What To Be Thinking Before We Plant !

<u>Roots And Leaves</u>

SOLUTIONS

TM

INITIAL SUCCESS OR TOTAL FAILURE

MARINE CORPS – EOD SLOGAN

Things To Keep In Mind

- Think out of the Box !
- We are not ignorant, it is that we know so much that is wrong !
- Never approach a horse from the rear a bull from the front or a fool from any direction!

R7™ PLACEMENT STRATEGY

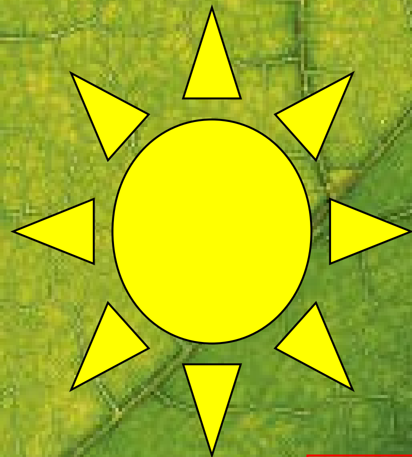
- **The Right Genetics** for
- **The Right Soil Type at**
- **The Right Plant Population in**
- **The Right Cropping System with**
- **The Right Traits fed**
- **The Right Plant Nutrition** defended with
- **The Right Crop Protection**

Reasoning

- The reasoning on how we make a product lies in the plants demand and use for the element of concern.
  - Yield and Quality
  - Use time – Crop cycle.
- Cost of the product is not and should not be the main concern. Cheaper products do not always address the crops demands
  - Am Zinc – misses crucial zinc demands
    - With a splash of Citric Acid
  - Wolftrax – one product all uses
  - EDTA as foliars


24 HOUR
FITNESS
POINT LON
HANDICA
TO UPPE
LOCATED
24 HOUR

Photosynthesis



Mn^{+2}

$$6\,CO_2 + 12\,H_2O \xrightarrow[\text{Chloroplast } Mg^{+2}]{N,\ P} \underline{C_6H_{12}O_6} + 6\,O_2$$

The Process is Producing Carbohydrate (sugar = energy)

The Importance of Reducing Stresses

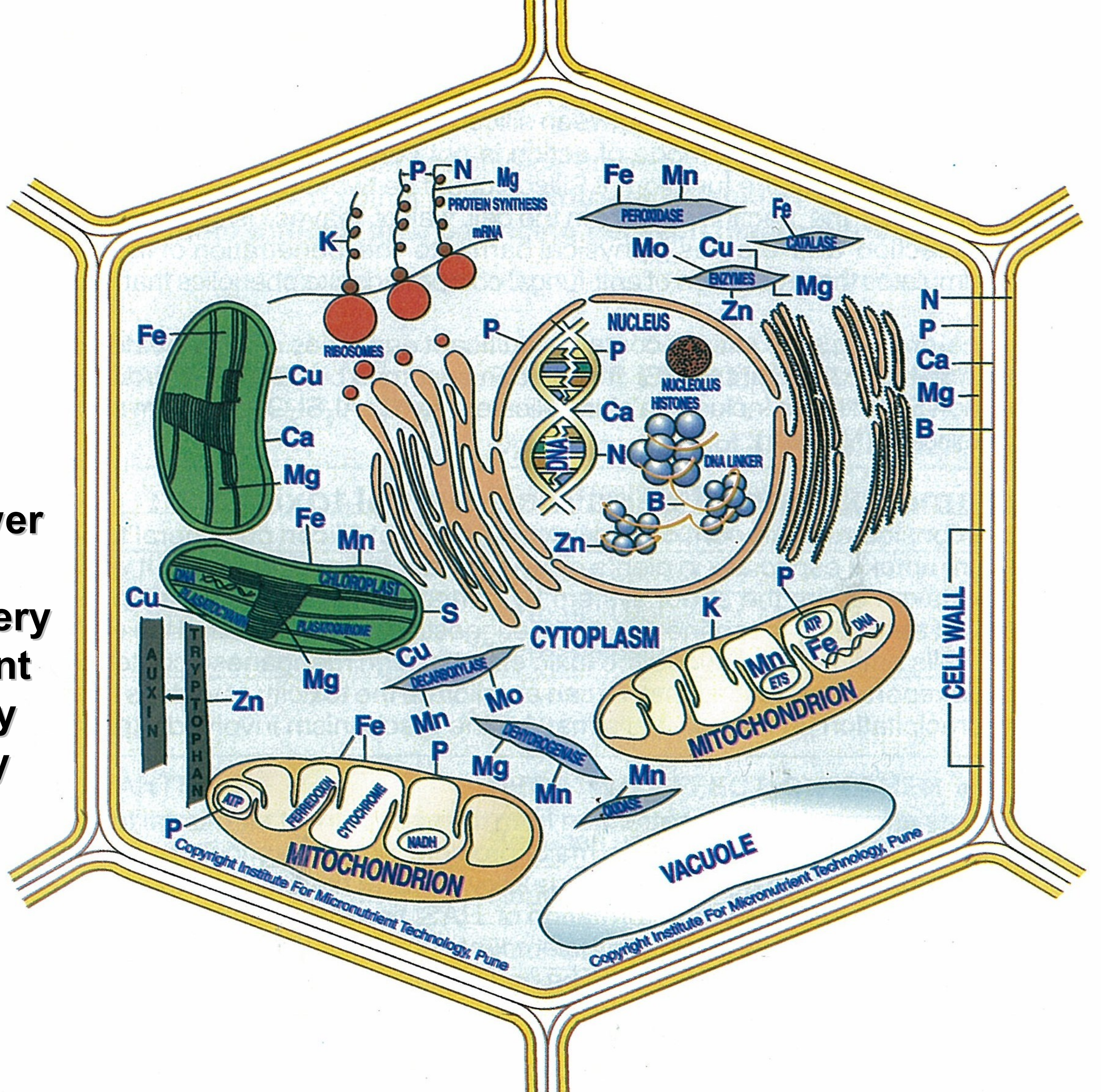
Genetic Potential **-** **Nutrition Physiology Management Environment Diseases Pests** **=** **Harvest**

Potential - Stresses = Yield

There is no free lunch! ***Dr. Andre Comeau***

<u>**Diagram of nutrient role in plant cell**</u>

What we are selling the grower is plant physiology. Every essential nutrient is found in every leaf cell of every plant. *<u>Genetic Families</u>* are driven by plant nutrition.



RIGHT Fertility Recommendations:

24K 30K 36K 42K

- Nutrient concentration in the soil needs to increase with smaller root masses that result from higher populations. <u>Recs. will vary by hybrid</u>

Fertility management changes are necessary

- **Do Nutrient uptake capabilities change as root sizes change?**
- How old is much of the fertility research?
- Have our populations changed in that time?
- Have yield goals changed?
- What are the proper fertility levels with increases in populations?

Elemental Prominence

- Plant Needs:C, H, O N,P,K,Mg,Ca,S,*Zn,Mn,Cu,B,Fe*,Mo,Cl – Ni, Co, Si
- Crop demand and sensitivity for each element is unique to each crop.
- Within each crop, there are specific physiological times of elemental prominence.

WINFIELD™ SOLUTIONS

Micronutrient Agronomics

- ***I.F.M.*** **-** ***<u>"Integrated Fertility Management"</u>***
  - Formulate a fertility strategy that ***<u>best suits the localized soil factors,</u>*** climatic conditions, crop type and disease potential to maximize the crops genetic potential and return-on-investment.
  - View fertility as a ***<u>season long approach,</u>*** taking into consideration the nutrients availability; associated with soils, climates, crop types and the changing nutrient demands during the growth cycle by the specific crop that effects quality and yield.
  - Utilize soil, tissue and crop analysis to insure that the ***<u>appropriate products</u>*** and applications are applied at the ***<u>correct physiological</u>*** timings to positively impact crop quality and yield.
  - ***<u>Understanding</u>*** the benefits and limitations of ***<u>various fertility products and methods of applications</u>*** by which one can optimize nutrient crop performance during the growth cycle that impacts quality, yield, return-on-investment and minimizes environmental concerns

Using a Proactive Fertility Marketing Approach:

- *“Deficiency Nutrient Approach”: is reactive & limiting*
  - Inadequate or excess supplies of one or more nutrients can produce latent deficiencies without visual symptoms or with visual symptoms. ***Reacting to a nutrient deficiency and/or excess may solve the immediate problem but quality and yield will have already been diminished.***
- *“Dynamic Nutrient Approach”: is vital & essential*
  - By utilizing crop nutrient profiling models and analysis, which monitor the nutrient dynamic’s during specific physiological growth stages, take into consideration the soils, crop nutrient sensitivities, climatic conditions and cultural practices that effect the nutrient availability, ***prevents deficiencies and/or excess. Thus maximizing the fertility factors that effect quality and yield potential in crops.***

This is reactive and limiting!

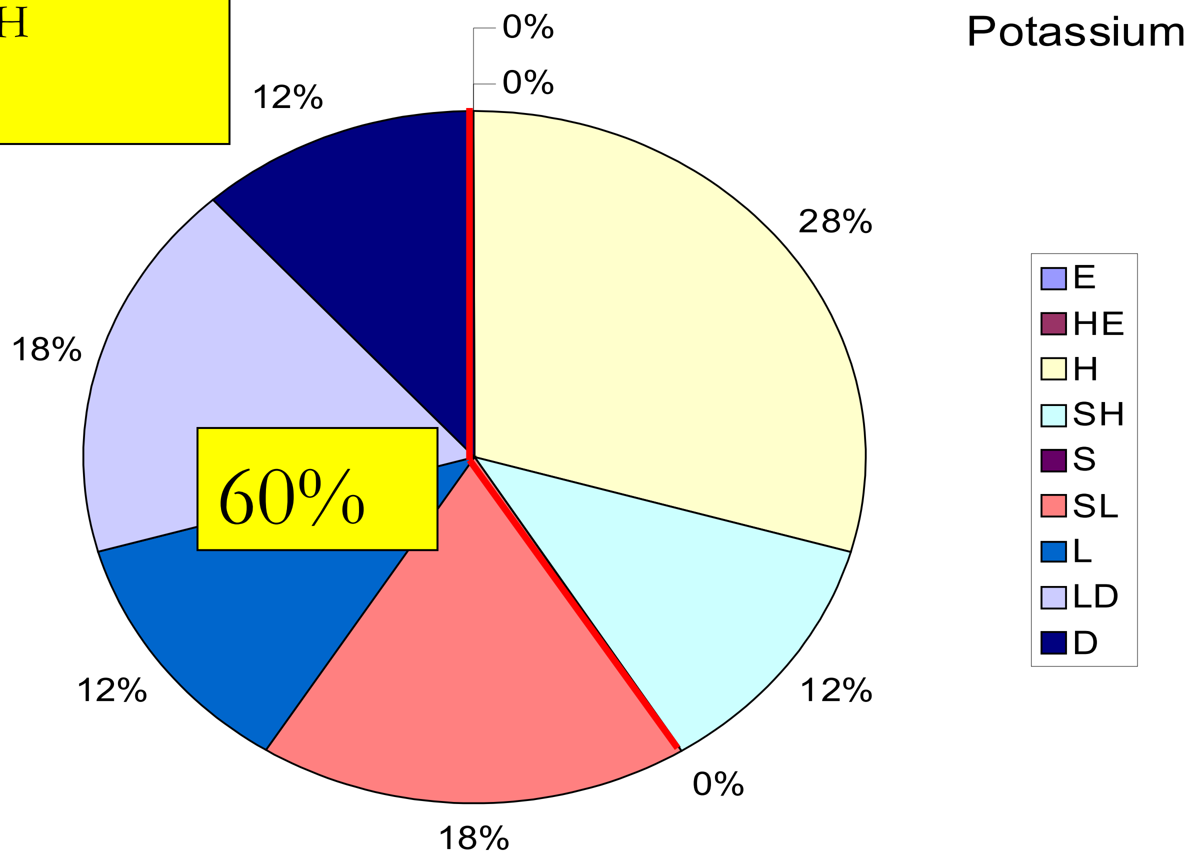
Potassium

Soil Samples

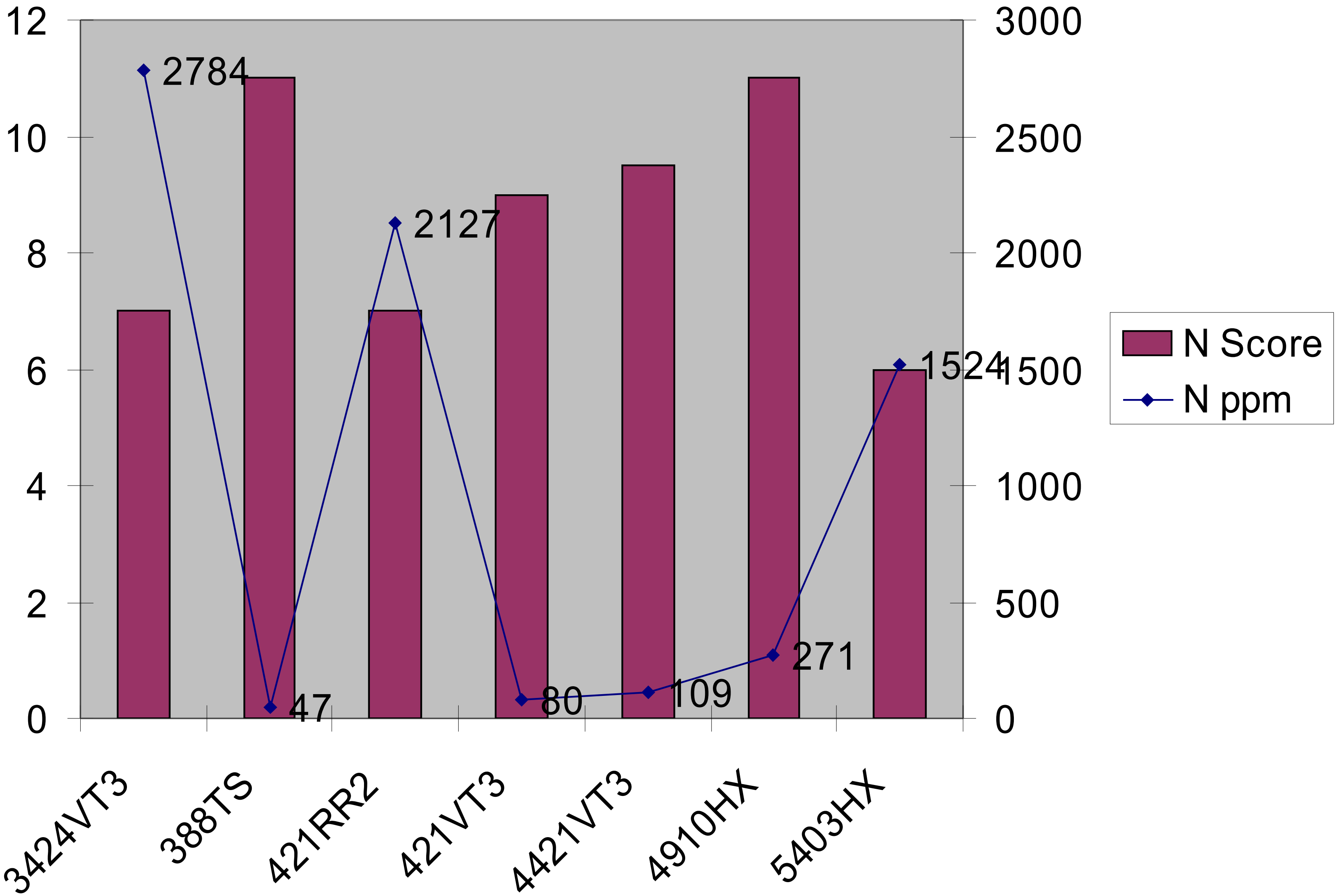
K Levels

58% = H to VH

42% = M



Lake Preston N Data



What it Will Take

- 300 Bushel
  - N = 472
  - P = 192
  - K = 366
  - Ca = 82
  - Mg = 80
  - S = 50
  - B = .17
  - Cu = .14
  - Fe = .48
  - Mn = . 48
  - Zn = .9
  - Cl = 6

1242 Lbs

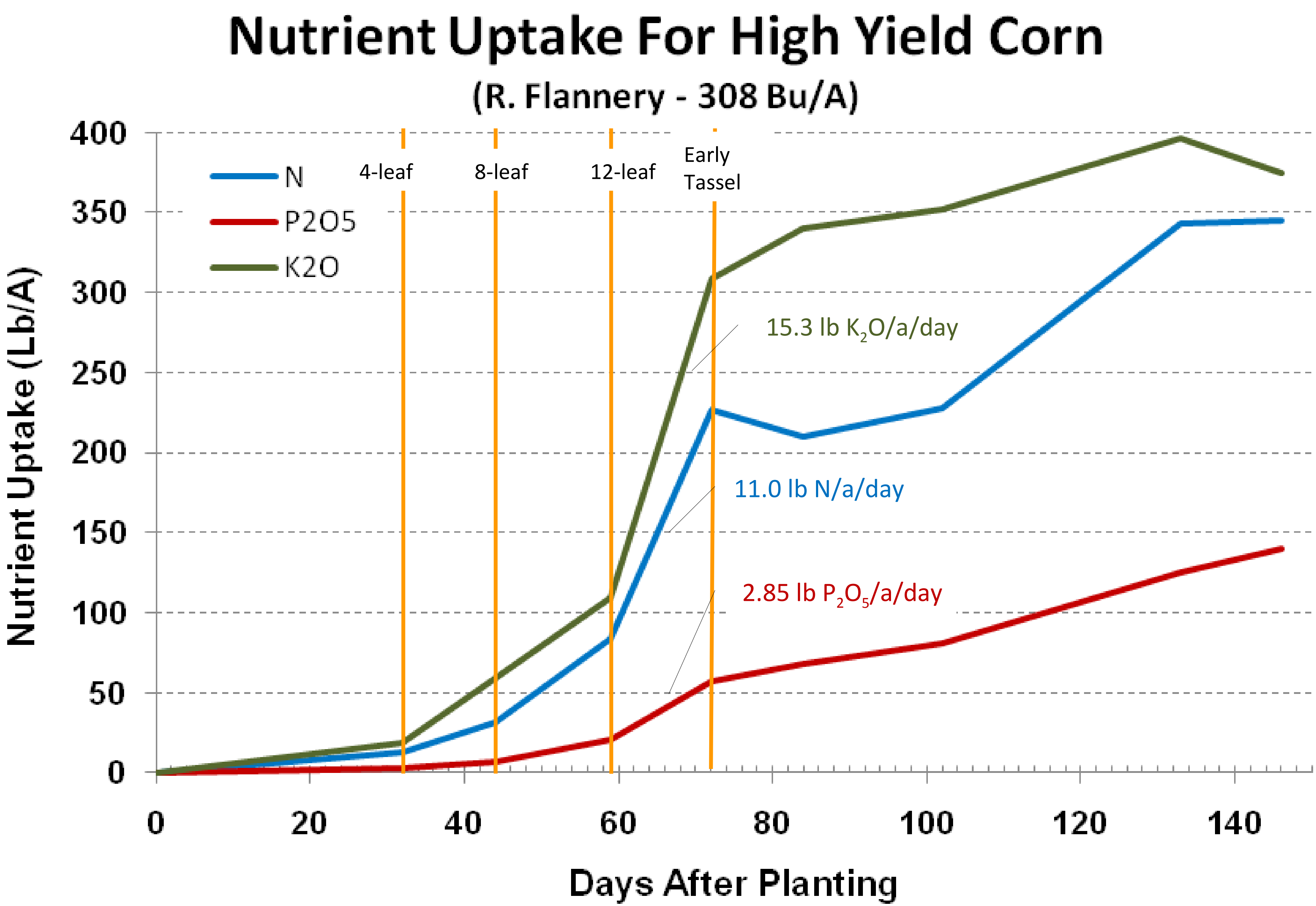
- 400 Bushel
  - N = 627
  - P = 255
  - K = 486
  - Ca = 109
  - Mg = 106
  - S = 66
  - B = .22
  - Cu = .18
  - Fe = .63
  - Mn = .63
  - Zn = 1.19
  - Cl = 8

1649 Lbs

Top corn yields from researchers in 1982

Dr. Roy Flannery
New Jersey
338 bu/A

Dr. Sterling Olsen
Colorado
332 bu/A


Nutrient Uptake For High Yield Corn
(R. Flannery - 308 Bu/A)
N
P2O5
K2O
4-leaf
8-leaf
12-leaf
Early Tassel
15.3 lb K_2O/a/day
11.0 lb N/a/day
2.85 lb P_2O_5/a/day
Nutrient Uptake (Lb/A)
0
50
100
150
200
250
300
350
400
Days After Planting
0
20
40
60
80
100
120
140

Nutrient Uptake Mechanisms

Mass Flow

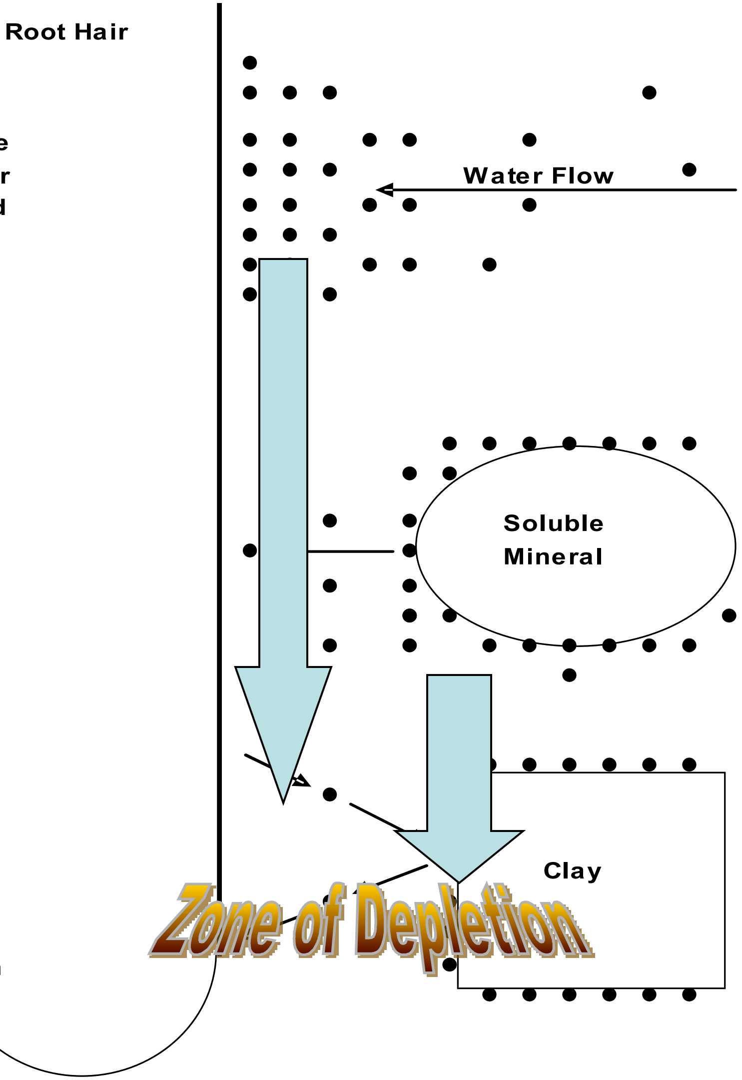
Nutrients that have been solubilized into the soil solution in relatively large quantities (NO_3^-, K^+,SO_4^{2-}) are carried toward root hairs by the flow of water As they come into contact with the surface of the root they accumulate and then begin the process of nutrient uptake.

Diffusion

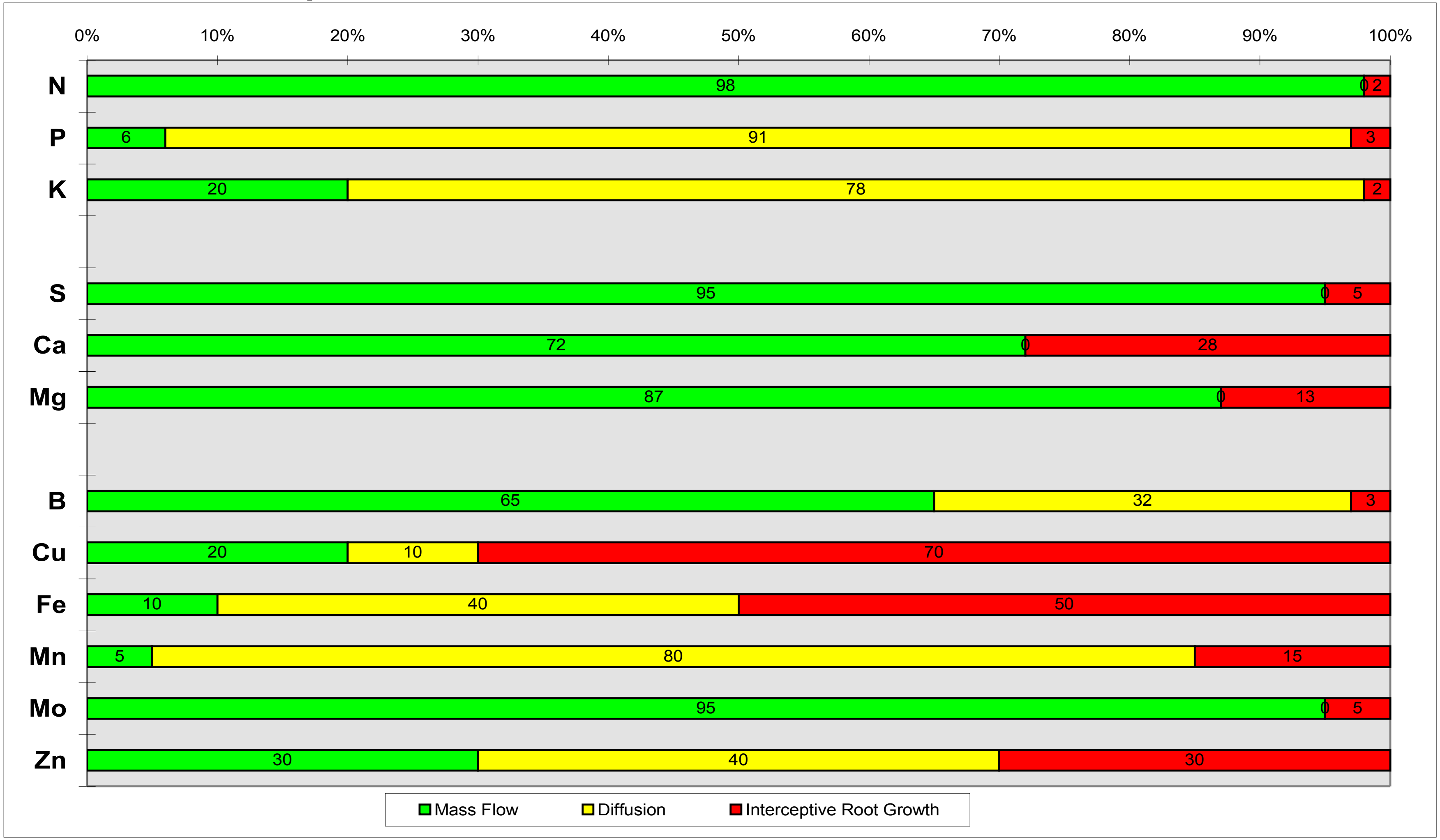
Fertilizer nutrients that are applied to the soiland slowly solubilize release nutrients in ionic form. These ions ($H_2PO_4^-$, for example) then diffuse "down" a concentration gradient toward the surface of the root where they are available for uptake.

Interceptive Root Growth

Cations are held on the soil particle surface by electrostatic attraction. Exudates from root hairs such as protons (H^+) or organic acids can be released into the soil solution and exchange with an adsorbed cation such as K^+, Mg^{2+}, Ca^{2+}, or others. The exchanged ion is then attracted to the surface of the root hair where it begins the process of root uptake.

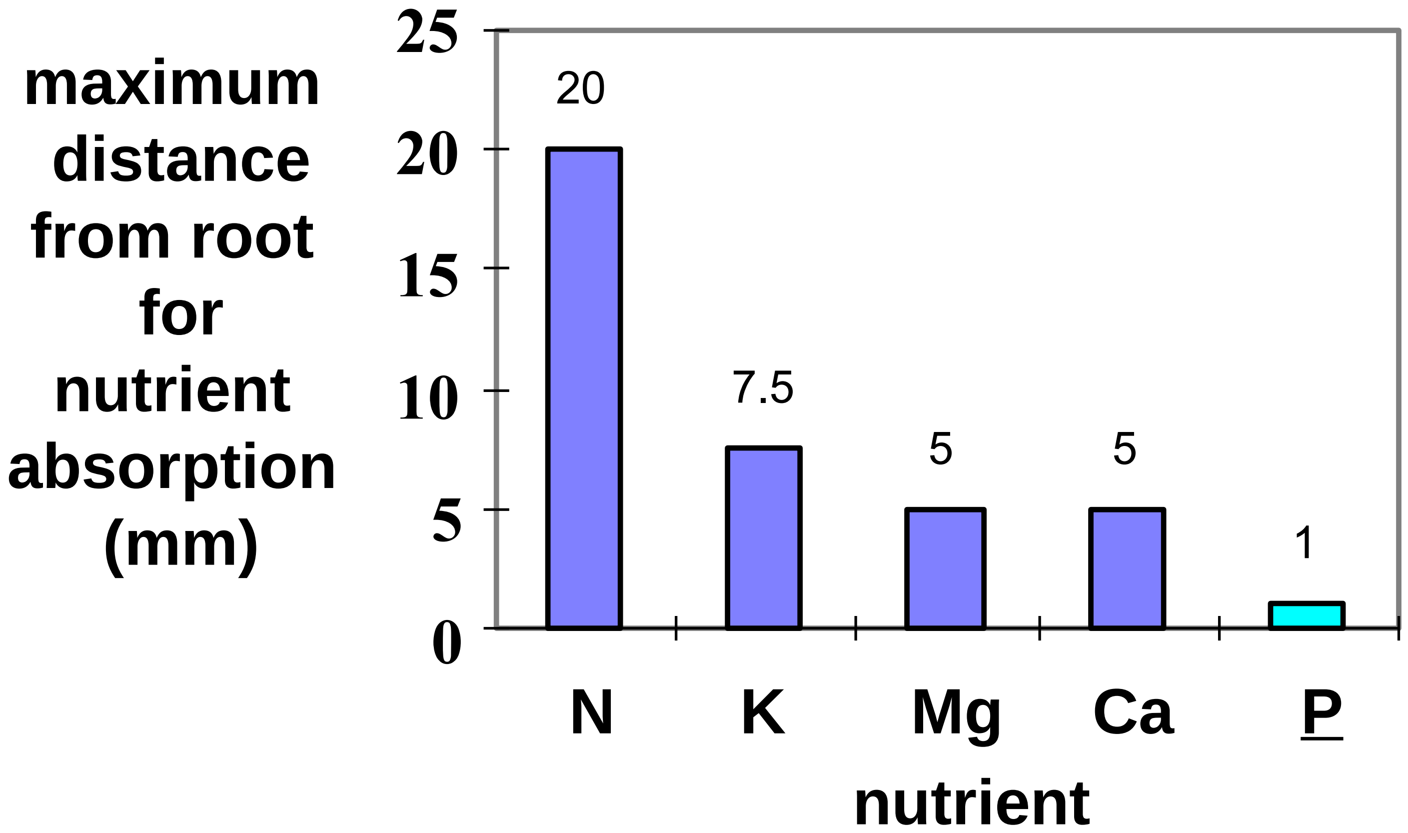


Percentages of Nutrient Uptake Through Roots by Mass Flow, Diffusion and Interceptive Root Growth

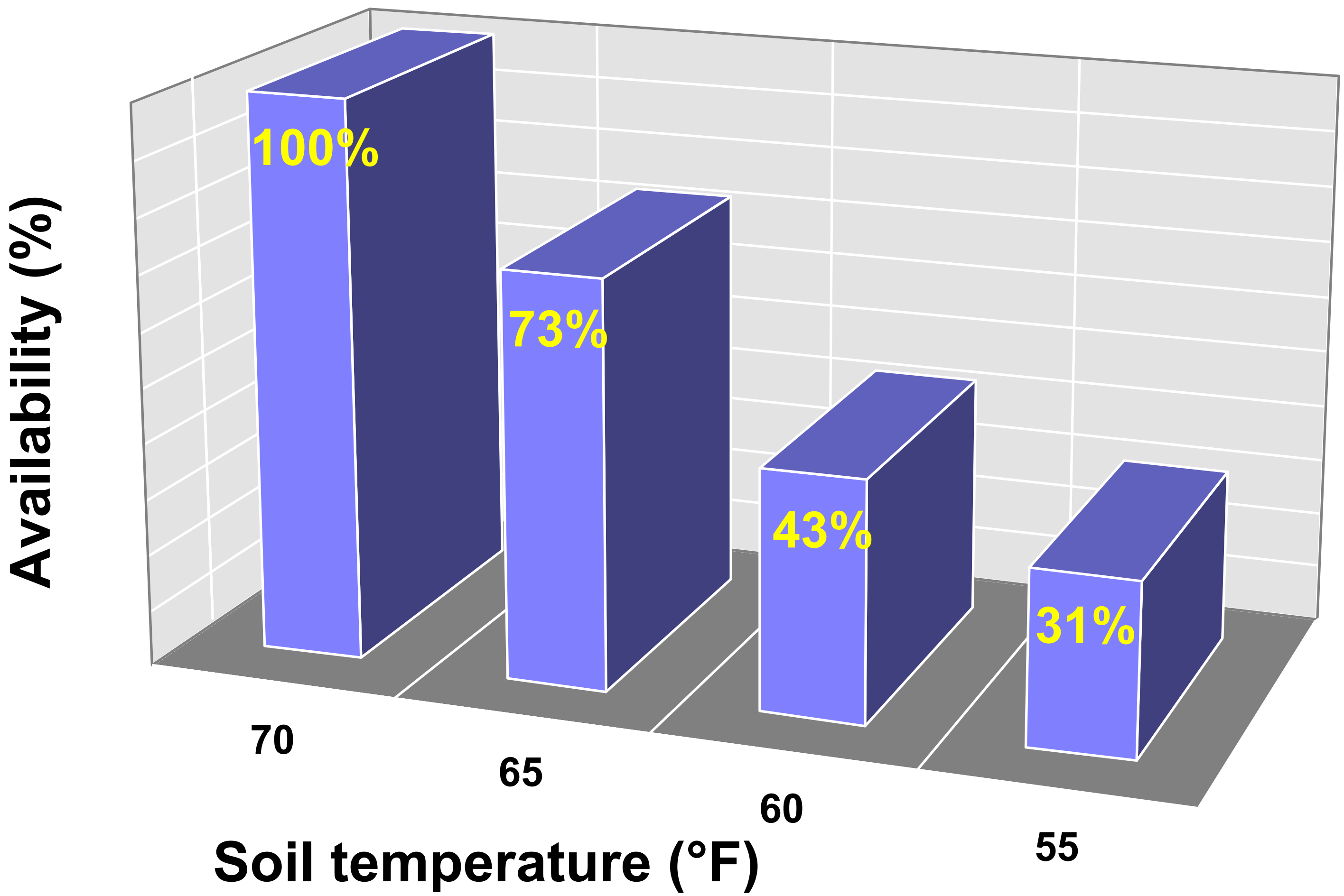


Compiled from data in BARBER and OLSEN 1968, DENNIS 1971

Plants only absorb phosphate that lies very close (1mm) to the root surface



A drop from 70°F to 55°F reduces phosphorus availability by almost 70%!



Need A Good Fast Start

Nutrient Uptake in Corn by Stage of Growth

Nitrogen:

•Primary building block for amino acids, proteins, and plant protoplasm

•Critical for rapid vegetative growth, and bud vigor

•Acts as a catalyst for other nutrients

black layer 2.0 0.25 0.4

Mengel and Barber, Purdue University

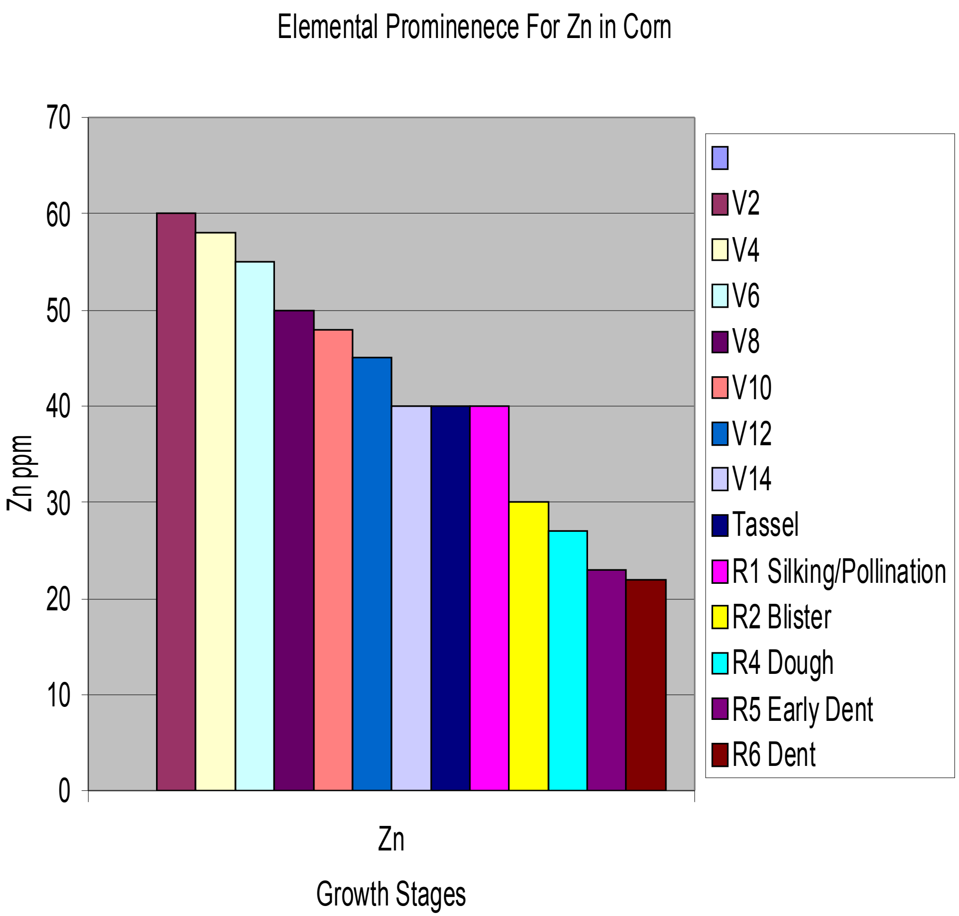
Nutrient Uptake in Corn by Stage of Growth

Phosphorus:

- Important in energy transfer and storage
- Promotes root, flower, and seed production
- Hastens maturity
- Cell division and integrity
- Carbohydrate production

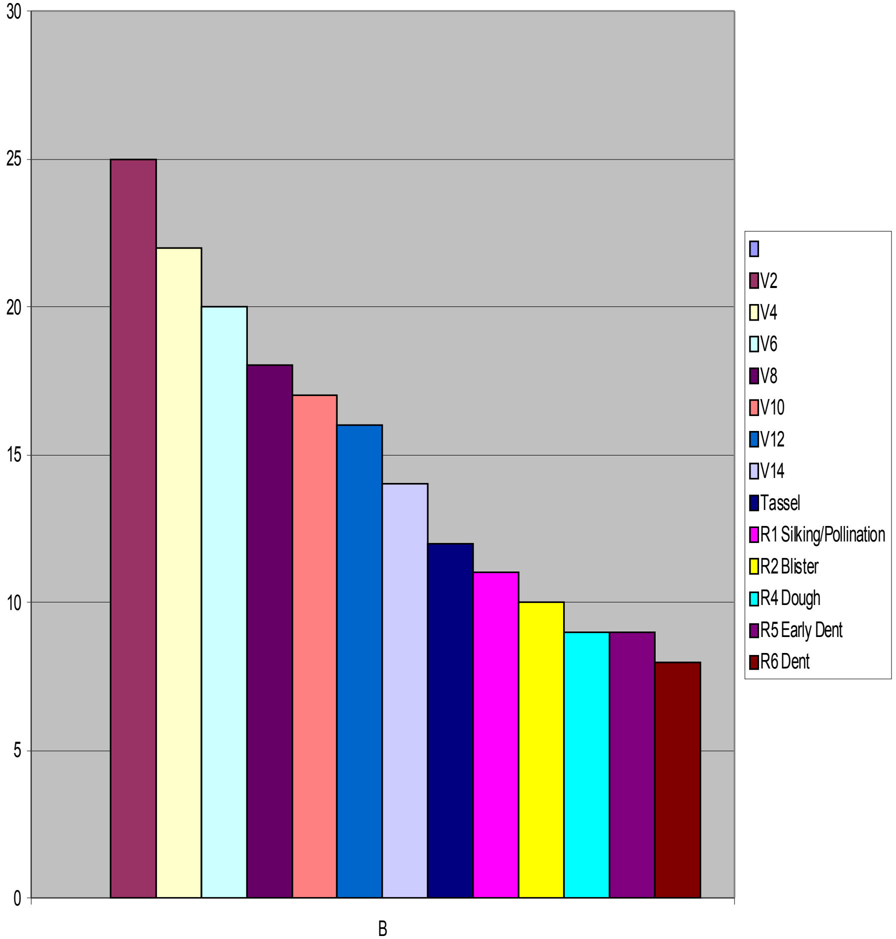
Mengel and Barber, Purdue University

Zinc



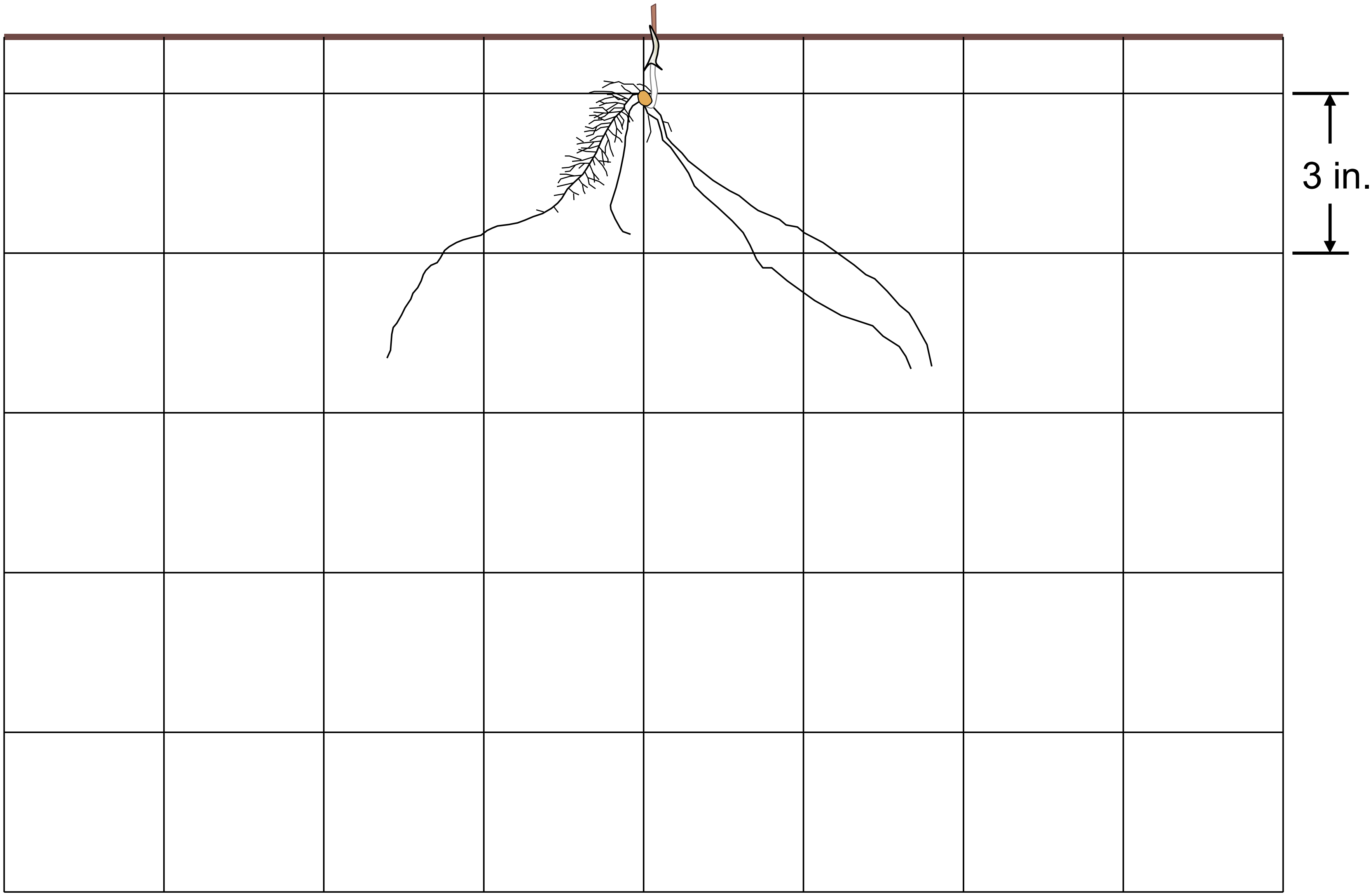
- Necessary for the synthesis of auxins (growth hormones) and proteins
- Important for seed germination and emergence
- Linked to xylem (vascular tissue) formation
- Essential for uniform maturity
- Aids in chloroplast formation and cell elongation
- Plant Health (pytoalexins, superoxide dismutase SOD)

Boron



- Essential for reproduction, aids in formation of pollen tube--facilitates fertilization
- Important for early growth
- Aids in calcium translocation
- Maintains balance between sugar and starch
- Necessary for cell division and differentiation

Corn roots: V1



Corn roots: V3

Minot Answer Plot- July 9, 2008

V5 Untreated

V6
Starter +
Origin Zinc

2340 RH (N x S.u.r.)


Starter
Check
Starter
Check

SOLUBILITY

- **FOR A NUTRIENT TO BE TAKEN UP BY THE PLANT**
  - **THE NUTRIENT MUST GO INTO THE SOIL SOLUTION AT SOME POINT TO BE TAKEN UP BY THE ROOT.**
  - **THEREFORE, IF A PRODUCT IS INSOLUBLE, CHANCES ARE THAT IT WILL NEVER BE AVAILABLE TO THE PLANT IN ADEQUATE QUANTITIES TO SATISFY PLANT NEEDS.**

What is de-activation or “tie-up”?

- When the chemical compound carrying the nutrient is changed to another compound and becomes unavailable to the plant.
- Usually the new compound being formed has low solubility and the soil solution does not contain enough of the nutrient to effectively supply the plant’s needs.

Solubility Products

Zinc Phosphate	$Zn_3(PO_4)_2$	9.00E-33
Zinc Carbonate	$ZnCO_3$	1.40E-11
Iron Phosphate	$FePO_4$	1.30E-22
Iron Carbonate	$FeCO_3$	3.20E-11
Manganese Carbonate	$MnCO_3$	1.80E-11
Copper Carbonate	$CuCO_3$	1.40E-10
Magnesium Phosphate	Mg_3PO_4	3.50E-08

Larger negative number is less soluble

Measuring The Strength of Chelates

Chelating Agent	Fe3+	Fe2+	Zn2+	Cu2+	Mn2+	Ca2+
			AMINOPOLYCARBOXYLATES			
[illegible]	25.0	[illegible]	14.9	[illegible]	13.8	11.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			HYDROXYCARBOXYLATES			
[illegible]	11.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	**37.2**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	24.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calcium does not form coordination bonds with chelating agents and by definition does not form chelates.

Photosynthesis

Mn^{+2}

N, P

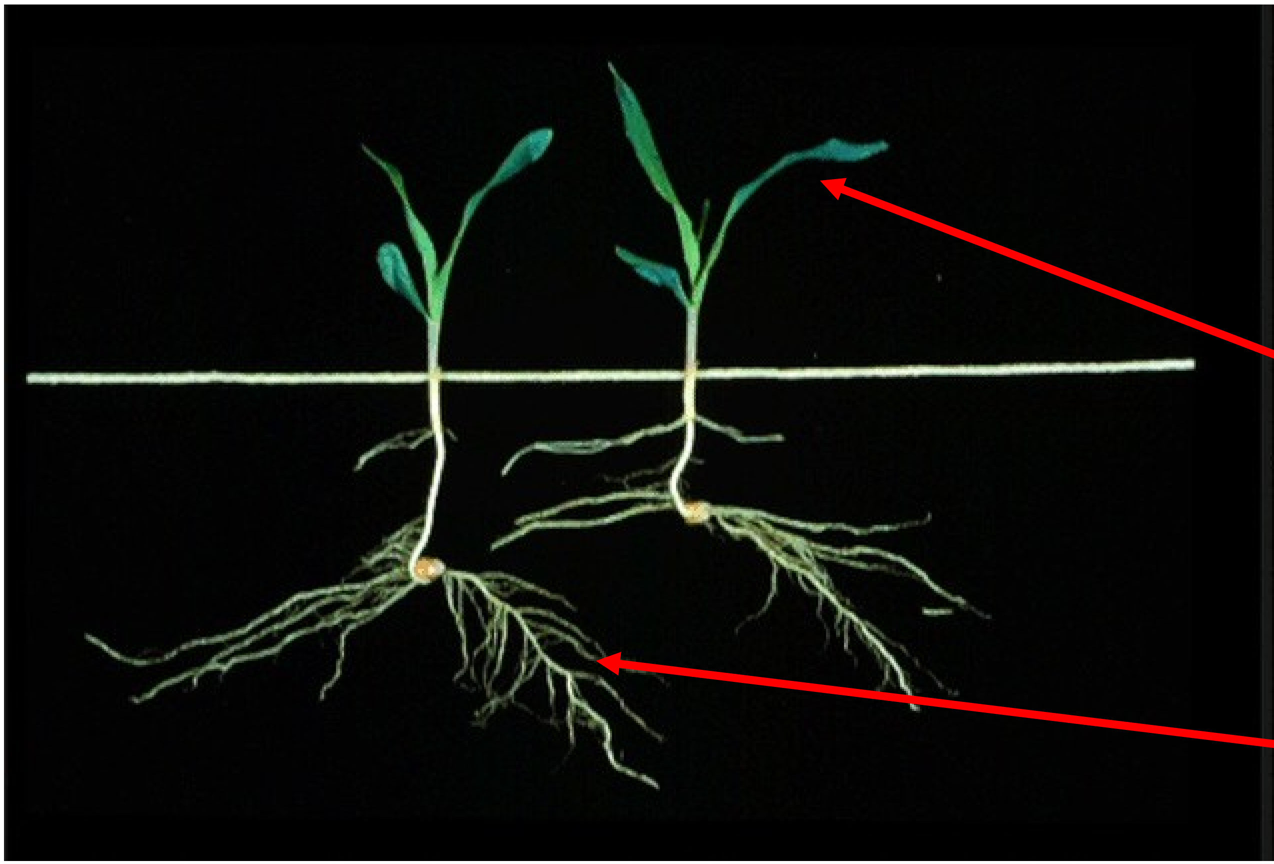
$$6\,CO_2 + 12\,H_2O \xrightarrow[\text{Chloroplast } Mg^{+2}]{\text{N, P}} \underline{C_6H_{12}O_6} + 6\,O_2$$

Chloroplast

Mg^{+2}

The Process is Producing Carbohydrate (sugar = energy)

Sink / Source = Larger Root System – More Efficient Plant



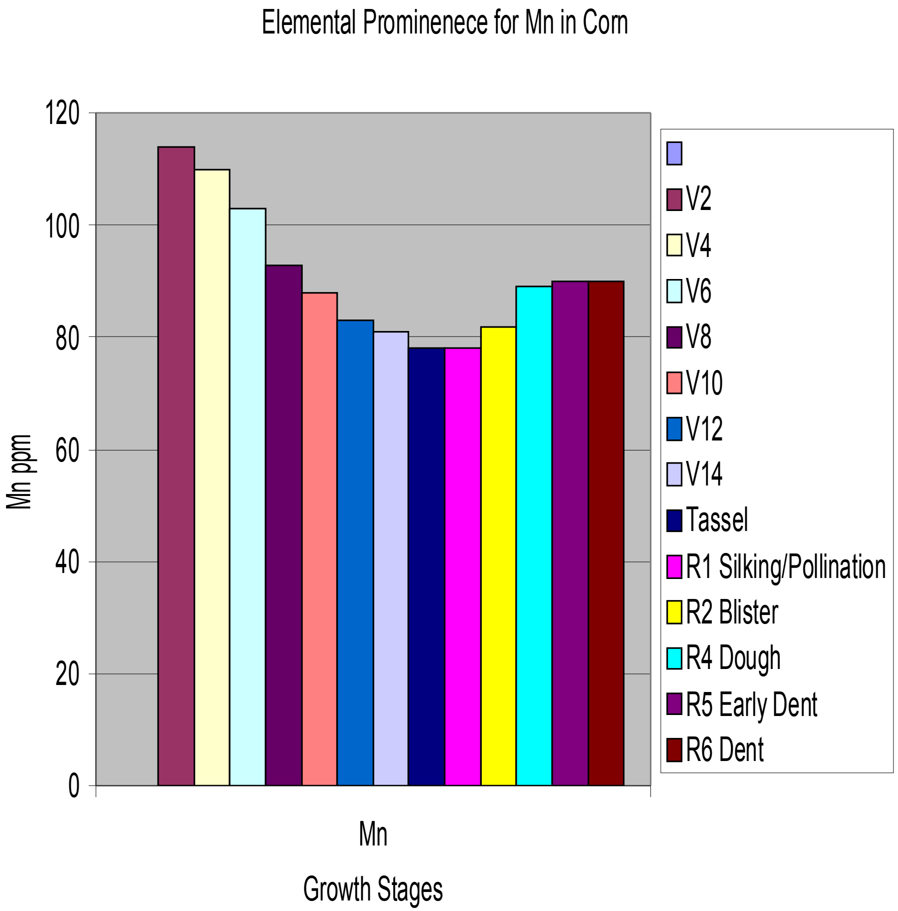
Sink / Source Relationship

Source = Makes Food for Plant Use.

Sink = Does Not Food Make Food. Food Made in Source Moves to Sink.

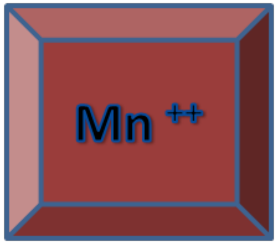
It is all about leaf size

Manganese



- Aids in nitrogen utilization
- Essential for phosphorus and magnesium uptake
- Essential in photosynthesis
- Aids in chlorophyll synthesis
- Plant Health(phytoalexins and SOD)
- ***<u>Essential For Nodulation and Nitrogen Utilization in Soybeans</u>***

Manganese



Nutrient Uptake in Corn by Stage of Growth

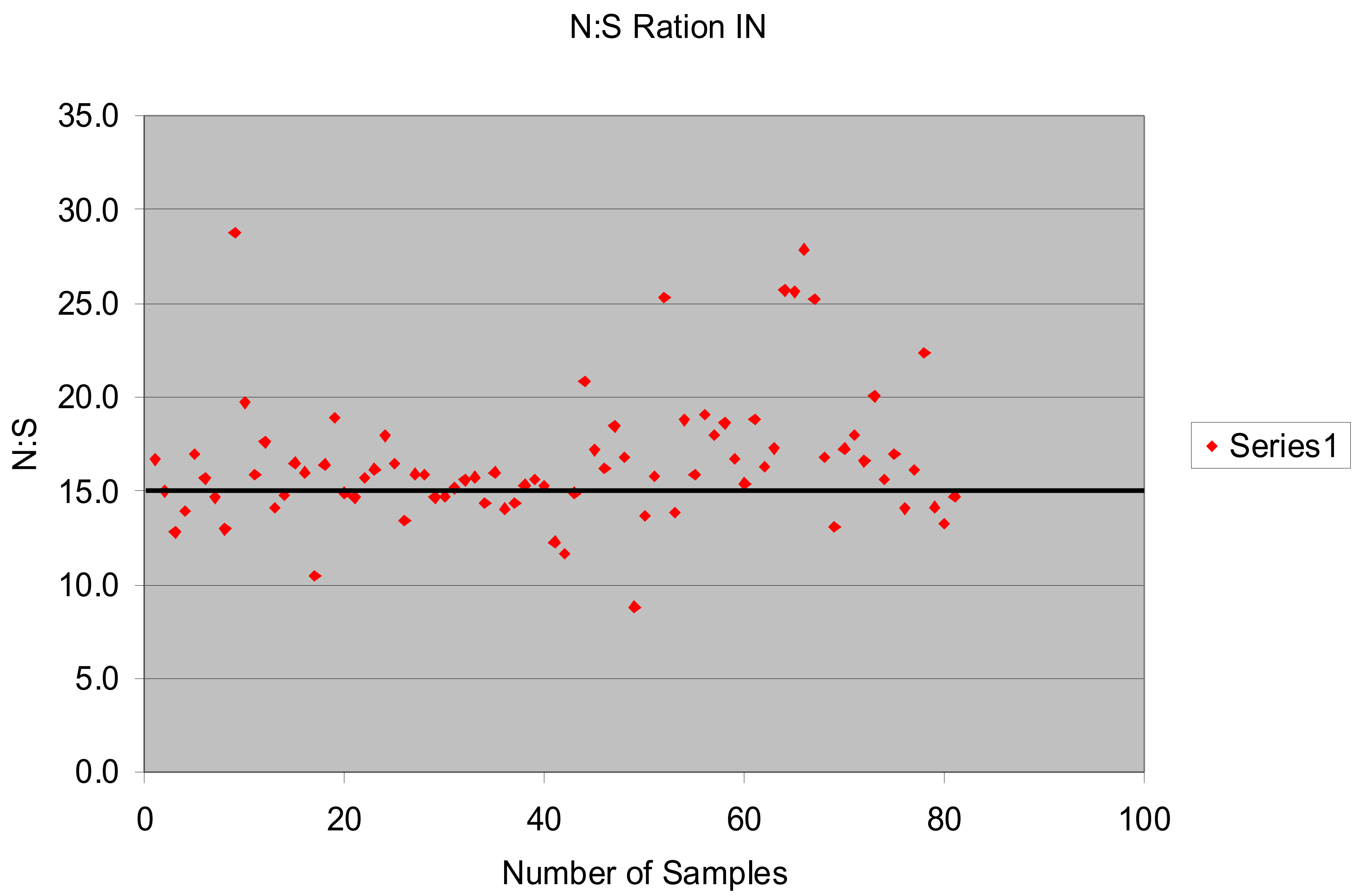
Potassium:

- Enzyme activator
- Improves cold weather tolerance
- Osmoregulation
- Maintain Electrochemical Equilibria (pH)
- Plant Health

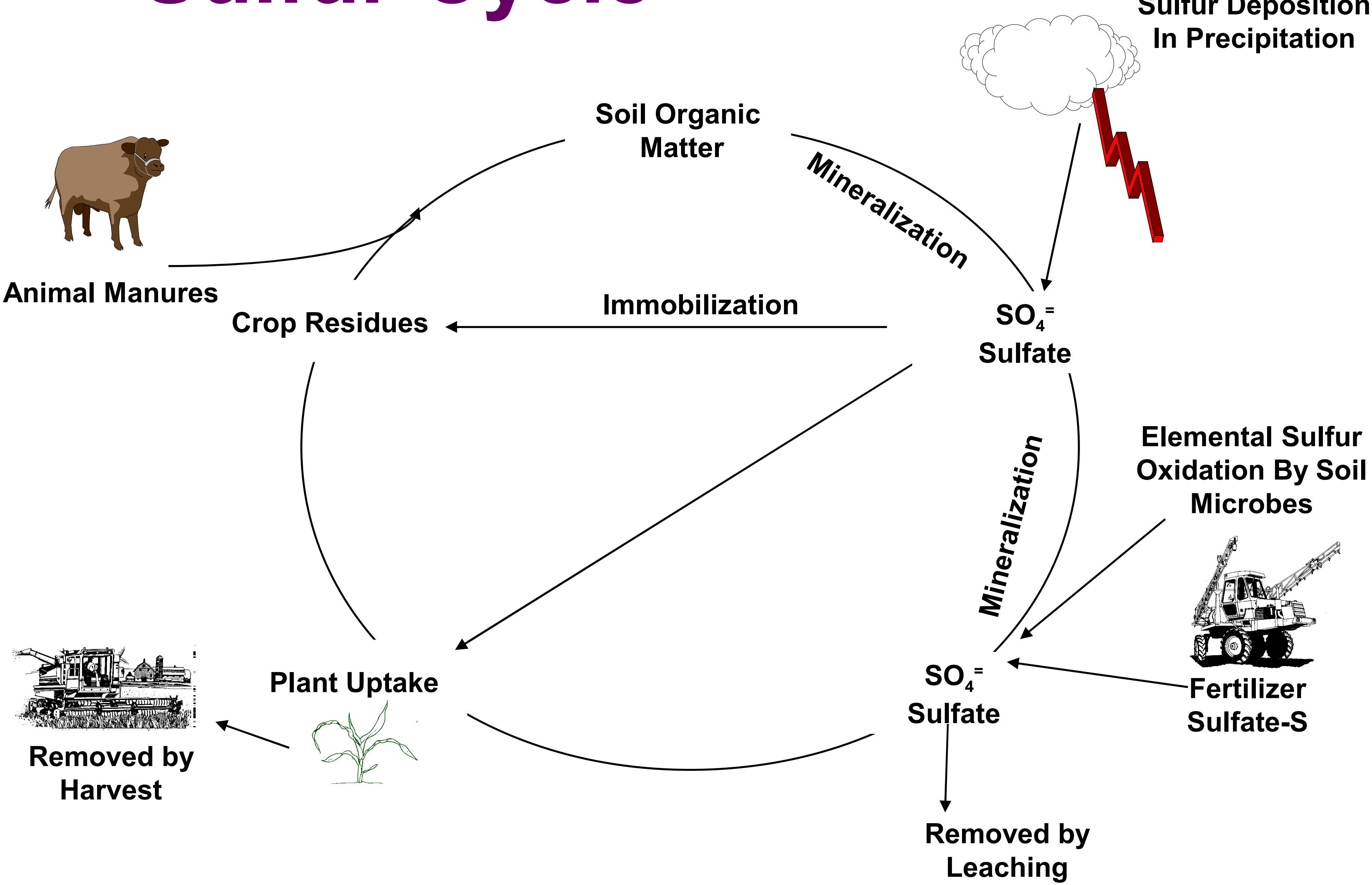
Mengel and Barber, Purdue University

Sulfur

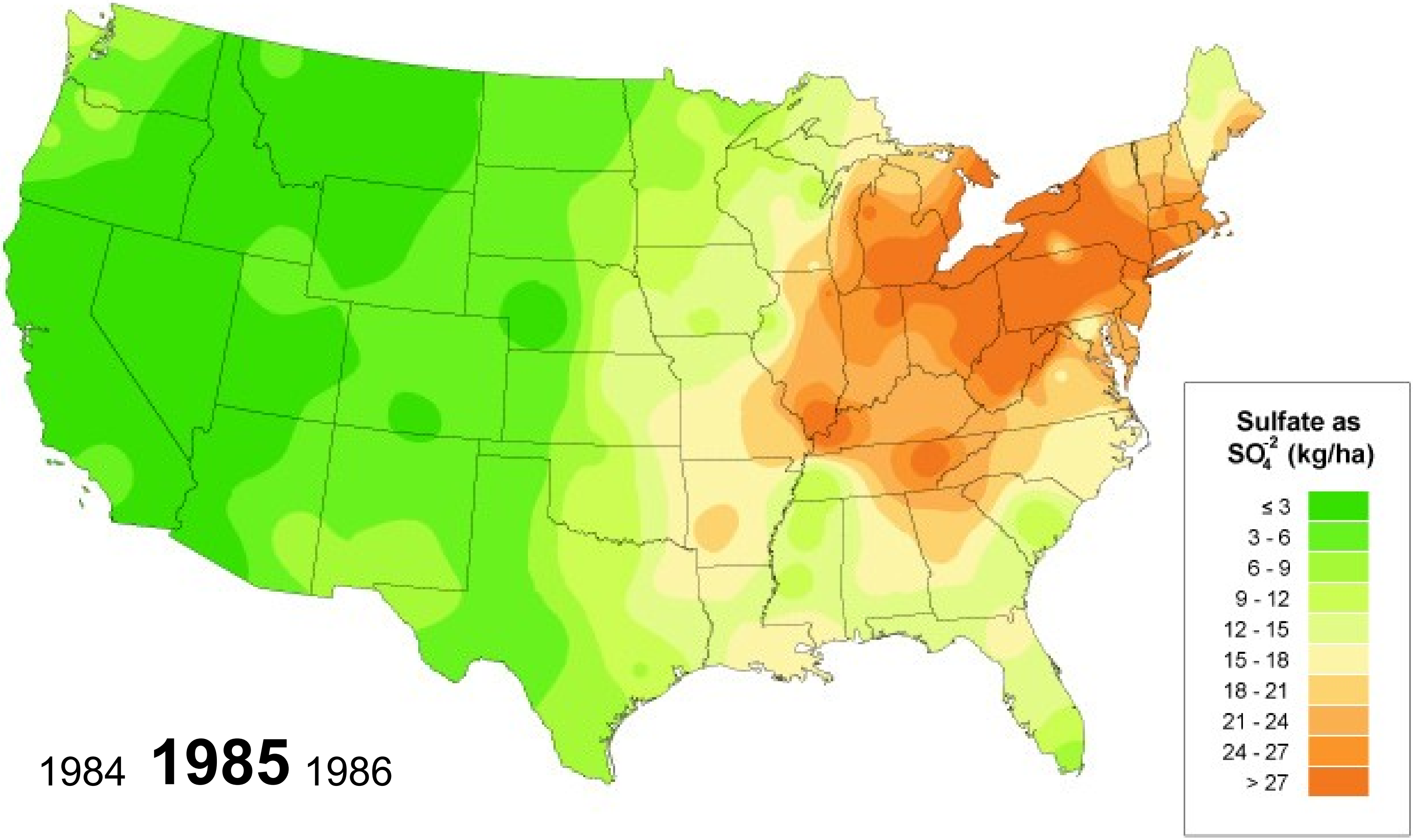
- Absorbed from soil as sulfate (SO_4^{--})
- Constituent in 3 of the 21 amino acids
- Deficiency symptoms
  - Yellowing and stunting
  - Begins on young leaves
  - Alfalfa - the leaves become long and slender


N:S Ration IN
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
N:S
0
20
40
60
80
100
Number of Samples
Series1

Sulfur Cycle

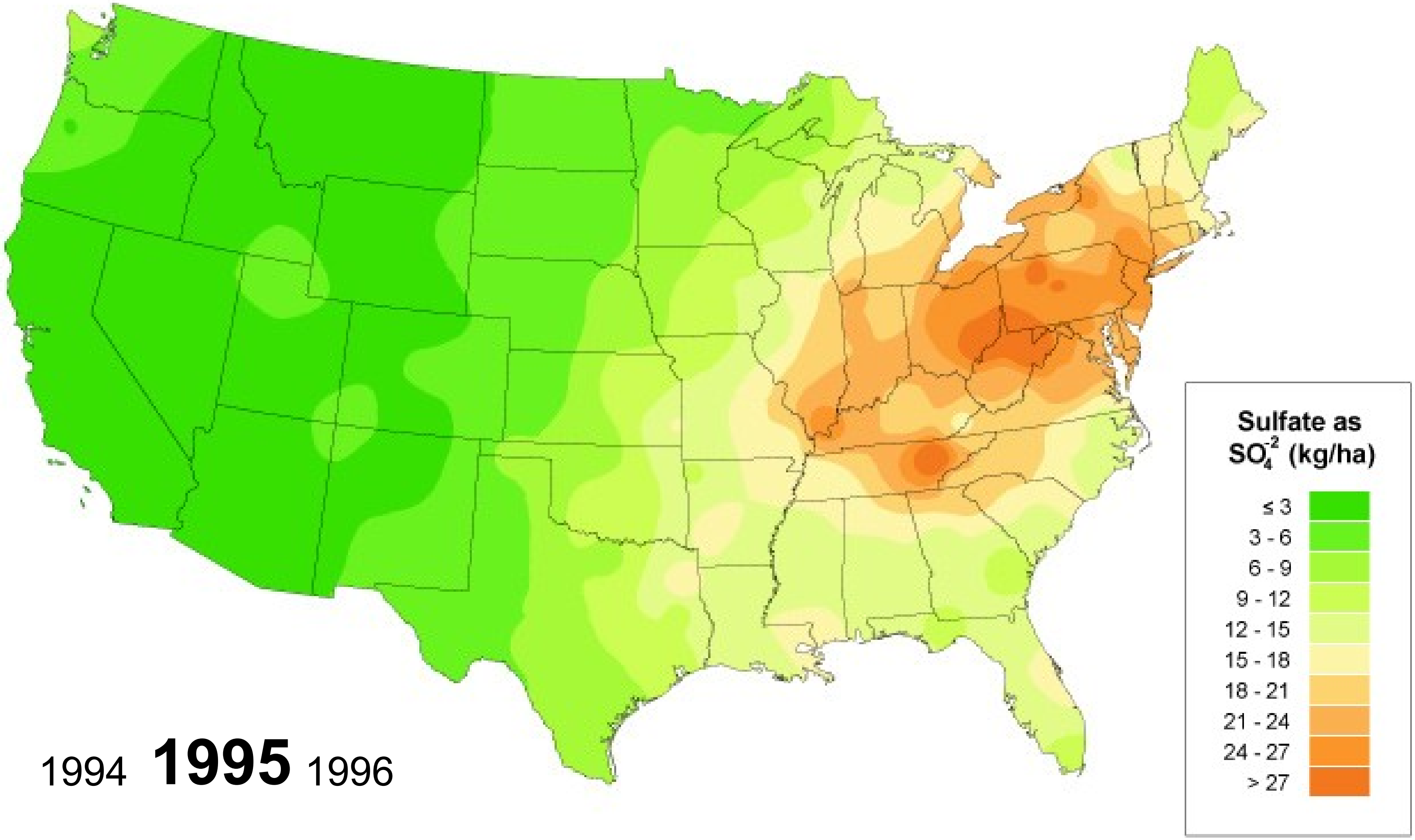


Sulfate Ion Wet Deposition 1985-2005



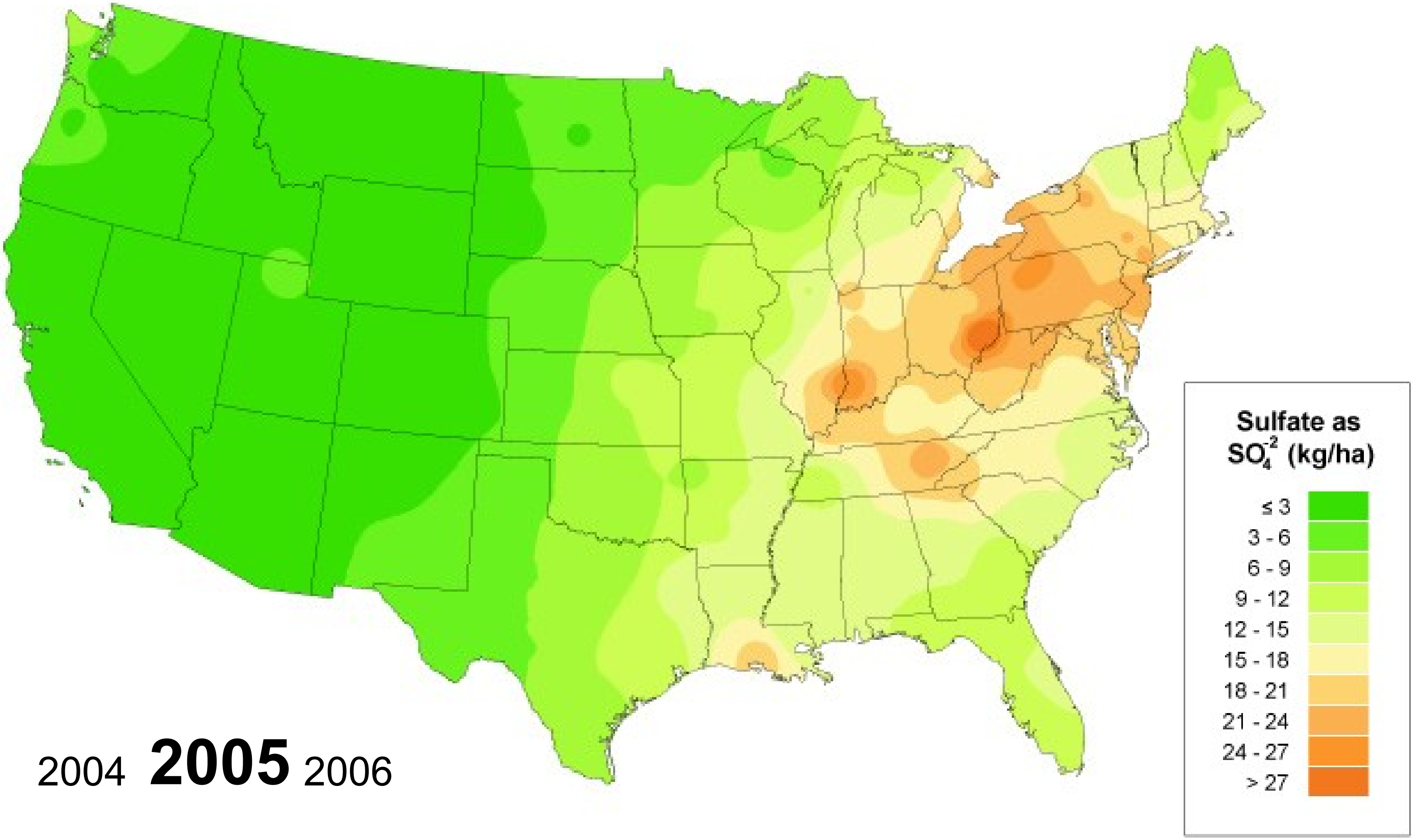
1984 **1985** 1986

Sulfate Ion Wet Deposition 1985-2005

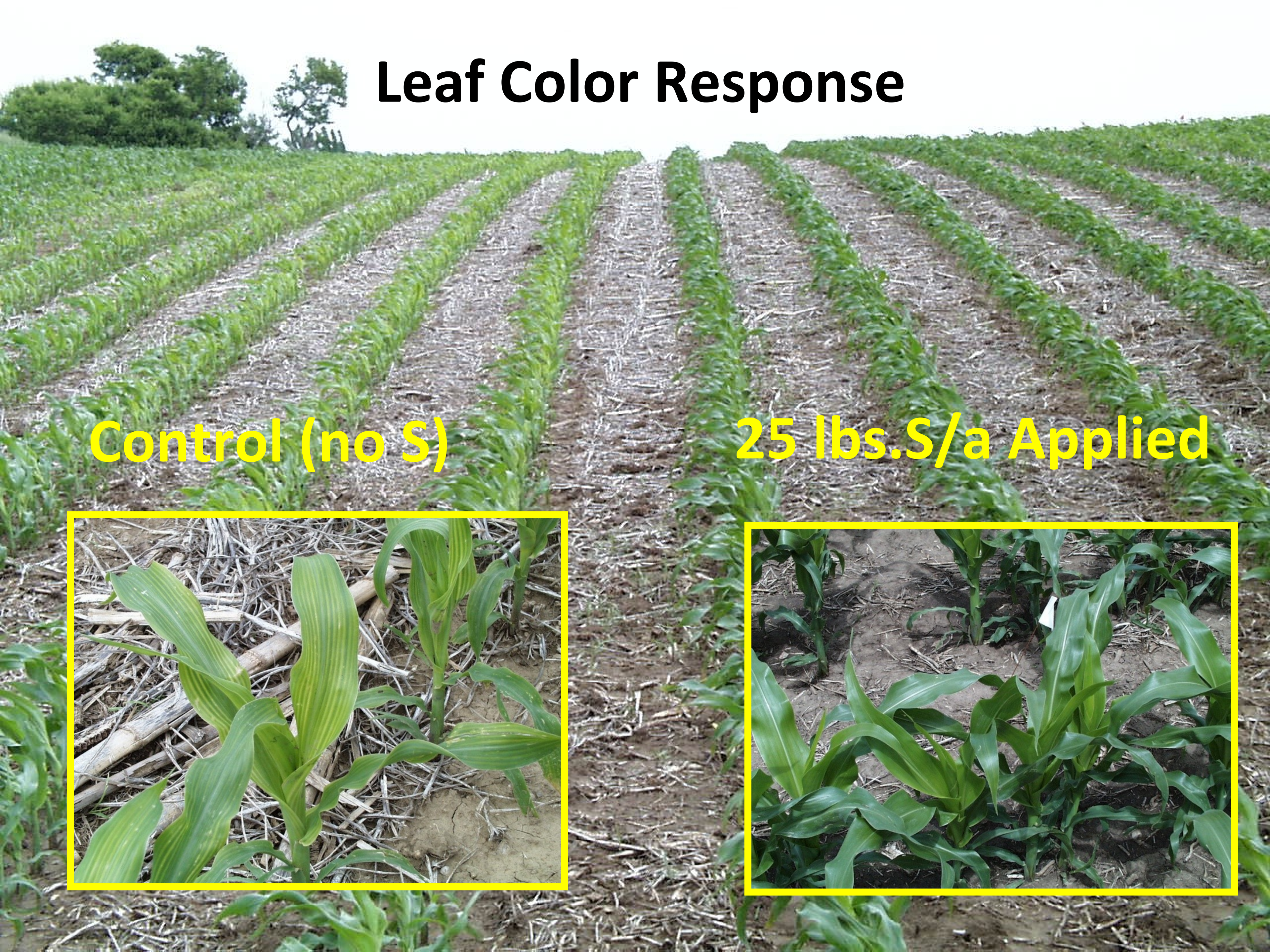


1994 **1995** 1996

Sulfate Ion Wet Deposition 1985-2005



2004 **2005** 2006


Leaf Color Response
Control (no S)
25 lbs.S/a Applied

How much S is used in Crops?

Crop	Total Need
	lbs. /a
Corn (150 bu)	45
Soybean (50 bu)	40
Wheat (60 bu)	25
Peanut (2T)	30
Alfalfa (6T)	60

Need For Sulfur Fertilization Increasing?

- Higher crop yields
- Intensified cropping systems

- Use of low sulfur fertilizers
- Less manure used in certain areas
- Less atmospheric S deposition
- Erosion of surface soil/OM

- No-till ??


Conventional Till
No-Till


No-Till
Conventional Till

Starter Sulfur

Table 3. Starter fertilizer effect on dryland corn early season growth and yield, 3-year average.

Treatment, N-P-K-S,	V-6 stage whole plant dry weight,	Grain yield,
lb/A	lb/A	bu/A
0-0-0-0	199	79
30-30-10-0	315	97
30-30-10-10	428	111

Source: Niehues, et. al., 2004.

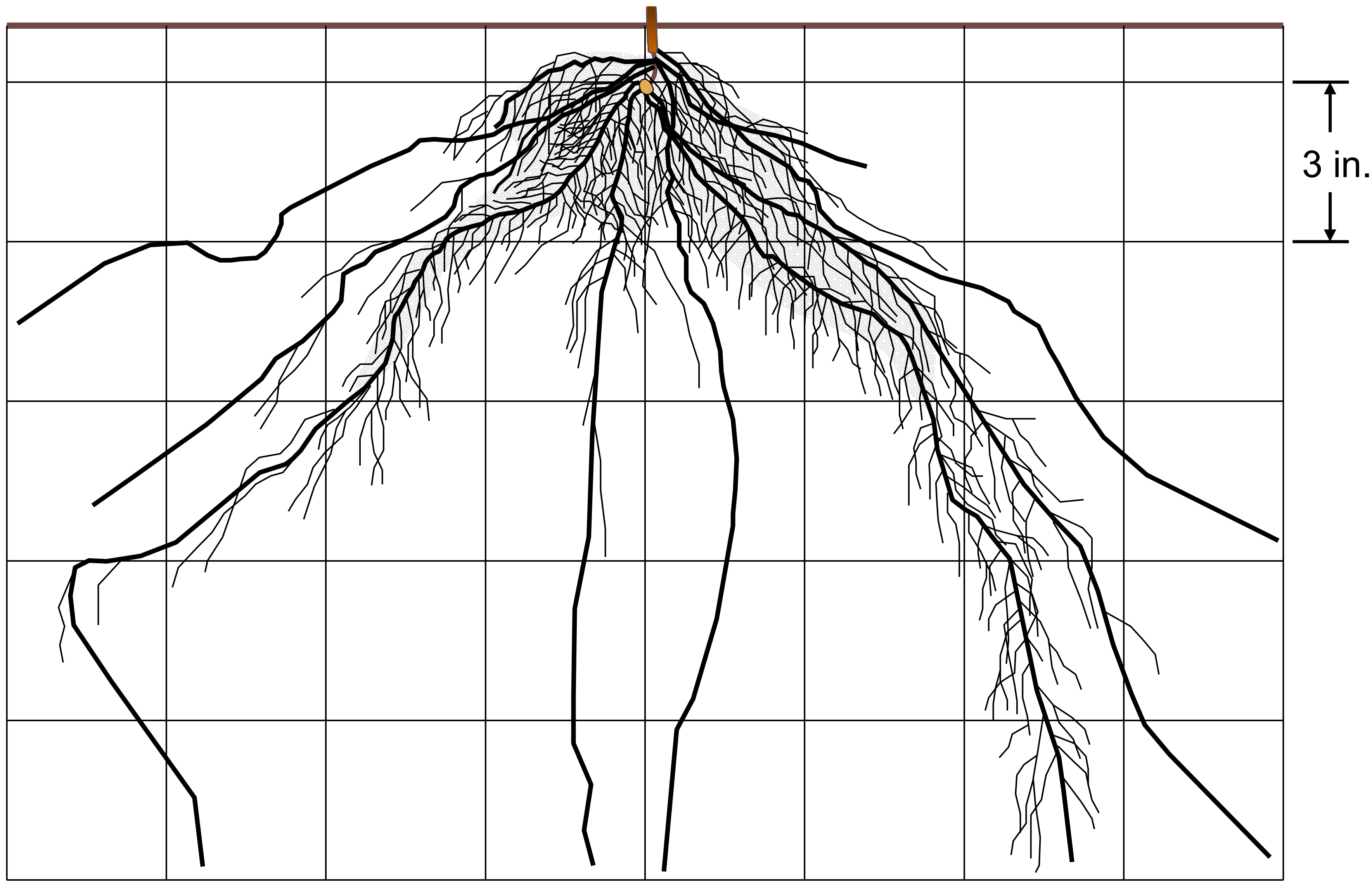
Determining Sulfur Need

- Low Organic Matter Soils
- Sands
- High demand crops such as alfalfa remove more sulfur and respond to sulfur fertilization
- Responsive crops/situations such as wheat and corn
- Low sulfate irrigation water

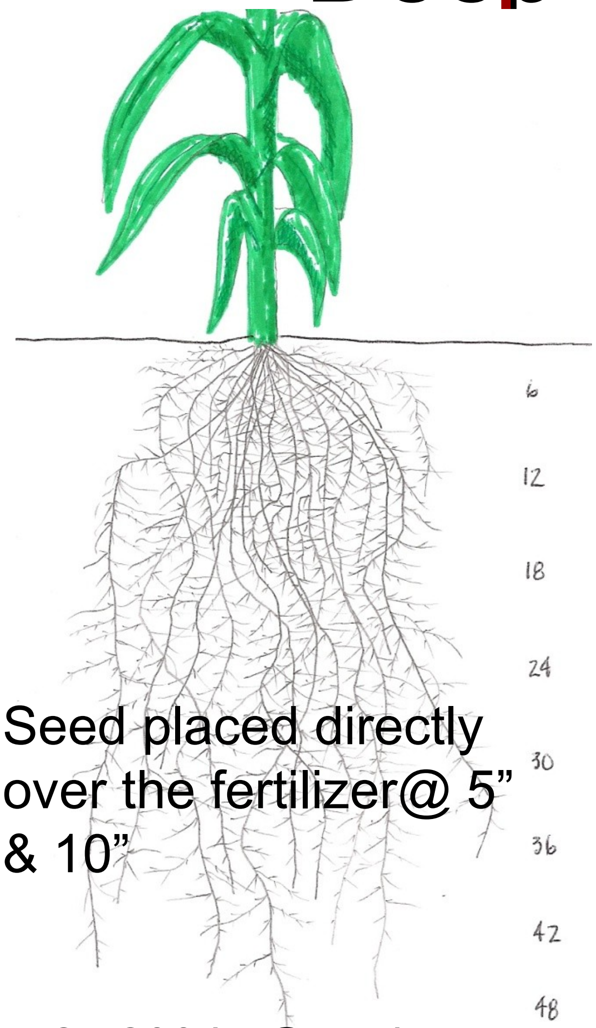
- Soil tests are more reliable on sandy soils
- Plant tissue tests more useful in diagnosing a deficiency

Optimized Populations Needs Optimized Nutrition

Corn roots: V5



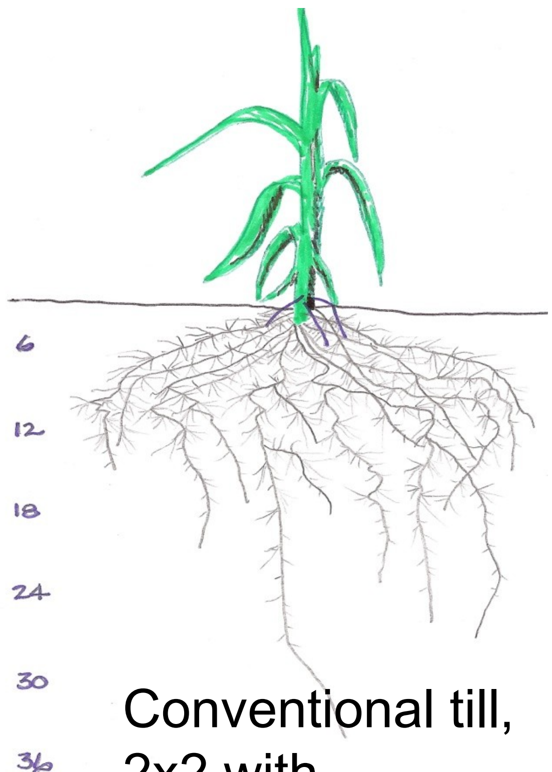
Deep Fertilizer Placement



Seed placed directly over the fertilizer@ 5" & 10"

25,200 in.@55 days

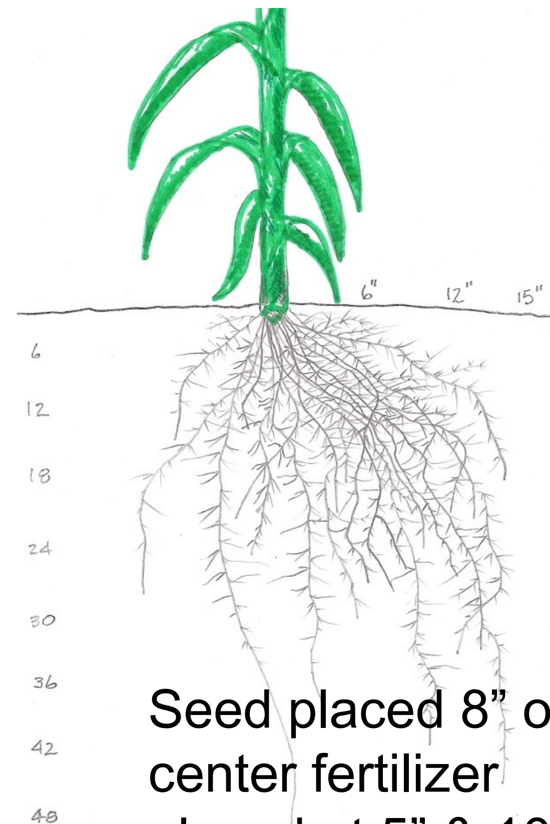
38210 in.@105 days



Conventional till, 2x2 with broadcast pre-plant

10,200 in.@55days

17640 in.@105 days



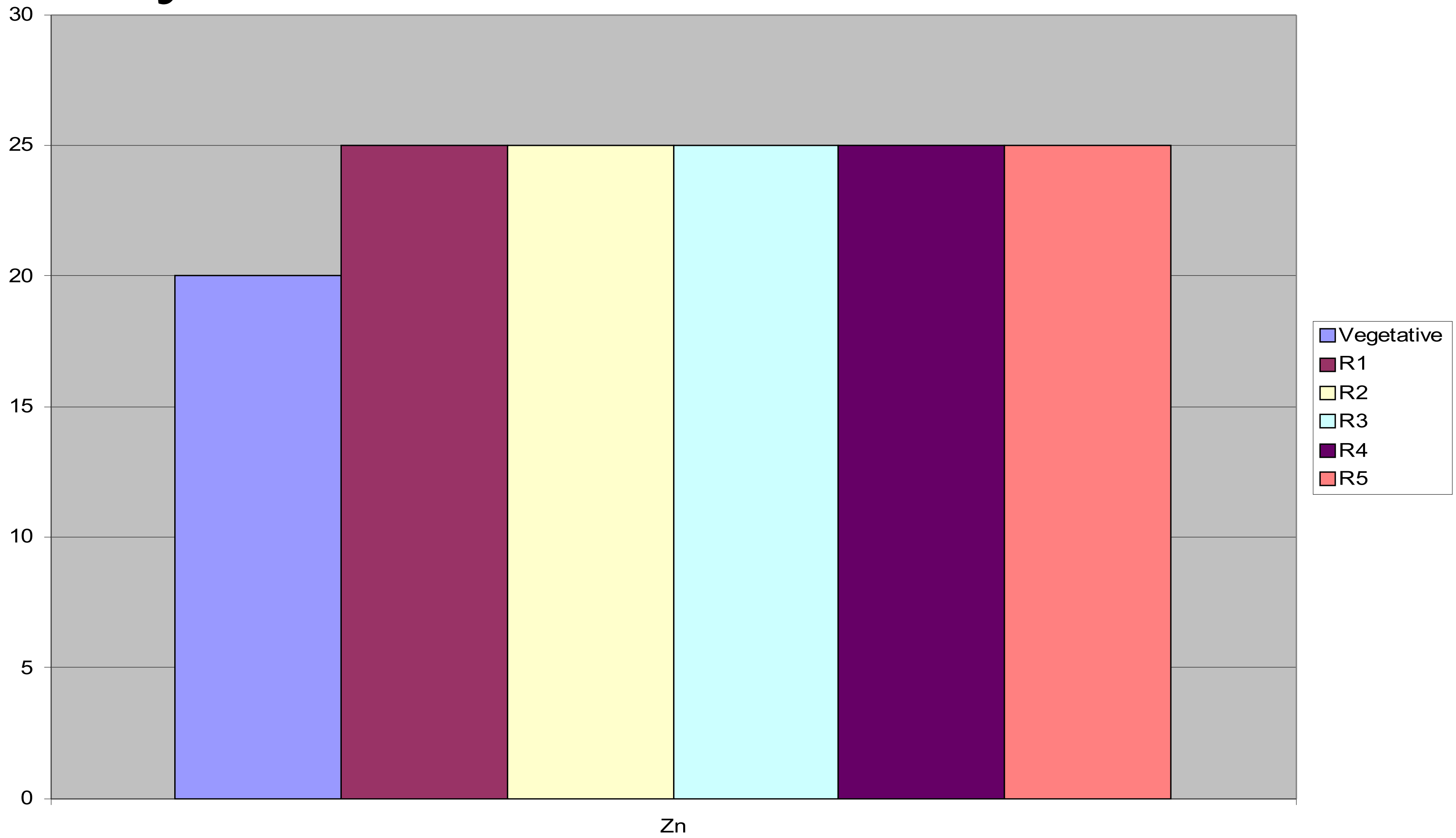
Seed placed 8" off-center fertilizer placed at 5" & 10"

15,400 in.@55days

20800 in.@105 days

Soybeans

Zinc –
Soybeans Elemental Promine



Manganese

Mn^{++}

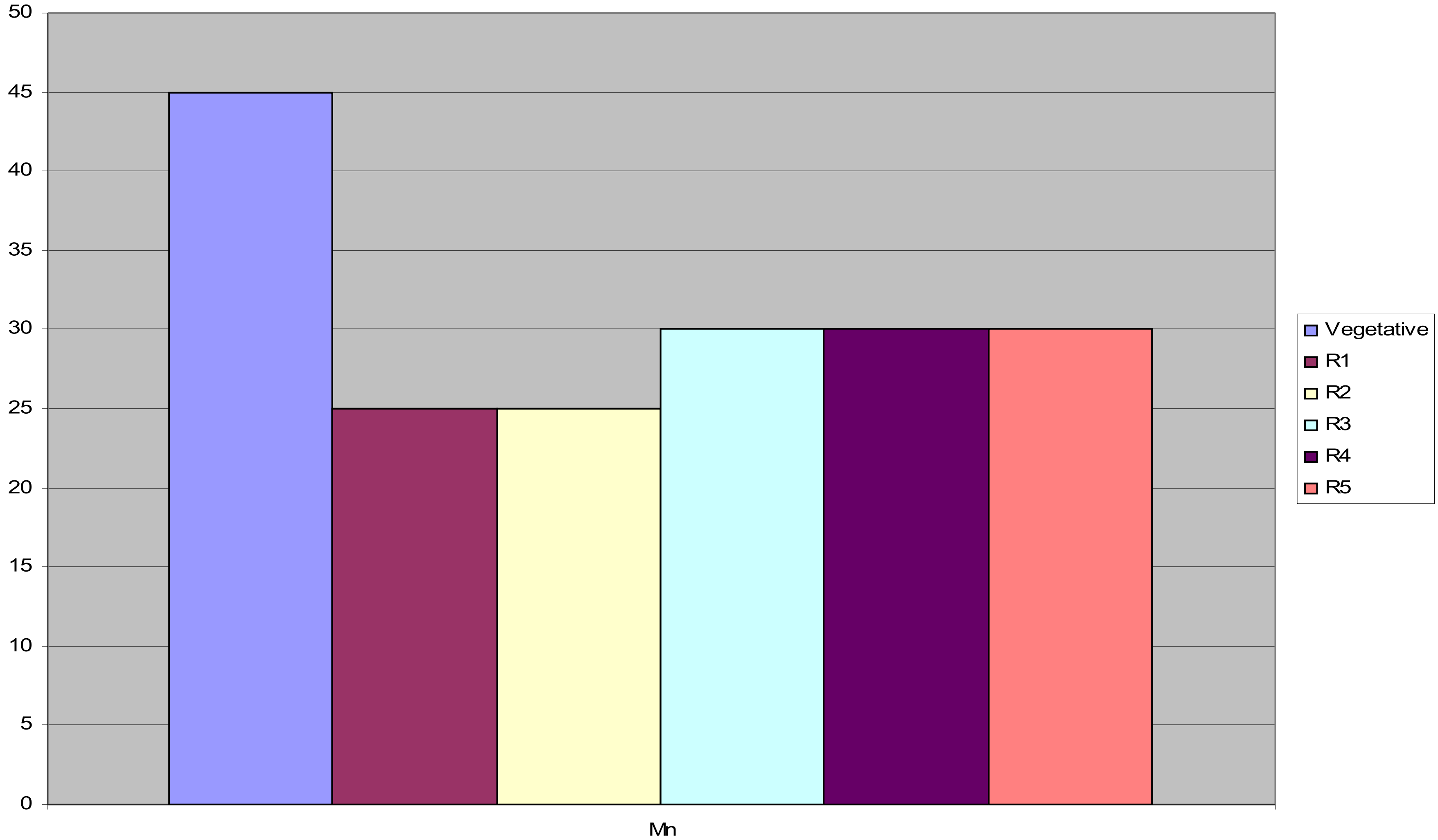
- Manganese
  - ***<u>Essential for Photosynthesis</u>*** –
    - ***<u>No Mn = No Photosynthesis</u>***
    - Glycolysis = Plants energy
  - Plant Health
  - Part of enzymes that function in
    - breakdown of carbohydrates
    - nitrogen metabolism
  - Activates enzymes leading to the biosynthesis of lignin and flavonoids. ***<u>Flavonoids in legumes stimulate nodulation gene expression.</u>***

  - Many other processes vital in plant growth

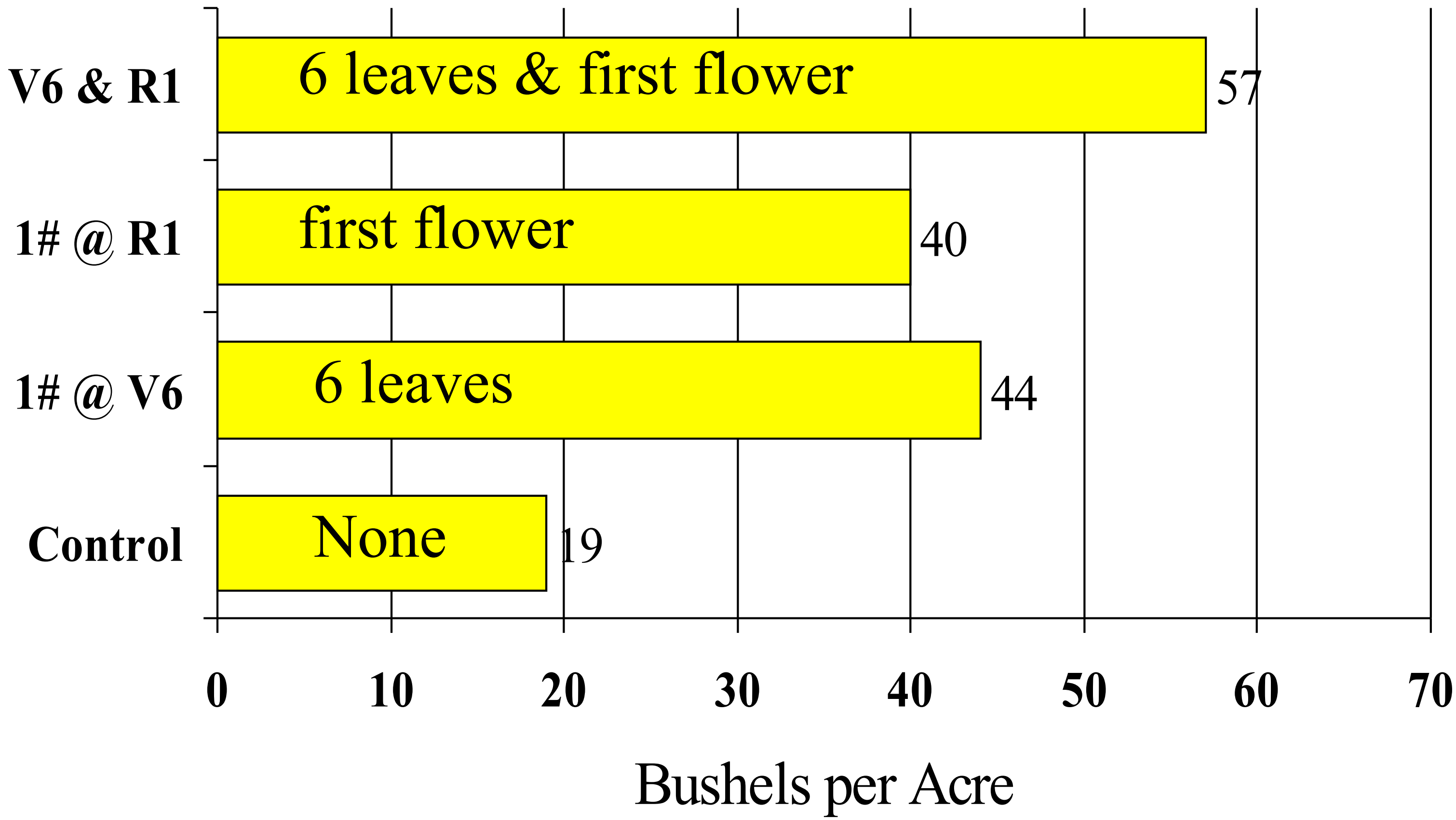
Manganese Deficiency

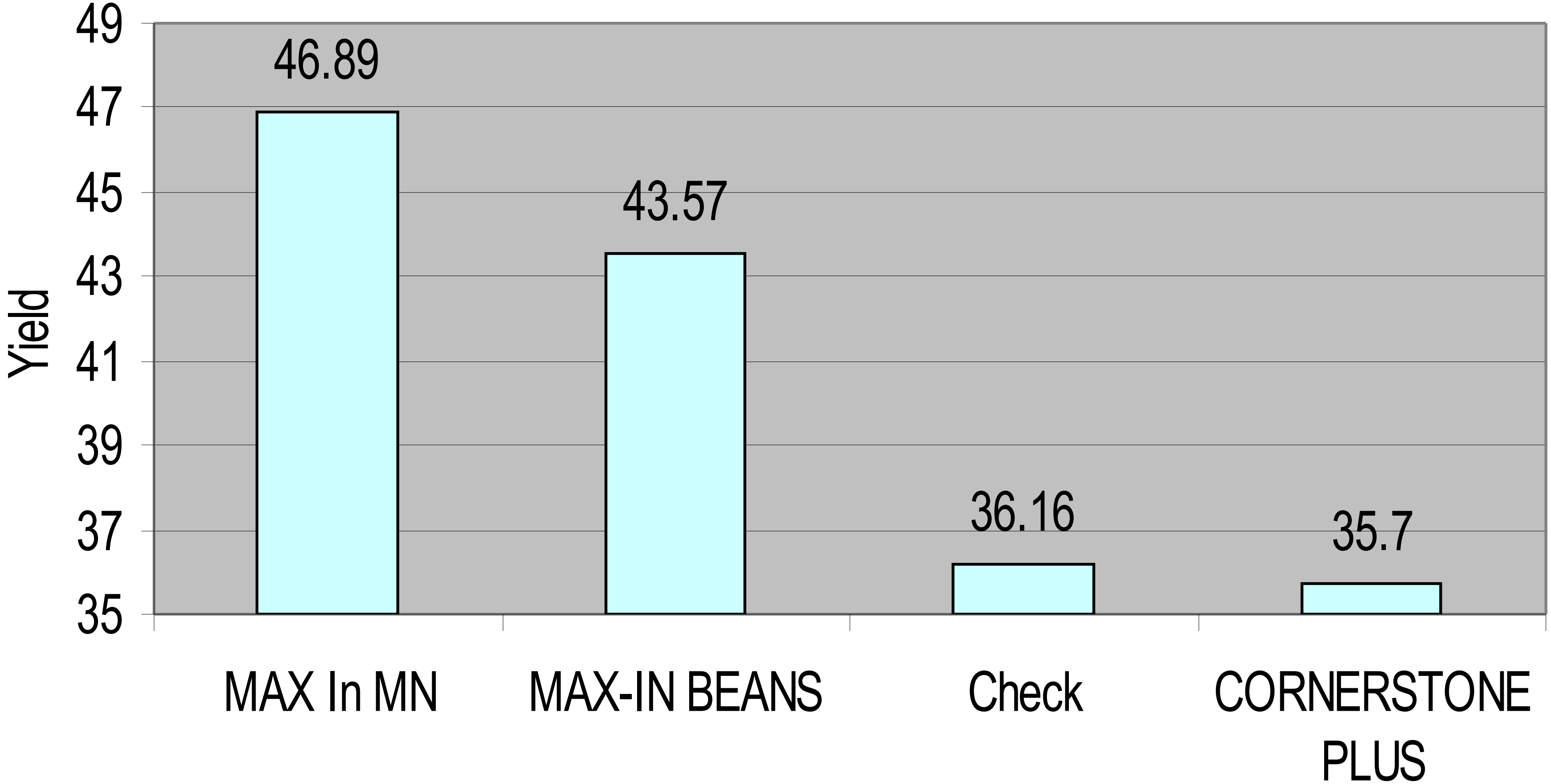
Manganese – Soybeans Elemental Prominence

Mn ++



Effect of Foliar Mn on Soybeans (VPI, 1985)




49
47
45
43
41
39
37
35
Yield
46.89
43.57
36.16
35.7
MAX In MN
MAX-IN BEANS
Check
CORNERSTONE PLUS

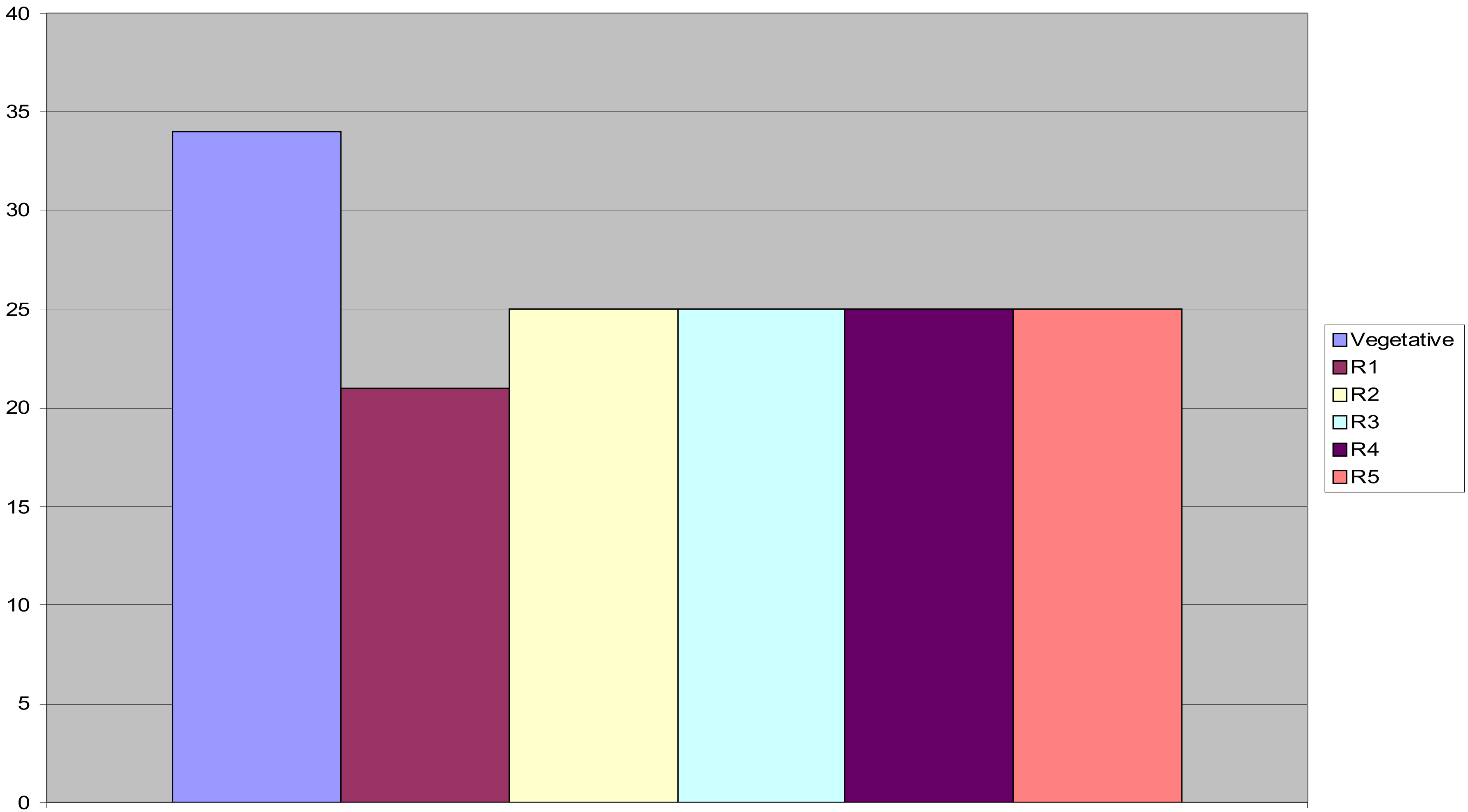
LSD 7.87

Boron (B)

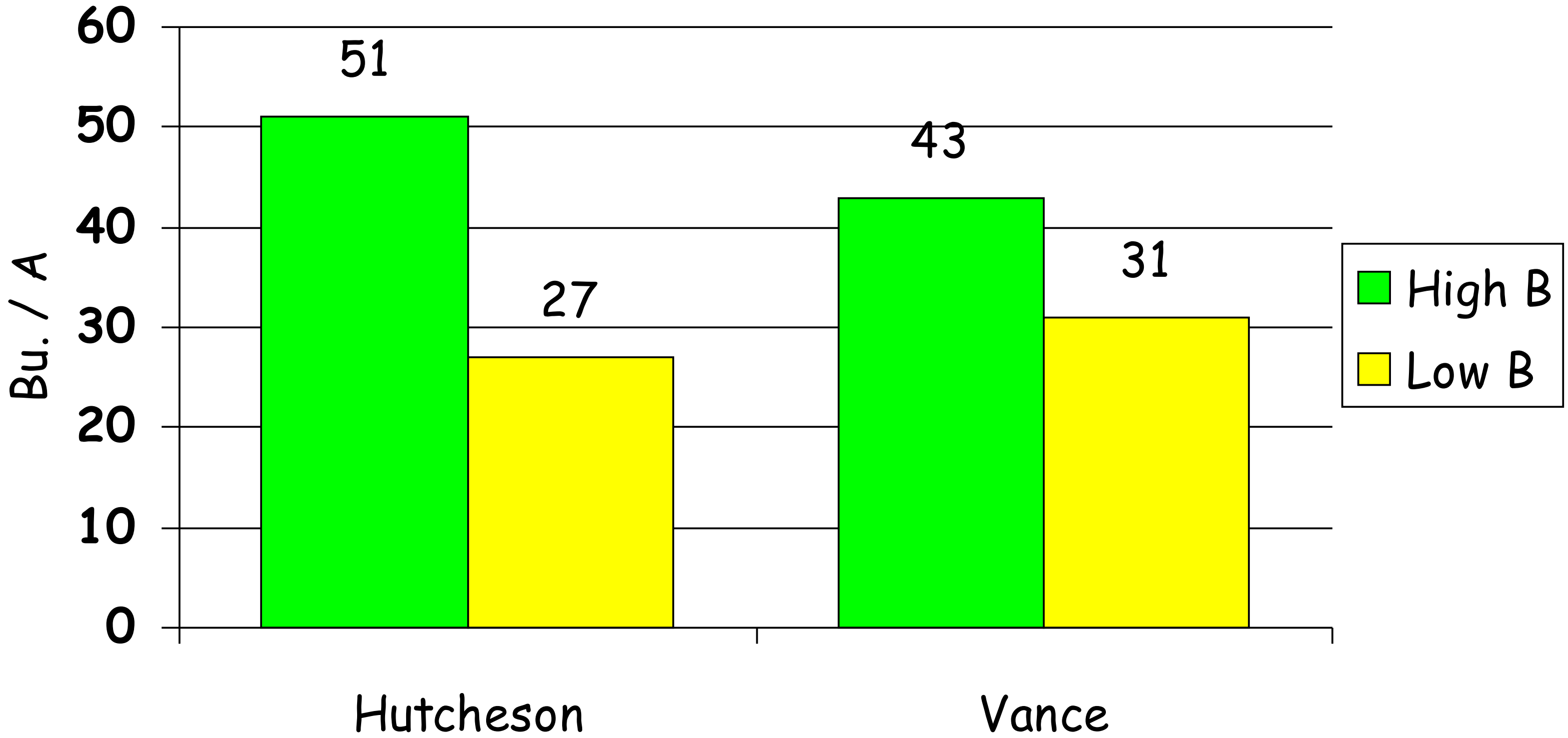
B
$B(OH)_3$

- Essential for reproduction, aids in formation of pollen tube--facilitates fertilization
- Important for early growth
- Aids in calcium translocation
- Maintains balance between sugar and starch
- Necessary for cell division and differentiation

Boron-
Elemental Prominence Soybe



High-Yield Soybeans Need Boron



VPI, Warsaw, 1991

Iron

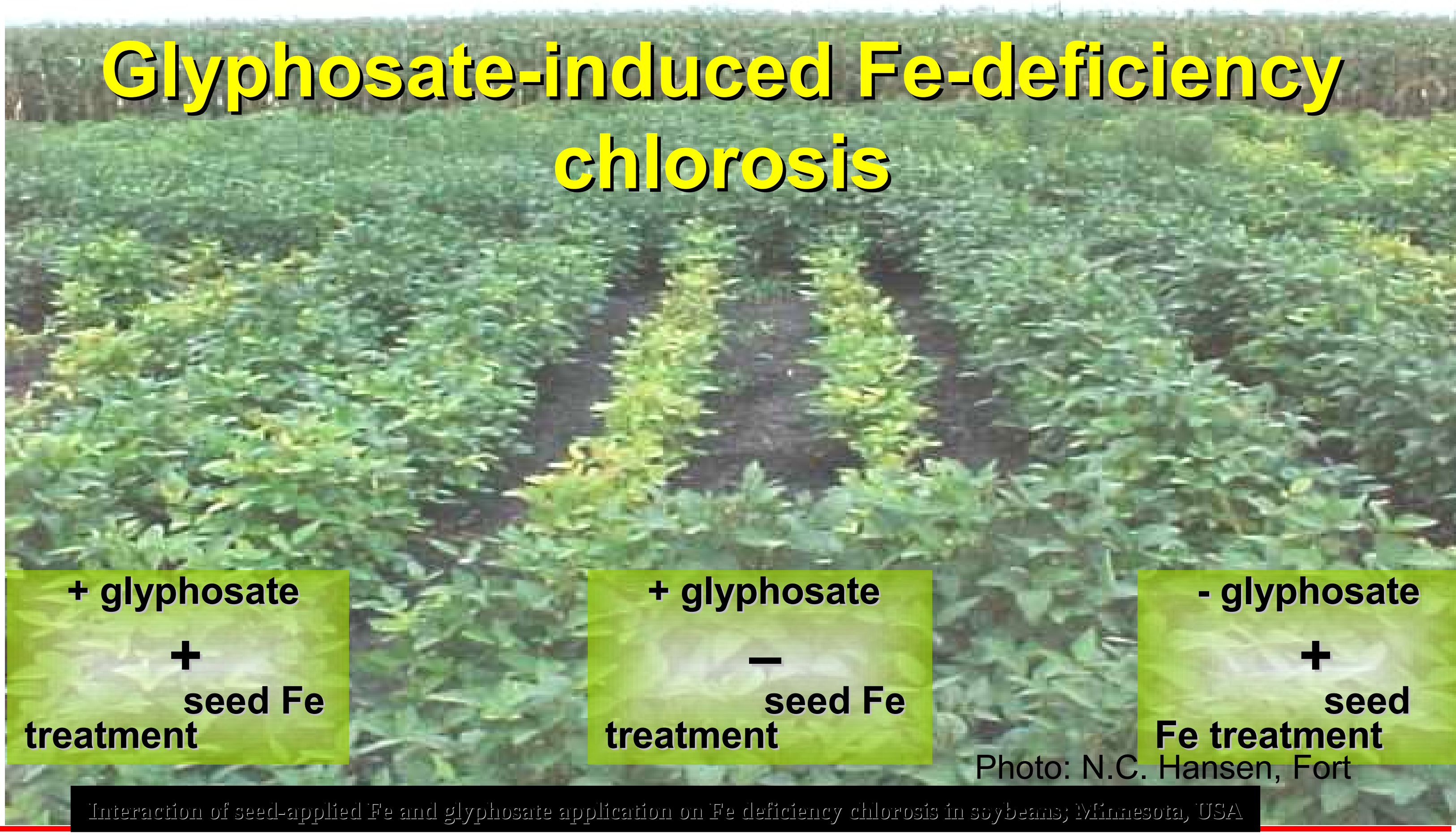
Fe^{++}

- Aids in energy transfer
- Enzyme activator
- Aids in flowering and fruit set
- Required for chlorophyll formation

Iron

Fe^{++}

Glyphosate-induced Fe-deficiency chlorosis



Interaction of seed-applied Fe and glyphosate application on Fe deficiency chlorosis in soybeans; Minnesota, USA

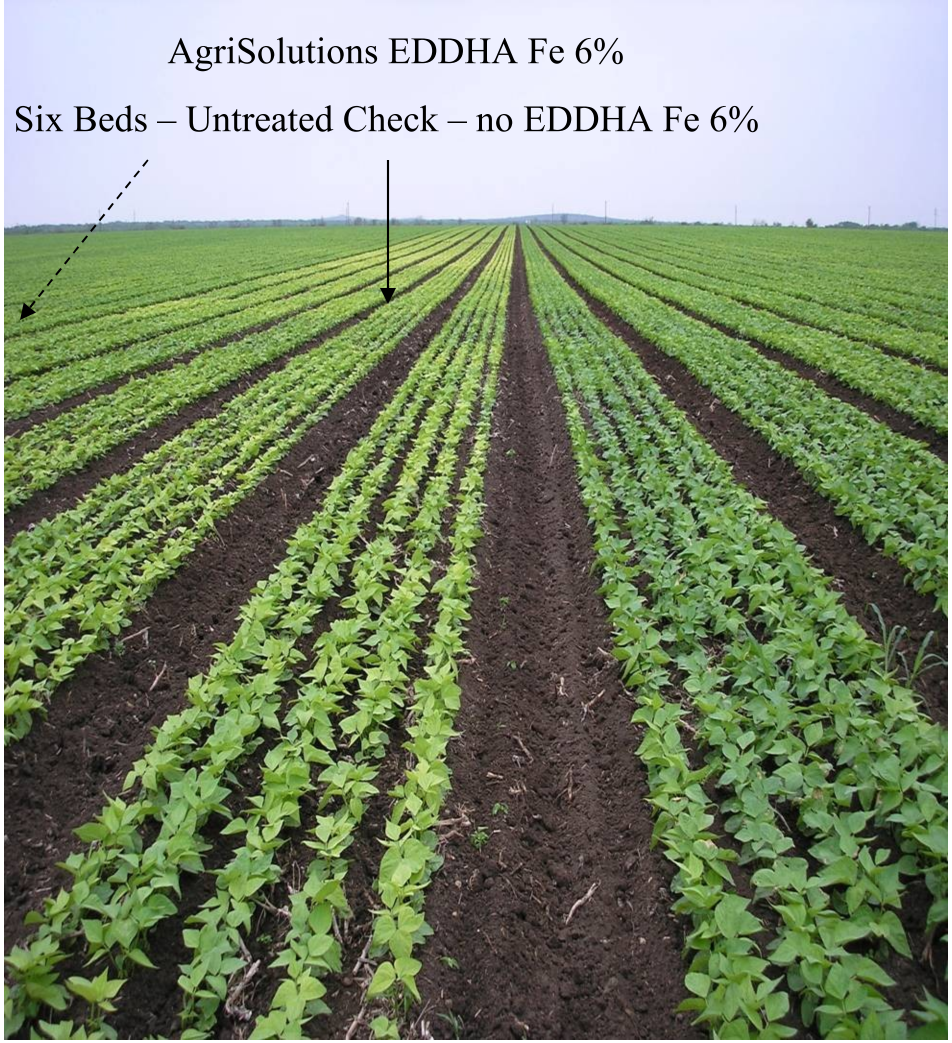
Treatment	Visual chlorosis score [1 = green; 5 = yellow]		Grain yield (bu/a)	
	- Fe	+ Fe	- Fe	+ Fe
Control (no herbicide)	3.1	2.8	33	52
Glyphosate	3.7	3.3	8	19

Jolley et al., 2004, Soil Science and Plant Nutrition 50:973-981

AgriSolutions™ 6% Iron EDDHA

- Fully Chelated Iron
- 80% Ortho Ortho Bound
  - pH’s above 8; High Salts and/or carbonates
- 100% Water Soluble Powder
- Available in high salt, high pH soils
- 1 to 3 lbs per acre

AgroSolutions EDDHA Fe 6%
06 Green Beans Uvalde Co. TX



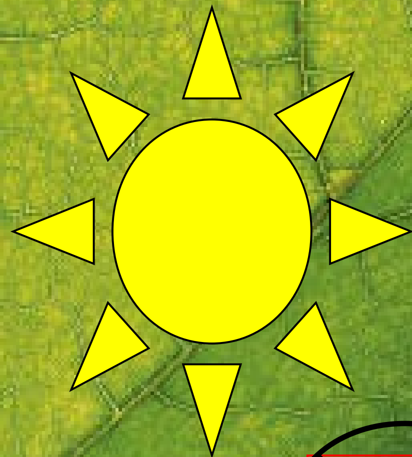
- AgriSolutions EDDHA Fe 6% was applied @ plant as a in-furrow application.

- Six beds, planting 3 beds at a time
- No **AgriSolutions** EDDHA Fe 6%. Grower forgot to turn on his pump which left the six beds with no EDDHA Fe 6% - untreated check.
- Rate is 1.5 lbs per acre

Maximizing Photosynthesis

- Are we doing anything that effects it.

Photosynthesis



Glyphosate Spray

$\cancel{Mn^{+2}}$

$$6\,CO_2 + 12\,H_2O \xrightarrow[\text{Chloroplast } Mg^{+2}]{N,\ P} \underline{C_6H_{12}O_6} + 6\,O_2$$

The Process is Producing Carbohydrate

(sugar = energy)

Manganese and Glyphosate

The Simple facts

Extensive Research

- Purdue
  - 5 years of research
- MSU
- KSU
- Canada
- Brazil

Roundup Ready© Program

- Provides highly effective weed control
- Reduces residual chemical concerns
- Simplifies management decisions
- Readily available seed stocks (cultivars)
- May provide a “vehicle” for micronutrients
- “Side-effects” in combination with some nutrients
  - Herbicidal activity
  - Nutrient availability

REPORTED EFFECTS OF GLYPHOSATE

- **Reduced Mn uptake efficiency***

  Root & foliage

- **Immobilization of Mn***

  Translocation

  Physiological efficiency

- **Reduced root nodulation & N-fixation***
- **Soil Microflora change - Root exudates**

  ***Rhizobium*, *Fusaria*, etc.**

  Toxic to manganese reducing organisms

- **Increased drought stress***
- **Earlier maturity***
- **More susceptible to some diseases***

***Can be modified by Mn or other micronutrient application**

Function of Manganese

- Important in photosynthesis (splitting of water molecule and evolution of oxygen).
- Activates enzymes leading to the biosynthesis of lignin and flavonoids. Flavonoids in legumes stimulate nodulation gene expression.
- Responsible for degradation of fixed N transported from roots to shoots.

Effect of Residual Glyphosate on Percent Nutrient Uptake and Translocation by Plants

After Eker et al 2006

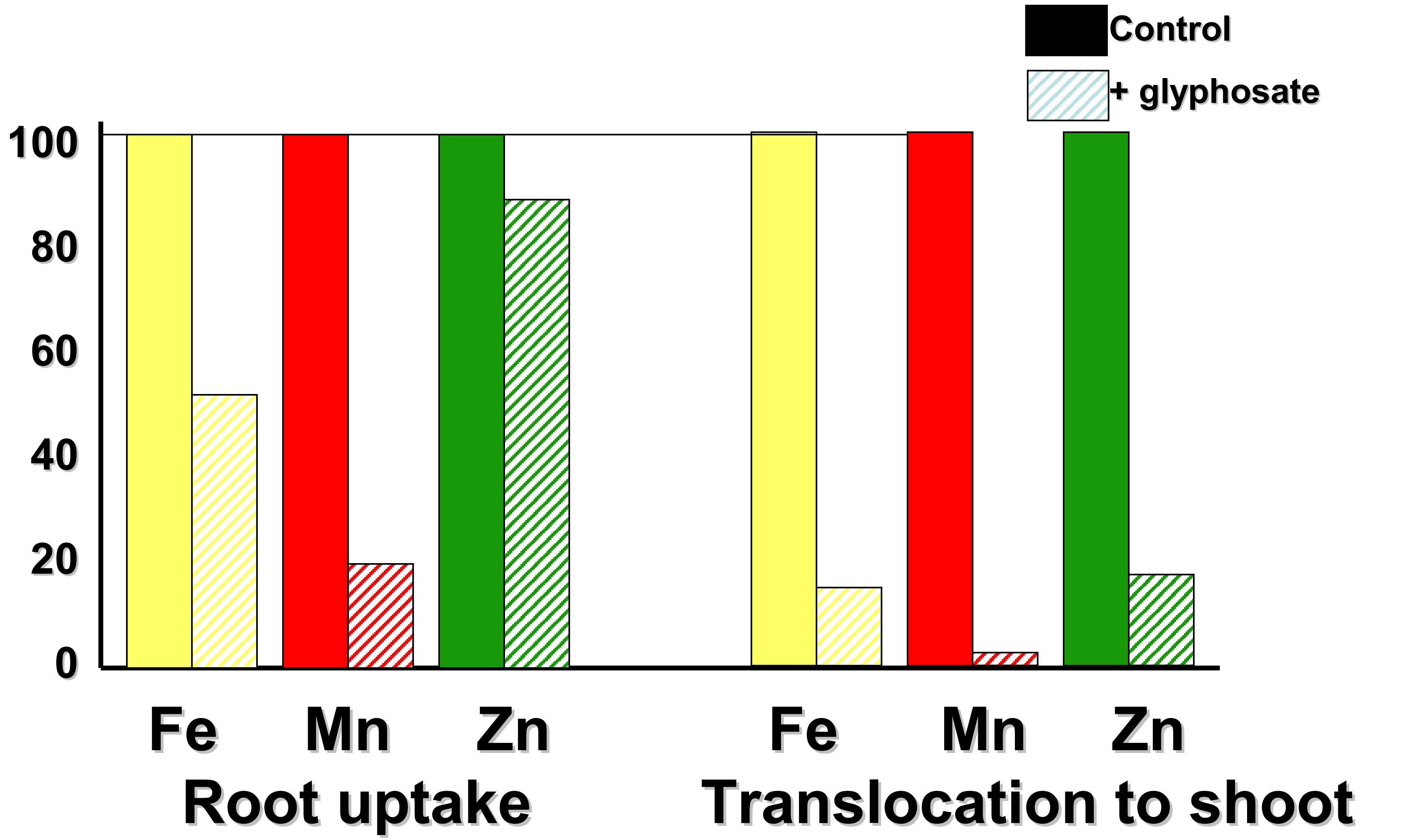
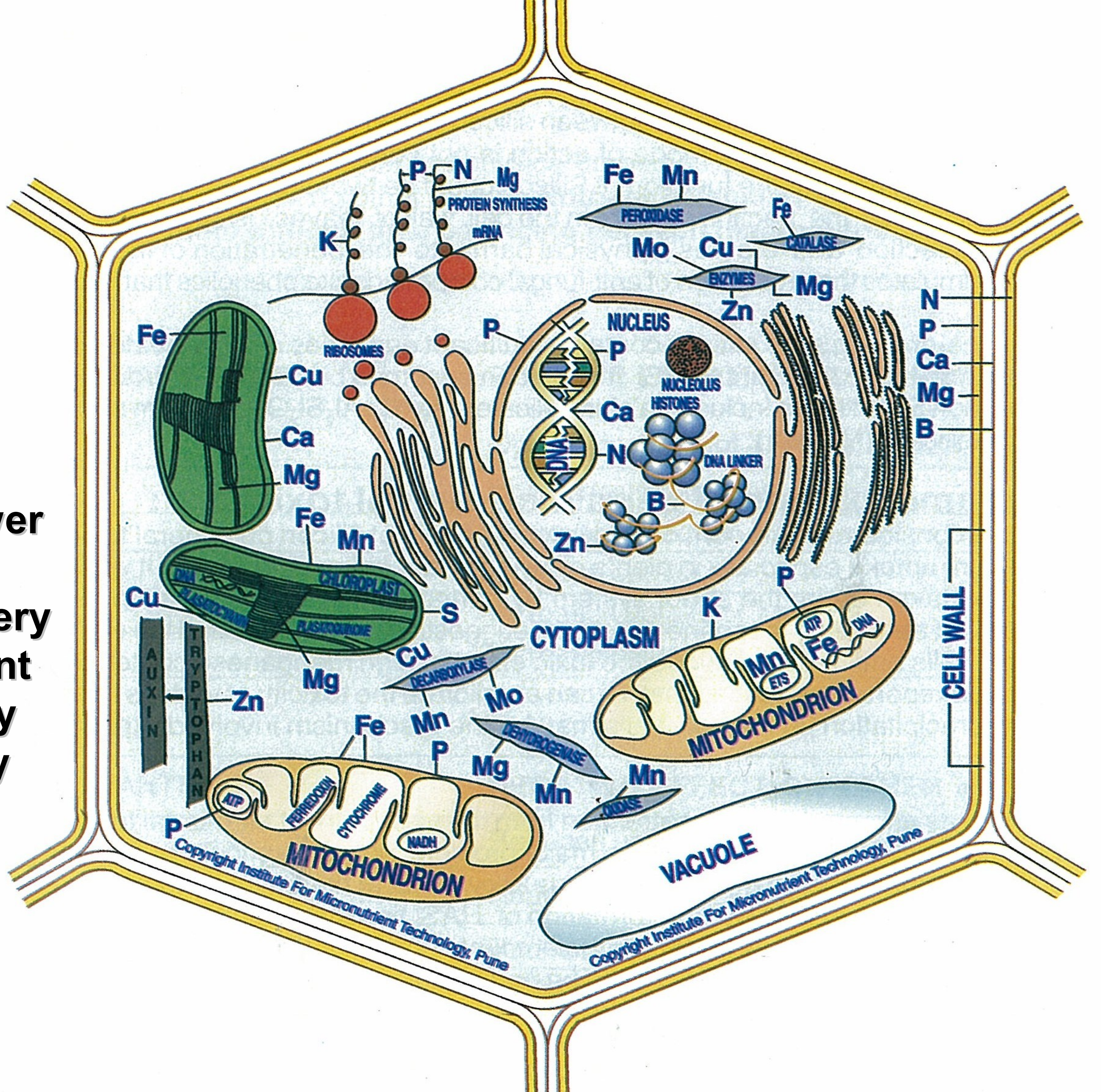


Diagram of nutrient role in plant cell

What we are selling the grower is plant physiology. Every essential nutrient is found in every leaf cell of every plant. ***Genetic Families*** are driven by plant nutrition.



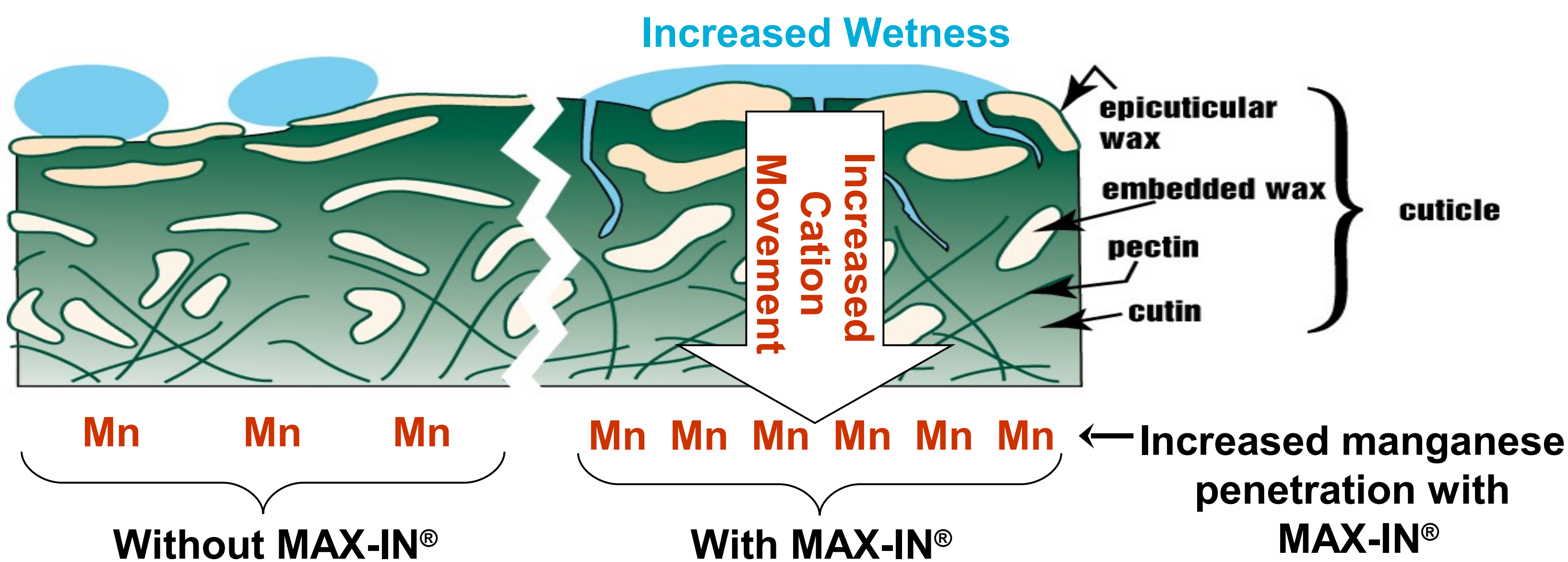
Foliar Nutrition
&
MAX-IN® Brands

Getting the MAX-IN the plant so you get the max out of your crop

AgriSOLUTIONS™

Key To Foliar Nutrition

- Foliar nutrition application goal:
  - Increase duration of leaf wetness to increase availability of elements
  - Increase cation movement through leaf cuticle
- Proprietary MAX-IN® Technology Powered with CornSorb™ Technology dramatically enhances element penetration equating to greater element availability and utilization



DATA

Treatment	Fe Content in Soybeans (ppm)
Check	90
Fe with component A (HFCS) and B (APG)	169
Fe with Component A only	107
Fe with	126

DATA

Treatment = 2qts Mn per acre	Mn Content in Soybeans (ppm)
Check	77
Mn no adjuvant	146
Mn with Non Ionic	143
Mn with MI	197

Amount of Mn used was constant.

Amount of surfactant used was constant

Mn Sulfate

DATA

Treatments	Fe Content in Soybeans	
1 qt/ac Fe w/o MI 1 qt/ac Fe with MI	175 215	 23% Increase
2 qts/ac Fe w/o MI 2 qts/ac Fe with MI	220 252	 15% Increase
4 qts/ac Fe w/o MI 4 qts/ac Fe with MI	255 334	 31% Increase

Fe EDTA

Effect of MaxIn Mn Application Timing on Soybean Yield – Ohio St.

Application timing	Soybean yield, bu/acre
Tank-mixed	65
Sequential	62
Check	58
$LSD_{0.1}$	1

Keith A. Diedrick and Robert W. Mullen – 2007

Northwest Branch

Pre-Application Tissue Samples

North of Wray, CO

PLANT ANALYSIS

	REPORT OF ANALYSIS-PERCENT							REPORT OF ANALYSIS - PARTS PER MILLION							
SAMPLE ID	N NITRO-GEN	P PHOS-PHORUS	K POTAS-SIUM	Mg MAG-NESIUM	Ca CALCIUM	S SULFUR	Na SODIUM	Fe IRON	Mn MANGA-NESE	B BORON	Cu COPPER	Zn ZINC			
PIONEER	3.28	0.37	3.10	0.18	0.45	0.23	0.002	111	54	11	9	22			
CORN-4	L-D	S-L	S	S	S	S	S	D	D	D	S-H	D			
3109444 NORMS	3.90	0.46	3.20	0.19	0.39	0.25	0.007	164	93	18	8	50			

Taken July 3, 24 hours before application of

1 Qt./ac. MAX-IN ZMB with treatment of Glysophate

V9 growth stage at time of sampling

PLANT ANALYSIS

	REPORT OF ANALYSIS-PERCENT							REPORT OF ANALYSIS - PARTS PER MILLION							
SAMPLE ID	N NITRO-GEN	P PHOS-PHORUS	K POTAS-SIUM	Mg MAG-NESIUM	Ca CALCIUM	S SULFUR	Na SODIUM	Fe IRON	Mn MANGA-NESE	B BORON	Cu COPPER	Zn ZINC			
CROPLAN	3.17	0.35	2.79	0.14	0.41	0.20	0.003	114	48	10	9	23			
CORN-4	L-D	S-L	L	S-L	S	S-L	S	L-D	D	D	S-H	D			
3109445 NORMS	3.90	0.46	3.20	0.19	0.39	0.25	0.007	164	93	18	8	50			

Post Application Tissue Samples

North of Wray, CO

PLANT ANALYSIS

	REPORT OF ANALYSIS-PERCENT							REPORT OF ANALYSIS - PARTS PER MILLION						
SAMPLE ID	N NITRO-GEN	P PHOS-PHORUS	K POTAS-SIUM	Mg MAG-NESIUM	Ca CALCIUM	S SULFUR	Na SODIUM	Fe IRON	Mn MANGA-NESE	B BORON	Cu COPPER	Zn ZINC		
PIONEER	3.83	0.47	3.10	0.23	0.46	0.30	0.002	119	114	10	12	99		
CORN-5	S	S	S-H	S-H	S	S-H	S	L-D	H	D	H-E	E		
3110045 NORMS	3.75	0.43	2.90	0.20	0.41	0.25	0.007	150	88	17	8	48		
CROPLAN	3.60	0.45	2.62	0.17	0.42	0.26	0.005	113	156	17	13	155		
CORN-5	S	S	S-L	S	S	S	S	L-D	H-E	S	E	E		
3110046 NORMS	3.75	0.43	2.90	0.20	0.41	0.25	0.007	150	88	17	8	48		

Taken July 6, 48 hours after application

V9-V10 Growth stage at time of sampling

2 applications of 1 qt/ac

- Treated 201.7
- Untreated 188.40

CSU 2007 Data

Mike Bartolo – Senior Research Scientist

Treatment	Rate Per Acre	% Grain Moistu re	Test Wt Lb/bu	Yield bu/acre
Unsprayed Control	-	15.6	56.2	233.9 a
Glyphosate AMS	1 lb A.I. 1 pint	15.6	56.2	194.7 d
Glyphosate AMS AGMO 7027	1 lb A.I. 1 pints 3 pints	15.6	56.2	221.4 b
Glyphosate AMS AGMO 4038	1 lb A.I. 1 pints 3 pints	15.6	56.2	207.5 c

WHY A PGR

- Gibberellins
  - Stimulate cell elongation and division
  - Stimulation of shoot elongation by GA vs. auxin
  - ***Important in breaking dormancy after imbibition of water by the seed coat. - MONOCOTS***
  - ***Signal germination activities***
    - Stimulate RNA to promote synthesis of enzymes that convert starches to sugars for rapid cell respiration during germination.

WHY A PGR

- **Auxins**
  - Primarily promotes cell elongation and cell enlargement.
  - Differentiation of vascular tissue
  - Stimulate production of secondary growth by stimulating cambium cells to divide and ***secondary xylem to differentiate.***
  - Root Initiation
    - Secondary Root Formation
  - Development of Buds, Flowers and Fruit
  - Tropic Responses
    - Light
    - Gravity
  - Legumes
    - Increased Nodulation
    - Increased Leghemoglobin Content (Protein that causes the red color)
    - Increased Nodule Nitrogen Content
    - Increased the Enzymes of Nitrogen Assimilation

WHY A PGR

- **Cytokines (Kinetin)**
  - **Promotes Cell Division, Differentiation, and Growth**
  - **Promotes germination**
  - **Delays the aging process of leaves**
  - **Regulates the transport of nutrients and photosynthetic products.**
  - **Promotes fruit formation**
  - **Induces differentiation of flower buds**
  - **Promotes primary root growth.**

Lincoln, IL Answer Plot

Naked

Cruiser Extreme 250

Cruiser Extreme 250 + ACZ

Cruiser Extreme 250 + ACZ + Ascend

Lincoln, IL Answer Plot

Fresh weight of CG 6725 (HY.ur.x N.w.) cut at 6th node

Diameter of stalk at narrowest point between 6th & 7th node

V15 V15 V13 V12

Stage of Growth DOP 5/11 photo 7/18 68 days after planting

What did the Chlorophyll meter

Ascend = 197.1

Untreated = 185.9

Approx. – 8% increase

45.8 %

49.4 %

EMERALD
EXTRAS

ANSWER PLOT™
Your knowledge site for local crop production expertise.

- THANK YOU!!