

Fertility Issues

**Louisiana Agricultural Technology
Management Conference**

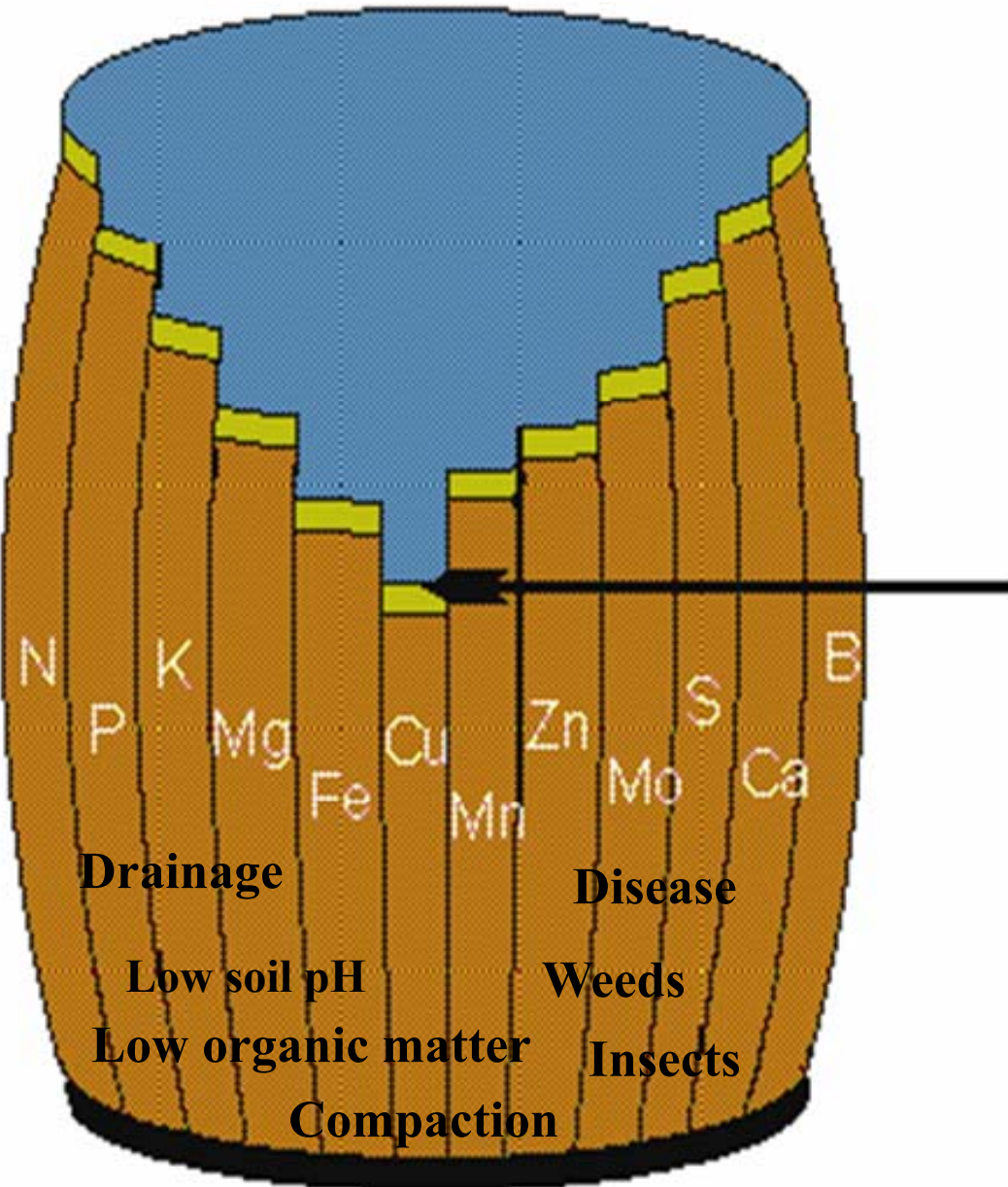
**Alexandria, LA
February 12, 2009**

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Soil Fertility/Nutrient Management



Clients Limiting Factors?



"A crop's yield is restricted by the lack of a single element, even though there may be sufficient quantities of all other essential nutrients."

Maximum yield potential

This principle compares the yield of a crop with a barrel, where the boards form the essential nutrients. The barrel can be filled up only to the shortest board.

Phosphate and Potash Recommendations

<u>Crop</u>	<u>Phosphate, lb/Ac</u>	<u>Potash, lb/Ac</u>
Corn	60 - 100	60 - 100
Cotton	40 - 80	40 - 80
Rice	20 - 60	20 - 60
Sugarcane	40- 50/60	80 - 130/140
Soybeans	30 - 80	30 - 80
Wheat	40 -100	40 - 100

Soil Reaction, pH-1

- Optimum pH for corn, cotton, grain sorghum, soybeans, sugarcane and wheat is the range of pH values from ~ 5.8-6.5
- * **Lime** should be applied when soil pH < 5.5 ; preferably in the fall so acidity can be neutralized before crop growth begins the following spring

Ag lime (Calcium carbonate) or
Dolomitic lime (Calcium/Magnesium carbonate)

- * **Lime recommendations**, if needed, are shown on the Routine Soil Test Results offered by the LSU AgCenter Soil Testing and Plant Analysis Lab, STPAL
















Soil Reaction, pH-2

- * Don't over-lime; open yourself up for micronutrient problems, such as Boron-Cotton, Manganese- Beans, and Zinc-Corn
- * Soybeans, if soil pH is between 5.2 and 6.2, use Molybdenum seed treatment. Supplies the Mo needed by plant to fix nitrogen. Doesn't take the place of lime, so... no help with a low soil pH
- * **Soil pH has a dramatic effect on the availability of native and applied plant nutrients**
- * Inoculate soybeans if greater than 4-5 years since planting beans, especially if after rice; the bacteria requires oxygen.
- * Over the past 5-7 years, soil test data from the STPAL has shown that approximately **27%** of the soil samples from **grain sorghum and soybean** fields had **pHs < 5.4**

Causes of Low Soil pH

- Leaching of calcium, magnesium and potassium
- Soil erosion on newly prepared areas
- Crop removal
- Use of acid-forming fertilizers:
 - *1.8 lb lime neutralized per lb N applied as ammonium nitrate, urea, & N sol.
 - *5.25 lb lime neutralized per lb N applied as ammonium sulfate

Fertilizer Efficiency Increases as Soil Acidity is Neutralized

SOIL ACIDITY	NITROGEN	PHOSPHATE	POTASH
Extremely Acid 4.5 pH <i>Needs Lime</i>	 30%	 23%	 33%
Very Strong Acid 5.0 pH <i>Needs Lime</i>	 53%	 34%	 52%
Strongly Acid 5.5 pH <i>Needs Lime</i>	 77%	 48%	 77%
Medium Acid 6.0 pH	 89%	 52%	 100%
Neutral 7.0 pH <i>Don't lime to this level</i>	 100%	 100% <i>Never Happen!!!!</i>	 100%

Price per Pound of Fertilizer

January 6, 2009

Fertilizer	\$/T	Lb/T	\$/lb
Urea	350	900	0.39
Am. Nitrate	400	680	0.59
Am. Sulfate	300	420	0.71
Urea/Am. Sul.	340	660	0.52
UAN 32%	475	640	0.74
DAP 18-46-0	500	920	0.54
TSP 0-46-0	450	920	0.49
KCl 0-0-60	825	1,200	0.69

Plant Food Removed In Harvested Crop

<u>Crop</u>	<u>Unit</u>	<u>N</u>	<u>Phosphate</u>	<u>Potash</u>
Corn	lb/bu	0.75	0.44	0.29
Cotton	lb/bale	32.00	14.00	20.00
Rice	lb/bu	0.55	0.29	0.18
Sugarcane	lb/ton	2.00	1.25	3.50
Soybeans	lb/bu	4.00	0.80	1.40
Wheat	lb/bu	1.15	0.55	0.34

IPNI data for southern crops

Plant Food Removed in Harvested Crops

<u>Crop</u>	<u>Yield/Ac</u>	<u>N,lb</u>	<u>Phosphate,lb</u>	<u>Potash,lb</u>
Corn	180 bu	135	79	52
<i>Stalks, etc.</i>		<i>105</i>	<i>23</i>	<i>188*</i>
Cotton	2 bale	64	28	40
<i>Residue</i>		<i>96</i>	<i>20</i>	<i>100*</i>
Rice	200 bu	110	58	36
<i>Straw</i>		<i>34</i>	<i>19</i>	<i>179*</i>
Sugarcane	40 ton	80	50	140
<i>Residue</i>		<i>88</i>	<i>30</i>	<i>124*</i>
Soybeans	60 bu	240	48	84
<i>Residue</i>		<i>96</i>	<i>9</i>	<i>132*</i>
Wheat	70 bu	81	39	24
<i>Straw</i>		<i>49</i>	<i>8</i>	<i>118*</i>

P and K in ppm

Removal, Medium Rate fert., Residue

<u>Crop</u>	<u>Yield/Ac</u>	<u>P Rem</u>	<u>P Med</u>	<u>P Res</u>	<u>K Rem</u>	<u>K Med</u>	<u>K Res</u>
Corn	180 bu	-17	+13	+5	-22	+25	+78
Cotton	2 bale	- 6	+ 9	+5	-17	+17	+42
Rice	200 bu	-13	+ 4	+4	-15	+ 8	+75
S. Cane	40 T	-11	+ 9	+7	-58	+17	+51
S. Beans	60 bu	-11	+ 7	+2	-35	+12	+55
<u>Wheat</u>	<u>70 bu</u>	<u>- 9</u>	<u>+ 9</u>	<u>+2</u>	<u>-10</u>	<u>+17</u>	<u>+49</u>

Note: P and K plus Soil Test values

Nutrients in Crop Residue

Not all are readily available for plant use

Contained in a organic matrix, similar to an organic fertilizer

Require soil microbes to breakdown the residues to release nutrients, as with Organic matter

Nutrients will show-up in a soil test

Baling Wheat/Rice Straw

Crop/yield	----- Lb/Ac-----			\$/Ac
	N	P ₂ O ₅	K ₂ O	
Wheat 70 bu	49	8	118	104
Rice 160 bu	27	16	143	117

Nutrients are leaving; look at the cost !!

Fertilizer costs as of Jan. 6, 2009

Burning Corn Residue

- * Most of the N can be lost:

$$180 \text{ bu} = 10,080 \text{ lb} \times 0.845 = 8,518 \text{ lb} \times 1\%N = 85 \text{ lb}$$

$$85 \text{ lb N} \times \$0.39/\text{lb N} = \$ 33.15$$

- * Ohio State Univ. simple table estimating N loss:

<u>Yield (Bu/Ac)</u>	<u>N Lost (Lb/Ac)</u>
120	40
160	54
<u>200</u>	<u>67</u>

Sulfur will be lost as well, about 13-36 lb, more-or-less;
P, K, Ca, Mg and Zn will remain in the ashes.

Recent Questions on Wheat

N recommendations; topdressing usually mid-late Feb. or 50% before jointing + 50% before boot. Normal year- jointing in about mid - Feb.

If wheat is green- adequate N; plant development. Now seeing stunted plants, yellow plants and purple leaves.... Environmental conditions!!!!

N is mobile in the plant- deficiency in older leaves;
S is not mobile in the plant- deficiency in new leaves

The End of the Day

