

## SUGAR CANE TRIALS

CLIENT: KISMET INTERNATIONAL PTY.LTD.

For And On Behalf Of

GUANO AUSTRALIA PTY.LTD.

49 FIELD ST, SHEPPARTON 3630, VICTORIA



RESEARCH COMPANY: CROP TECH PTY LTD  
410 Langbeckers East Road  
Bundaberg 4670, Queensland

## OVERVIEW

A crop nutrition trial was conducted in Bundaberg, to compare the effectiveness of MADURA GUANO GOLD – KWIK START® // REEFSAFE® FERTILISER (GUANO® / REEFSAFE®), against the conventional fertilisers, on sugar cane yield and commercial cane sugar (CCS) levels.

GUANO® / REEFSAFE® fertiliser is an organic di-calcium product, rich in 100% available Phosphorus, Calcium, Silica, Organic Carbon and a high CEC (Cation Exchange Capacity) product (see Appendix 1).

Other parameters monitored throughout the trial were shoot emergence, root development, and the uptake of the full range of nutrients, especially phosphorous and silica.

## INTRODUCTION

A trial site was established in the Bundaberg region. The site was representative of the area with respect to soil type, irrigation methods, and crop rotation systems. The field was approximately 4.5ha in area.

The site was planted on the 4<sup>th</sup> of September 2003. The previous sugar cane ratoon crop was ploughed out in the 2002 sugar cane crushing season. In the 12 month fallow period between cane crops the site grew a crop of soybeans, followed by oats.

## TRIAL DESIGN

The trial area was laid out as a Randomised Complete Block design, two treatments by 12 replicates, giving a total of 24 plots. The two treatments are shown in Table 1.

**Table 1:** Treatments applied.

Treatment 1	Industry standard fertiliser applied at 250kg/ha (Incitec 2003/CB 27277, N P K S analysis 19.1 : 10 : 0 : 12.8)
Treatment 2	GUANO® / REEFSAFE® / Sulphate of Ammonia applied at 350kg/ha (N P K Ca S Si analysis 10.5 : 5.5 : 0 : 14.5 : 12 : 5)

Each plot was three rows wide. The treatments were applied to the full length of the rows. The row orientation was east west.

## METHODS AND MATERIALS

### Pre-plant

The standard pre-plant land preparation was conducted. During land preparation a full soil test was taken and analysed. The results of the soil test and the standard fertiliser recommendation are shown in Appendix 2. Gypsum was applied to the total field at the rate of 2000kg/ha.

## Planting

The two treatment planting fertiliser rates are shown in Table 2.

**Table 2:** Planting fertiliser rates.

Treatment	N	P	K	Ca	S	Si
<b>GUANO® / REEFSAFE®</b>	37	20	0	51	42	17.5
<b>Standard</b>	48	25	0	0	32	0

The rows treated with the standard fertiliser were planted first. The GUANO® / REEFSAFE® treatment was planted the following day.

The field was planted with a conventional cane billet planter, as shown in Figure 1.

**Figure 1:** GUANO® / REEFSAFE® rows being planted.



## Post-planting

During the spring and summer period a number of agronomic attributes were monitored at the site.

Shoot emergence and root development was monitored at two months and five months post emergence.

Approximately three months after planting leaf samples were collected from the trial site for dried tissue analysis. One sample was taken from each of the plots (24 samples), while a combined sample was taken from across all plots, of each of the two treatments (two samples).

The 24 samples were analysed for total phosphorous and total silica, while the two samples were analysed for the full range of elements. The results are shown in Appendix 3 and 4 respectively.

## Side dress fertiliser application

One post plant application of fertiliser was applied at the site, approximately three months post planting. All plots in all treatments received 240 kg/ha of Muriate of Potash.

The total fertiliser applied to each treatment is shown in Table 3.

**Table 3:** Total fertiliser rates.

Treatment	N	P	K	Ca	S	Si
<b>GUANO® / REEFSAFE®</b>	37	20	120	51	42	17.5
<b>Standard</b>	48	25	120	0	32	0

## Harvesting

Harvesting of the trial block took place on the 11<sup>th</sup> of October 2004, following commercial harvest procedures. The site was harvested working across the field, from north to south. The cane from each three row plot was loaded into five bins on the cane rail siding, adjacent to the farm. The bin numbers were documented to enable yield and CCS levels for each plot to be quantified. The total trial site was harvested within one day.

The cane was crushed within 24 hours of being harvested.

## RESULTS

### Shoot emergence and Root appearance

Although no statistical analysis was performed on the shoot and root assessments, a number of trends were obvious.

At the spiking stage of the crop, total shoot numbers on the average appeared slightly lower on the GUANO® / REEFSAFE® treatments. However at this growth stage, the GUANO® / REEFSAFE® plants appeared to have a more aggressive root system (see Figure 2).

**Figure 2:** Superior root growth on GUANO® / REEFSAFE® treated plots.



**GUANO® / REEFSAFE® treatment**



**Standard treatment**

The GUANO® / REEFSAFE® plants appeared to have a lower shoot count at this early stage, however this treatment appeared to have a larger number of shoots still emerging from the sett (see Figure 3).

**Figure 3:** Emerging shoots (two months post planting).



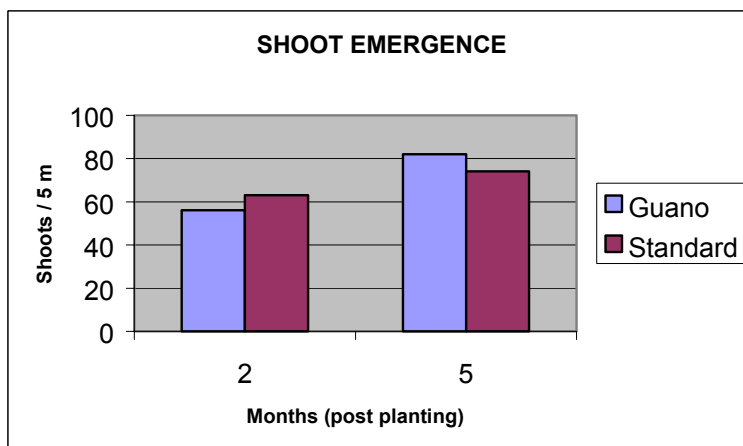
**GUANO® / REEFSAFE® sett**



**Standard sett**

By canopy closure the two treatments appeared to be almost comparable. Although the results were not analysed, the GUANO® / REEFSAFE® treatment had produced slightly more shoots than the standard treatment. The cane stalk length however was slightly shorter in that treatment. Figure 4 shows the progression of shoot counts.

**Figure 4:** Shoot counts over time.



## **Dry Tissue**

Dry tissue analysis of the two treatments showed significant differences in phosphorous and silica levels.

The GUANO® / REEFSAFE® treatment had significantly more phosphorous within the plant tissue, when compared to the standard treatment.

The GUANO® / REEFSAFE® treatment had significantly more silica (at the 1% level) within the plant tissue, when compared to the standard treatment.

The statistically analysed phosphorous and silica data are shown in Appendix 5.

## **Harvest**

Statistical analysis showed the same tonnes per hectare and sugar content were recorded for each treatment.

The statistically analysed CCS and yield data are shown in Appendix 5.

## **DISCUSSION**

The root/shoot ratio appeared to be higher in the GUANO® / REEFSAFE® treatment than the commercial treatment. This is probably due to a better uptake of phosphorus, calcium and silica, which all influence root growth. By canopy closure however, the GUANO® / REEFSAFE® treatment had produced slightly more shoots than the standard treatment.

The silica component in the GUANO® / REEFSAFE® fertiliser plays a significant role in driving the absorption of phosphorous and calcium. Leaf blade levels of phosphorous and silica were significantly higher in the GUANO® / REEFSAFE® treatment than the standard treatment. Silica releases locked up phosphorous in the soil, by exchanging on to lockup sites.

Results indicate that plants in the GUANO® / REEFSAFE® treatment absorbed more phosphorous, even though almost 20% extra phosphorous was applied to the standard treatment.

It should be noted the dry tissue analysis was conducted only three months post planting. With the continuous release action of phosphorous from GUANO® / REEFSAFE® fertiliser, and the nutrient enhancement of silica, it would be interesting to analyse the plant tissue in the following ratoon crop.

## **CONCLUSION**

Silica also plays a major role in increasing the cell strength of plant tissue, and thus the rigidity of the plant. The continuous release action of phosphorous from GUANO® / REEFSAFE® fertiliser may result in less lockup and leaching losses than conventional fertilisers. This would indicate that results from GUANO® / REEFSAFE® fertilisers may be more significant in lighter coastal soils, in high rainfall seasons.

Under the conditions of this trial, the GUANO® / REEFSAFE® fertiliser has performed as well as the standard fertiliser blends. At no extra cost to the grower, both CCS levels and crop yield have been maintained, when using MADURA GUANO GOLD – KWIK START® // REEFSAFE® FERTILISER.



# Crop Tech

## SOIL TEST RESULTS

410, Langbeckers East Road  
Bundaberg QLD 4670  
ABN: 13 010 782 975

Telephone: 07 4155 6344

E-mail: [croptech@croptech.com.au](mailto:croptech@croptech.com.au)

Facsimile: 07 41556656

Web site: <http://www.croptech.com.au>

The account for this test will be billed to:  
*please advise if details are incorrect*

KISMET INTERNATIONAL PTY LTD  
49 FIELD STREET  
SHEPPARTON VIC 3630

<b>Grower:</b>	GUANO	<b>Sample number:</b>	7
<b>Block:</b>	27	<b>Date entered:</b>	11-Aug-2003
<b>Recommendation for:</b>	Sugarcane	<b>Order no.:</b>	
<b>Variety:</b>	Unknown	<b>Age:</b>	TO BE PLANTED
<b>Irrigation type:</b>	Flood	<b>Soil drainage:</b>	Fair
<b>Soil type:</b>	Sandy Loam	<b>Water penetration:</b>	Average
<b>Soil condition:</b>		<b>Soil colour:</b>	Friable
<b>Soil colour:</b>		<b>Preferred application:</b>	Side dress
<b>Yield goal (t/ha):</b>	0.0	<b>Crop duration (days):</b>	0
		<b>Target pH:</b>	0.0

### Soil test results

						Comments
<b>pH:</b>	6.4					Optimal
<b>EC:</b>	0.04	mS/cm	40	µS/cm		Very low
<b>Nitrate-N:</b>	2	ppm				Very low
<b>Phosphate-P (BSES):</b>	33	ppm				Optimal
<b>Phosphate-P (Colwell):</b>	27	ppm				Optimal
<b>Potassium:</b>	57	ppm	0.15	meq %		Very low
<b>% cations:</b>	6.62	%				Optimal
<b>Calcium:</b>	259	ppm	1.30	meq %		Very low
<b>% cations:</b>	58.69	%				Very low
<b>Magnesium:</b>	60	ppm	0.50	meq %		Optimal
<b>% cations:</b>	22.66	%				Medium-High
<b>Sodium:</b>	61	ppm	0.27	meq %		Optimal
<b>% cations:</b>	12.02	%				Medium-high
<b>Sulfate - S:</b>	1	ppm				Very low
<b>Zinc:</b>	4.0	ppm				Optimal
<b>Copper:</b>	0.7	ppm				Optimal
<b>Manganese:</b>	0.05	ppm				Very low
<b>Iron:</b>	28.4	ppm				Very high
<b>Boron:</b>	0.01	ppm				Very low
<b>Organic carbon:</b>	1.29	%				Very low
<b>Chloride:</b>	37	ppm				Optimal
<b>K retention:</b>	3	%				

### Optional tests

<b>Silicon:</b>		ppm
<b>Ammonium-N:</b>		ppm
<b>P retention:</b>	0	%

### Recommendations:

#### DISCLAIMER:

Results are based on analysis of the sample as received. Because of the variability of sampling procedures, environmental and managerial conditions the Company does not accept liability for lack of performance based on these recommendations. Recommendations are made in good faith based on the sample and information received.

**Grower:** GUANO  
**Block:** 27  
**Recommendation for:** Sugarcane

**Sample number:** 7  
**Date entered:** 11-Aug-2003  
**Order no.:**

---

<b>Variety:</b>	Unknown	<b>Age:</b>	TO BE PLANTED	<b>Soil condition:</b>	Friable
<b>Irrigation type:</b>	Flood	<b>Soil drainage:</b>	Fair	<b>Soil colour:</b>	Grey
<b>Soil type:</b>	Sandy Loam	<b>Water penetration:</b>	Average	<b>Preferred application:</b>	Side dress
<b>Yield goal (t/ha):</b>	0.0	<b>Crop duration (days):</b>	0	<b>Target pH:</b>	0.0

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**Pre plant**

Due to low calcium levels and pH slightly higher than optimum consider

Gypsum @ 2-2.5 t/ha [broadcast and incorporate ]  
and  
Magnesium sulphate @ 100-150kg/ha [broadcast ]

**Note**

Would apply suscon at fill in /side dress stage

**Plant**

Approx 150 units of N  
20 units of P  
and 110 units of K required for crop  
at planting apply  
30 units of N ,20 units of P and 30 units of K  
as  
Urea @ 65kg/ha .  
Superphosphate @ 225kg/ha  
Potassium sulphate @ 75kg/ha

**Side dress**

Approx 120 units of N as Urea @ 260kg/ha  
and 80 units of K as KCL @ 160kg/ha

**Note**

Amounts can be drilled in or fertigated .

**Foliars**

As test strips for response. [1 application at 1 mtr.]  
Supa Mang @ 1L/ha  
next  
Supa Bor @ 1L.ha

**DISCLAIMER:**

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### Appendix 3

2 December 2003

Crop Tech Pty Ltd  
410 Langbecker's East Road  
Bundaberg QLD 4670

Agent: Kismet International

#### REPORT ON SAMPLE OF PLANT

Plant Type: Sugar Cane  
Plant Part: Leaves

<b>FILE NO:</b>	<b>031130503</b>		
<b>SAMPLE ID:</b>	<b>STANDARD 1</b>		
Total Phosphorus	P	%	0.17
Total Silica	Si	%	0.11

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<b>FILE NO:</b>	<b>031130504</b>		
<b>SAMPLE ID:</b>	<b>STANDARD 2</b>		
Total Phosphorus	P	%	0.16
Total Silica	Si	%	0.09

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<b>FILE NO:</b>	<b>031130505</b>		
<b>SAMPLE ID:</b>	<b>STANDARD 3</b>		
Total Phosphorus	P	%	0.17
Total Silica	Si	%	0.13

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<b>FILE NO:</b>	<b>031130506</b>		
<b>SAMPLE ID:</b>	<b>STANDARD 4</b>		
Total Phosphorus	P	%	0.15
Total Silica	Si	%	0.12

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<b>FILE NO:</b>	<b>031130507</b>		
<b>SAMPLE ID:</b>	<b>STANDARD 5</b>		
Total Phosphorus	P	%	0.21
Total Silica	Si	%	0.10

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<b>FILE NO:</b>		<b>031130508</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 6</b>	
Total Phosphorus	P	%	0.20
Total Silica	Si	%	0.07

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<b>FILE NO:</b>		<b>031130509</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 7</b>	
Total Phosphorus	P	%	0.17
Total Silica	Si	%	0.06

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<b>FILE NO:</b>		<b>031130510</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 8</b>	
Total Phosphorus	P	%	0.11
Total Silica	Si	%	0.11

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<b>FILE NO:</b>		<b>031130511</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 9</b>	
Total Phosphorus	P	%	0.16
Total Silica	Si	%	0.14

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<b>FILE NO:</b>		<b>031130512</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 10</b>	
Total Phosphorus	P	%	0.19
Total Silica	Si	%	0.13

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<b>FILE NO:</b>		<b>031130513</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 11</b>	
Total Phosphorus	P	%	0.15
Total Silica	Si	%	0.11

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<b>FILE NO:</b>		<b>031130514</b>	
<b>SAMPLE ID:</b>		<b>STANDARD 12</b>	
Total Phosphorus	P	%	0.19
Total Silica	Si	%	0.13

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<b>FILE NO:</b>		<b>031130515</b>	
<b>SAMPLE ID:</b>		<b>GUANO 1</b>	
Total Phosphorus	P	%	0.31
Total Silica	Si	%	0.15

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<b>FILE NO:</b>		<b>031130516</b>	
<b>SAMPLE ID:</b>		<b>GUANO 2</b>	
Total Phosphorus	P	%	0.34
Total Silica	Si	%	0.13

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<b>FILE NO:</b>		<b>031130517</b>	
<b>SAMPLE ID:</b>		<b>GUANO 3</b>	
Total Phosphorus	P	%	0.17
Total Silica	Si	%	0.11

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<b>FILE NO:</b>		<b>031130518</b>	
<b>SAMPLE ID:</b>		<b>GUANO 4</b>	
Total Phosphorus	P	%	0.32
Total Silica	Si	%	0.12

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<b>FILE NO:</b>		<b>031130519</b>	
<b>SAMPLE ID:</b>		<b>GUANO 5</b>	
Total Phosphorus	P	%	0.27
Total Silica	Si	%	0.11

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<b>FILE NO:</b>		<b>031130520</b>	
<b>SAMPLE ID:</b>		<b>GUANO 6</b>	
Total Phosphorus	P	%	0.32
Total Silica	Si	%	0.12

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<b>FILE NO:</b>		<b>031130521</b>	
<b>SAMPLE ID:</b>		<b>GUANO 7</b>	
Total Phosphorus	P	%	0.28
Total Silica	Si	%	0.13

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<b>FILE NO:</b>		<b>031130522</b>	
<b>SAMPLE ID:</b>		<b>GUANO 8</b>	
Total Phosphorus	P	%	0.16
Total Silica	Si	%	0.13

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<b>FILE NO:</b>		<b>031130523</b>	
<b>SAMPLE ID:</b>		<b>GUANO 9</b>	
Total Phosphorus	P	%	0.20
Total Silica	Si	%	0.14

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<b>FILE NO:</b>		<b>031130524</b>	
<b>SAMPLE ID:</b>		<b>GUANO 10</b>	
Total Phosphorus	P	%	0.16
Total Silica	Si	%	0.18

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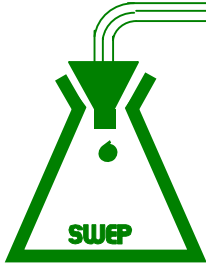
<b>FILE NO:</b>		<b>031130525</b>	
<b>SAMPLE ID:</b>		<b>GUANO 11</b>	
Total Phosphorus	P	%	0.17
Total Silica	Si	%	0.16

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<b>FILE NO:</b>		<b>031130526</b>	
<b>SAMPLE ID:</b>		<b>GUANO 12</b>	
Total Phosphorus	P	%	0.14
Total Silica	Si	%	0.18

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E.H. (Ted) Mikhail  
**Managing Director**



**SWEP**  
PTY. LTD.

ABN 26 005 031 569

**ANALYTICAL  
LABORATORIES**

Tel: (03) 9701 6007  
Fax: (03) 9701 5712

**REPORT ON SAMPLE OF PLANT**

**FILE NO :** 031130501

**DATE ISSUED :** 8/12/2004

CROP TECH  
410 LANGBECKER'S EAST RD

**CLIENT ID :** CRO040  
**PHONE :** 07 4155 6344

BUNDABERG, QLD 4670

**REFERENCE :** KISMET INTERNATIONAL PTY LTD  
**SAMPLE ID :** GUANO & STANDARD  
**PLANT TYPE :** SUGAR CANE  
**PLANT PART :** LEAF

**REFERENCE ID :** KISMET  
**DATE RECEIVED :** 27/11/2003  
**ANALYSIS REQUIRED :** Full + Total Si

ITEMS				RESULTS		DESIRABLE LEVEL
			GUANO	STANDARD		
TOTAL CALCIUM	Ca	%	0.36	0.35	0.20-0.45	
TOTAL MAGNESIUM	Mg	%	0.21	0.24	0.2-1	
TOTAL SODIUM	Na	%	0.04	0.06	<0.02	
TOTAL POTASSIUM	K	%	1.45	1.22	1.20-2.00	
TOTAL NITROGEN	N	%	0.65	0.86	2.00-2.60	
TOTAL PHOSPHORUS	P	%	0.2	0.19	0.20-0.30	
TOTAL IRON	Fe	ppm	866	489	50-150	
TOTAL MANGANESE	Mn	ppm	296	300	15-400	
TOTAL ZINC	Zn	ppm	13.6	15.4	10-50	
TOTAL COPPER	Cu	ppm	6.8	7.5	2-50	
TOTAL COBALT	Co	ppm	0.43	0.31	N.A	
TOTAL BORON	B	ppm	25.56	25.51	0.1-30	
TOTAL SULPHUR	S	%	0.34	0.32	0.1-0.5	
TOTAL SILICA	Si	%	0.17	0.13		

## Appendix 5

### Phosphorous levels

	DF	Analysis of Variance		F	P-value
		SS	MS		
blk	11	0.040046	0.0036405	1.24705	0.36034
trt	1	0.027338	0.027338	9.36434 *	0.01085
ERROR	11	0.032112	0.0029193		

General mean 0.20292

Treatment means

	Standard	Guano
(1)	0.16917	0.23667

LSD(5%) 0.48549E-01 LSD(1%) 0.68509E-01

SIGNIFICANT DIFFERENCES

2 \* 1

**There were significant differences in treatments**

### Silica levels

DF	SS	Analysis of Variance		F	P-value
		MS			
blk	11	0.0092333	0.00083939	2.25203	0.096965
trt	1	0.0054	0.0054	14.48780 **	0.0029114
ERROR	11	0.0041	0.00037273		

General mean 0.12333

Treatment means

	Standard	Guano
	0.10833	0.13833

LSD(5%) 0.17348E-01 LSD(1%) 0.24479E-01

SIGNIFICANT DIFFERENCES

2 \*\* 1

**There were highly significant differences in treatments**

### CCS levels

DF	SS	Analysis of Variance		F	P-value
		MS			
blk	11	1.3133	0.11939	5.08387	0.0060013
trt	1	0.041667	0.041667	1.77419	0.2098
ERROR	11	0.25833	0.023485		

General mean 16.467

Treatment means

	Standard	Guano
	16.508	16.425

LSD(5%) 0.13770 LSD(1%) 0.19431

**There were no significant differences in treatments**

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**Yield (t)**

		Analysis of Variance			P-value	
DF	SS	MS	F			
blk	11	6.0238	0.54762	8.26901	0.00075296	
trt	1	0.010417	0.010417	0.15729	0.69925	
ERROR	11	0.72848	0.066226			

General mean 18.652

Treatment means  
Standard      Guano  
18.672          18.631

LSD(5%) 0.23124      LSD(1%) 0.32630

**There were no significant differences in treatments**