Assessing tolerance to low Phosphorus in corn

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Why study tolerance to low P?

1. P is an important plant macronutrient

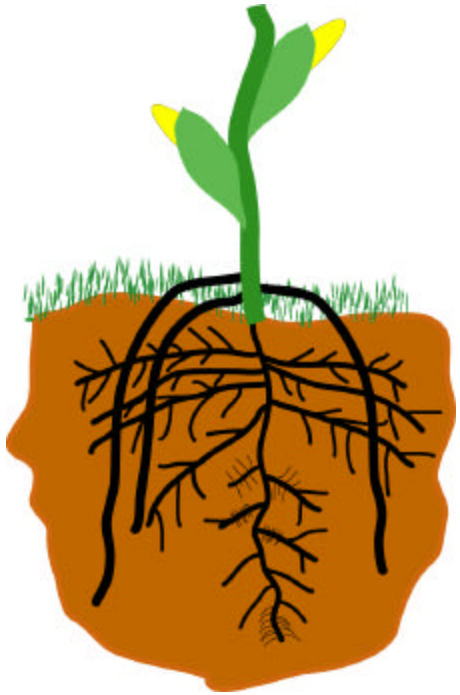
2. Many important agricultural soils are P deficient

3. In Wisconsin P stress at low temperatures

4. Phosphate rock mined for fertilizer is limited

Objectives

1. Characterize a given population of plants by measuring the above-ground parts
2. Understand what traits are good indicators of low P stress tolerance



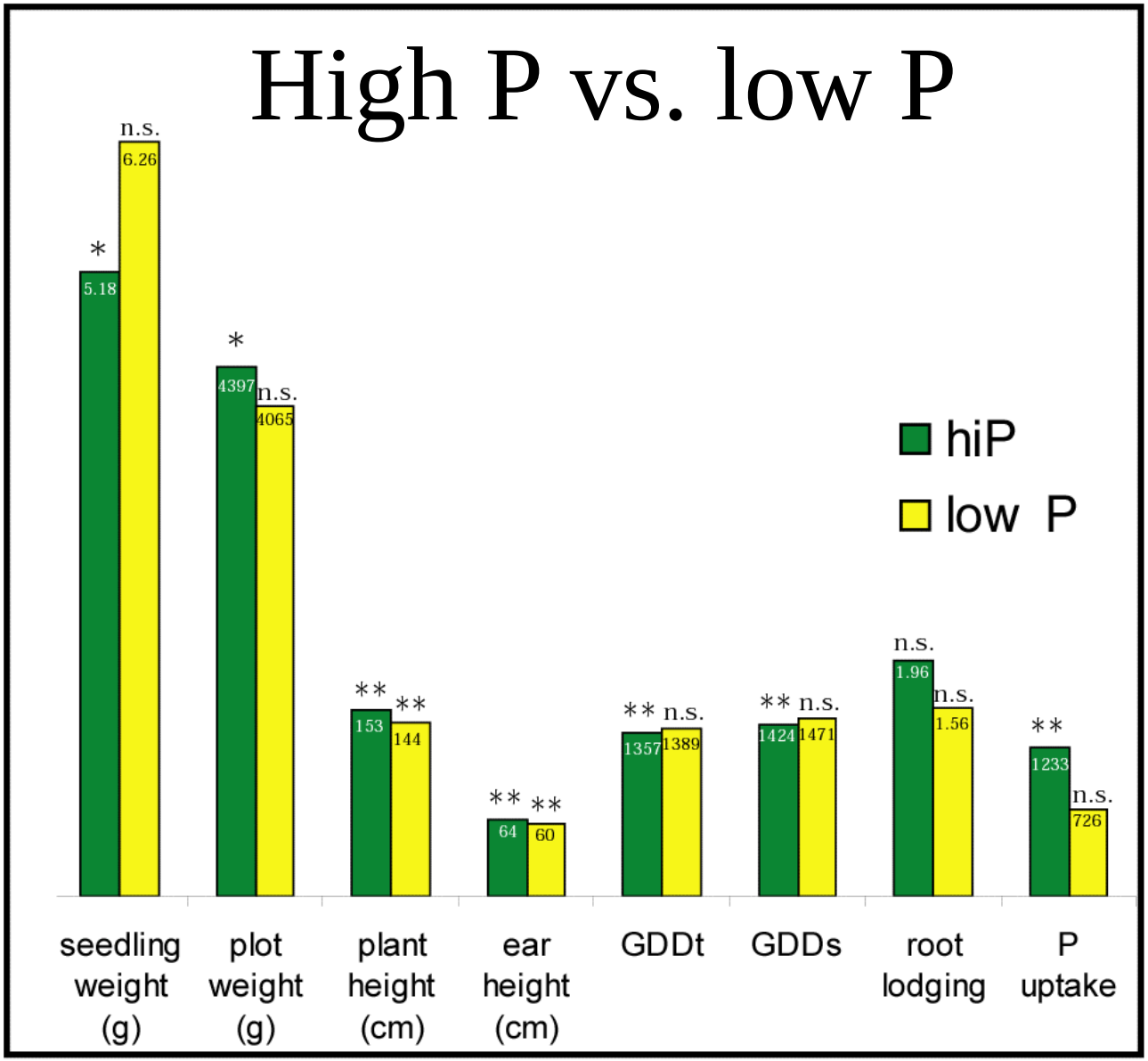
UW Marshfield research station

Data collection

Types of data collected:

- % germination
- Seedling weight
- Flowering dates
- Plant and ear height
- Root and stock lodging
- Yield
- P content in above ground plant

High P vs. low P

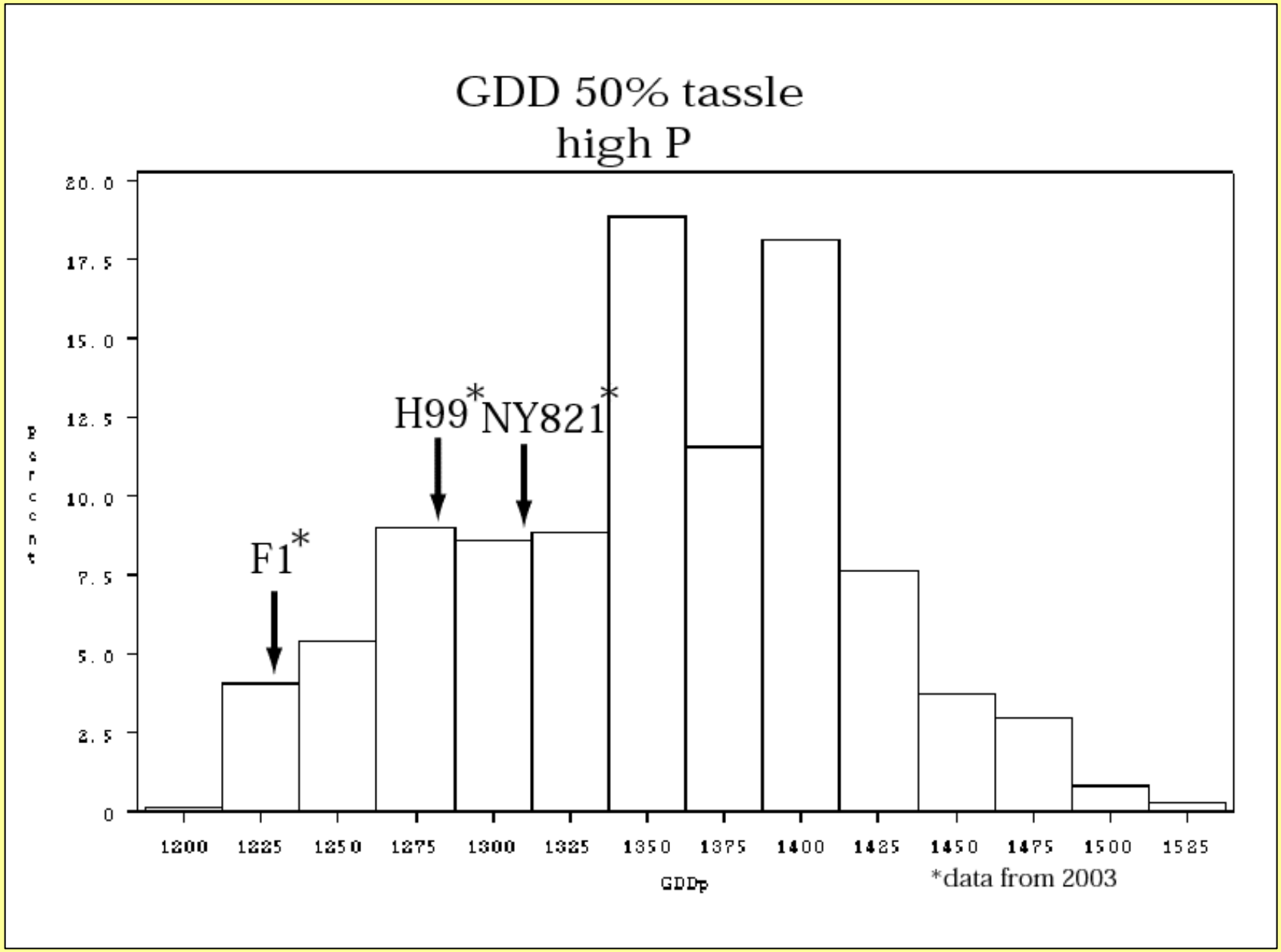


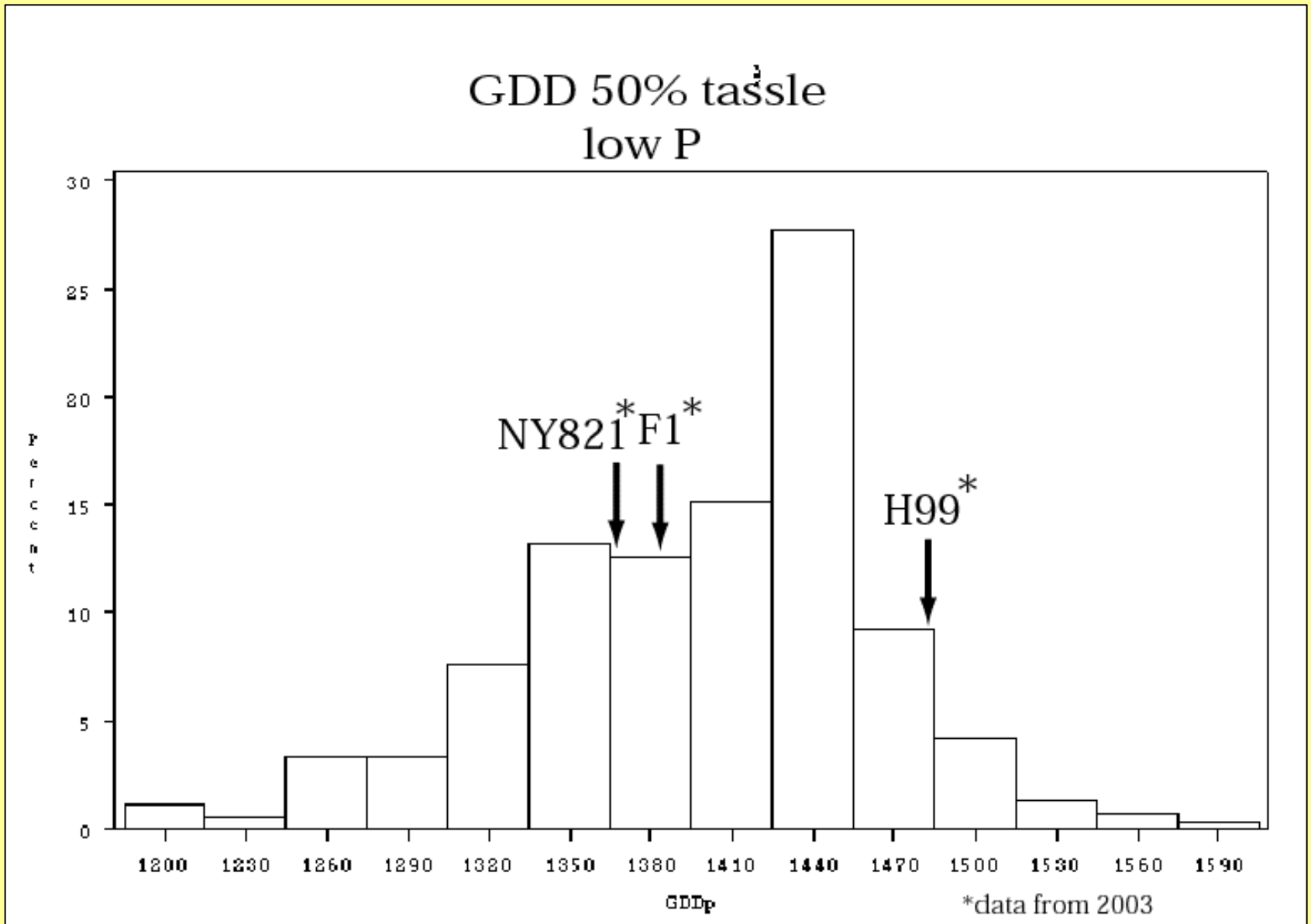
Trait correlations

Correlation coefficients:

	High P	Low P
	seedling weight (g)	
GDD(50% tassles)	-0.4671**	-0.4789**
GDD(50% silks)	-0.4300**	-0.4156**

**significant at <0.001


GDD 50% tassle
high P
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0
Percent
F1*
H99*
NY821*
1200
1225
1250
1275
1300
1325
1350
1375
1400
1425
1450
1475
1500
1525
GDDp
*data from 2003


GDD 50% tassle
low P
NY821*F1*
H99*
Percent
30
25
20
15
10
5
0
1200
1230
1260
1290
1320
1350
1380
1410
1440
1470
1500
1530
1560
1590
GDDp
*data from 2003

Response to P availability

Phenotypic response calculated as [(high P-low P)/low P]*100

	Response at low P	Response at high P
Plot weight plasticity	-38%	114%
P uptake plasticity	-28%	213%

Negative value = perform better at low P

Positive value = perform better at high P

Summary

- Characterize a population of plants in high P and low P in the field

- GDD may be useful indicator of tolerance to low P stress

- Further study root architecture of plants with positive and negative response values