CROP RESPONSE TO SOIL TEST P & K AND STARTER FERTILIZER

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Introduction

- Frequent reports of K deficiency.
- More often seen in no-till.
- Do current soil test K recommend-ations need modification ?
- Does starter fertilizer containing K prevent deficiencies?

Procedure

- Long-term plots with wide range of soil test K (VL to EH, 60 to 265 ppm).
- Response to NPK starter (100/9-23-30) across range of soil test K levels.
- Corn yield responses measured over 4 yr.

Soil test K interpretation for corn (Group B soils)

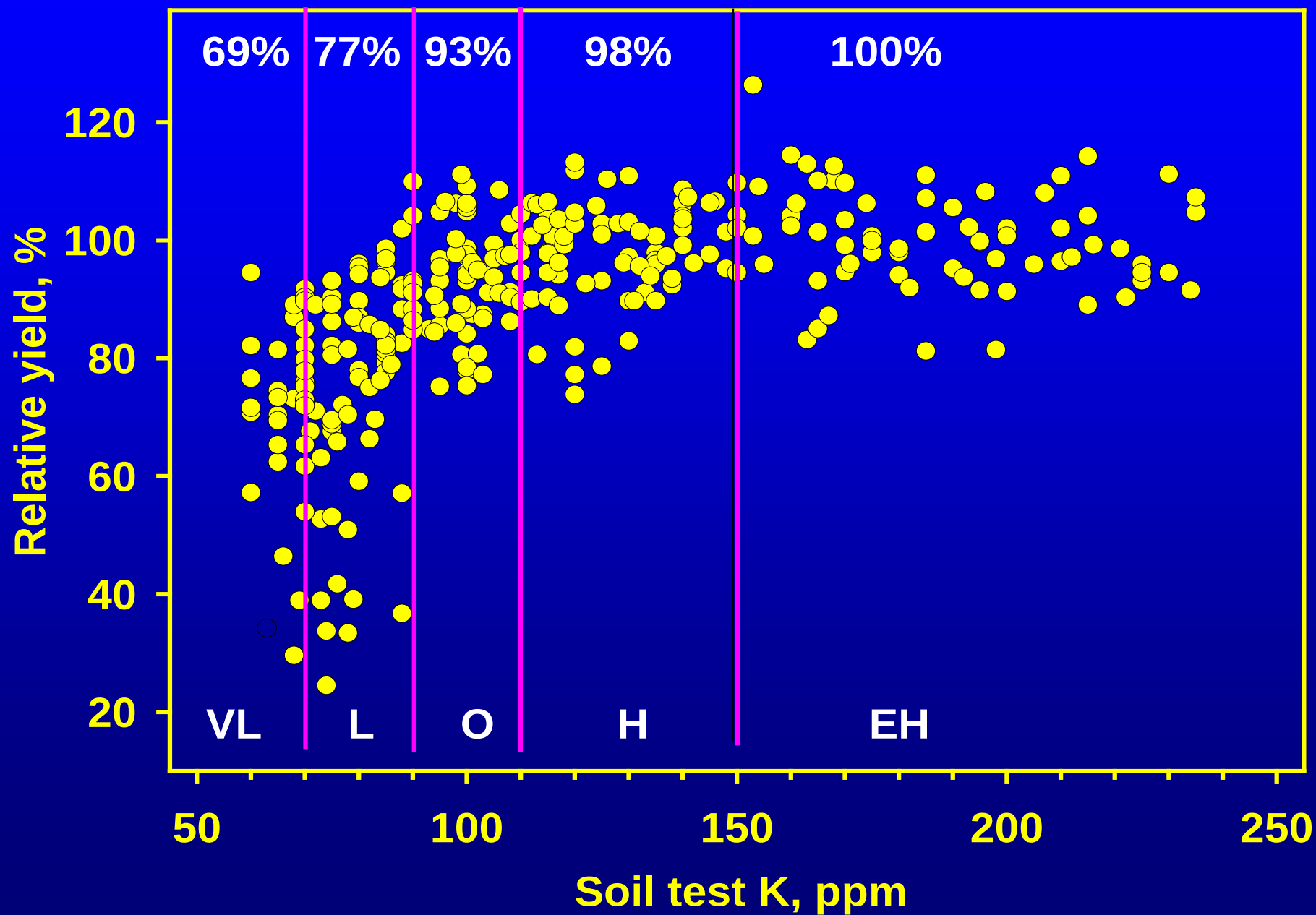
Category	Soil test K (ppm)	Recommend.* (lb K_2O/acre)
V. low (VL)	< 70	100
Low (L)	70-90	90
Optimum (O)	91-110	60
High (H)	111-150	30
Ex. high (EH)	> 150	0

* 151-170 bu/acre yield goal.

Procedure

- 1993 to 1996.
- P and K broadcast to some plots (1993 & 1995 – spring disked & chisel plowed) to expand the range of soil test levels.
- No-till in 1994 and 1996.

Soil K response relationship relative to current soil test interpretation ranges at Arlington, 1993 to 1996

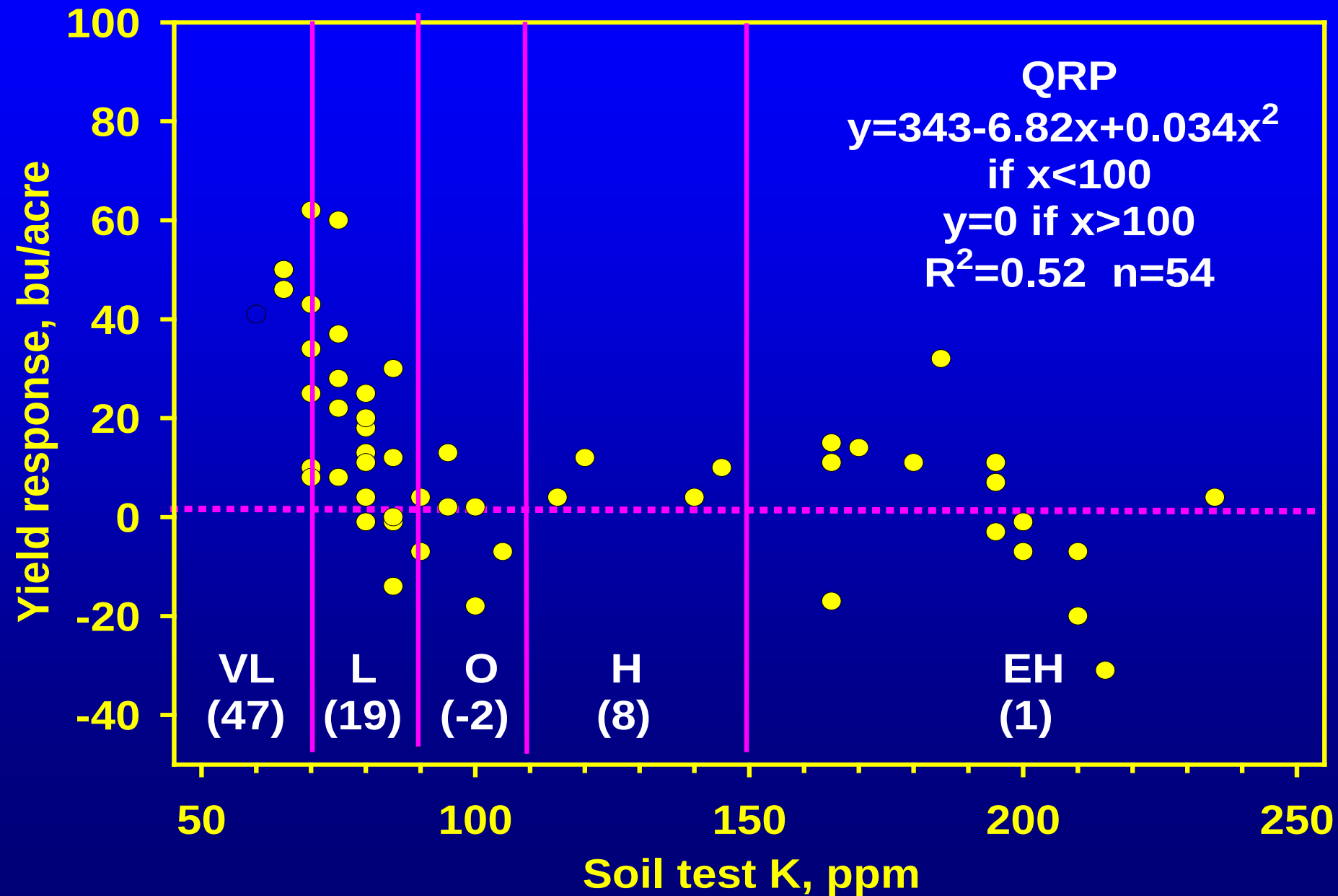


Growing season characteristics

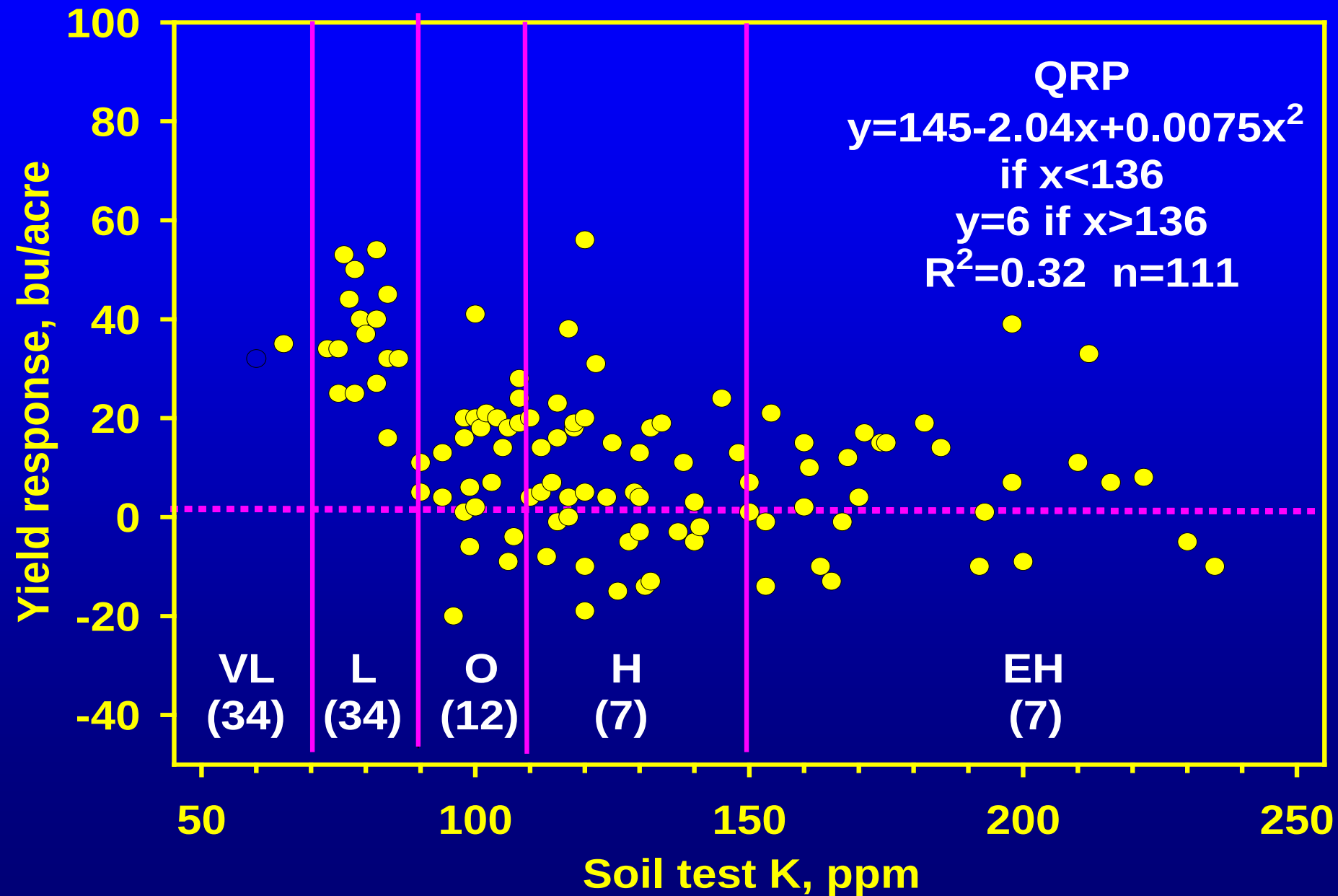
Year	PDRM*	F.F. days	GDD
1993	225	154	2055
1994	228	189	2293
1995	227	145	2413
1996	228	170	2043

* Planting dates: Apr. 30 to May 3; RM=105

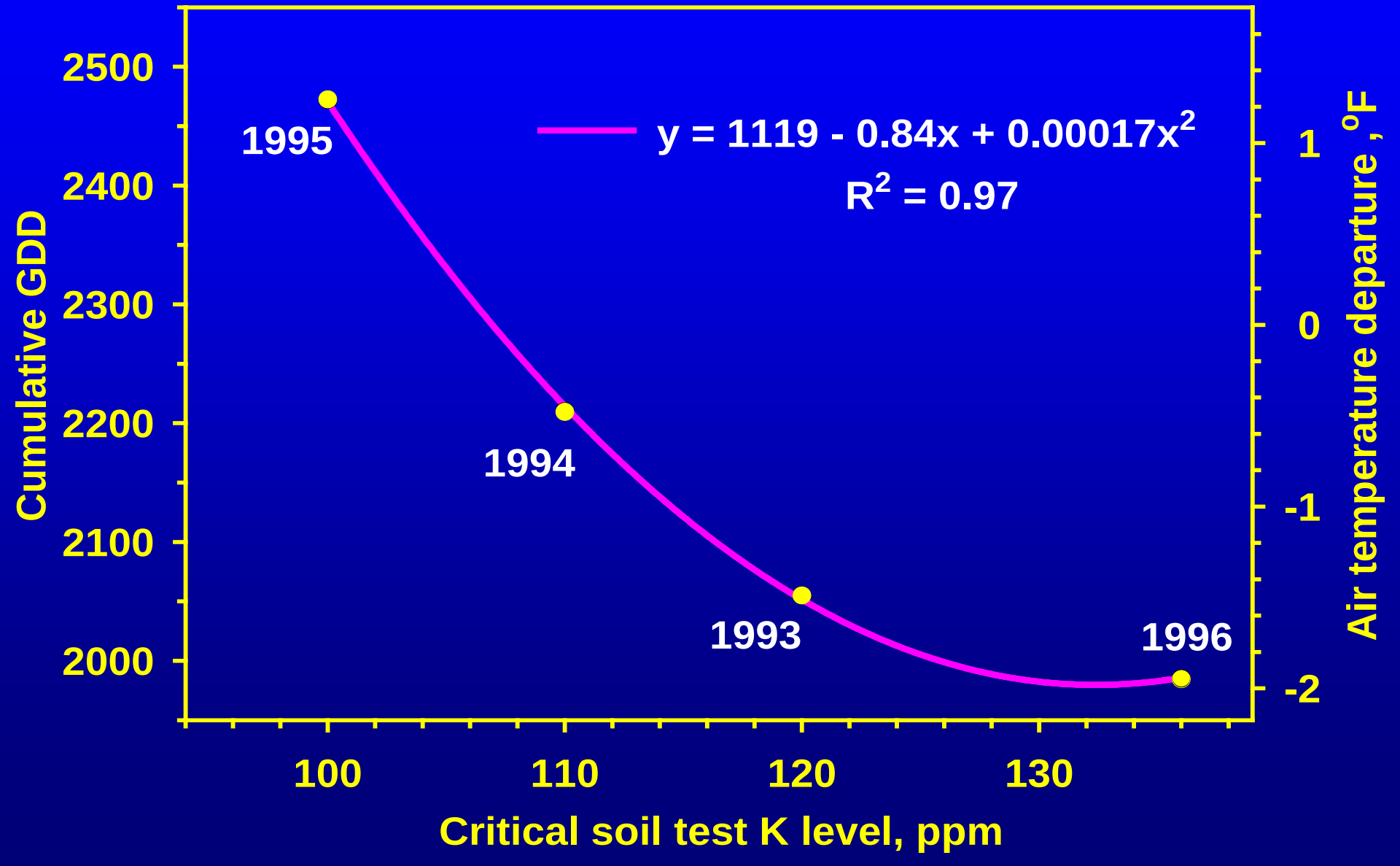
Relationship between soil test K level and yield response to starter fertilizer at Arlington, 1995



Relationship between soil test K level and yield response to starter fertilizer at Arlington, 1996



Relationship between temperature (GDD and departure – May to September) and maximum soil test K level where yield response to starter fertilizer occurred



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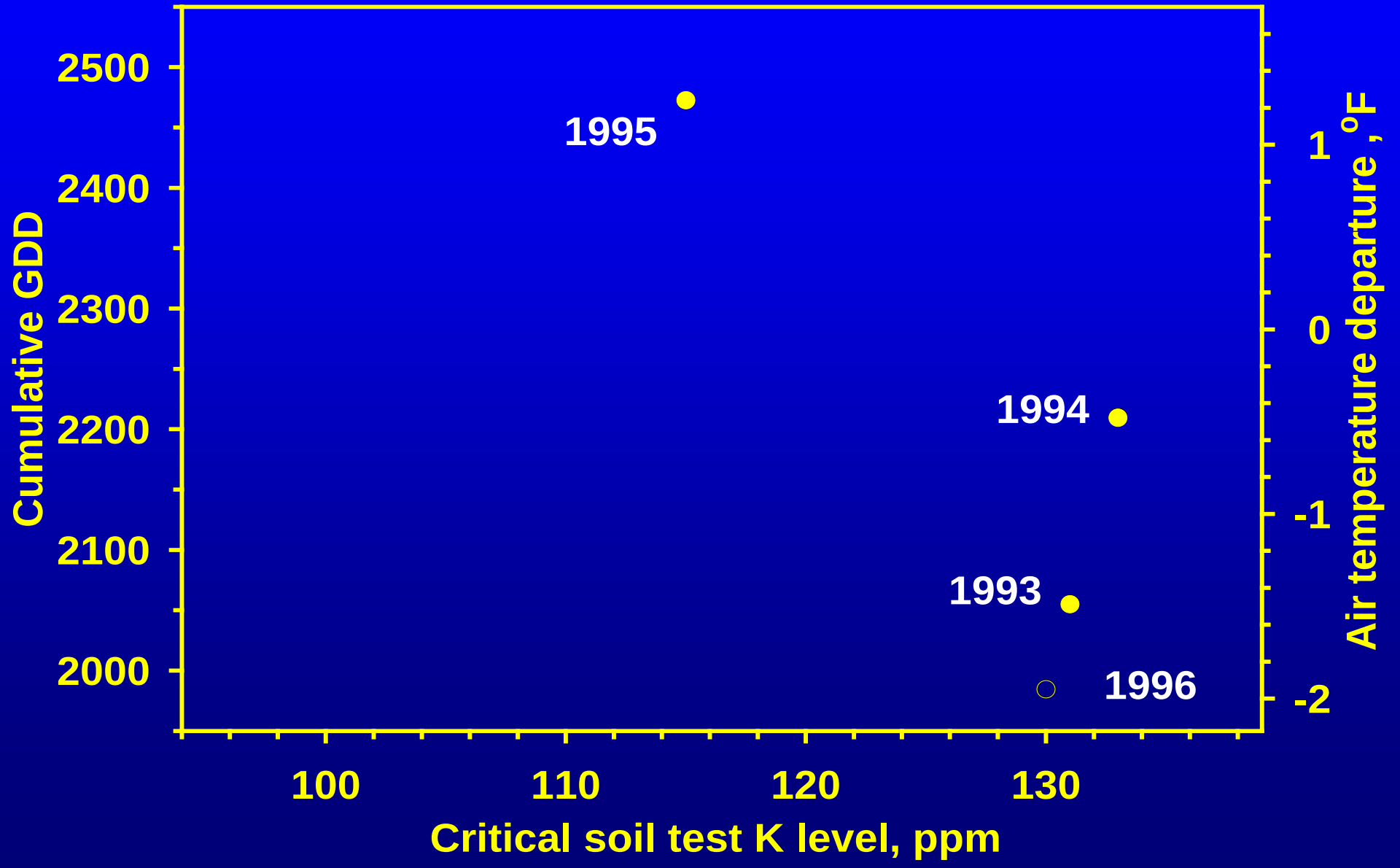
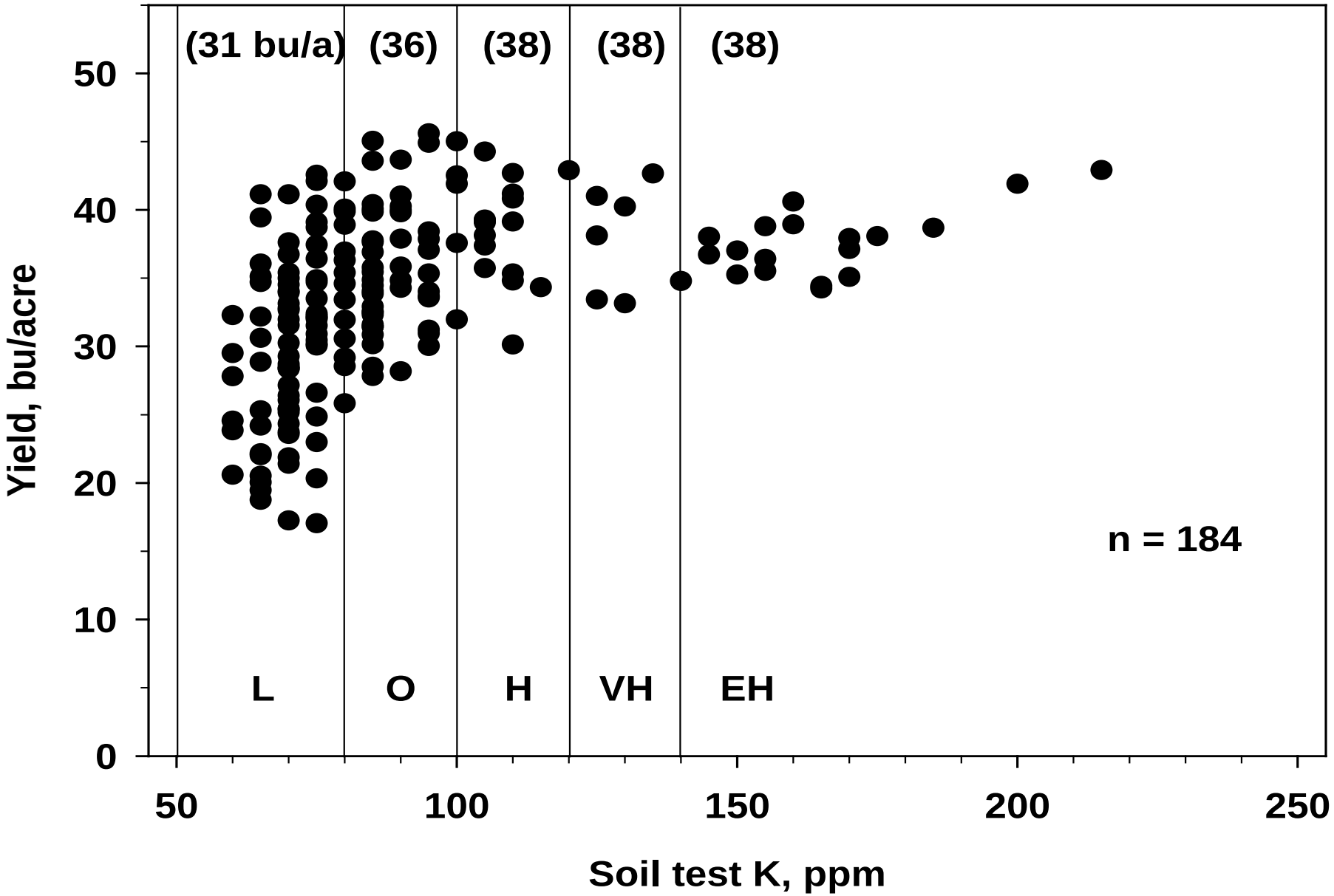
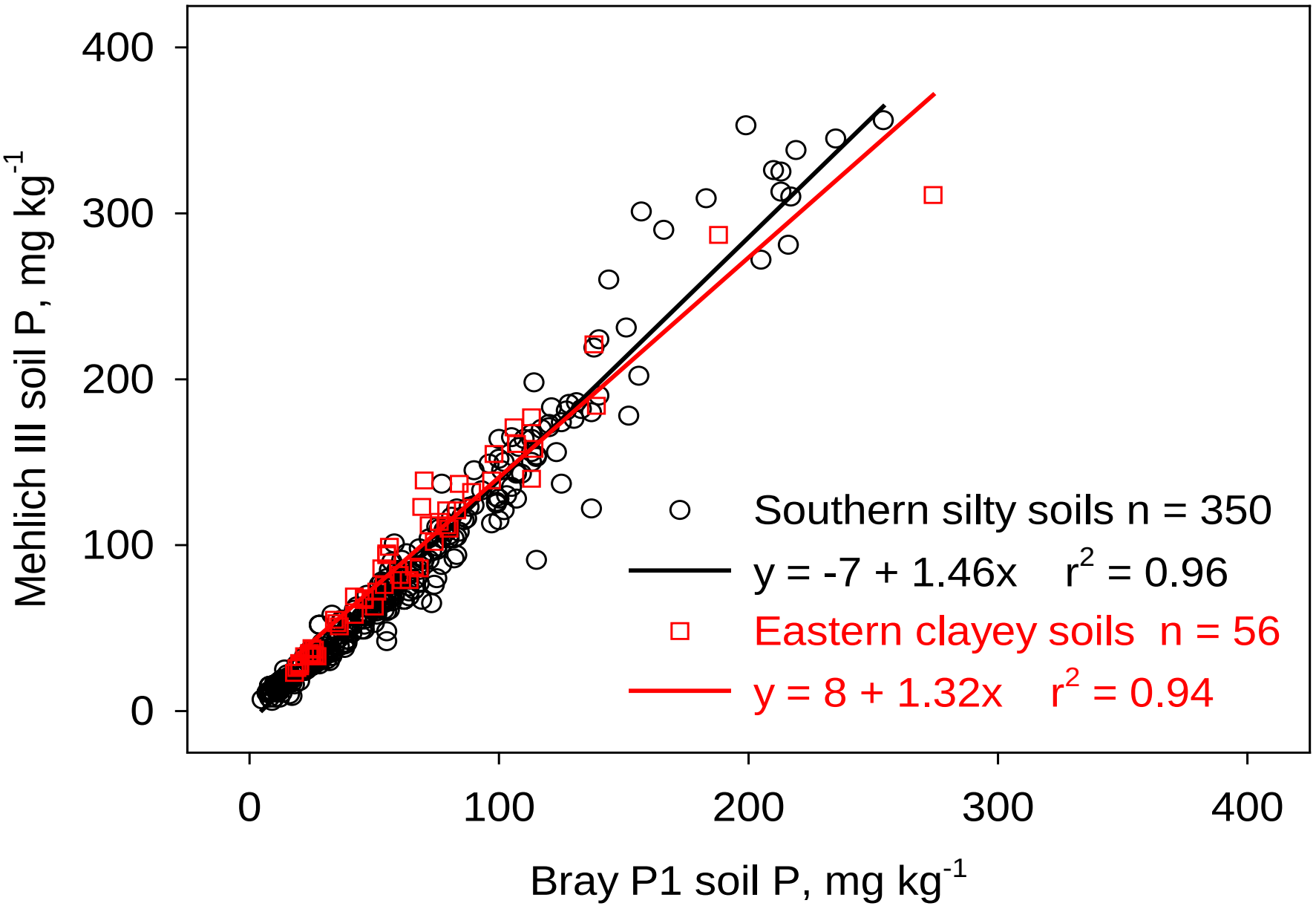


Relationship between soil test K level and soybean grain yield relative to current soil test interpretation ranges at Arlington, 1992



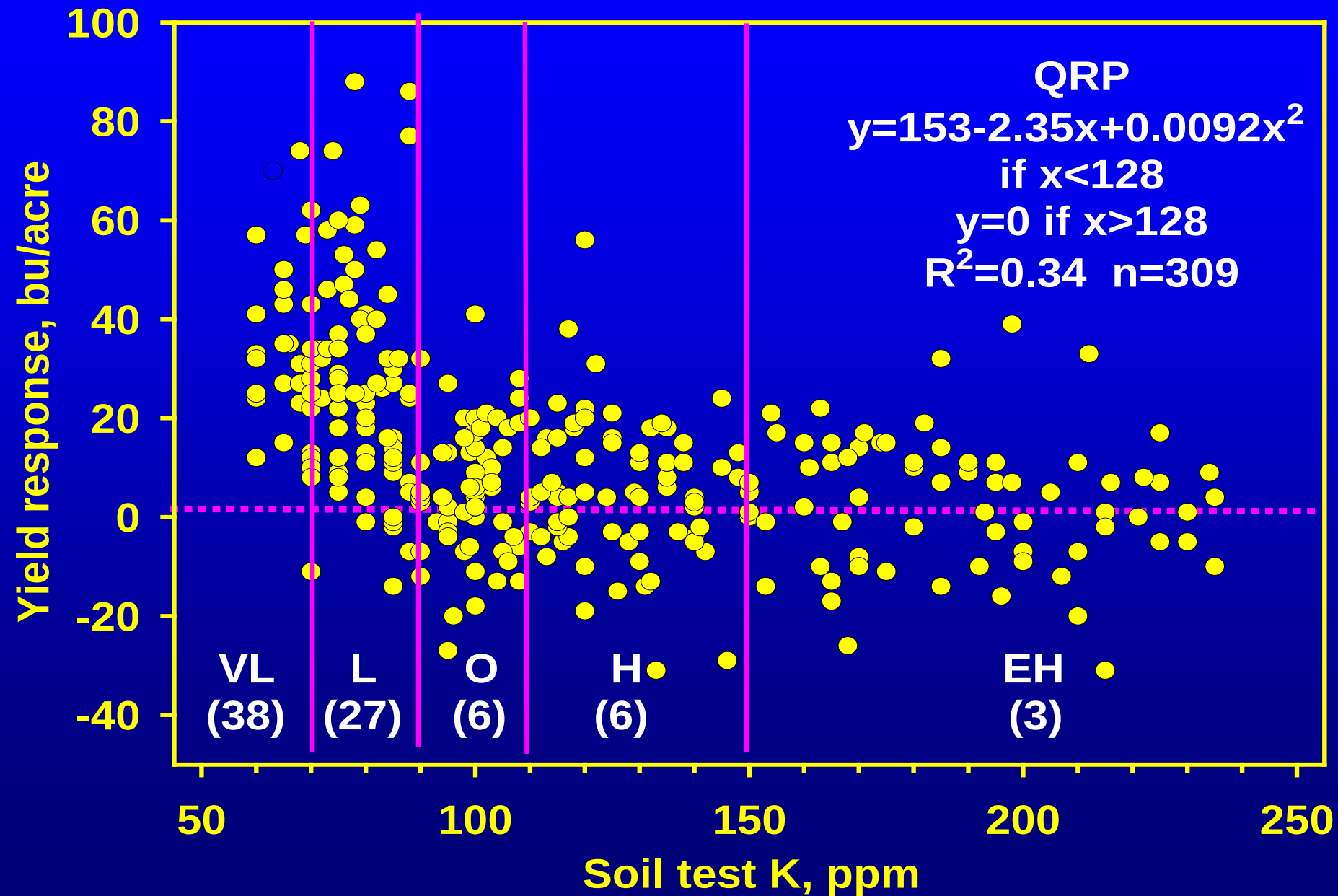
Relationship between Bray P1 and Mehlich III extractable soil P (0-2 cm) for southern silty and eastern clayey soils in Wisconsin.

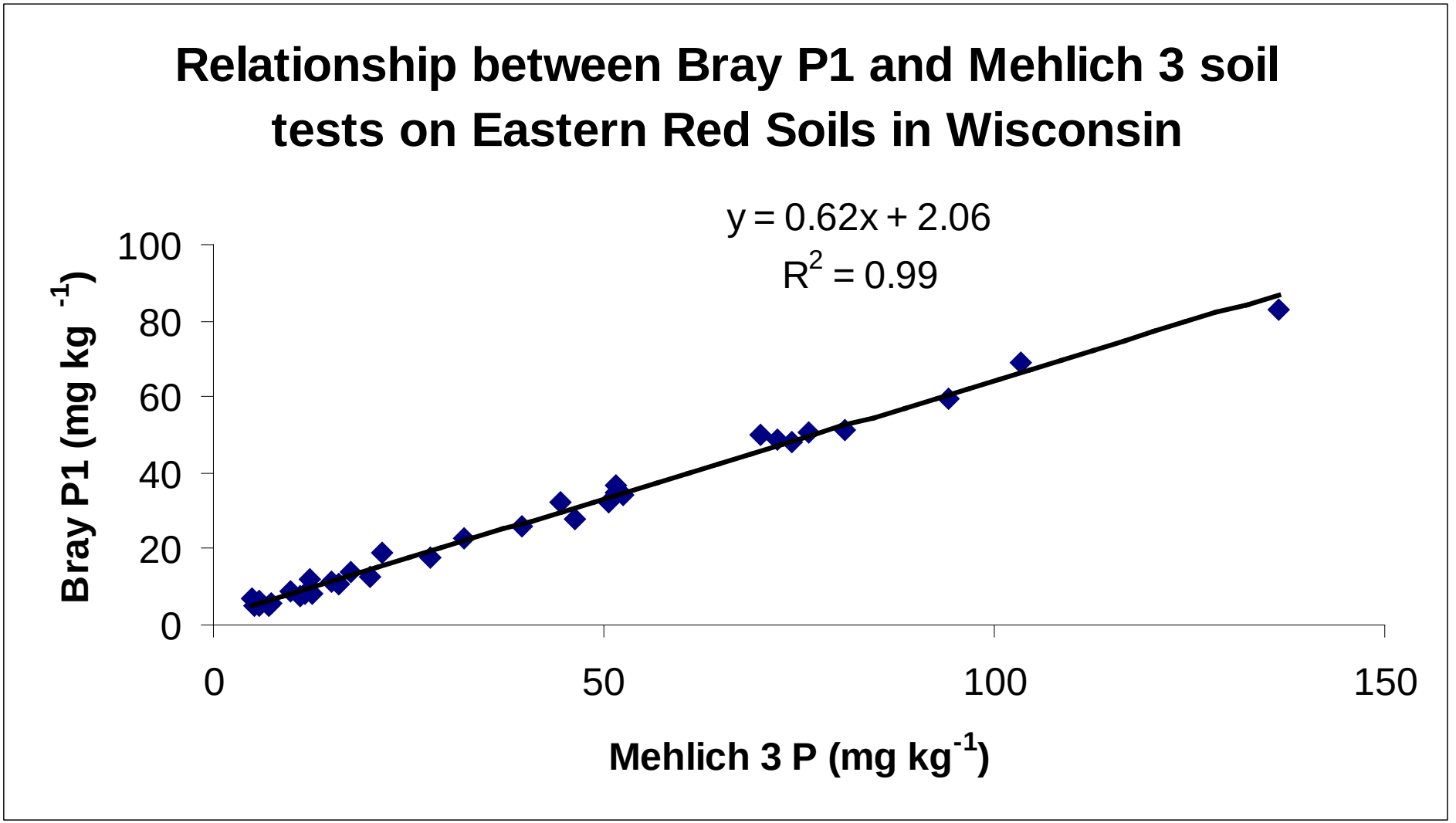


Summary

- Results support the soil test K & P categories used for current fert. recommendations.
- For corn, little response to increasing soil test K above 110 ppm or above 20 ppm for P.
- Frequency and size of response to starter was influenced by GDD accumulation.
- Response to starter occurred at higher soil test K levels in cooler growing seasons

Relationship between soil test K level and yield response to starter fertilizer at Arlington, 1993 to 1996



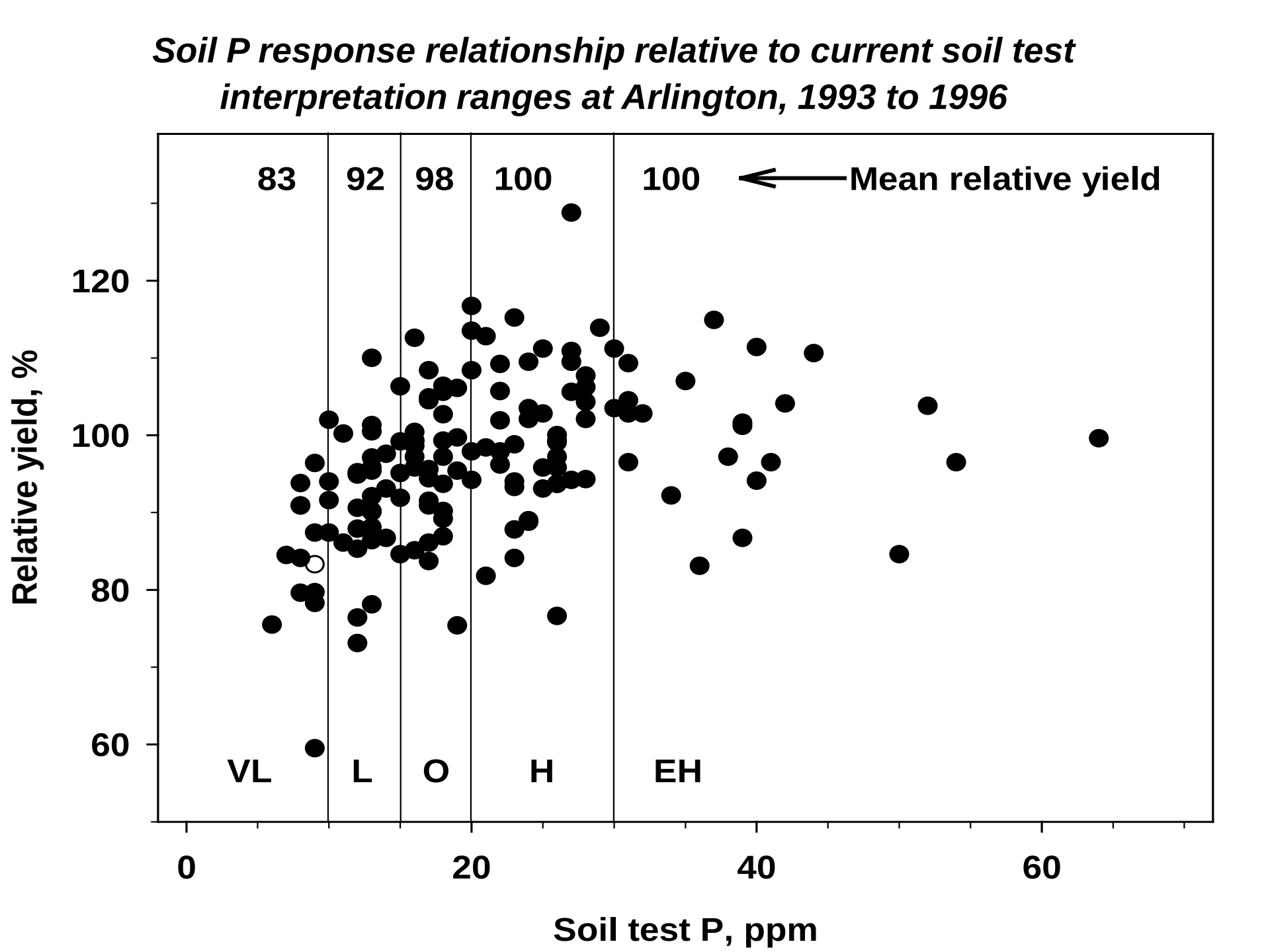

Relationship between Bray P1 and Mehlich 3 soil tests on Eastern Red Soils in Wisconsin
y = 0.62x + 2.06
R2 = 0.99
Bray P1 (mg kg -1)
100
80
60
40
20
0
0
50
100
150
Mehlich 3 P (mg kg-1)

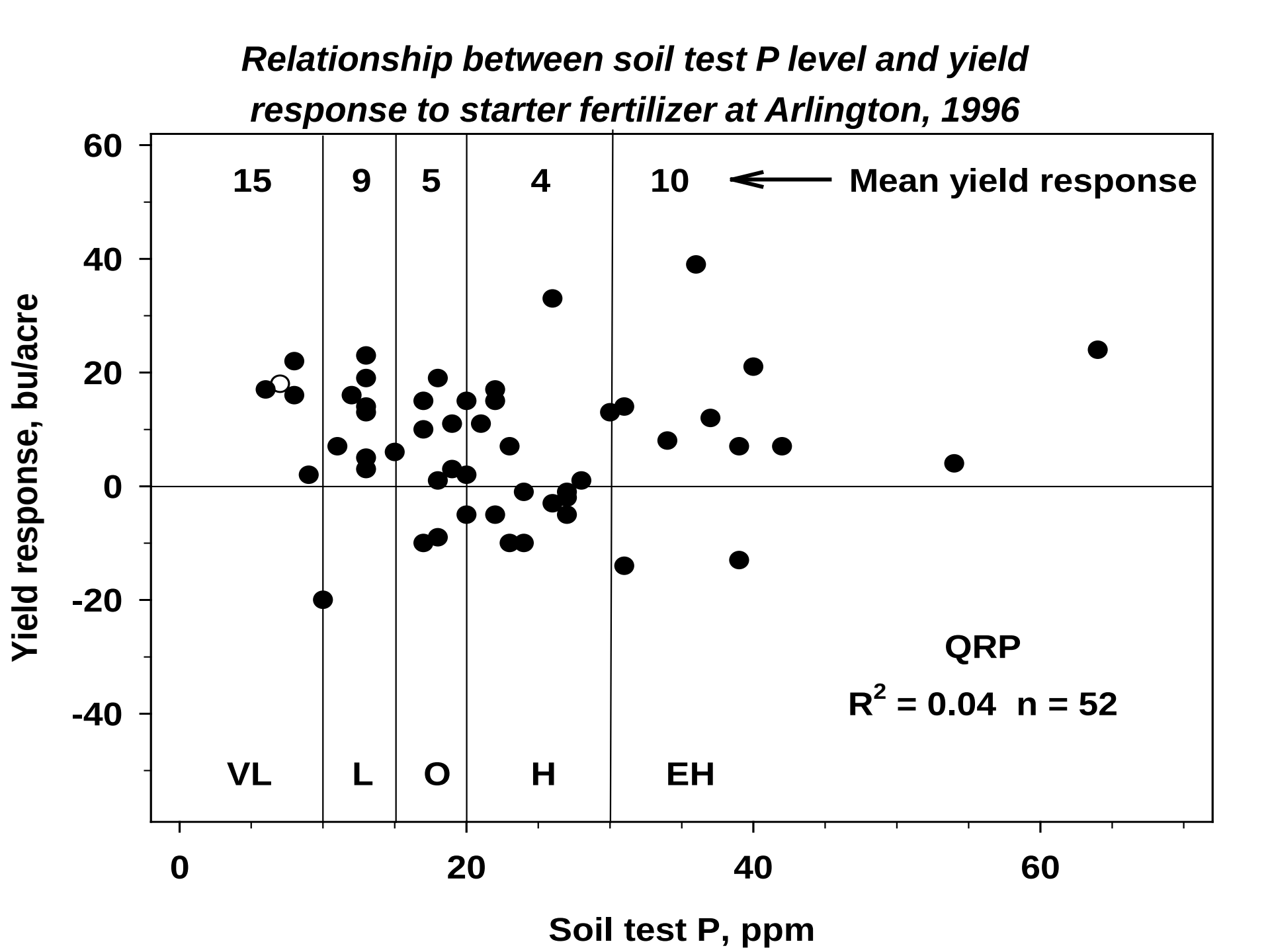
Procedure- Corn P Response

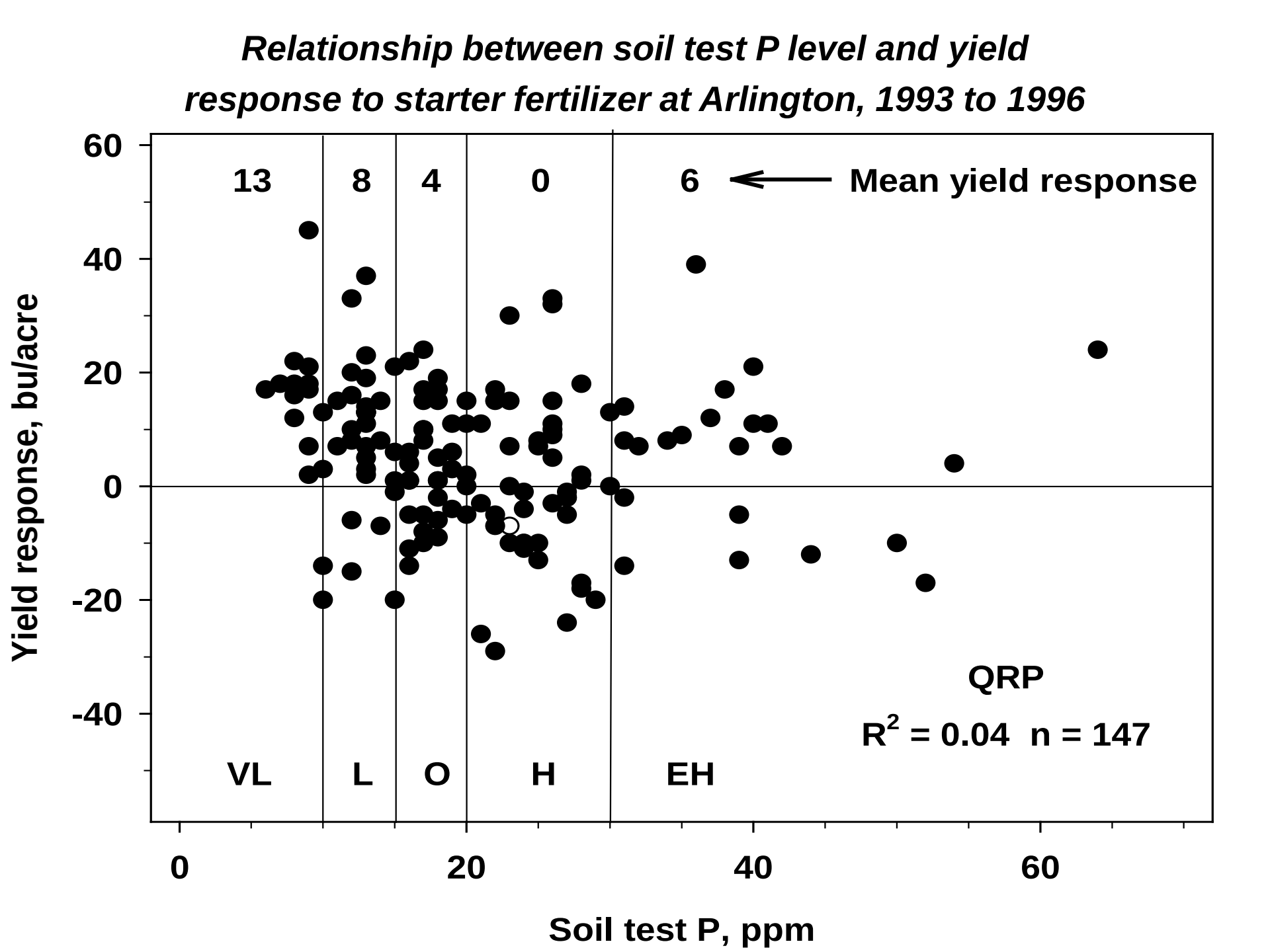
- Results only from plots with soil test K values ≥ 135 ppm and where no broadcast P was applied in the study year.

- Range of soil test P levels (6 – 64 ppm).

- Max. yield to calculate rel. yield was the average of plots with STP>30.


Soil P response relationship relative to current soil test interpretation ranges at Arlington, 1993 to 1996
83
92
98
100
100
Mean relative yield
120
100
80
60
Relative yield, %
VL
L
O
H
EH
0
20
40
60
Soil test P, ppm


Relationship between soil test P level and yield response to starter fertilizer at Arlington, 1996
60
40
20
0
-20
-40
15
9
5
4
10
Mean yield response
QRP
R2 = 0.04 n = 52
VL
L
O
H
EH
0
20
40
60
Yield response, bu/acre
Soil test P, ppm


Relationship between soil test P level and yield response to starter fertilizer at Arlington, 1993 to 1996
60
40
20
0
-20
-40
13
8
4
0
6
Mean yield response
VL
L
O
H
EH
QRP
R2 = 0.04 n = 147
0
20
40
60
Yield response, bu/acre
Soil test P, ppm