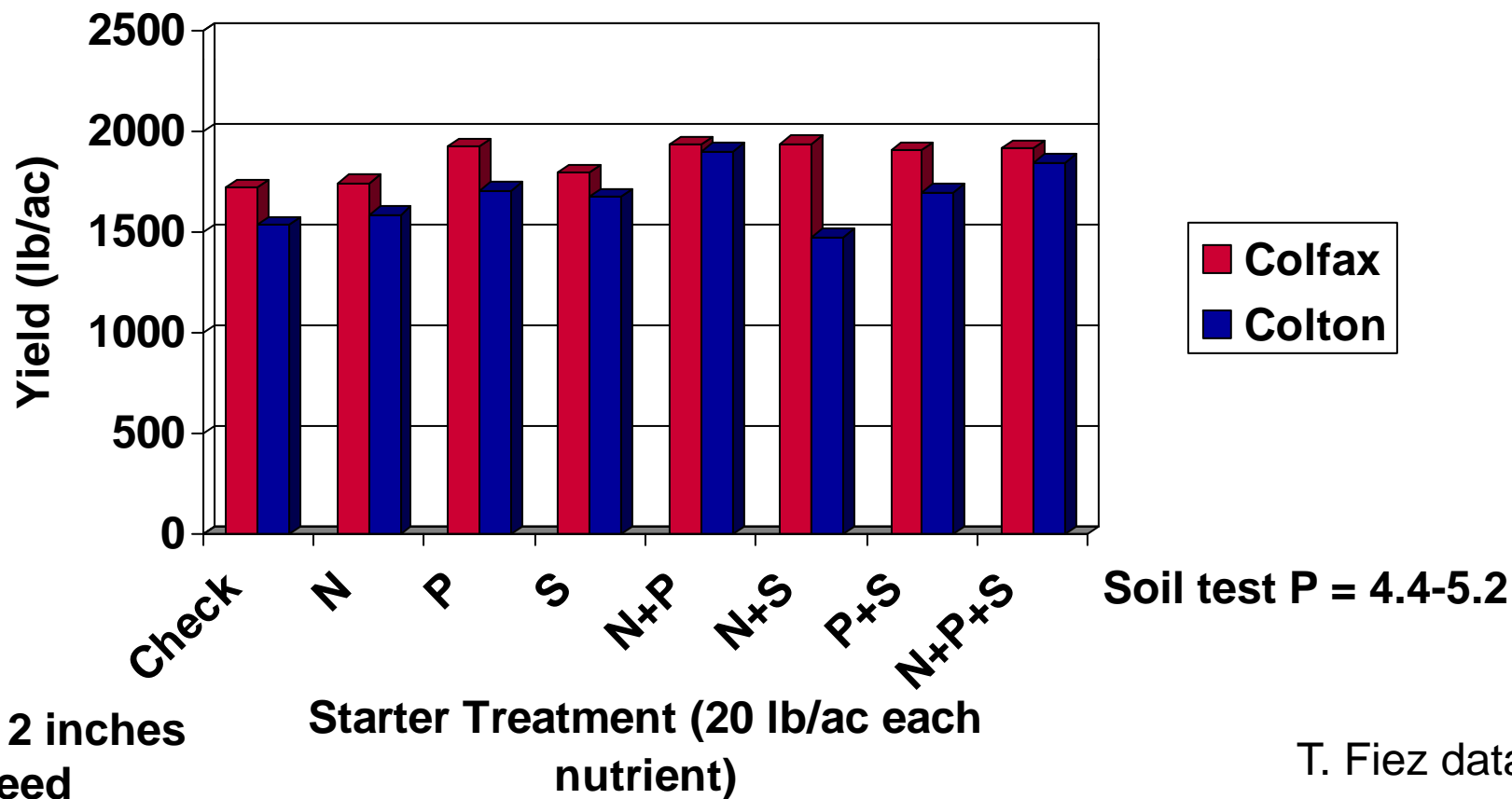
Boron and molybdenum

- High rainfall environments (>20 inches)
- Low pH (5.7 or below) soils
 - Boron soil test below 0.5 ppm
 - ½ to 1 lb boron/acre – broadcast, not banded
 - Molybdenum – 1 oz/acre as seed treatment

1998 WA State Univ. Study Dry peas – no response



1999 repeat of study – response to P



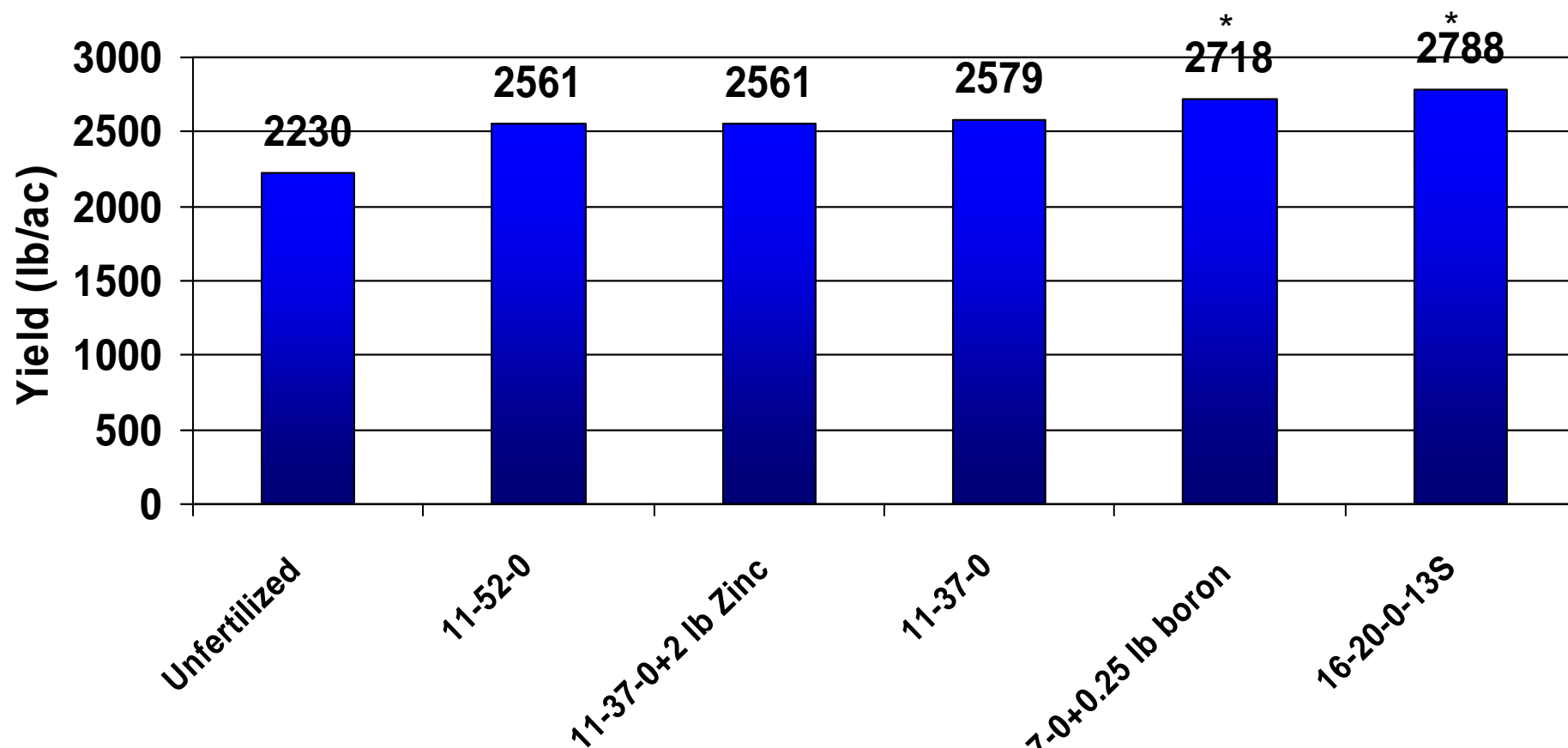
Recent fertility studies

- **Dryland green peas in Milton-Freewater area**
- **2005, 2007, 2008 study years**
 - **2006 crop failed**
 - **2008 crop was dry**
- **Pre-plant soil tests collected**
 - **Representative of dryland green pea fields, other pea fields**
- **Phosphorus, S, B, Zn treatments**

2005 green pea fertility trial soil test results (1 foot depth)

Parameter	Average of 4 samples	Interpretation
Soil pH	5.5	Borderline for peas (>5.5)
Phosphorus	22 ppm	Adequate for peas (>18)
Potassium	360 ppm	Adequate for peas (>100)
Sulfur	3 ppm	Very low for peas (>10)
Zinc	1.7 ppm	Adequate for peas (>1.0)
Boron	0.18 ppm	Very low for peas (>0.5)
Iron	49 ppm	Adequate for peas (>5)
Manganese	27 ppm	Adequate for peas (>1)
Copper	1.5 ppm	Adequate for peas (>0.2)

2005 green pea yields



Fertilizer banded 2 inches
below the seed row

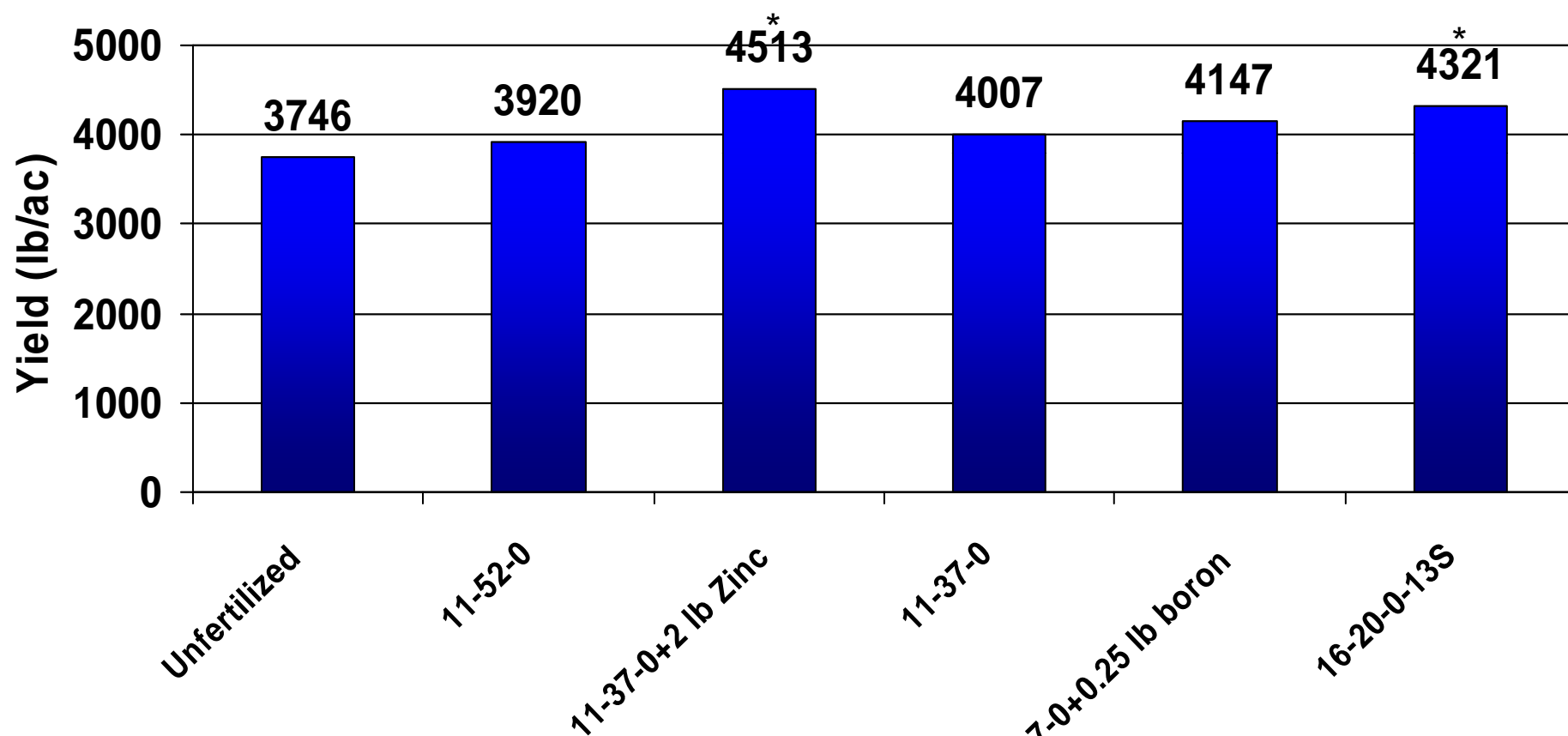
Treatment (20 lb P₂O₅/ac)

*different from unfertilized

2007 green pea fertility trial soil test results (1 foot depth) – no-till site

Parameter	Average of 4 samples	Interpretation
Soil pH	5.6	Borderline for peas (>5.5)
Phosphorus	16 ppm	Adequate for peas (>18)
Potassium	492 ppm	Adequate for peas (>100)
Sulfur	4 ppm	Very low for peas (>10)
Zinc	1.15 ppm	Adequate for peas (>1.0)
Boron	0.29 ppm	Very low for peas (>0.5)
Iron	43 ppm	Adequate for peas (>5)
Manganese	36 ppm	Adequate for peas (>1)
Copper	1.3 ppm	Adequate for peas (>0.2)

2007 green pea yields (no-till)



Fertilizer banded 2 inches
below the seed row

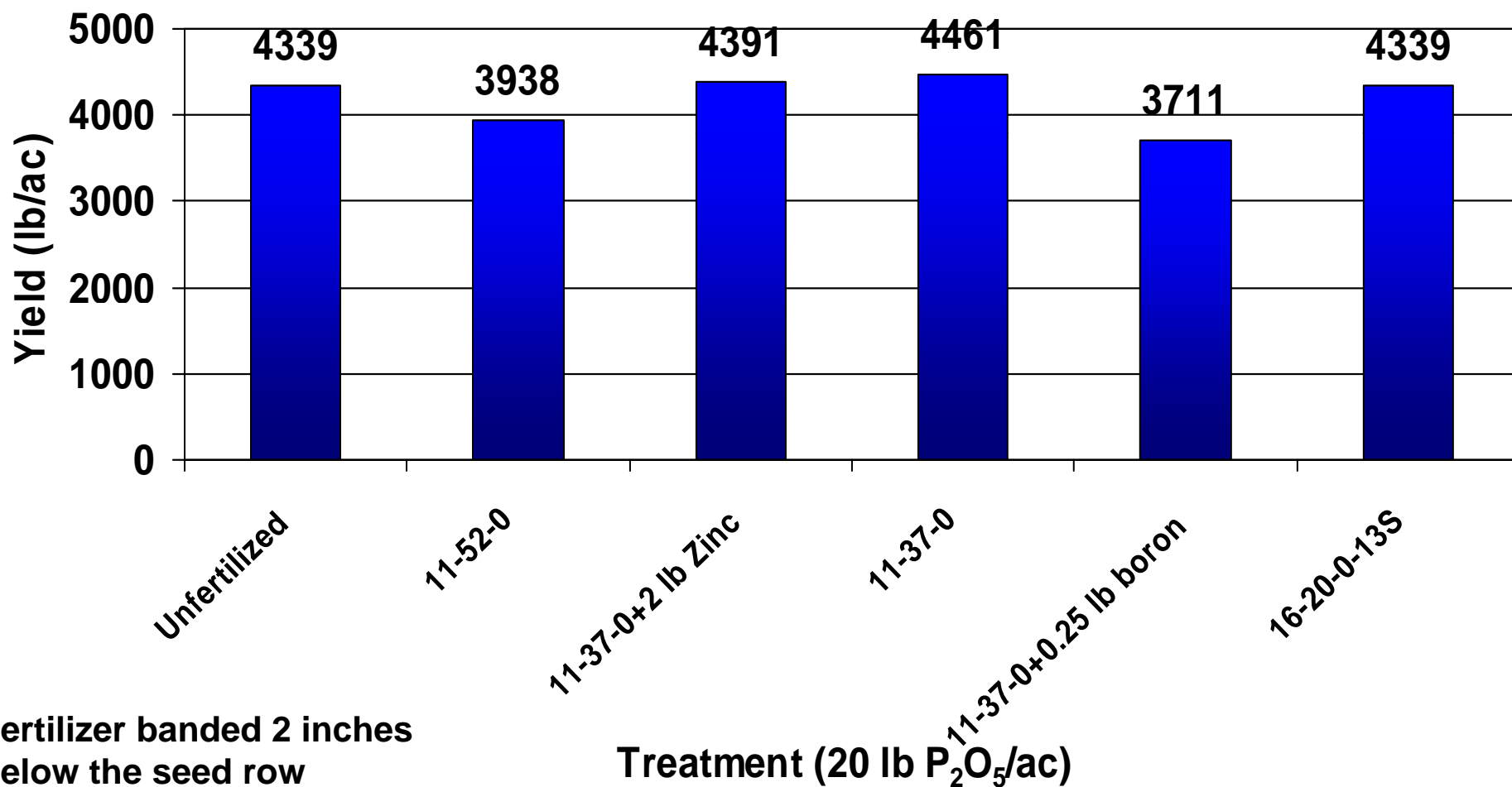
Treatment (20 lb P₂O₅/ac)

*different from unfertilized

2007 green pea fertility trial soil test results (1 foot depth) – conventional site

Parameter	Average of 4 samples	Interpretation
Soil pH	5.5	Borderline for peas (>5.5)
Phosphorus	18 ppm	Adequate for peas (>18)
Potassium	422 ppm	Adequate for peas (>100)
Sulfur	5 ppm	Very low for peas (>10)
Zinc	0.38 ppm	Very low for peas (>1.0)
Boron	0.27 ppm	Very low for peas (>0.5)
Iron	43 ppm	Adequate for peas (>5)
Manganese	38 ppm	Adequate for peas (>1)
Copper	1.5 ppm	Adequate for peas (>0.2)

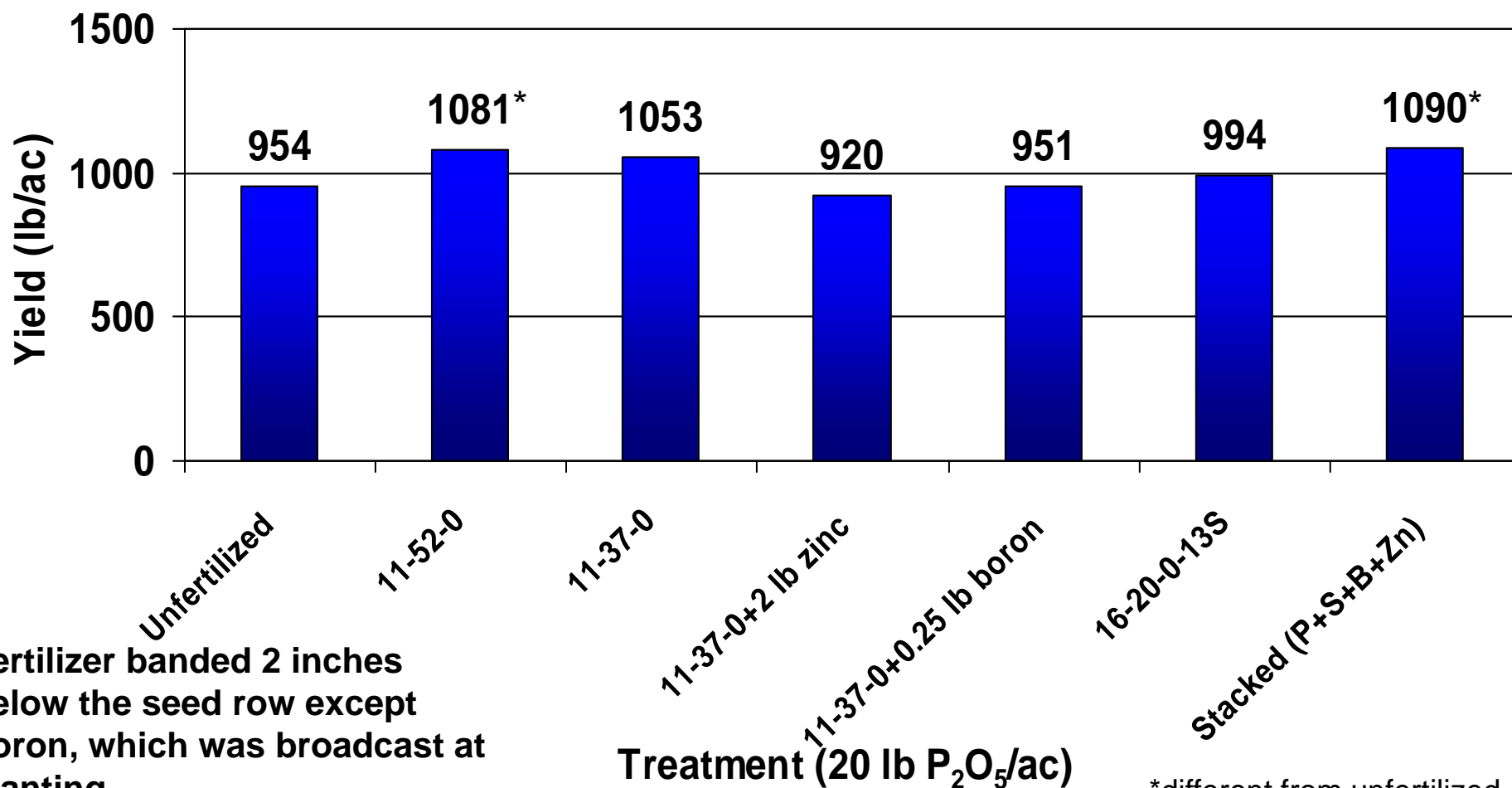
2007 green pea yields (conventional till)



2008 green pea fertility trial soil test results (1 foot depth) – Reser (no-till) site

Parameter	Average of 4 samples	Interpretation
Soil pH	5.9	Adequate for peas (>5.5)
Phosphorus	13 ppm	Low for peas (>18)
Potassium	400 ppm	Adequate for peas (>100)
Sulfur	3 ppm	Very low for peas (>10)
Zinc	0.52 ppm	Low for peas (>1.0)
Boron	0.34 ppm	Low for peas (>0.5)
Iron	35 ppm	Adequate for peas (>5)
Manganese	20 ppm	Adequate for peas (>1)
Copper	1.1 ppm	Adequate for peas (>0.2)

2008 dry pea yields (no-till)



Fertilizer banded 2 inches below the seed row except boron, which was broadcast at planting

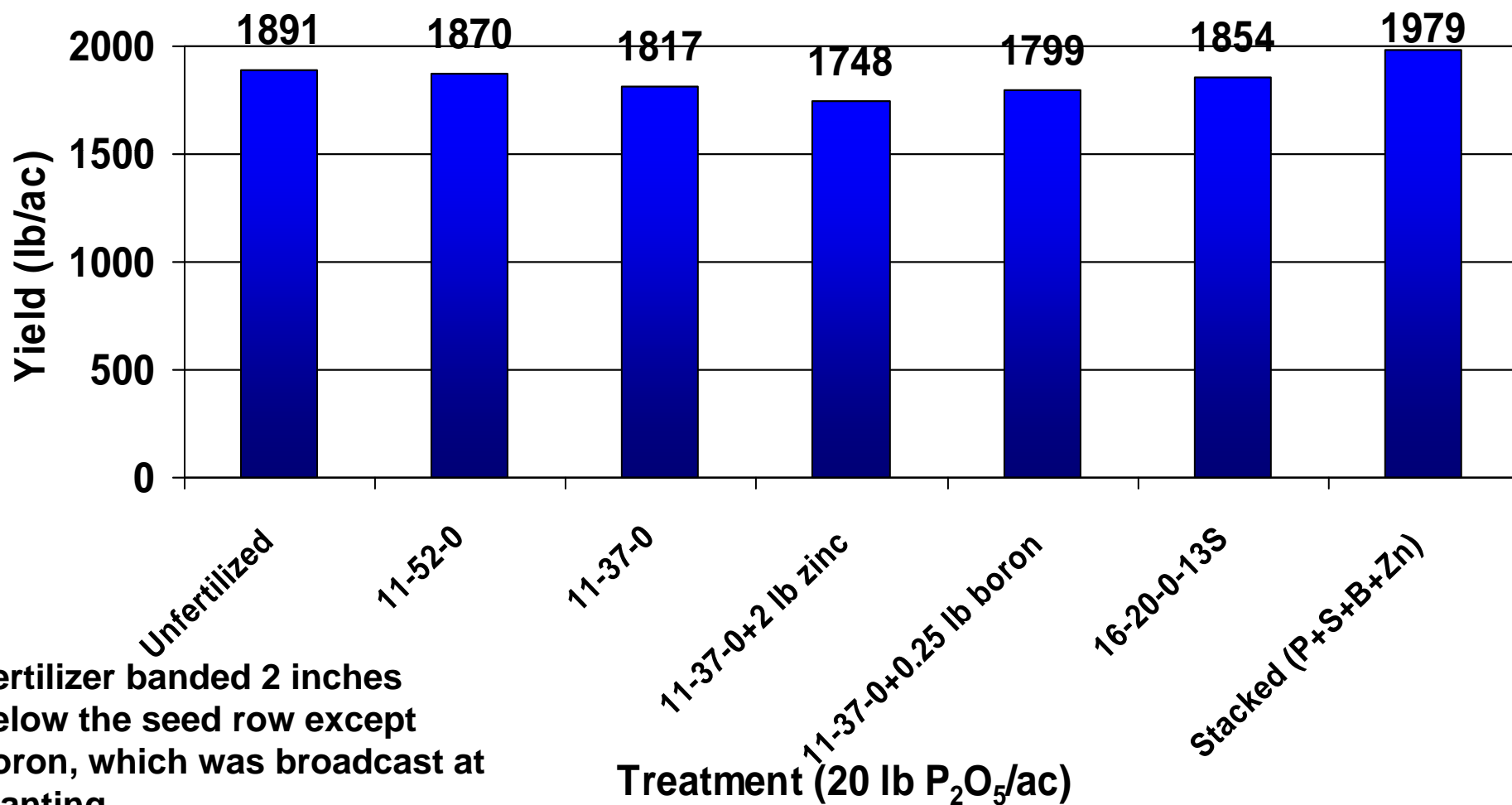
Treatment (20 lb P₂O₅/ac)

*different from unfertilized

2008 green pea fertility trial soil test results (1 foot depth) – Nibler (tilled) site

Parameter	Average of 4 samples	Interpretation
Soil pH	5.8	Adequate for peas (>5.5)
Phosphorus	12 ppm	Low for peas (>18)
Potassium	305 ppm	Adequate for peas (>100)
Sulfur	4 ppm	Very low for peas (>10)
Zinc	0.57 ppm	Low for peas (>1.0)
Boron	0.31 ppm	Low for peas (>0.5)
Iron	31 ppm	Adequate for peas (>5)
Manganese	22 ppm	Adequate for peas (>1)
Copper	1.2 ppm	Adequate for peas (>0.2)

2008 dry pea yields (tilled)



Fertilizer banded 2 inches below the seed row except boron, which was broadcast at planting

Summary from fertility studies

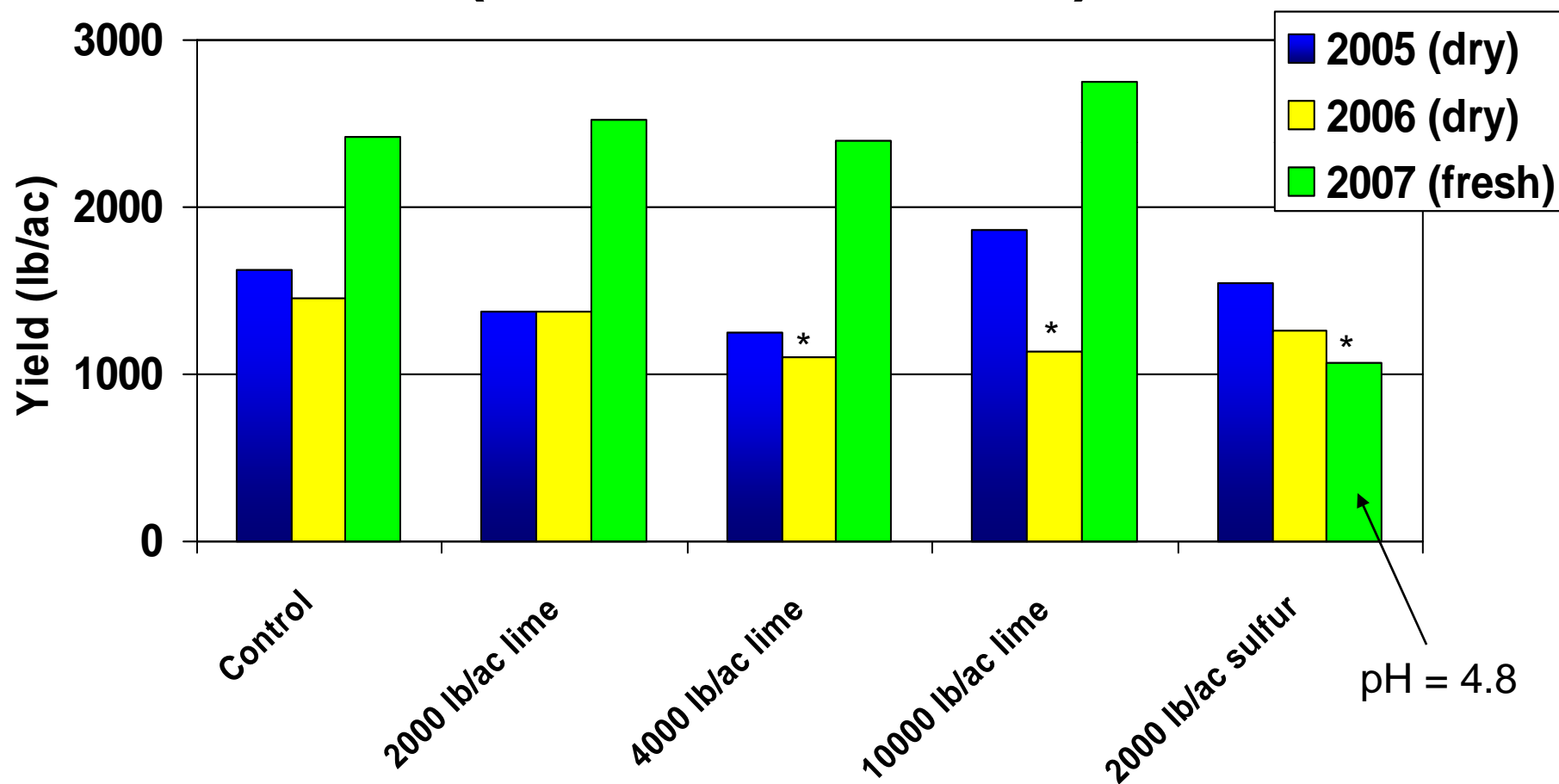
- **2008 results compromised by hot weather, dry harvest**
- **Repeated low sulfur, zinc and boron soil tests**
- **Evidence of responses to sulfur and perhaps boron; occasionally zinc and phosphorus**
 - **Broadcast applications of boron, don't band**
- **The preplant soil test predicted a fertilizer response in many situations**

Lime and sulfur applications in 2005



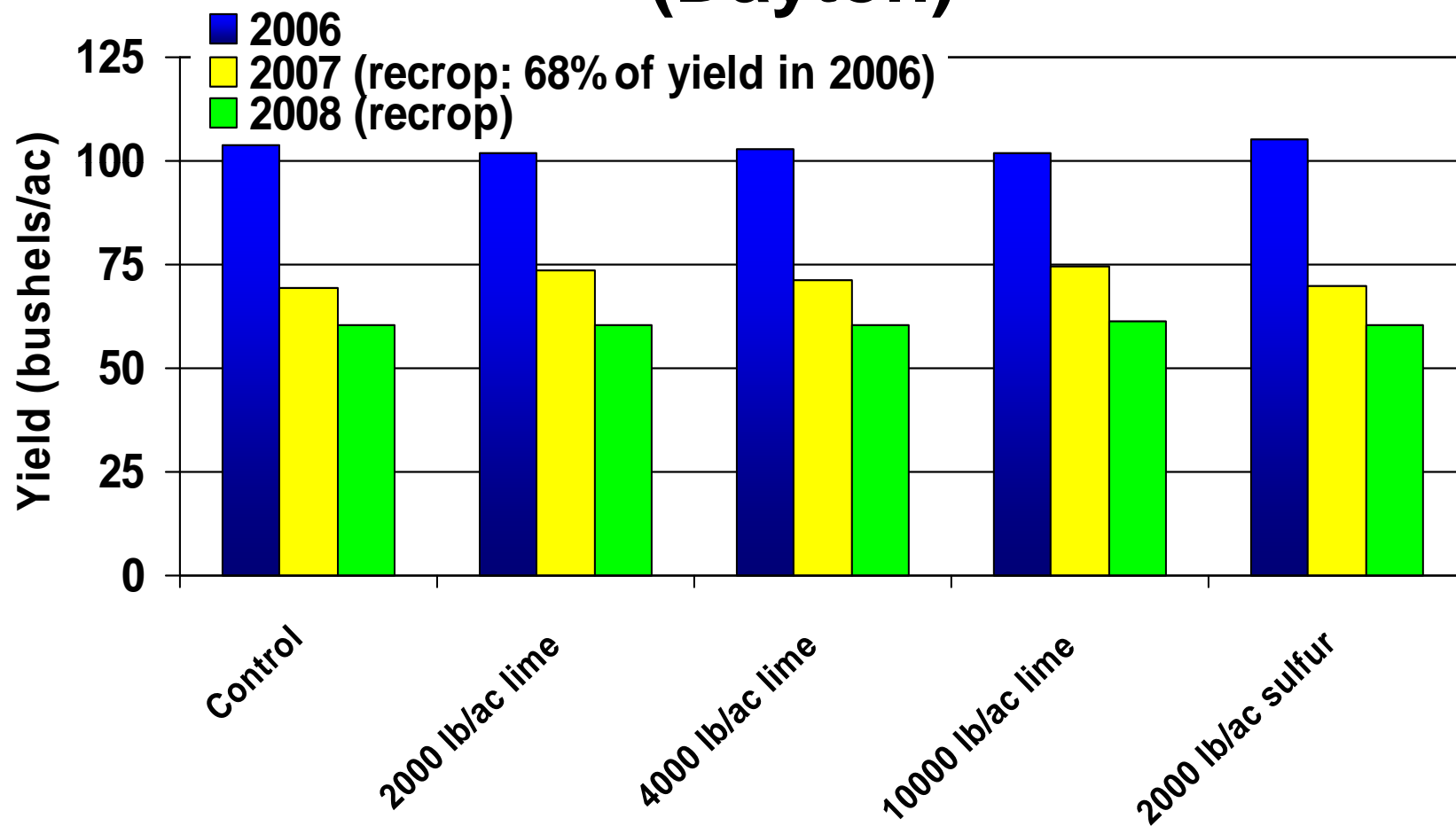
20 by 40 foot plots

Pea yields from long term lime study (Milton-Freewater)



* = different from the control

Winter wheat yields from long term lime study (Dayton)



No difference

Interim summary and conclusions

Long term liming studies

- **Results do not support the need for lime at this time**
- **Higher pH soil below 8 inches may moderate impact of acidic surface soil**
- **Future implications?**