Field Notes

March 21, 2014

Johnny Saichuk

Like everyone else we are off to a slow late start this year. Last year a lot of rice had been planted by this date then persisting cold weather held the crop back. This year persisting cold conditions prevented early planting and even though temperatures are supposed to drop over the weekend a lot of rice is being planted either by air as is shown here or by grain drills. This photo was taken this morning as our verification field in Vermilion parish was being planted. It is the first to be planted with Jeff Davis likely to be planted this weekend too.

Our Vermilion field is being water seeded with Jupiter with plans to pinpoint flood. The seed had been soaked, but very little germination had occurred in the sample I saw. The combination of the lack of germination progress and the likelihood of low temperatures caused the grower to hold the water until Monday morning, at little longer than usual, but not excessive given the conditions.

Part of this newsletter are two documents on fertility prepared by Dr. Dustin Harrell. There will be more to come along with a crops fertility newsletter. Contact your county agent if you would like copies.

Phosphorus Fertility in Rice

LSU AgCenter Fact Sheet

Dustin Harrell, LSU AgCenter Rice Research Station

A. Background:

Phosphorus is a constituent of nucleic acids, and is needed for several plant essential processes including photosynthesis, respiration, energy storage, and energy transfer among others. Rice removes P from the soil as an orthophosphate ion, primarily $H_2PO_4^-$ or HPO_4^{-2}. Fertilizer P is always expressed as a percent P_2O_5 equivalent and on a fertilizer label is located as the second number (example: 0-46-0). Soil test P and soil test based fertilizer recommendations can be reported as either P_2O_5 equivalent or P. Convert P to P_2O_5 equivalent by dividing by 0.44. Convert P_2O_5 equivalent to P by multiplying by 0.44. Soil P is most available to plants in soils with a pH around 6.5. Typically, plant available P is decreased as a soil becomes more alkaline or acidic. When a rice soil is flooded and becomes anaerobic (no oxygen) the pH of the soil migrates towards neutrality over time regardless of the initial pH; therefore, in most cases P becomes more available to rice after permanent flood establishment. Rice takes up approximately 0.0086 pounds of P_2O_5 (0.02 pounds of P) per pound of dry rice harvested. Approximately 75% of the P taken up is contained in the harvested grain.

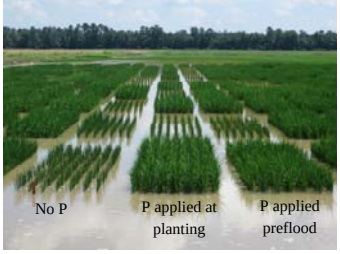
B. Soil Test Based Fertilizer Recommendations:

LSU AgCenter's Soil Testing and Plant Analysis Laboratory uses the Mehlich-3 soil test extraction to extract P and determine fertilizer needs. Soil test results are given in ppm of extractable P while fertilizer recommendations are given in pounds of P_2O_5 per acre.

	Soil Test Category			
	Very Low	Low	Medium	High
	ppm			
Mehlich-3 Extractable P	<10	11 - 20	21 - 35	≥36
Fertilizer Recommendation	**lb P_2O_5 / Acre**			
	60	**40**	**20**	**0**

C. Management:

Phosphorus fertilizer rates should be determined from a recent soil test. Phosphorus fertilizer is most efficient in rice production when applied just before planting until permanent flood establishment (5th leaf to first tiller). Research has shown that P fertilizer applications after this time (often referred to as "rescue" applications) are beneficial; however, yields will be reduced as compared to earlier P application timings. Recent research with ratoon rice production in Louisiana has shown that an additional 30 pounds of P_2O_5 was needed to maximize ratoon yields from a soil testing low in extractable P. The additional 30 pounds can be included with the first crop application or applied immediately after first crop harvest prior to reflooding.



D. Fertilizer Sources:

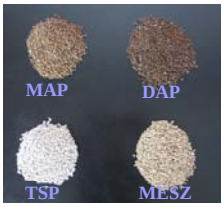
Phosphate fertilizers are commonly blended with potassium and nitrogen fertilizers to provide site specific fertilizer needs of the producer. Commonly used P fertilizer sources in rice include:

triple superphosphate (0-46-0)

diammonium phosphate (18-46-0)

monoammonium phosphate (11-53-0)

MicroEssentials SZ (12-40-0-10S-1Zn)



E. Nutrient Deficiency Symptoms:

Phosphorus is a mobile nutrient within the rice plant. When a plant becomes deficient in P, it is translocated from the older (lower) leaves into the newer (upper) leaves.

Symptoms include:

- Stunted plants with slender stems
- Leaves tend to have a very dark green color which stand erect
- Reduced tillering
- Slowed plant development
- Necrosis (death) of leaves beginning with the oldest leaves.

F. Identifying P Deficiency by Tissue Analysis:

Plant tissue analysis can be used to help diagnose nutrient deficiencies during the growing season. When tissue concentrations fall below a designated critical level (point at which a 5-10 % growth or yield reduction would occur) they are considered to be deficient in that particular nutrient. Critical values are determined by research and are highly dependent on the stage of growth and the part of plant evaluated. Selected published critical values for rice tissue P include:

Stage of Growth	% P	Part of plant	Reference
Mid-tillering	0.14 - 3.6	Most recently mature leaf (Y leaf)	Bell & Kovar, 2000
Panicle initiation	0.18 - 0.29	Most recently mature leaf (Y leaf)	Bell & Kovar, 2000
2 mm panicle	0.12 - 0.20	Most recently mature leaf (Y leaf)	Sedberry et al., 1987

Potassium Fertility in Rice

LSU AgCenter Fact Sheet

Dustin Harrell, LSU AgCenter Rice Research Station

A. Background:

Potassium is needed to regulate normal metabolic processes in the plant including photosynthesis and protein synthesis as well as maintaining plant osmotic pressure. Deficiencies of K in rice have been related to increased disease incidence typically brown spot, stem rot, and blast. Rice takes up K in the ionic (K^+) form. Deficiencies of K in rice are more often found on coarser textured soils with a relatively low cation exchange capacity (CEC). Fertilizer K is expressed as a percent of K_2O equivalent, and on the fertilizer label it is located as the third number (example 0-0-60). Soil test K and soil test K fertilizer recommendations can be reported as either K_2O or K. Convert K to K_2O by multiplying by 1.2. Convert K_2O to K by multiplying by 0.83. Rice takes up approximately 0.024 pounds of K_2O (0.02 pounds of K) per pound of dry rice harvested. Approximately 17% of the K taken up is contained in the grain while the remaining 83% is contained in the straw.

B. Soil Test Based Fertilizer Recommendations:

LSU AgCenter's Soil Testing and Plant Analysis Laboratory uses the Mehlich-3 soil test extraction to extract K and determine fertilizer needs. Soil test results are given in ppm of extractable K while fertilizer recommendations are given in pounds of K_2O per acre.

Soil type	Texture	Soil Test Category				
		Very Low	Low	Medium	High	Very High
		ppm				
Alluvial						
	clay, silty clay	<114	114 - 182	183 - 227	228 - 273	>273
	clay loam, silty clay loam	<91	91 - 136	137 - 182	183 - 205	>205
	loam and silt loam	<57	57 - 91	92 - 136	137 - 159	>159
	sandy loam	<45	45 - 80	81 - 114	115 - 136	>136
Upland						
	clay, silty clay	<114	114 - 182	183 - 227	228 - 250	>250
	clay loam, silty clay loam	<57	57 - 102	103 - 148	149 - 170	>170
	loam and silt loam	<57	57 - 91	92 - 136	137 - 159	>159
	sandy loam	<45	45 - 80	81 - 114	115 - 136	>136
Fertilizer Recommendation		lb K_2O / Acre				
		60	40	20	0	0

C. Management:

Potassium fertilizer rates should be determined from a recent soil test. Potassium fertilizer is most efficient in rice production when applied just before planting until permanent flood establishment (5^{th} leaf to first tiller). Splitting K applications between preplant and permanent flood establishment have been shown to be beneficial in severely K deficient, coarser textured soils. Late season K fertilizer applications applied after the onset of deficiency symptoms ("rescue" applications) are generally beneficial; however, yields will be reduced as compared to earlier K application timings. It is uncertain whether fertilizer K applications made after head emergence is beneficial to yield.

D. Fertilizer Sources:

Potassium fertilizers are commonly blended with phosphorus and nitrogen fertilizers to provide site specific fertilizer needs of the producer. Potash (KCl, 0-0-60 or 0-0-62) is the most common K fertilizer source used in commercial rice production. Other potential K fertilizer sources include potassium sulfate, also known as sulfate of potash (0-0-50-18S) and K-Mag (0-0-22-22S plus 11% Mg) however, these sources are rarely used. Potassium nitrate fertilizer (13-0-44) is commonly used for rice production due to the nitrate form of nitrogen.

E. Nutrient Deficiency Symptoms:

Potassium is a mobile nutrient within the rice plant. When a plant becomes deficient in K, it is translocated from the older (lower) leaves into the newer (upper) leaves.

Symptoms include:

- Stunted plants
- Interveinal chlorosis (yellowing) of oldest leaves beginning at leaf tips and moving backward down the leaf
- Necrosis (death) of leaf tissue following chlorosis beginning at leaf tips
- Increased incidence of brown spot
- Potential for increased disease pressure from stem rot and blast

F. Identifying K Deficiency by Tissue Analysis:

Plant tissue analysis can be used to help diagnose nutrient deficiencies during the growing season. When tissue concentrations fall below a designated critical level (point at which a 5-10 % growth or yield reduction would occur) they are considered to be deficient in that particular nutrient. Critical values are determined by research and are highly dependent on the stage of growth and the part of plant evaluated. Selected published critical values for rice tissue P include:


Photo courtesy of J. Saichuk

Stage of Growth	% K	Part of plant	Reference
Mid-tillering	1.5 – 2.7	Most recently mature leaf (Y leaf)	Bell & Kovar, 2000
Panicle initiation	1.5 – 2.7	Most recently mature leaf (Y leaf)	Bell & Kovar, 2000
2 mm panicle	1.0 – 1.5	Most recently mature leaf (Y leaf)	Sedberry et al., 1987