

Rice Nutritional Trials 2013: Phosphorus, Potassium, and Silicon

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Phosphorus/Potassium Trial

Objective: To determine the yield response of rice to phosphorus and potassium fertilization on organic soils and to relate potential yield response to extractable soil phosphorus and potassium

Phosphorus/Potassium Trial: Design and Initial Soil Test

- 3 P rates: 0, 25, and 50 lb P_2O_5 /acre
- 3 K rates: 0, 50, and 100 lb K_2O /acre
- 4 replications in a RCB design
- Initial soil test: pH 6.96

Pm = 11

Acetic K = 93

Phosphorus/Potassium Trial: Harvest Data

	Rice Yield (Cwt)
<u>P Rate</u> (lb P ₂ O ₅ /acre)	
0	40.96
25	38.06
50	41.96
<i>P>F</i>	0.170 (NS)
LSD (0.05)	4.28
<u>K Rate</u> (lb K ₂ O/acre)	
0	41.42
50	41.33
100	38.22
<i>P>F</i>	0.233 (NS)
LSD (0.05)	4.28
<u>P rate X K rate</u> (<i>P>F</i>)	0.344 (NS)

Silicon Sources Trial

Objectives:

- 1) Determine the yield response of rice to Zumsil/Ash/ Slag applications
- 2) Determine if any of these Si sources has any residual effect for the benefit of the subsequent cane crop

Silicon Sources Trial: Design

- 5 X 5 Latin square design
- Treatments:
 - Control (no Si)
 - Zumasil (1 gal/ac)
 - Zumasil (2 gal/ac)
 - Ash (2 T/ac)
 - Slag (2.5 T/ac)

Silicon Sources Trial: Harvest, Straw, and Soil Data

Treatment	Yield (Cwt) Harvest 1	Straw Si % Harvest 1	Straw Si % Harvest 2	Soil Si (After Harvest 2)
Control (No Si)	34.33c	1.56c	2.50b	9b
Zumsil (1 gal/ac)	36.87bc	1.56c	2.77ab	9b
Zumsil (2 gal/ac)	36.15bc	1.50c	2.34b	11b
Ash (2 T/ac)	39.21b	2.04b	2.17b	9b
Slag (2.5 T/ac)	45.13a	3.75a	3.33a	85a
<i>P>F</i>	0.002	<0.0001	0.013	<0.0001
LSD (0.05)	4.72	0.18	0.64	26

Rice straw should contain approximately 3% Si for optimum production (Snyder et al., 1986).

There was a 31% yield increase in the first rice crop with slag application compared to the control.

Conclusions: P and K

- There was no rice yield response to phosphorus or potassium fertilizers
- There needs to be more research to evaluate yield response to P and K at low soil test levels

Conclusions: Silicon

- There was no yield response to Zumsil and in this trial Zumsil was not a good source of silicon
- Ash application at 2 T/acre increased rice yield compared to the control but was also lower than slag application at the recommended rate (2.5 T/acre)
- Calcium silicate slag was by far the best source of silicon and was the only source which maintained adequate straw Si and also substantially increased soil Si
- More research should be done with higher rates of ash and possibly other sources of silicon

Proposed P/K/Micronutrients Trial

Objective:

To determine the yield response of rice to phosphorus, potassium, and micronutrient fertilization on organic soils

Possible Treatments:

(1) No fertilizer, (2) P fertilizer, (3) K fertilizer,
(4) micronutrients, (5) P + K, (6) P + K + micros

Proposed Silicon Trial

Objective:

To determine the yield response of rice and cane to calcium silicate, mill ash, and other potential Si sources

Possible Treatments:

- (1) No Si, (2) Recommended slag rate,
- (3) Increased ash rate, (4) New slag candidate 1,
- (5) New slag candidate 2