

2012 Nutrient Applicator Voucher Training

Willie Lantz
Extension Educator
AGNR Garrett County

Maryland Weed Science

<http://weeds.umd.edu/>

Relative effectiveness of herbicides for corn

Please select an herbicide stage and up to 5 weed problems and then click the 'View Treatments' button to view the best treatments for your weed problems.

Herbicide Stage
<input type="radio"/> Preplant incorporated
<input type="radio"/> Preemergence
<input type="radio"/> Postemergence
<input checked="" type="radio"/> All Stages

Select?	Weed Problems	Select?	Weed Problems	Select?	Weed Problems
<input type="checkbox"/>	Barnyardgrass	<input type="checkbox"/>	Bermudagrass	<input type="checkbox"/>	Broadleaf signalgrass
<input type="checkbox"/>	Crabgrass	<input type="checkbox"/>	Fall panicum	<input checked="" type="checkbox"/>	Foxtails
<input type="checkbox"/>	Goosegrass	<input type="checkbox"/>	Johnsongrass (seedling)	<input type="checkbox"/>	Johnsongrass (rhizome)
<input type="checkbox"/>	Quackgrass	<input type="checkbox"/>	Sandbur	<input type="checkbox"/>	Shattercane
<input type="checkbox"/>	Texas panicum	<input type="checkbox"/>	Yellow nutsedge	<input type="checkbox"/>	Eastern black nightshade
<input type="checkbox"/>	Burcucumber	<input type="checkbox"/>	Cocklebur	<input type="checkbox"/>	Jimsonweed
<input checked="" type="checkbox"/>	Lambsquarters	<input type="checkbox"/>	TR-Lambsquarters	<input type="checkbox"/>	Morningglory (annual spp)
<input checked="" type="checkbox"/>	Pigweed	<input type="checkbox"/>	TR-Pigweed	<input type="checkbox"/>	Giant Ragweed
<input checked="" type="checkbox"/>	Common ragweed	<input type="checkbox"/>	Sicklepod	<input type="checkbox"/>	Smartweed



[Home](#) > [Weed Control in Field Crops](#) > [Weed Control - Corn](#) > [Relative effectiveness of herbicides for corn](#)

Relative effectiveness of herbicides for corn

Legend- based on adequate moisture, good growing conditions, and proper herbicide application

E Excellent (>90% control)	G- Good to Excellent	G Good (80-90% control)	F- Fair to Good	F Fair (60-80% control)	P- Poor to Fair	P Poor (20-60% control)	N None (<20% control)
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You are viewing records 1 - 10 of 78. [Next 10 Records](#)

Herbicide (ordered from best suited to worst suited)	Stage	Foxtails	Lambsquarters	Pigweed	Common ragweed
Dual II Magnum/Cinch + Atrazine	Preemergence	E	E	E	E
Dual II Magnum/Cinch + Atrazine + Princep	Preemergence	E	E	E	E
Harness/Degree + Atrazine	Preemergence	E	E	E	E
Harness/Degree + Atrazine + Princep	Preemergence	E	E	E	E
MicroTech + Atrazine	Preemergence	E	E	E	E
MicroTech + Atrazine + Princep	Preemergence	E	E	E	E
Topnotch + Atrazine	Preemergence	E	E	E	E
Topnotch + Atrazine + Princep	Preemergence	E	E	E	E
Define + Atrazine	Preemergence	E	E	E	E
Keystone	Preemergence	E	E	E	E

You are viewing records 1 - 10 of 78. [Next 10 Records](#)

Pesticide Use and Safety Update

Willie Lantz

University of Maryland Extension



UNIVERSITY OF
MARYLAND
EXTENSION

Solutions in your community

Record Keeping Requirements For Private Applicators



PRIVATE APPLICATOR PESTICIDE APPLICATION RECORD **

ESTABLISHMENT NAME: Coon Hollow Farms

Name/Address of Certified Applicator or Applicator (if different)	Application Date (mm/dd/yy) & (time)	Location of Treated Area	Product Name EPA Reg. # Active Ingredient	Crop/Site Treated & Acres, Size, No. of Plants Treated	Application Rate & Total Amount Used	R.E.I. (in hrs)	DO NOT ENTER UNTIL: (mm/dd/time)	Comments
Joe's Agri-Service 123 Tomato Alley Road Regulation, MD 12345	5/2/01 4:00pm-6:00pm	Field 1A	Bicep Magnum 100-817 atrazine/s-metolachlor	Field Corn (pre-emerge) 65 acres	2.5 qts. per acre 40.6 gal.	24	5/3/01 6:00pm	calm, breeze <5mph (west) cool 55 degrees
Jim Johnson 11 Coon Hollow Farm Ln Regulation, MD 12345	6/1/01 4:30am-6:00am	Field 7 Block 1A	Warrior 10182-96 lambda-cyhalothrin	Sweet Corn 15 acres	3oz per acre 45 ozs	24	6/2/01 6:00am	cool, 60, light breeze (south) 5-8 mph
Joe's Agri-Service	6/29/01 6:00am-9:00am	Field 1A	Accent 352-560 nicosulfuron	Field Corn 65 acres	1oz / acre 65ozs	4	6/29/01 1 pm	nice, 75, light breeze (south) 6-10 mph
Jim Johnson	7/5/01 7-9pm	Field 25	Quadris 10182-415 azoxystrobin	Tomatoes 10 acres	6.2oz / acre 62ozs	12	7/6/01 9 am	cloudy, humid 85, breeze <5mph (south)

** Meets Maryland and EPA Worker Protection pesticide application record keeping requirements

Records Must Be Maintained For Both General and Restricted Use Pesticide Applications



RESTRICTED USE PESTICIDE
Toxic to fish and aquatic organisms
For retail sale to and use only by certified applicators, or persons under their direct supervision and only for those uses covered by the certified applicator's certification.



Records Must Be Held For A Period Of Two Years

Maryland Does Not Mandate That A Specific Form Be Used. However, Certain Information Must Be Recorded For Each Pesticide Application

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** Meets Maryland and EPA Worker Protection pesticide application record keeping requirements

The Federal Worker Protection Standard (WPS) Requires That Certain Information Be Recorded As Part Of The Application Record

The Restricted Entry Interval (REI) In Hours

The Date and Time That The Field Can Be Entered

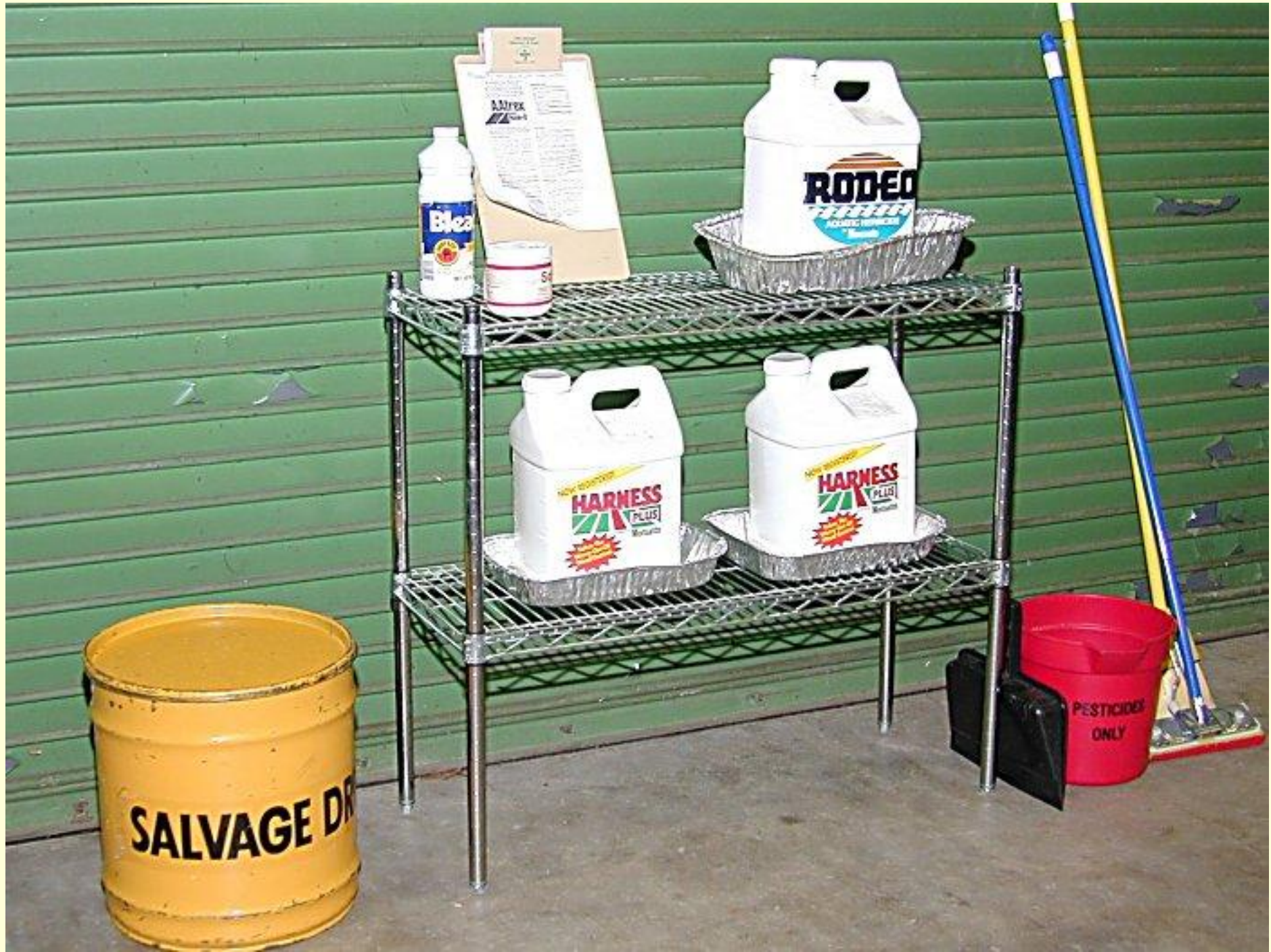
Application Name & Amount Used	R.E.I (in hrs)	DO NOT ENTER UNTIL: (mm/dd/time)	Comments
per acre	24	5/3/01 6:00pm	calm, breeze <5mph (west) cool 55 degrees
per acre	24	6/2/01 6:00am	cool, 60, light breeze (south) 5-8 mph



Safe Pesticide Storage

**Pesticide Safety Education Program
University of Delaware**





Clipboard with document

Bleach

RODEO
ALL-GRADE DISINFECTANT

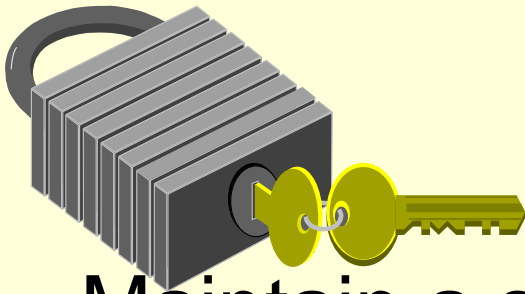
Small jar

HARNESS PLUS
Disinfectant

HARNESS PLUS
Disinfectant

SALVAGE DR

PESTICIDES ONLY



Storage



- Maintain a separate location for the storage of pesticides.
- If the storage area is located within a larger structure, provide access through a separate outside door.
- Keep the storage area locked.
- Do not allow unauthorized access.

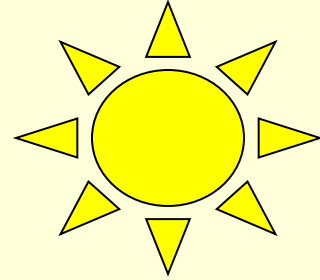
Crop Fertility

Willie Lantz

Extension Educator

Agriculture & Natural Resources

What Does a Plant Need to Grow?



- Light – adequate under most all crop conditions – may affect flowering
- Temperature – major factor in crop maturity
- Water – vital for uptake of nutrients
- Minerals – provides NPK & Micronutrients
- Growing Medium – Soil is most common

Plant Nutrition

- Plants Need 16 basic Elements
- The Big 3 are FREE
 - Carbon (C), Hydrogen (H), Oxygen (O)
- Major Nutrients
 - Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), Sulfur (S)
- Micro Nutrients
 - Iron (Fe), Manganese (Mn), Boron (B), Copper (Cu), Zinc (Zn), Molybdenum (Mo), Fluorine (F)

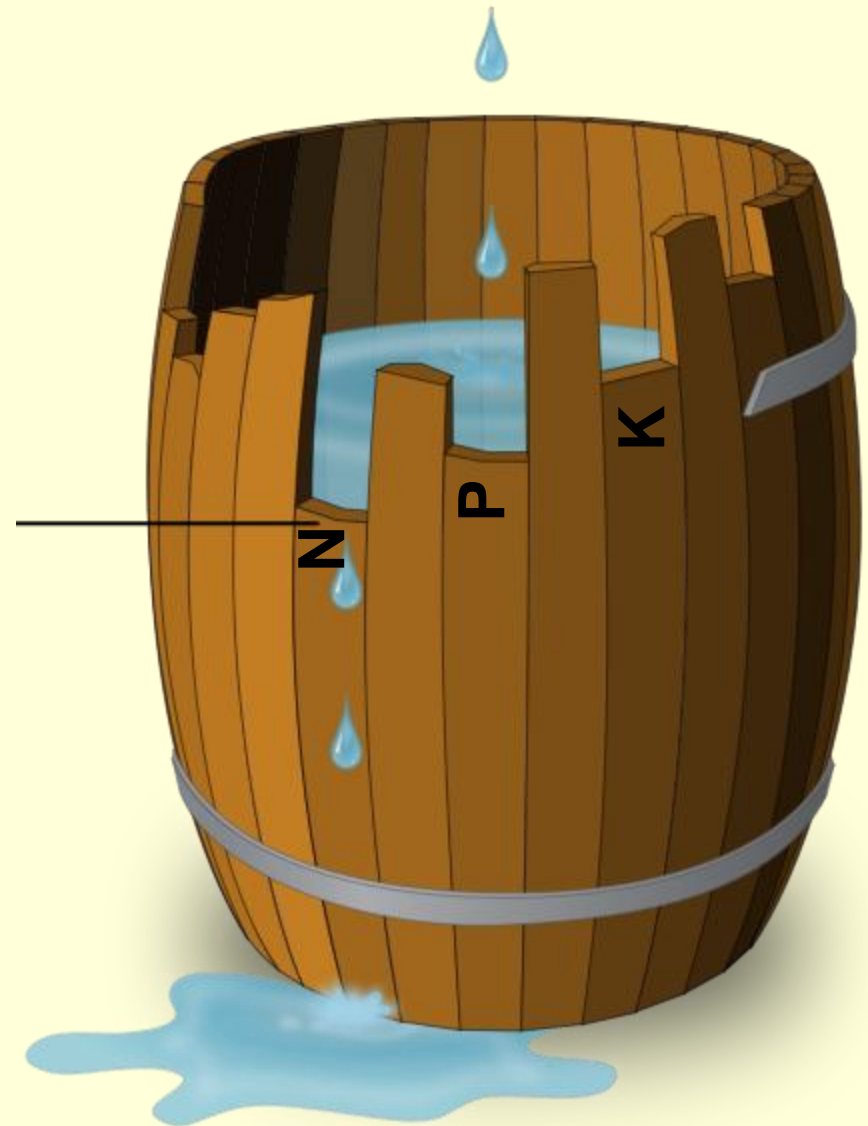
Typical concentrations sufficient for plant growth.

Element	Symbol	mg/kg	percent	Relative number of atoms
Nitrogen	N	15,000	1.5	1,000,000
Potassium	K	10,000	1.0	250,000
Calcium	Ca	5,000	0.5	125,000
Magnesium	Mg	2,000	0.2	80,000
Phosphorus	P	2,000	0.2	60,000
Sulfur	S	1,000	0.1	30,000
Chlorine	Cl	100	--	3,000
Iron	Fe	100	--	2,000
Boron	B	20	--	2,000
Manganese	Mn	50	--	1,000
Zinc	Zn	20	--	300
Copper	Cu	6	--	100
Molybdenum	Mo	0.1	--	1
Nickel	Ni	0.1	--	1

After E. Epstein. 1965. "Mineral metabolism" pp. 438-466. in: Plant Biochemistry (J.Bonner and J.E. Varner, eds.) Academic Press, London.

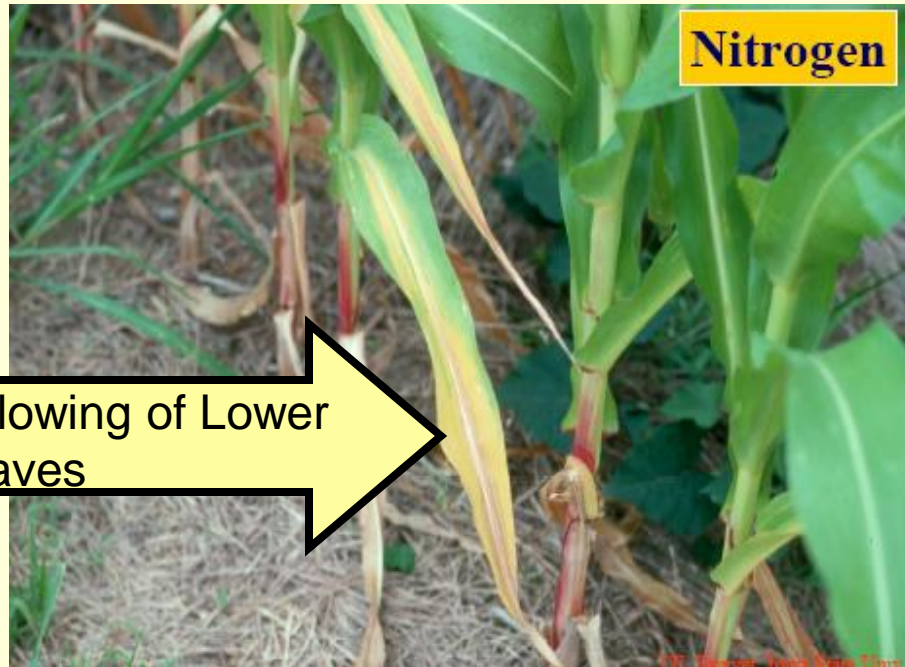
Liebig's Barrel

- Liebig's law of the minimum states
 - “The availability of the most abundant nutrient in the soil is as available as the availability of the least abundant nutrient in the soil.”
- Sun, water, pH
- N, P, K
- Ca, Mg, S
- ...and then maybe micronutrients



Nitrogen

- 78% of the atmosphere is N_2 (gas)
- What are the signs of Nitrogen Deficiency?



Stunting of
Plant
Growth

Yellowing of Lower
Leaves

Poor
Production

Why is Nitrogen so Important?

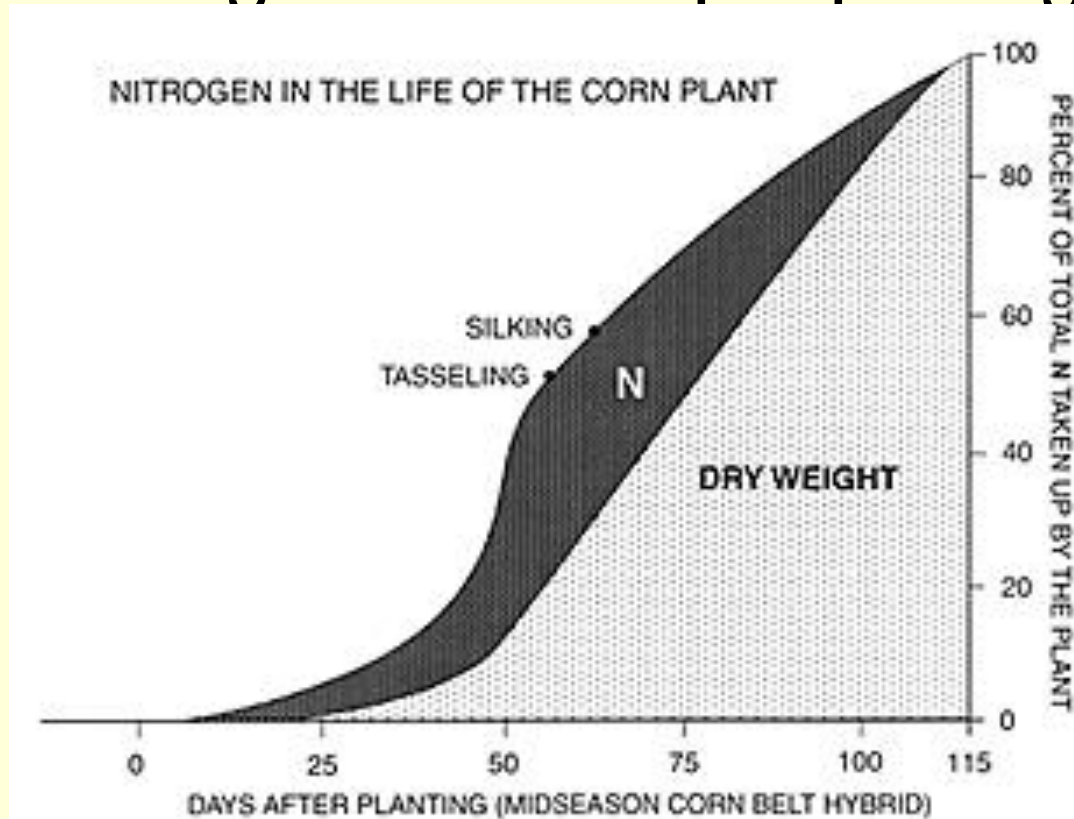
- Nitrogen is part of **Chlorophyll**
 - green pigment necessary for photosynthesis
- Nitrogen is part of DNA
 - Cell division → Plant Growth
- Nitrogen is part of all amino acids.
 - Used to form proteins
 - Proteins are 16% N
 - 1 acre of Corn at 25 tons of Corn Silage removes:
 $25 \text{ ton} \times 2000\text{lbs/ton} \times .04 \text{ protein} \times .4 \text{ dry matter} \times .16$
(% N in Protein) = 128 pounds of N

Nitrogen is mobile in the plant

- Nitrogen is needed in areas of the plant where:
 - The plant is receiving the most light.
 - The plant is growing rapidly
 - Therefore lower leaves will become yellow first if there is a deficiency

When does a plant need large amounts of N?

- Mostly during times of rapid plant growth



<http://www.ext.vt.edu/pubs/rowcrop/424-027/figure1.html>

Fig. 1. Dry weight and N uptake by corn (Harway, 1963).

Nitrogen Management Basics

(since early 1990s in MD)

Corn:

- Apply N based on realistic yield goal
 - 1 lb N/bu expected yield
- Split-apply N fertilizer on corn
 - apply 30 – 40 lbs/A at planting
 - remaining N as sidedress
- When utilizing manure or following leguminous cover crops use the Pre-Sidedress Nitrate Test

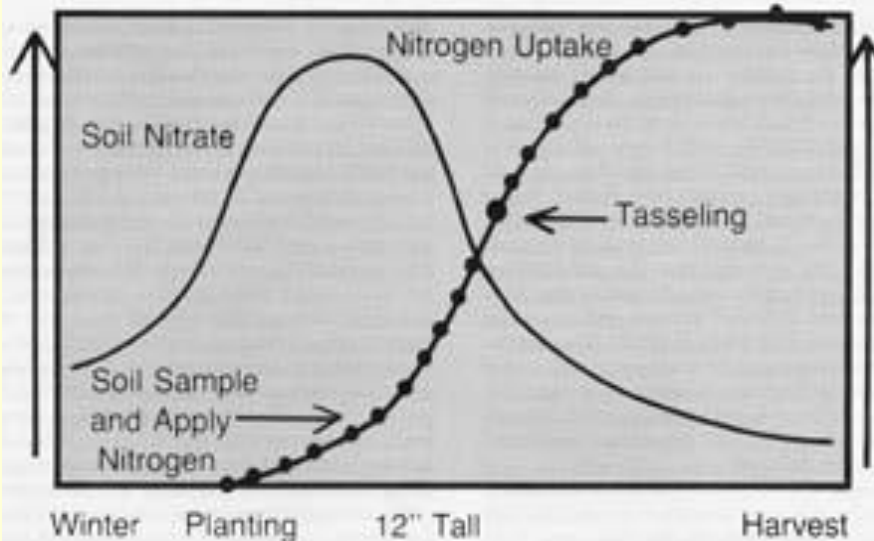
Wheat:

- Apply a total 70 – 120 lbs of N
- 20 – 40 lbs at planting
- Split top-dress 80 – 100
 - Green-up
 - Feekes 5 - 6



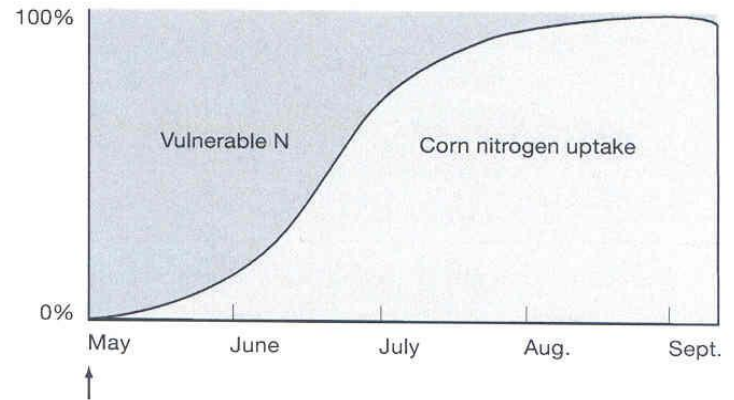
Split Application of N is starting point

- If the N is not yet applied, it can not be lost
- Apply the N when it is required by the crop
- Here's why it works

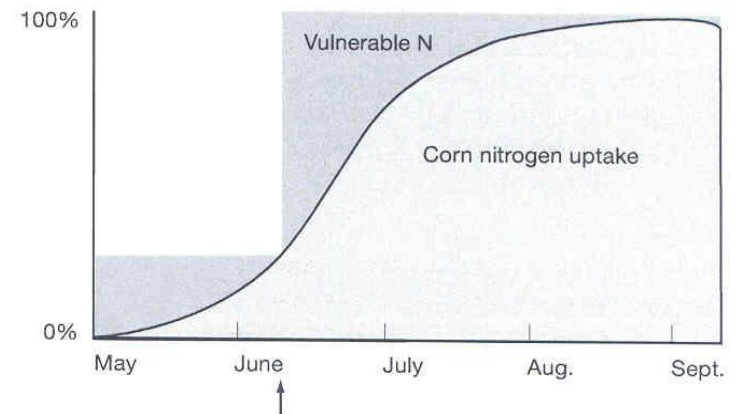


Bandel et al. UMD FS-559

A. All N applied preplant



B. Bulk of N applied as a sidedress



Note: Arrows indicate when fertilizer is applied.

Organic Nitrogen

- What is manure?
 - Urine (urea and ammonia), Undigested Plant Material (N tied up in Un-digestible proteins such as lignin), bedding (straw and saw dust)
- How does Organic N become Plant Available
 - Broken down by micro-organisms (bacteria)
 - Must have the following:
 - 50F Soil Temperatures
 - Oxygen
 - C:N Ratio - 20:1 to 50:1
 - Mineralization Rate (cattle manure)
 - 1st year – 35% 2nd year – 18% 3rd year – 9%

Nitrogen Fertilizers

- Urea 46-0-0
 - Will volatilize if not incorporated into the soil or get at least .25” of rain
- Ammonium Nitrate 34-0-0
 - Forms salts in the soil
 - Less volatilization than urea if surface applied
- Ammonium Sulfate 21-0-0
 - Least amount of volatilization if surface applied
 - Includes sulfur if needed
 - Most acidifying form of N
- UAN – Urea and Ammonia Nitrate
 - 28% Nitrogen (weighs about 11.5 lbs/gal)

10 gal = 11.5 X 10 = 115 lbs X .28 = 32.2 lbs N

Cost of Nitrogen

- Calculate the cost of N by:

Step 1 – Calculate lbs N in a ton

$$\text{Urea} = 46\% \quad 2000\text{lbs} \times .46 = 960 \text{ lbs N}$$

Step 2 – Determine the cost per ton of fertilizer

Step 3

Cost of Fert/ton divided by lbs of N/ton

$$\$650/\text{ton Urea}/960\text{lbs N/ton} = \$.68/\text{lb}$$

Nitrogen Credits for Legume Crops

Crop	Lbs. N/Acre
------	-------------

Perennial Crops

Alfalfa	100 - 150a
Ladino clover	60
Red clover	40
Birdsfoot trefoil	40

Winter Annual Crops

Crimson clover	50 - 100b
Hairy vetch	75 - 150b
Austrian winter peas	75 - 150b

Summer Annual Crops

Lespedeza	20
Soybeans	15 - 40c

- a. Depends on stand;
 - if stand is good (>4 plants per sq ft), credit 150 lbs;
 - if stand is fair (1.5 to 4 plants per sq ft), credit 125 lbs;
 - if stand is poor (<1.5 plants per sq ft), credit 100 lbs.
- b. Depends on planting date (biomass production), kill date and subsequent tillage.
- c. A minimum of 15 lbs and may be as much as 1 pound per bushel if soybeans up to 40 lbs. maximum

PSNT

- Pre Sidedress Nitrogen Test
 - Availability of nitrate for corn uptake
 - Predicts the amount of N to be released from legumes, manures, and crop residues
 - Only reliable if 50lbs of less N applied as commercial fertilizer
 - Corn should be 6-12 inches tall
 - Soil should be tested 12 inches deep
 - MCE Nutrient Management Advisors can test soil in the office and tests are available quickly

Phosphorus in the plant

- Phosphorus major function in the plant:
 - Energy transport and storage
 - Early root development
- Phosphorus is mobile in the plant
 - P is transported through the phloem (sugar highway)
 - Plants will become uniformly deficient

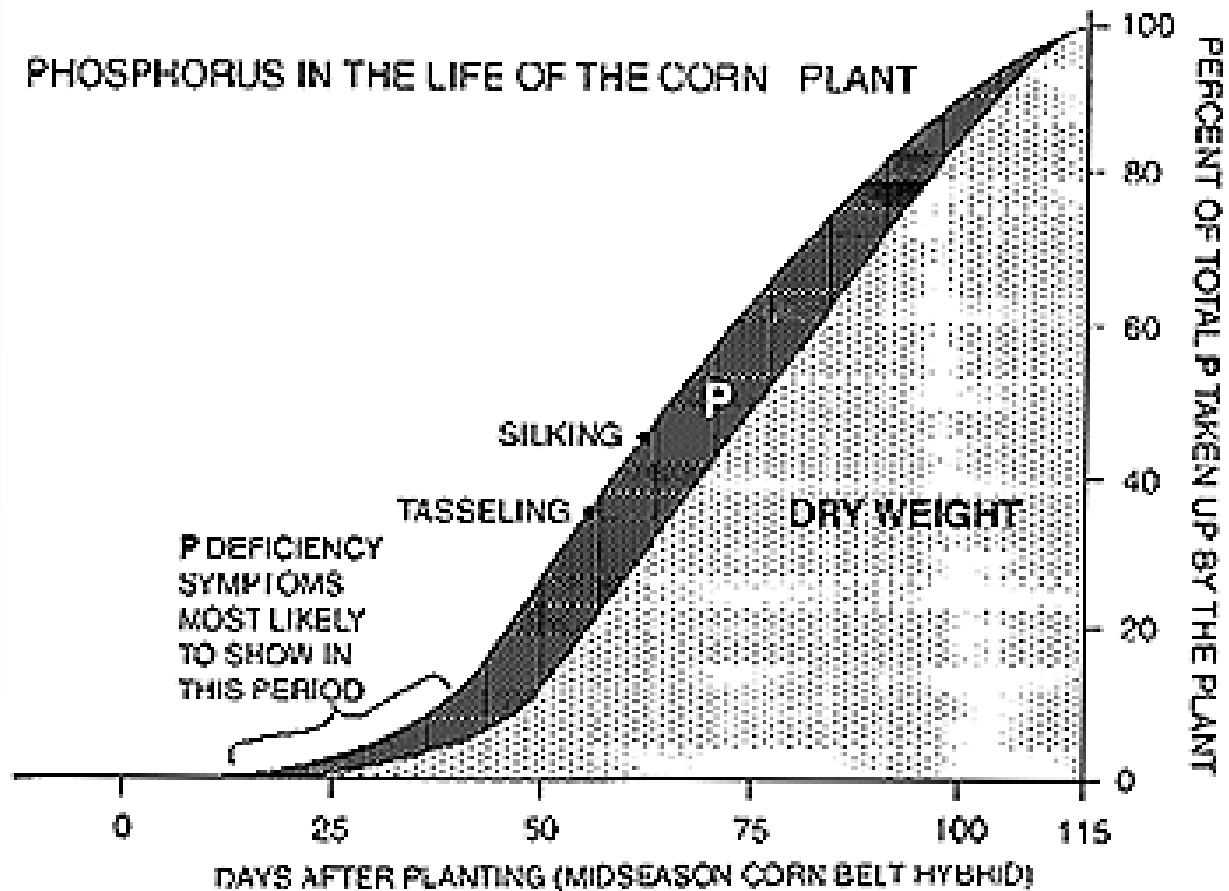


Fig. 2. Dry weight and P uptake by corn (Hanway, 1983).

Phosphorus Deficiency



Phosphorus Fertilizers

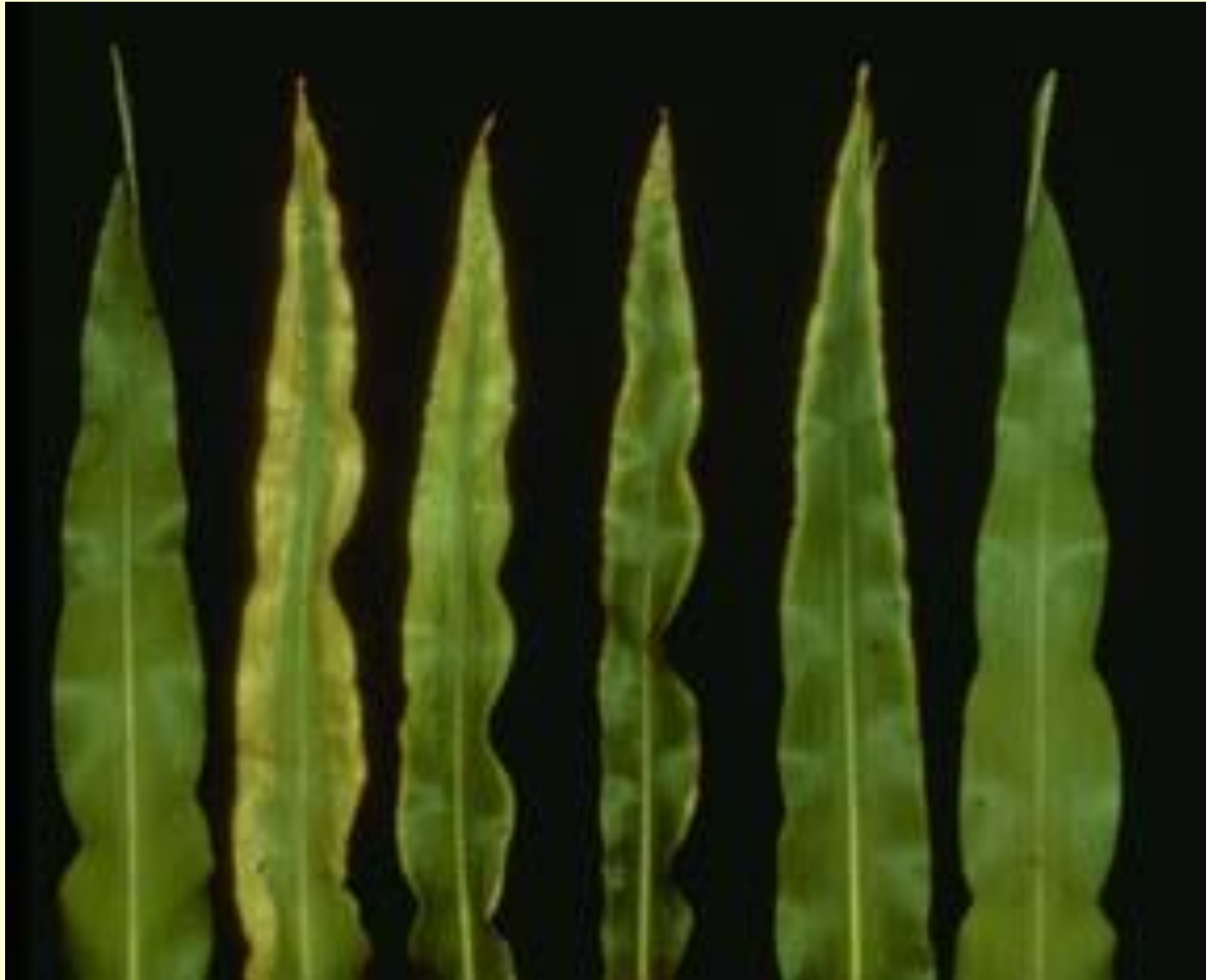
- diammonium phosphate, $(\text{NH}_4)_2\text{HPO}_4$
 - 18% N and 46% P_2O_5
- **Triple Superphosphate:** $\text{Ca}(\text{H}_2\text{PO}_4)_2$
 - 46% P_2O_5

Potassium in the Plant

catalytic or osmotic functions

- Stems of potassium-deficient plants may become weak due to internal breakdown or failure of supporting cells to develop
- seeds of cereals will be unfilled or chaffy, and ears of corn will fail to fill at the tips
- Potassium is mobile within the plant
- Greatest need is when corn is rapidly growing
 - Deficiencies will show most often in dry years or with limited rooted plants (drought, compaction, insect damage)

Potassium Deficiency in Corn



<http://www.extension.umn.edu/distribution/cropsystems/DC6794.html>

Potassium Deficiency in Soybeans



<http://www.extension.umn.edu/distribution/cropsystems/DC6794.html>

TABLE 1. POTASSIUM REMOVAL.

Crop	Amount harvested per acre	Potassium removed, in lbs/A
Alfalfa hay	8 t	400
Orchardgrass hay	5 t	260
Soybeans	50 bu	40
Corn grain	150 bu	25
Corn silage	25 t	170
Wheat	80 bu	20

Potassium Fertilizers

- **Potassium Chloride, KCl:** This single K source amounts to ~90% of all K fertilizers consumed in the U.S.
 - 60% K_2O

Potassium in Manure

- Cattle Manure
 - Variable depending on type of bedding
 - 3 - 15 pounds per ton
 - Average around 9 lbs per ton
 - Liquid manure 8 lbs per 1,000 gallon
- Broiler Litter
 - 40-50 pounds per ton
 - 40 lbs N and 55 lbs P/ ton

Why be concerned about Potassium?

- High prices
 - High world demand – US, China, India, Brazil
 - Production not keeping pace
 - \$.55 per pound
- Shift from Animal to Crop Production in the county
 - Less K available from manure
 - Less K needed for grain production
- More soybean production
 - State limiting manure applications for soybeans
 - No Nitrogen Requirement

Soil pH

- Soil pH needs to be between 6-7 for most crops

Most Ag Crops



Soil pH and Nutrient Availability

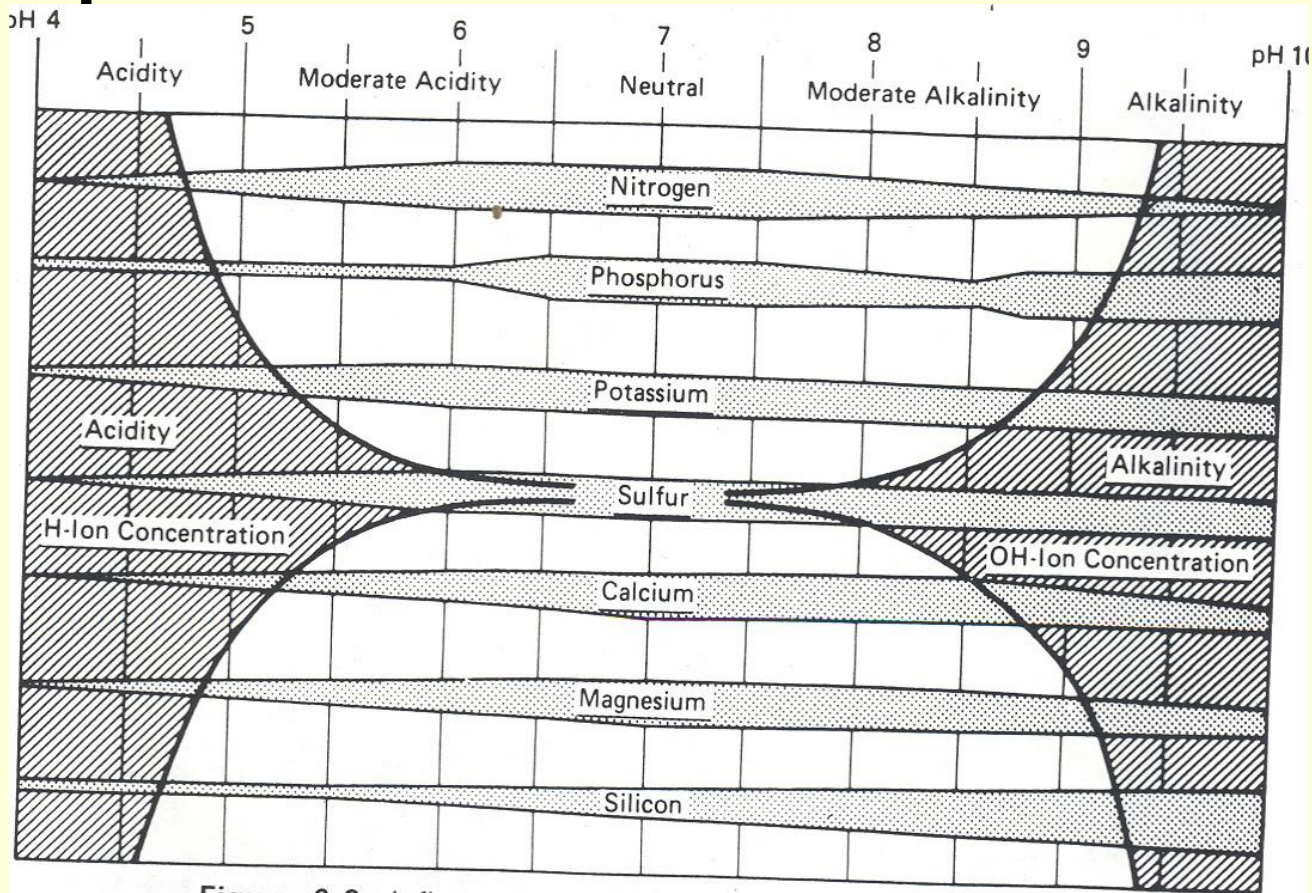


Figure 6-9 Influence of soil pH on the solubility of major plant nutrients (N, P, K, Ca, Mg, and S). The width of the bands indicates the solubility of the elements as influenced by soil pH. (Source: U. S. Jones, *Fertilizers and Soil Fertility*, © 1982. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, N.J.)

Soil Test

- Get a good representative Sample
 - Sample good for 3 years

Fertilizing Your Crop

- Set a Yield Goal
- Crop Needs – Manure Nutrients =
Fertilizer Needs

Things to Consider

- Add Legume Crops to pastures and meadows.
- Rotate Crops – take advantage of legume nitrogen credits
- Soil Test and Fertilize according to Nutrient Management Plan
- Utilize Manure
 - Incorporate in row crops
 - Spread animals out on pasture for winter feeding
- Practice good pasture management

Nutrient Value in a ton of Manure

- One ton of manure provides

– 3.5 lbs of N X \$.50 = \$1.75

– 4.5 lbs of P X \$.50 = \$2.25

– 9 lbs of K X \$.55 = \$4.95

Total = \$8.95/ton

10 ton/acre = \$89.50/acre

Nutrient Value of One Ton of Straw

- one dry matter ton of straw off the field contains (on average)
 - 14 lbs. of nitrogen
 - 6 lbs. of P₂O₅
 - 29 lbs. of K₂O.
 - Using current fertilizer prices (\$0.50/lb. N, \$0.50/lb. P₂O₅, and \$0.55/lb. K₂O), this equates to about \$25.95 of fertilizer equivalent per ton of dry matter.

Past fertilizing programs

- Corn
 - 500 pounds of 19-19-19
 - 95 lbs N 95 lbs P 95 lbs K
 - 10 ton of manure per acre
 - 35 lbs N, 45 lbs P, 90 lbs K
 - Total Provides 125 lbs N, 135 lbs P, 185 lbs K

Low P & K Soils (FIV 20)

25 ton Corn Silage

Requires - 155 lbs N, 94 lbs P, 205 lbs K Manure Value
 -30 + 46 -20 \$67.00/ac (\$49.50 from K)

150 bu Corn Grain

Requires - 150 lbs N, 85 lbs P, 132 lbs K Manure Value
 -25 +50 +53 \$37.85/ac (\$20.35 from K)

Soil Test Levels (FIVs), Soil Test Category and Yield Response

Soil Test Fertility Index Value (FIV)	Soil Test Category	Likelihood of Yield Response
0-25	low	yield response likely
26-50	medium	yield response possible
51-100	optimum	yield response unlikely
>100	excessive	yield response very unlikely

Corn Production on High P & K Soil (FIV 100)

25 ton Corn Silage

155 lbs N 33 lbs P 55 lbs K **Manure Value**

-25 **+102** **+130** **\$17.50** all from N

Use a starter (200 lbs 20-10-10) + 175 lbs Urea = \$62.50/ac (manure worth \$43.25)

150 bu Corn Grain

150 lbs N 23 lbs P 24lbs K **Manure Value**

-25 **+112** **+161** **\$17.50** all from N

Use a starter (200 lbs 20-10-10) + 175 lbs Urea = \$62.50/ac (manure worth \$21.20)

Soybeans

40 bushel /acre

10 ton manure providing 35 lbs N, 45 lbs P, 90 lbs K

- Low P & K Soil (20 FIV)

– 0 lbs N, 88lbs P, 89lbs K

+ 35 - 39 +1 Manure Value = \$71.45

- High P & K Soil (100 FIV)

– 0 lbs N, 20 lbs P, 20 lbs K

+35 +25 +70 Manure Value = \$21.00

- Hay – Assuming 10 ton of Manure (35-45-90)
 - Alfalfa – 4 ton per acre (Low P and K – 20 FIV)
 - 0 lbs N, 68 lbs P, 207 lbs K
 - +35 -23 -117 \$72.00/ac (\$49.50 from K)
 - Alfalfa – 4 ton per acre (High P and K – 100 FIV)
 - 0 lbs N, 20 lbs P, 90 lbs K
 - +35 +25 0 \$59.50/ac (\$49.50 from K)
 - Orchard Grass – 4 ton per acre (Low P & K – 20 FIV)
 - 160 lbs N, 78 lbs P, 128 lbs K
 - 125 -33 -38 \$89.50/ac
 - Orchard Grass – 4 ton per acre (High P & K – 100 FIV)
 - 160 lbs N, 20 lbs P, 20 lbs K
 - 125 +20 +70 \$38.50/ac

Priority Use for Manure

1. Low P & K Cool Season Grass (orchard grass)
2. Low P & K Corn Silage
3. Low P & K Corn Grain (use 100% of manure nutrients)
4. Low P & K Alfalfa
5. Low P & K Soybeans
6. High P & K Alfalfa
7. High P & K Corn Silage
8. High P & K Cool Season Grass
9. High P & K Corn Grain
10. High P & K Soybeans

Management Practices

- Soil Test
- Keep pH between 6.2 and 6.7
- Follow Nutrient Management Plan
- Split applications of Nitrogen
- Corn with Manure – Do a PSNT (pre side dress nitrogen test)
 - If less than 50 lbs N at planting
 - Take a 12” soil sample when corn is between 6” – 12” tall
 - Can run at the Extension Office – No Charge
 - Indicate if more N is needed

Upcoming Meetings

- Friday, Feb 10th – **Mt. Fruit and Veg Conference**
– Garrett College
- Friday, March 9th – **UME Spring Crop Meeting**
Garrett College
– Cover crops, weed control, crop insurance, corn marketing, and much more
- Tuesday, Feb 28th **Estate Planning Webinar** – 4 weeks on Tuesdays
- Tuesday, Feb 28th **Beef Crossbreeding Webinar**
- Tuesday, March 13th – **National Safe Tractor Operators Program** – required for 14-15 year olds for operating tractors.