

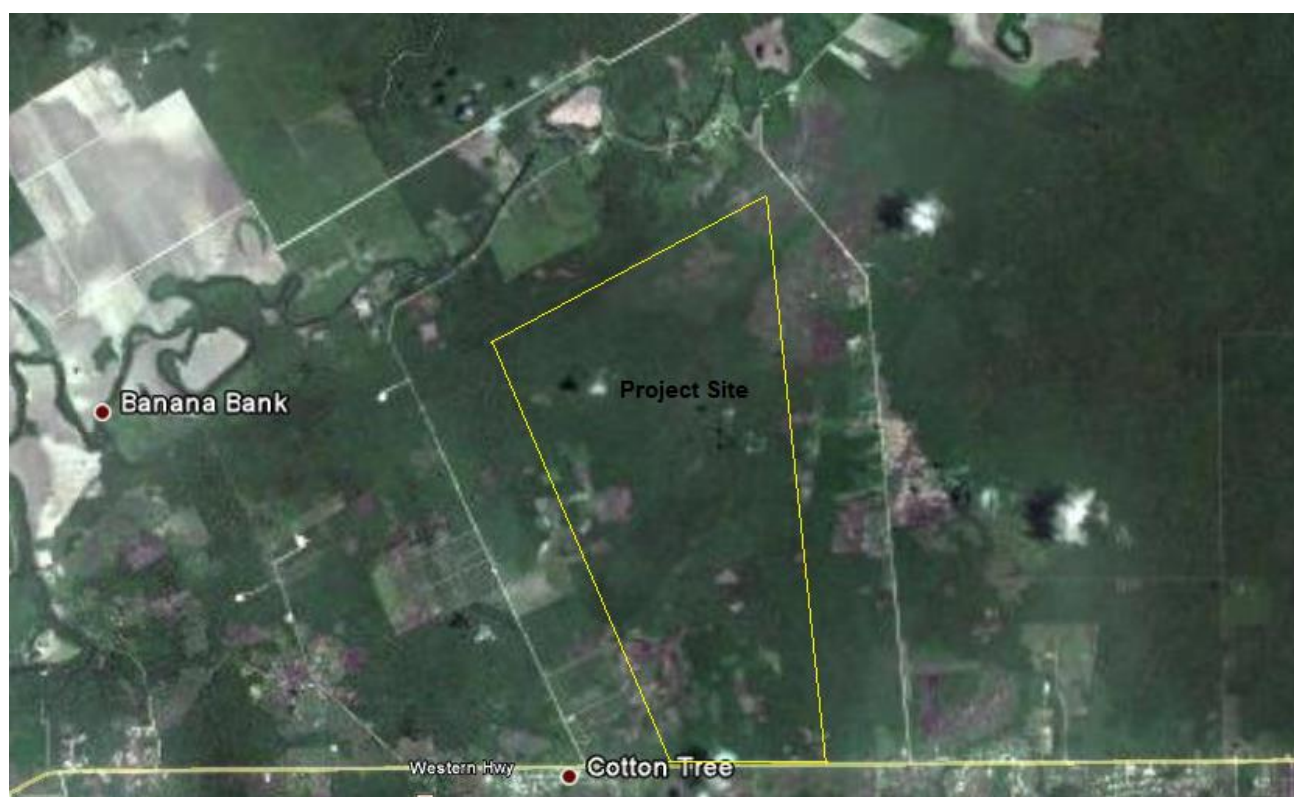
# Belize Sustainable Agriculture, Ltd. Farming Report – Jun 29, 2015

## General Comments & Weather

This is the third of BSA's fortnightly Farming Reports for the 2015 Summer (Wet) Season, whose main objectives are to:

- Inform readers as to BSA's farming activities by season, farm, and crop
- Provide relevant data on climatic conditions and agricultural pests potentially affecting our crops.
- Inform readers on domestic and regional market conditions for BSA's crops.

BSA is only farming in the Summer 2015 season at the Cayo One Estate, situated approximately between miles 40 and 42 of the George Price Highway in Belize, near the village of Cotton Tree in Cayo District. Cayo One is some 41 miles west of Belize City, some 9 miles east of Belmopan and 38 miles east of the Belize-Guatemala border at Melchor.



Cayo One has experienced an exceptionally rainy month of June, with rainfall during the June 15-28 fortnight totaling 229mm. By June 30 the monthly rainfall was 491mm, which was twice the historical average and the second highest in the past 15 years (2002 was the highest). As the report will show, this level of rainfall is clearly detrimental to CSA's corn crop. While the long range forecast for the next fortnight appears to be more clement, permanent damage has already been done. The report will also discuss how CSA's plan to integrate irrigation in all its farming and to plant the Wet Season crop in April will in the future substantially mitigate the risks from unusually heavy summer rains.

The table below shows rainfall at Belmopan, which is about 9 miles from Cayo One. Data are shown both for the current year and an average for the past 15 years.

Belmopan Precipitation Data (mm per month)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	195	0.1	56	18	57	491						
2000-2014	137	55	49	31	132	245	261	238	216	252	165	129

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You can (normally) follow Belize's weather on:

<http://www.hydromet.gov.bz/250-km-radar-loop>

Unfortunately, the Belize Meteorology Department weather radar is still out of commission. We have been told that, owing to Government budget difficulties, the necessary spare parts and technical service to reinstate the weather radar have only recently been ordered and it may not be operational until the end of June (now July). Our fall back weather radar is the US NOAA Hurricane Center weather radar network which monitors the Caribbean basin:

<http://www.nhc.noaa.gov/>

### **Cayo One (Corn) – 358 acres (100% non-irrigated)**

BSA planted 358 acres of corn have been planted on 3 fields at Cayo One (described in the data table below) between May 28<sup>th</sup> and 30<sup>th</sup>. All of Cayo One's fields are virgin ground, with soil tests for the newly created farmland showing a consistently rich black soil with some clay, 3-4% organic matter, pH levels in a range of 6.0 – 6.9.

Pre-planting operations involved a disking, a leveling, and a harrowing of the fields, after which a granular base fertilizer was applied. Our 2015 Summer Crop is relying principally on granular based fertilizers, with a modest amount of supplemental liquid fertilizers. Specifics of the fertilizers and their applications are in the data table and lot records below. It is important to note that BSA has budgeted fertilizers for its corn fields based on a 150 bushel / acre (9.4 mt/Ha) yield goal. We do not expect to achieve that yield in this first year of operation, but we are fertilizing to that level in order to begin enhancing our soil quality. Our optimum outcome for this first season would be 110 bushels / acre (6.9 mt/Ha) and our financial budgets assume a yield of 81 bushels / acre (5.1 mt/Ha). We are likely to revise these numbers downwards in the next report.

Despite the adverse conditions a surprisingly large percentage of the corn has progressed well, with the better drained areas of the fields responding extremely well to the urea application of June 12th. Many plants are at the V-6 to V-7 stage; indeed some of the corn in these areas is above waist height and quite verdant (see pictures). Stalk diameters are large with stabilizing roots beginning to appear. Roots are continuing to develop and supply the plant with the available nutrition. One danger of having significantly above average moisture is the roots stay rather shallow and in the event of high winds causes the plant to be more prone to toppling. This can be a real issue once the plant has put on a cob and becomes somewhat more top-heavy.

The areas where drainage is an issue due to ponding are not faring nearly as well. Issues range from complete drowning or severe stunting to plants that will recover but will be delayed in cob setting and undoubtedly experience reduced yield. Some of the photos below attest to the early severity of this problem; the next two weeks will be critical in terms of plant growth: If sunshine prevails then there is a good likelihood that many of the sickly plants will recover and produce. If rain continues at or near recent levels, these plants will either succumb or not produce any worthwhile yield. Mortality creates another issue of allowing direct sunlight into the crop and weed and grasses proliferate due to having no competition, which is of course undesirable! So we all have fingers crossed for high amounts of sunshine and winds to dry the current puddles and low spots.

The worm situation is under control thanks to the application on June 18th of Chlorfluba, which belongs to a relatively new family of chemicals called chitin inhibitors. We continue to monitor fields on a daily basis and are ready to respond to any evidence of insect or weed related issues.

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Early observations while walking the fields are that the machinery used for planting has done a better than expected job with singulation and plant spacing. Both are mandatory for high yields. A skip of one kernel creates an unnecessary gap resulting in lower yield. Likewise a doubling up of seed in one location will also create a condition where both plants will not do well therefore a reduced yield. Both scenarios need to be avoided and it is critical that the Planter be maintained well enough to ensure that both of these only happen very infrequently. For the next report we will have actual data taken from all three fields showing:

- Plant count per acre
- Percent singulation
- Percent double plant spacing

On the nutrition front, a further urea (nitrogen) application took place on June 30<sup>th</sup>, consisting of an additional 110lbs per acre being applied aerially (land based application would be impossible at the moment!). The particular type of urea contains agrotain, a urease inhibitor that slows down the release of nitrogen, thereby making it less prone to volatilization and extending its release to the plant. This nitrogen application will give the struggling plants a boost and continue to allow the plants that are doing well to thrive. For those plants the additional nutrition will help to determine cob size, especially its length. Also planned is a very low dosage of broadleaf herbicide to kill any weeds that have escaped the earlier applied Prowl and Atrazine. There is presence of a vining plant that can cause great harvesting difficulty if not controlled.

We have so far seen an unusually strong worm presence this season and we are addressing this issue with four treatments: a seed coating, an application of Nomax 15EC, Cipermethrin, and Chlorfluba. Field surveys made on the 13<sup>th</sup> and 15<sup>th</sup> of June seem to indicate that the teflubenzuron in the Nomax 15 EC are beginning to work. This delayed response is likely due to the high amounts of water and the reluctance of the worm to climb to the topside of the leaf.

One compelling conclusion of this month's unusually heavy rain is the importance of implementing BSA's core strategy of investing in levelling, drainage, and irrigation. Time and resources did not allow us to complete these key steps prior to planting the Summer 2015 crop. Yet we are confident that well drained soil will allow areas prone to ponding to resist heavy rains, such as those we experienced in June 2015, far better. Moreover, the ability to plant a Wet Season crop in the second half of April, typically the end of the driest part of the year in Belize (hence the critical need for irrigation), would ensure that by the time heavy seasonal rains arrive in early June our corn crop would be past the critical V-12 stage. Therefore, the main yield characteristics of our crop would already be set and, subject to good drainage, our crop could resist even a heavy June downpour. So we have a plan, and it's simply a matter of having the necessary time and resources to implement it.

**Cayo One (Rice) – 125 acres (100% non-irrigated)**

The rice field has been designated as field #4 and runs east to west across the northernmost section of the prepared farmland. Field four received one disking, two passes with a harrow and one leveling during preparation. It has essentially the same soil composition and chemistry as the corn fields.

Base Fertilizer was applied aerially on June 12<sup>th</sup>, using ~250lbs/acre of a granular formula with 12-26-23 primary characteristics as well as micro-nutrients. Accordingly, the following nutrients have already been applied:

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N: 30 lbs. /acre - An additional 115 lbs to 160 lbs per acre of N will be applied, subject to weather, in the form of Urea (46-0-0)

P: 65 lbs. /acre

K: 58 lbs. /acre

Glyphosate was applied on Field 4 on June 18th as a burn-down for any weeds or grasses that have come up since the last ground work was done. This application was very effective with complete kill of anything unwanted.

A total of 125 net acres were (finally!) planted on June 26<sup>th</sup> via aerial application with a Cheniere seed variety as a slight break in weather provided safe and suitable planting conditions; the seeding rate was increased slightly to 110lbs/acre to compensate for a modest reduction in final germination rates (92%) as well as the exceptionally erratic weather. Rice will somewhat determine its own plant density by tillering. Higher seeding rates will result in slightly less tillering per plant but has little to no bearing on yield. If seed germination is less than ideal than a slightly higher rate of seed will effectively offset this deficiency. And, of course, rice doesn't mind water quite the way the corn does...



Heavy Ponding after rains – June 26, 2015



Northern view of Field 1 drying off – June 29, 2015



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Santander Sugar fields north of Cayo One - June 15<sup>th</sup>, 2015



Well established fields north of Cayo planted May 1:6/26/15



Healthy Stalks despite rains thanks to nutrition 6/29/15



Excellent roots despite rains thanks to nutrition 6/29/15



Over half of corn still very healthy June 29<sup>th</sup>, 2015



What Cayo One can look like with dry weather- 6/30/15

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### **Summary and Conclusion**

Interestingly, despite continued weakness in grain prices on the US Commodity exchanges, regional grain prices in Belize and Guatemala have recently firmed.

#### Corn

Corn again continues to be in short supply locally in Belize, where Belizean buyers are currently paying BZD 0.27+ / lb for local delivery, which equates to USD 7.56 per bushel and USD 298 per metric ton. Prices in Guatemala are reported to be modestly lower for feed grade corn (net of freight costs to Guatemala) but marginally higher for food grade corn.

#### Rice

Rice continues to be in tight supply in Belize and prices remain firm, although for limited quantities. Local wholesale prices for rough rice ("Paddy rice") at the mill are expected to reach at least USD 22.50/cwt or USD 496 /mt. Milled premium rice wholesales for USD 45.00 / cwt, although Belize's annual consumption of milled rice is not likely to exceed 10,000 mt. We have still had only informal discussions with potential importers of rice from Guatemala, with prospective prices expected to be close to those achieved in Belize.

#### Soybeans

Soybeans also continue to be in short supply in Belize; the limited domestic production that was apparently sold for BZD 0.56-0.60 / lb, which equates to USD 16.80-18.00 / bushel and USD 617 – 660 / mt. We continue to believe that there is local Belizean demand for an additional 10,000-20,000 acres of soybeans to meet domestic livestock feed requirements, although some local farmers are planting soybeans this summer. While the economics are attractive, planting soybeans during the Wet Season certainly seems to be challenging Mother Nature (and we know who generally wins that argument!)

#### Milo

We are discontinuing our comments on Milo due to the lack of activity and interest in this grain.

We have been reminded this past fortnight that Mother Nature has a determining impact on our success this season. After a very encouraging start, the heavy rains in June are indeed challenging. However, while they are not atypical for the month, their severity has been atypical and we expect that they will now relent. There is a forecast for reasonable sunshine in the days ahead, which should allow nutrient uptake which is essential as we are now in a critical stage of plant, kernel, and cob development.

Notwithstanding the challenges of June, we continue to firmly believe that, with the right infrastructure and planning, we can produce superior crops even when, as in June 2015, Mother Nature is less than co-operative.

Thanks!

Abram Dyck, John Peters, and the Farming Report Editorial Team

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Grower	Location	Field #	Acres	Irr ?	Soil Type	Crop	Seed Variety (count/acre)	Plant Date	Stand Date	Fertilizer Program (For full details of applications, refer to Lot Records)	Comments
BSA	Cayo One	1A	36	N	Black	Corn	DK 7088 27,000/acre	05/28	06/02	<u>Base</u> 330 lbs/acre 13+30+13+Micros <u>Starter 1</u> 1 ltr/acre Algaenzyme <u>Starter 2</u> 3.5 ltr/acre K - Focus <u>Post-Plant</u> 46-0-0 110 lbs (1 <sup>st</sup> ) Foliar 6/18 46-0-0- 110 lbs (2 <sup>nd</sup> )	Western strip that received a “Deep Soil Rip”  Full Base: 13.31-30.3-13.2+1.77S +0.12B+0.04Cu+0.22Mn+1Zn+0.22Fe  Planted just in time ☺  235mm of rain days 4-15  V4+ at Day 17  240m of rain days 15-28!  V7 at Day 31
BSA	Cayo One	1B	89	N	Black	Corn	DK 7088 27,000/acre	05/28	06/02	<u>Base</u> 330 lbs/acre 13+30+13+Micros <u>Starter 1</u> 1 ltr/acre Algaenzyme <u>Starter 2</u> 3.5 ltr/acre K - Focus <u>Post-Plant</u> 46-0-0 110 lbs (1 <sup>st</sup> )	Full Base: 13.31-30.3-13.2+1.77S +0.12B+0.04Cu+0.22Mn+1Zn+0.22Fe  Planted just in time ☺  235mm of rain days 4-15  V4+ at Day 17  240m of rain days 15-28!  V7 at Day 31

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										Foliar 6/18 46-0-0- 110 lbs (2 <sup>nd</sup> )	
BSA	Cayo One	2	100	N	Black	Corn	DK 7088 27,000/acre	05/29	06/03	<u>Base</u> 330 lbs/acre 13+30+13+Micros <u>Starter 1</u> 1 ltr/acre Algaenzyme <u>Starter 2</u> 3.5 ltr/acre K - Focus <u>Post-Plant</u> 46-0-0 110 lbs (1 <sup>st</sup> ) Foliar 6/18 46-0-0 110 lbs (2 <sup>nd</sup> )	Full Base: 13.31-30.3-13.2+1.77S +0.12B+0.04Cu+0.22Mn+1Zn+0.22Fe  Planted just in time ☺  235mm of rain days 3-15  V4+ at Day 17  240m of rain days 15-28!  V7 at Day 31
BSA	Cayo One	3	133	N	Black	Corn	DK 7088 27,000/acre	05/30	06/04	<u>Base</u> 330 lbs/acre 13+30+13+Micros <u>Starter 1</u> 1 ltr/acre Algaenzyme <u>Starter 2</u> 3.5 ltr/acre K - Focus <u>Post-Plant</u> 46-0-0 110 lbs (1 <sup>st</sup> ) Foliar 6/18 46-0-0	Full Base: 13.31-30.3-13.2+1.77S +0.12B+0.04Cu+0.22Mn+1Zn+0.22Fe  Planted just in time ☺  235mm of rain days 2-15  V4+ at Day 17  240m of rain days 15-28!  V7 at Day 31



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										110 lbs (2 <sup>nd</sup> )	
BSA	Cayo One	4	122	N	Black	Rice	Cheniere 110 lbs/acre	By 6/26	TBA	<u>Base</u> 250 lbs/acre 12+26+23+Micros	Full Base spread 6/13 50%: 13.31-30.3- 13.2+1.77S+0.12B+0.04Cu+0.22Mn+ 1Zn+0.22Fe 50%: 11-22-13.33+ 5S +0.1B+ 0.04Cu+0.22Mn+1Zn+0.22Fe  235mm of rain 6/1-14  240m of rain days 15-28!

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## Lot Records for Fields 1, 2, 3, & 4

<b>GROWER:</b> <u>BSA</u>						<b>Date Planted:</b> <u>May 28, 2015</u>					
<b>SECTION #:</b> <u>1</u>						<b>BLOCK #:</b> _____					
<b>FARM LOCATION:</b> <u>Cayo One Estates I</u>						<b>SOIL TYPE:</b> <u>Black Loam</u>					
<b>CROP:</b> <u>Corn</u>						<b>VARIETY:</b> <u>DeKalb 7088</u>					
<b># OF ACRES:</b> <u>125</u>											

LAND PREPARATION					FERTILIZERS			PLANTING	
Discing	Harrowing	Leveling or Land Plane	Cultivating	Other	PREPLANT	AT PLANTING		Seed-Rate	Condition
2	2	2			See Below	Liquid Dry	See Below	Projected 27,000	Soil dry to moist

FERTILIZERS						Rain		PESTICIDES					
Date	Analysis	Rate/Ac	Ground	Air	#	Date	Quantity	Date	Description	Rate/Ac	Ground	Air	#
25-May-15	13.31-30.3-13.2+1	330lb	Preplant		1	5/18-5/31	38 mm	27-May-15	Cruiser	seed	X		1
27-May-15	AlgaEnzims	1 Litre	At planting		2	6/01-6/14	236 mm	29-May-15	Atrazine	1.25lb	X		2
27-May-15	K-Focus	3.5 Litre	At planting		2	6/15-6/26	128 mm	29-May-15	Prowl	1 Litre	X		2
9-Jun-15	Frutal (PH adjust)	13.8CC		X	3			9-Jun-15	Nomax 15 EC	125CC		X	3
12-Jun-15	Frutal (PH adjust)	13.8CC		X	4			12-Jun-15	Cipermethrin	150CC		X	4
12-Jun-15	46-0-0	110lb		X	5			18-Jun-15	Chlorfluba	400CC		X	6
18-Jun-15	NPK (PH adjust)	27.6CC		X	6								
18-Jun-15	Sagaquel Combi	500CC		X	6								

<b>GROWER:</b> <u>BSA</u>						<b>Date Planted:</b> <u>May 29, 2015</u>					
<b>SECTION #:</b> <u>2</u>						<b>BLOCK #:</b> _____					
<b>FARM LOCATION:</b> <u>Cayo One Estates I</u>						<b>SOIL TYPE:</b> <u>Black Loam</u>					
<b>CROP:</b> <u>Corn</u>						<b>VARIETY:</b> <u>DeKalb 7088</u>					
<b># OF ACRES:</b> <u>100</u>											

LAND PREPARATION					FERTILIZERS			PLANTING	
Discing	Harrowing	Leveling or Land Plane	Cultivating	Other	PREPLANT	AT PLANTING		Seed-Rate	Condition
2	2	2			See Below	Liquid Dry	See Below	Projected 27,000	Soil dry to moist

FERTILIZERS						Rain		PESTICIDES					
Date	Analysis	Rate/Ac	Ground	Air	#	Date	Quantity	Date	Description	Rate/Ac	Ground	Air	#
25-May-15	13.31-30.3-13.2+1	330lb	Preplant		1	5/18-5/31	38 mm	28-May-15	Cruiser	seed	X		1
28-May-15	AlgaEnzims	1 Litre	At planting		2	6/01-6/14	236 mm	30-May-15	Atrazine	1.25lb	X		2
28-May-15	K-Focus	3.5 Litre	At planting		2	6/15-6/26	128 mm	30-May-15	Prowl	1 Litre	X		2
9-Jun-15	Frutal (PH adjust)	13.8CC		X	3			9-Jun-15	Nomax 15 EC	125CC		X	3
12-Jun-15	Frutal (PH adjust)	13.8CC		X	4			12-Jun-15	Cipermethrin	150CC		X	4
12-Jun-15	46-0-0	110lb		X	5			18-Jun-15	Chlorfluba	400CC		X	6
18-Jun-15	NPK (PH adjust)	27.6CC		X	6								
18-Jun-15	Sagaquel Combi	500CC		X	6								

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GROWER: <u>BSA</u>					Date Planted: <u>May 30, 2015</u>					
FARM LOCATION: <u>Cayo One Estates I</u>					SECTION #: <u>3</u>		BLOCK #: <u></u>		SOIL TYPE: <u>Black Loam</u>	
CROP: <u>Corn</u>					VARIETY: <u>DeKalb 7088</u>		# OF ACRES: <u>133</u>			

LAND PREPARATION					FERTILIZERS			PLANTING			
Discing	Harrowing	Leveling or Land Plane	Cultivating	Other	PREPLANT	AT PLANTING		Seed-Rate	Condition		
2	2	2			See Below	Liquid	See Below	Projected 27,000	Soil dry to moist		
						Dry					

FERTILIZERS						Rain		PESTICIDES					
Date	Analysis	Rate/Ac	Ground	Air	#	Date	Quantity	Date	Description	Rate/Ac	Ground	Air	#
27-May-15	13.31-30.3-13.2+1	330lb	Preplant		1	5/18-5/31	38 mm	30-May-15	Cruiser	seed	X		1
30-May-15	AlgaEnzims	1 Litre	At planting		2	6/01-6/14	236 mm	30-May-15	Atrazine	1.25lb	X		2
30-May-15	K-Focus	3.5 Litre	At planting		2	6/15-6/26	128 mm	30-May-15	Prowl	1 Litre	X		2
9-Jun-15	Frutal (PH adjust)	13.8CC		X	3			9-Jun-15	Nomax 15 EC	125cc		X	3
12-Jun-15	Frutal (PH adjust)	13.8CC		X	4			12-Jun-15	Cipermethrin	150cc		X	4
12-Jun-15	46-0-0	110lb		X	5			18-Jun-15	Chlorfluba	400CC		X	6
18-Jun-15	NPK (PH adjust)	27.6CC		X	6								
18-Jun-15	Sagaquel Combi	500CC		X	6								

GROWER: <u>BSA</u>					Date Planted: <u>June 26, 2015</u>					
FARM LOCATION: <u>Cayo One Estates I</u>					SECTION #: <u>4</u>		BLOCK #: <u></u>		SOIL TYPE: <u>Black Loam</u>	
CROP: <u>Rice</u>					VARIETY: <u>Cheniere</u>		# OF ACRES: <u>122</u>			

LAND PREPARATION					FERTILIZERS			PLANTING			
Discing	Harrowing	Leveling or Land Plane	Cultivating	Other	PREPLANT	AT PLANTING		Seed-Rate	Condition		
1	2	1			See Below	Liquid		110lbs	Wet		
						Dry					

FERTILIZERS						Rain		PESTICIDES					
Date	Analysis	Rate/Ac	Ground	Air	#	Date	Quantity	Date	Description	Rate/Ac	Ground	Air	#
12-Jun-15	13.31-30.3-13.2+1	124.4lb	Pre-plant	X	1	5/18-5/31	38 mm	18-Jun-15	Touchdown	600CC		X	3
12-Jun-15	11-22-13.33+5S+0	124.4lb	Pre-plant	X	2	6/01-6/14	236 mm						
18-Jun-15	NPK (PH adjust)	27.6CC	Pre-plant	X	3	6/15-6/26	128 mm						