Pre-sidedress Nitrate Testing

What is a Pre-sidedress Nitrate Test?

A Soil Test used to detect nitrate nitrogen

I'll speak about corn production however there are many crops for which PSNT is useful

Most useful to analyze mineralization of organic sources of N

-not so much regarding commercial sources of N

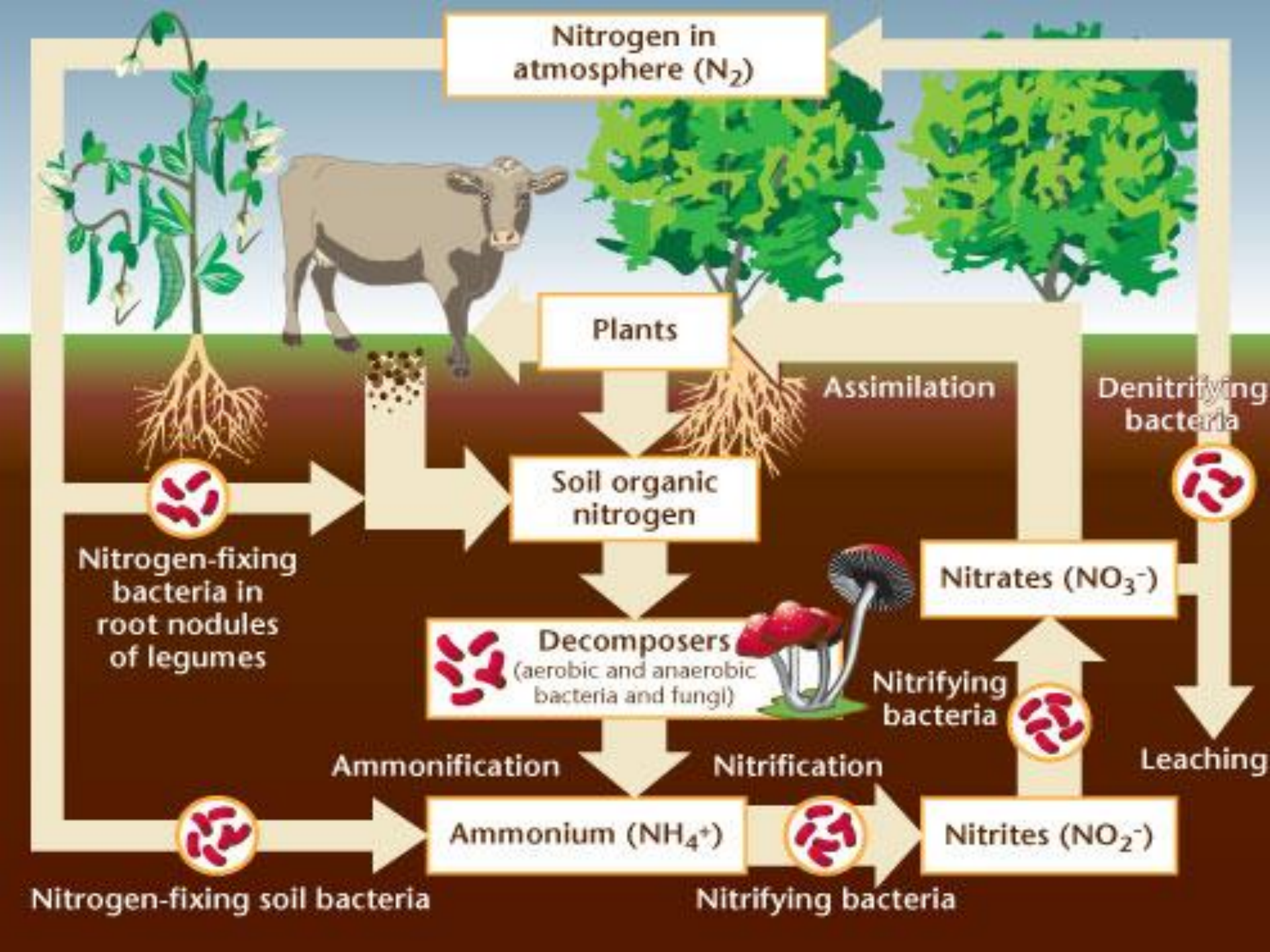
Nitrogen Sources

Organic Sources Include:

- **Animal Manures**
- **Cover Crops**
- **Legume Residues**
- **Biosolids**
- **Compost**

Inorganic Sources Include:

- **UAN**
- **Urea**
- **Ammonium Nitrate**
- **Ammonium Sulfate**
- **DAP**
- **Anhydrous Ammonia**


Nitrogen in atmosphere (N_2)
Plants
Assimilation
Denitrifying bacteria
Soil organic nitrogen
Nitrogen-fixing bacteria in root nodules of legumes
Nitrates (NO_3^-)
Decomposers
(aerobic and anaerobic bacteria and fungi)
Nitrifying bacteria
Leaching
Ammonification
Nitrification
Ammonium (NH_4^+)
Nitrites (NO_2^-)
Nitrogen-fixing soil bacteria
Nitrifying bacteria

Uncertainty

PSNT Benefits

Contributes to Management for Efficiency in a systems approach

- **Split application of N**
- **Banding starter fertilizers**
- **Judicious utilization of available organic N source**
- **Timing of PSNT allows flexibility**
- **As in calling an audible @ the line**

Apply only a minimum of fertilizer N in the spring (starter fertilizer and/or N used as herbicide carrier).

Take soil samples when the corn is 12 inches tall or at least a week before planned sidedressing.

Penn State: Agronomy Facts #17

Taking the soil sample

- Corn 10”=15” in height at top of whorl
- Sample BETWEEN rows
- Take 10-20 **12”** deep cores
- Thoroughly crumble and mix sample
- Store in cooler if in fields for hours

Performing nitrate test

Many good test kits available

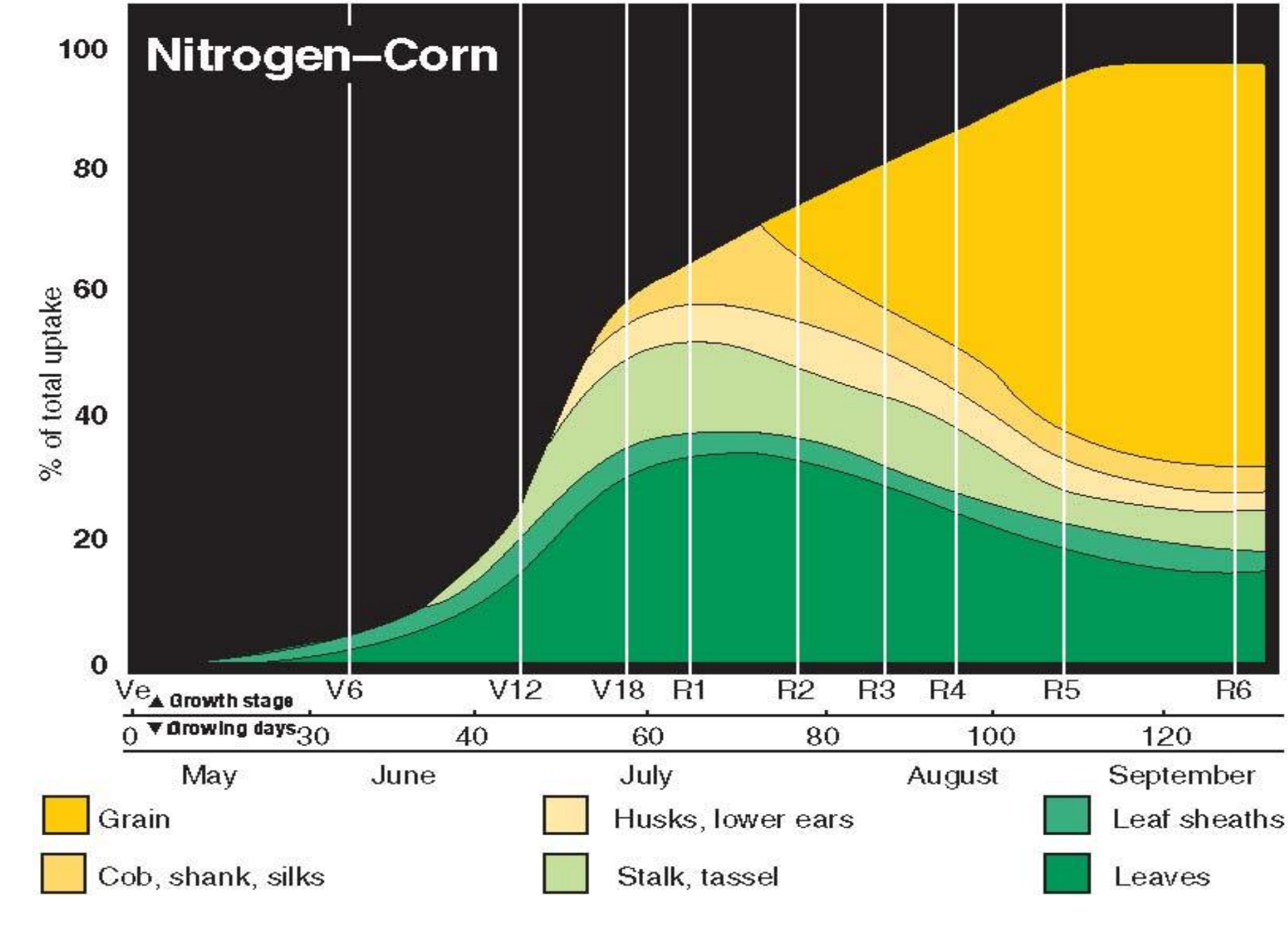
All require a good representative soil sample taken 12” deep

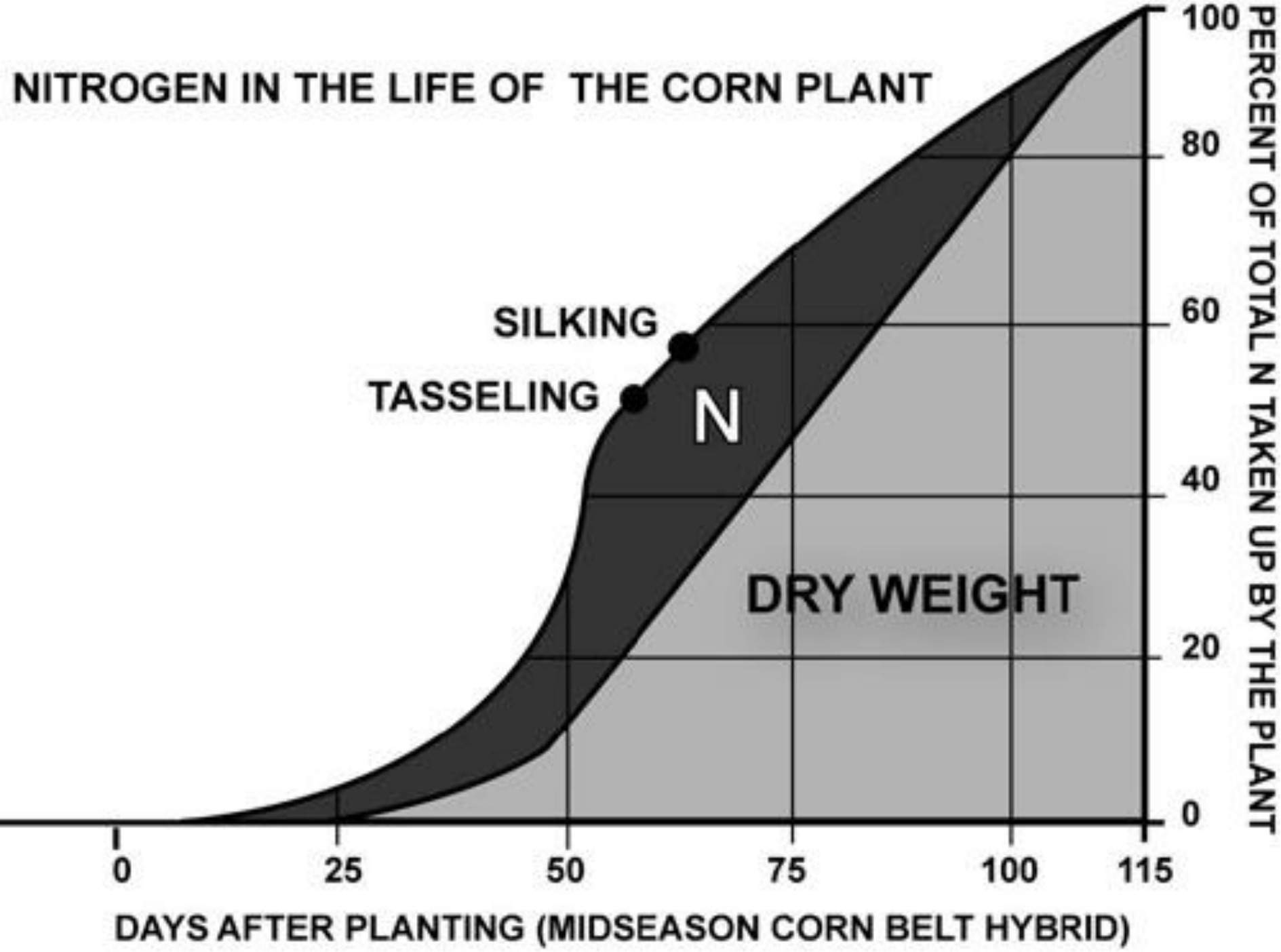
They have a means of extracting Nitrate

They analyze available Nitrate

Labs around Virginia perform PSNT

DCR offices perform PSNT


Nitrogen–Corn
100
80
60
40
20
0
% of total uptake
Ve
V6
V12
V18
R1
R2
R3
R4
R5
R6
Growth stage
Growing days
0
30
40
60
80
100
120
May
June
July
August
September
Grain
Husks, lower ears
Leaf sheaths
Cob, shank, silks
Stalk, tassel
Leaves


NITROGEN IN THE LIFE OF THE CORN PLANT
SILKING
TASSELING
N
DRY WEIGHT
0
25
50
75
100
115
DAYS AFTER PLANTING (MIDSEASON CORN BELT HYBRID)
0
20
40
60
80
100
PERCENT OF TOTAL N TAKEN UP BY THE PLANT

Nitrate-N Conc.	N Rate Recommendation
< 15 ppm	Apply full rate of sidedress N that is specified for the field in the nutrient management plan.
15-26 ppm	Apply 50 - 75% of sidedress N that is specified for the field in the nutrient management plan. The decision to reduce the recommended nitrogen rate must be made on a site-by site basis and should take into account previous field history, organic N additions, and management practices.
> 26 ppm	Nitrate nitrogen at a level to meet the yield goal without any sidedress nitrogen needed

Nitrate-N Conc.	N Rate Recommendation
< 11 ppm	Apply full rate of sidedress N that is specified for the field in the nutrient management plan.
11-20 ppm	Apply 50 - 75% of sidedress N that is specified for the field in the nutrient management plan. The decision to reduce the recommended nitrogen rate must be made on a site-by site basis and should take into account previous field history, organic N additions, and management practices.
> 20 ppm	Nitrate nitrogen at a level to meet the yield goal without any sidedress nitrogen needed

Example 1:

N recommendation: 150 lbs/acre

90 lbs/acre applied as manure pre-plant

60 lbs/acre fertilizer to be applied as Sidedress

PSNT result is 19 ppm

Should sidedress be adjusted?

If sidedress rate should be adjusted, what should the new sidedress rate be?

Example 2:

N recommendation: 170 lbs/acre

90 lbs/ acre applied as manure pre-plant

30 lbs/acre fertilizer broadcast pre-plant

50 lbs/acre fertilizer to be applied as sidedress

PSNT result is 30 ppm

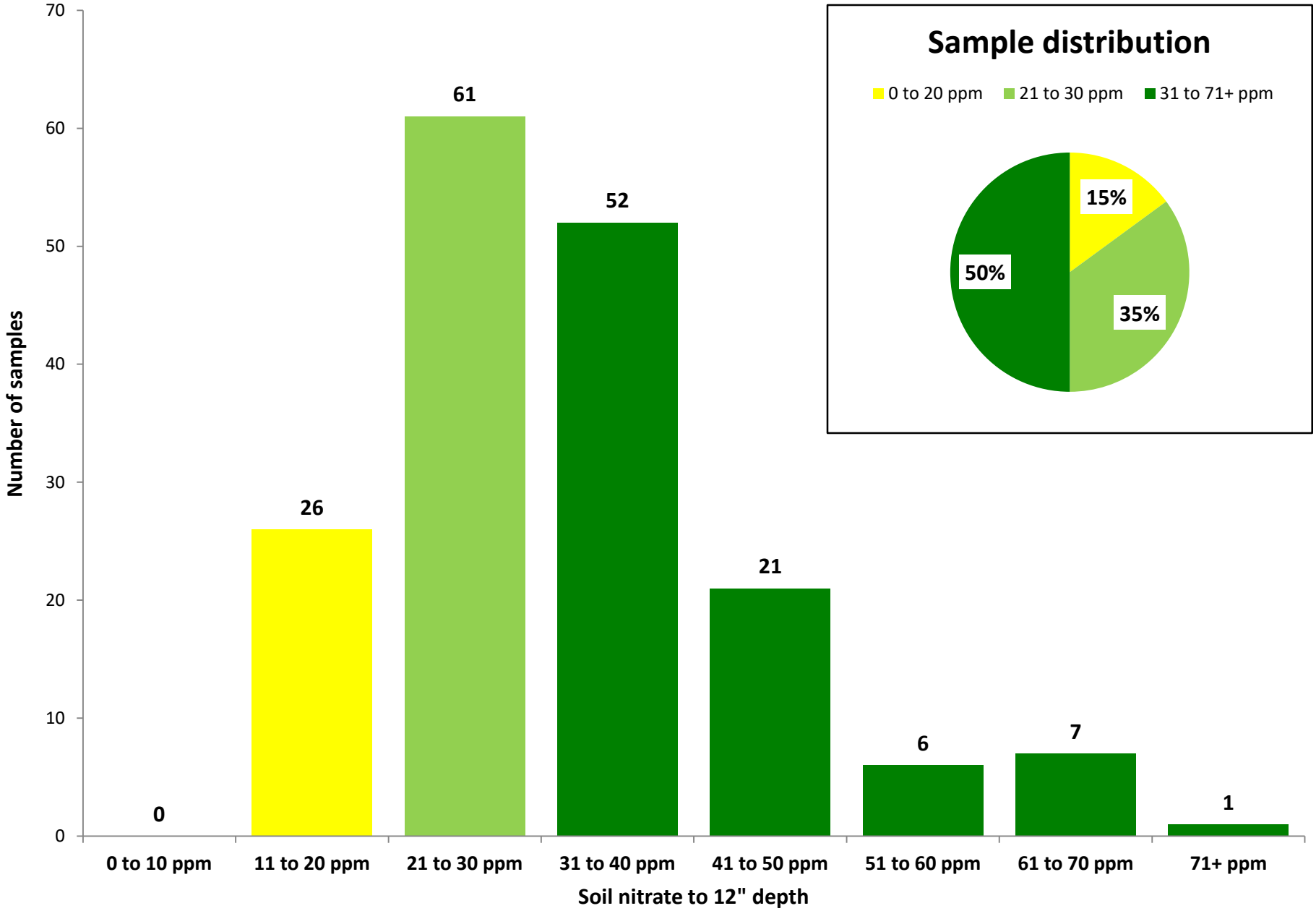
Should sidedress rate be adjusted?

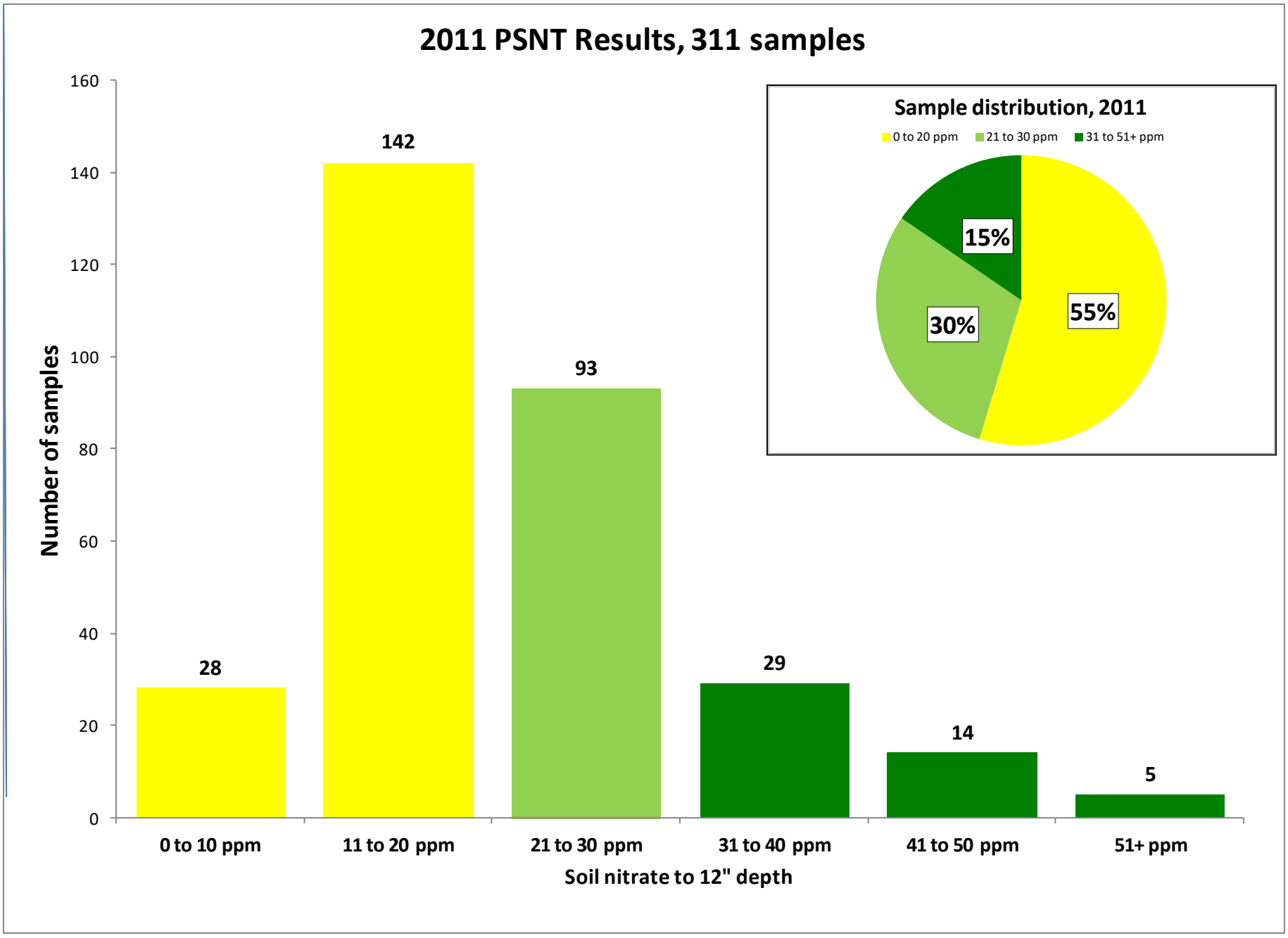
If sidedress rate should be adjusted, what should the new sidedress rate be?

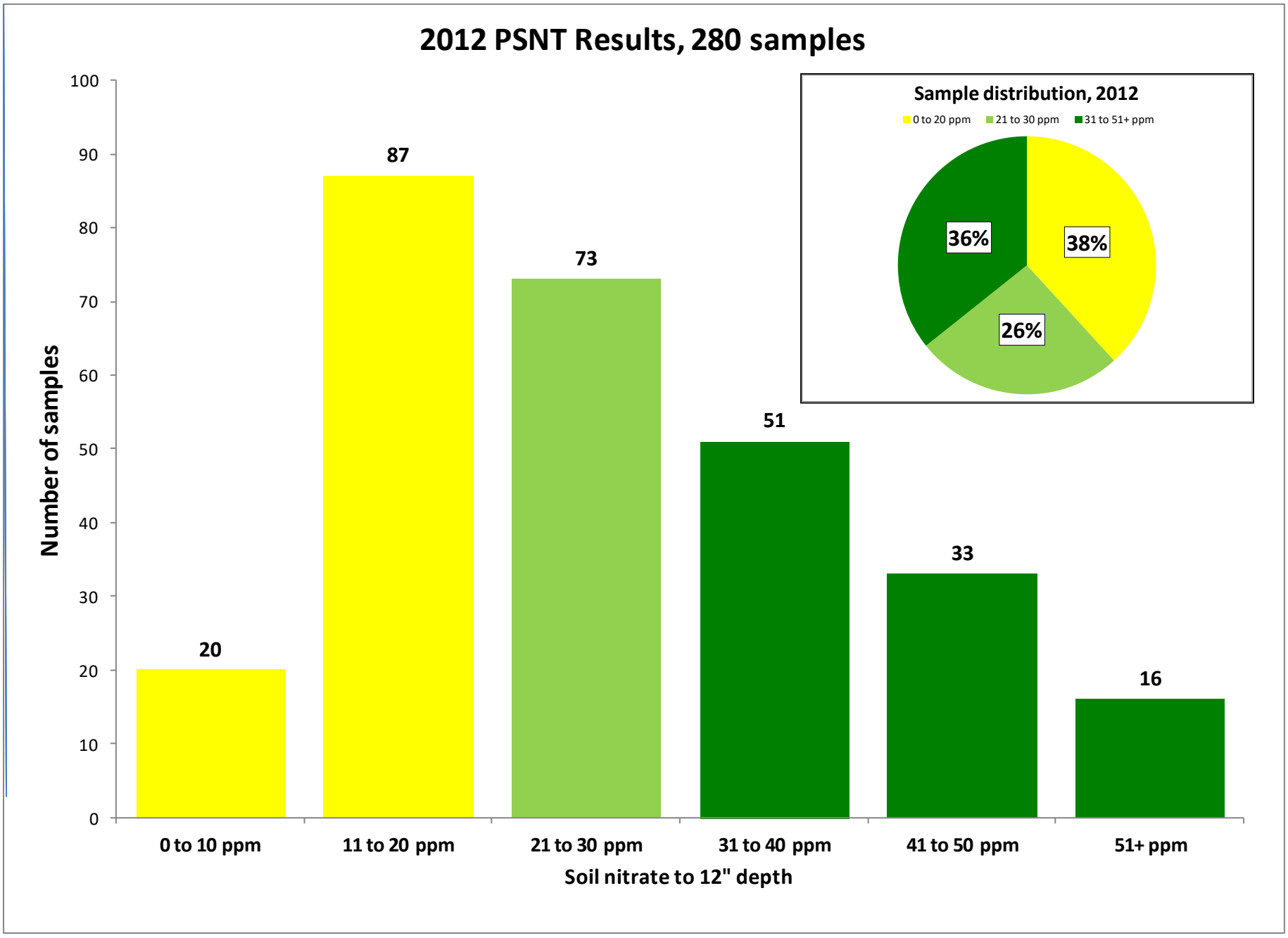
2012 PSNT TRACKING DATA ------- John Fallon

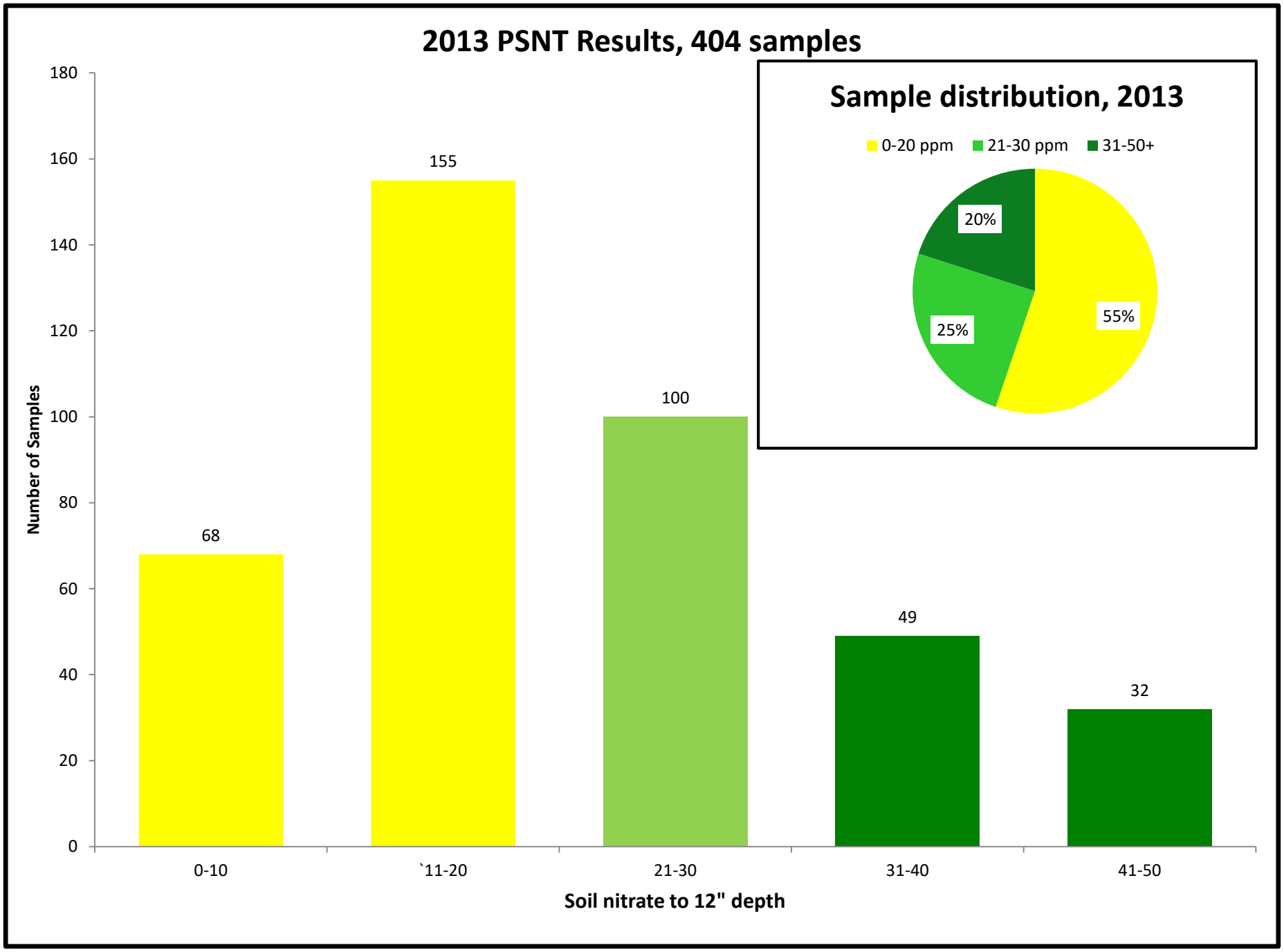
Farm	acres	Planned #N sidedress	Actual #N sidedress	% Reduction	# N Saved*	$ Cost N/LB	$ $ Saved
MVD	32	2080	960	54	1120	.70	784.00
BHD	47	2585	960	63	1625	.70	1138.00
HTD	79	3685	1920	48	1765	.70	1235.50
RFF	40	2200	0	100	2200	.70	1540.00
AF	226	13560	6780	50	6780	.70	746.00
WF	57	3420	1710	50	1710	.70	1197.00
RMD	273	20475	2700	87	17775	.70	12442.50
OF	450	22500	0	100	22500	.70	15750.00
Totals	**1204**	**70505**	**15030**	**77**	**55475**		**38833.00**

2010 PSNT Results 174 samples




2011 PSNT Results, 311 samples
Number of samples
160
140
120
100
80
60
40
20
0
28
142
93
29
14
5
0 to 10 ppm
11 to 20 ppm
21 to 30 ppm
31 to 40 ppm
41 to 50 ppm
51+ ppm
Soil nitrate to 12" depth
Sample distribution, 2011
0 to 20 ppm
21 to 30 ppm
31 to 51+ ppm
15%
30%
55%


2012 PSNT Results, 280 samples
Number of samples
100
90
80
70
60
50
40
30
20
10
0
20
87
73
51
33
16
0 to 10 ppm
11 to 20 ppm
21 to 30 ppm
31 to 40 ppm
41 to 50 ppm
51+ ppm
Soil nitrate to 12" depth
Sample distribution, 2012
0 to 20 ppm
21 to 30 ppm
31 to 51+ ppm
36%
38%
26%


2013 PSNT Results, 404 samples
Number of Samples
180
160
140
120
100
80
60
40
20
0
68
155
100
49
32
0-10
`11-20
21-30
31-40
41-50
Soil nitrate to 12" depth
Sample distribution, 2013
0-20 ppm
21-30 ppm
31-50+
20%
25%
55%


Questions?