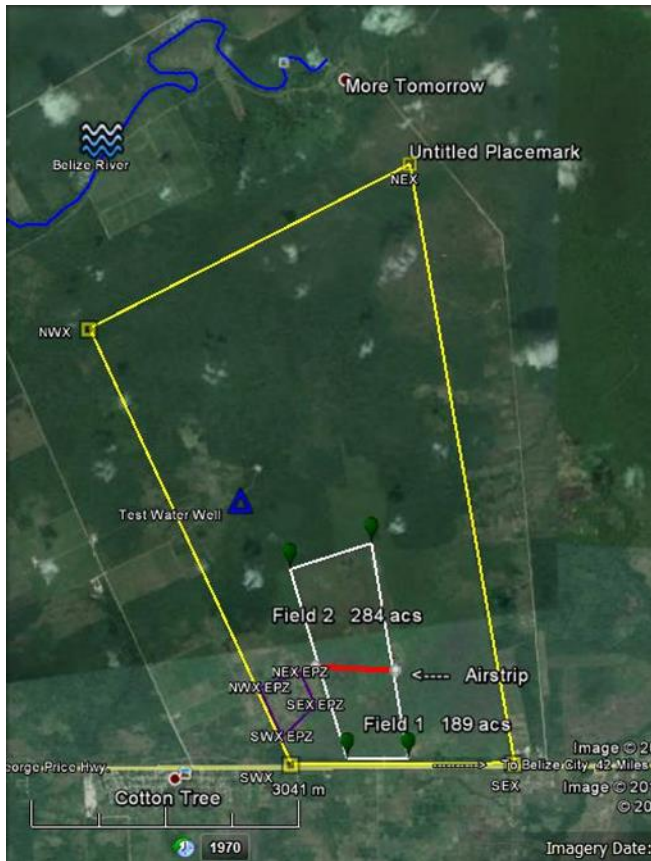


Belize Sustainable Agriculture, Ltd. Farming Report – July 12, 2016

General Comments & Weather



This is the sixth fortnightly Farming Report for BSA’s 2016 Summer (Wet) Season, whose main objectives are:

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

BSA is only farming at the Cayo One Estate in the Summer 2016 season; it is 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 some 38 miles east of the Belize-Guatemala border at Melchor.

July 2016 has seen a return to more typical patterns of episodic afternoon thundershowers, sometimes heavy, with long periods of overcast but warm and breezy skies that also have periods of bright sunshine. So far the first half of July has seen sufficient sunshine and dry spells for the ground to partially dry out after June’s near record rainfall. Much will depend on precise rainfall patterns in the coming fortnight/month. One of the peculiar characteristics of Belize summer thunderstorms is that they are very much “hit or miss”. Rain laden dark clouds will move through the skies and periodically release copious amounts of water. However they can rapidly drop an inch or more of water at one location and a couple of miles away there is no rain at all. Evidence again that you “can’t farm the averages...”

Belmopan Precipitation Data (mm per month) - July Data through July 11 th												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	105	282	30	66	71	414	38					
2000-2015	141	51	50	30	127	261	261	228	230	269	232	129

You can (normally) follow Belize’s weather on: <http://www.hydromet.gov.bz/250-km-radar-loop>

We continue to use the US NOAA Hurricane Center weather radar network which monitors the Caribbean basin, and would also suggest Weather Underground as an additional resource:

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

<http://www.wunderground.com/q/zmw:00000.2.WMGMM>

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Cayo One ~ 473 acres (100% non-irrigated)

Farm Operations

Land Preparations

These were timely completed, and a full description is provided in the Lot Records at the end of this document.

Rain Impact

June's weather was definitely less than ideal for good growing conditions. Over 16" (414mm) of rain left our fields completely waterlogged with ponding and runoff throughout the whole farm. The first part of July has seen distinctly drier conditions, which is giving the corn a chance to recover. While some permanent damage has been done, we are still hopeful that targeted yield levels can be achieved. We will have a better idea once ears form in the next 30 days.

One again, June's heavy rains are a reminder of the importance of implanting our drainage program as soon as possible (Dry Season 2016/2017). While this could not fully mitigate heavy rain, drainage tiling would allow 3/8"-1/2" of water to be drained off the land every day which would not only absorb water but it would sharply reduce surface run-off.

Seed Selection & Planting

Planting began on Saturday May 28th and finished on June 1st. Final acreages planted were:

- **DeKalb 7088 - 425 acres (Part of Field 1 and all of Field 2) @ 27,656 seeds/acre**
- **Dow 3383 - 24 acres (Part of Field 1) @ 27,656 seeds/acre**
- **American Seed & Genetics R9000 - 24 acres (Part of Field 1) @ 27,656 seeds/acre**

As reported last fortnight, one of the three lots of **DeKalb-7088** seed, representing some 60 bags (120 acres of seed) developed major issues after emergence. We observed very irregular vigor with erratic plants varying from unusually small to unusually large. Representatives from the Distributor (Belagro) and the Manufacturer (Monsanto) were summoned to Cayo One to inspect our fields. Given that some of the DK-7088 showed very good results, and that both of the trials have showed very good results, everyone agreed that there are quality issues with the seed. Monsanto made another visit last week, and reconfirmed the that there were seed issues with DK-7088 across the entire region. Surprisingly, while the Monsanto Tech-Rep has been responsive and confirmed that they were looking to provide growers with some type of assistance, the (recently appointed) local agent has so far been very unresponsive. We await Monsanto/DeKalb's specific proposals.

The **Dow 3383** corn is continuing to outperform the others on our farm at least in growth and foliage. Physiologically it is not showing the signs of sulfur and nitrogen deficiency seen on the other two varieties. It also shows little to no leaf discoloration due to high soil moisture. This will sometimes present itself in purpling of the leaf but more particularly the stalk. With adequate nitrogen and sunshine this will disappear. The underlying issue we have with this variety is the fact that it tillers under stress. This year the stress is due to excessive rainfall. Unless the plant is fed with huge amounts of nitrogen these tillers will produce nothing while taking away nutrients from the main stalk because they share the same root system. This in turn usually results in lesser yields and more straw.

The **ASG RY9000** hybrid appears to need more nitrogen than the other two that BSA has planted. It is visually lighter in color and upon closer inspection is lacking both sulfur and nitrogen. The plants most certainly suffer more than the

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DK7088 from the abundant rainfall of the last month. There is also some evidence that the Prowl that was sprayed before emergence is slightly harmful to this hybrid. Anecdotal evidence from other growers would indicate the same observation. In fact, in trials done last year, farmers who used Prowl for pre-emerge weed control were very disappointed whereas those that did not were quite pleased with yield results.

Despite numerous promises that the seed representative would inspect our fields he has not yet appeared. We find this disappointing as there are numerous issues that we would like to address but are unable to do so without his presence in the field.

The brace roots are starting to appear on this hybrid and we say it is about time! The plants could certainly employ the extra stability these will provide in our loose rain-soaked fields. These roots provide no other function than to provide stability and do not contribute to any nutrient uptake. This is a particularly tall plant with a cob that sets very high in the plant so the stability is a requirement for RY9000.

As we reported last fortnight, these seed issues will clearly have a negative impact on yields. However, as we began with conservative harvest targets, and we are not suggesting that our yield targets need yet be revised downwards (from 107 Bushels/acre, 60 cwt/acre, 6.7mt/Ha). Subject to reasonable weather going forward we remain confident that we will reach our targets.

Fertilizer Program

We feel it is worth repeating BSA's fertilizer strategy for Cayo One, which is based on multiple goals:

1. Test the impact of higher fertilization rates on yields
2. Ensure that fertilization is at least 110% of theoretical "maintenance rates"
3. Test one plot for higher Nitrogen Applications
4. Initiate long term trial of organic worm based soil enrichment

For a detailed discussion of BSA's fertilizer strategy, see the May 31st report and the field matrices later in this report.

We applied 136 lbs./acre of 38.5-0-0-7.2S (the numbers refer to % N/Nitrogen-P/Phosphorous-K/Potash-S/Sulfur) on July 8 (day 36). Although this was at least a week earlier than anticipated by our growing schedule, by watching the V stages of the plants' development, it was clear that physiologically the plants were in need of this application. We were beginning to see isolated areas that are showing signs of phosphorus deficiency. However this is not widespread and no additional unscheduled applications are being planned.

We are delighted to report that the crop duster used our new airstrip at Cayo One! This facility will save considerable time and money in the months and years ahead! (See photo below)

Pests, weeds, and grasses

We are very pleased with the performance of our Pest Control program. The Certero which was applied to help control the worm infestation has done a marvelous job. We attribute this to proper PH of our water and the use of a very powerful, yet inexpensive, adjuvant/sticker. This combination worked extremely well although we continue to monitor for pests on a daily basis by covering different sections of the field; there is little or no evidence of worms or other undesirable bugs. Meanwhile our herbicide program seems to have addressed the early issues caused by the poorly performing Prowl herbicide.

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Cayo One Northerly – Sunshine helps! – July 05, 2016



Cayo One Southeasterly – Starting to dry! – July 7, 2016



ASG in forefront of Dow (Greener) at Day 34 - 7/7/16



Field 1 - ASG under Stress on Day 34 – July 7, 2016



AirCat crop duster taking off from Cayo One 7/8/16



Overloaded truck with 60,000 lbs of Fertilizer - 7/8/16

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Market Conditions and Conclusion

Grain prices continue in a steady price range in Belize, unlike the highly volatile US price activity. Recent crop results and prospective smaller harvests are providing a somewhat firmer undertone.

Corn

Corn prices continue to trade within the same BZD 28.00-30.00/cwt range, which is from the last reporting period (BZD 29.00/cwt; USD 8.12/Bu; USD 320/mt) and there continue to be indications that prices will remain well bid. We have confirmed that large areas in the Cayo District have been replanted in difficult conditions, so the harvest is likely to be negatively affected.

Once again, domestic corn production, which has already seen some acreage transfer into sugarcane, may be challenged to meet Belize's domestic needs. This should continue to support firm domestic prices, irrespective of international market developments.

CSA is currently discussing a possible multi-year corn supply agreement with a US Fortune 100 company; the corn would be exported to nearby Guatemala. If mutually satisfactory terms can be agreed, which would have to reflect the substantial local price premium, the agreement would lock in most of CSA's corn production for the next 3 years.

Soybeans

Soybean prices in Belize have acquired a firmer undertone, as poor harvest results in one of Belize's main producing areas (Little Belize) have removed a significant supply source. Quality was very poor due to heavy rainfall at harvest time. This caused abundant fungus growth in and on the pods and resulted in largely inferior almost unusable beans. Many feed houses are unwilling to take these beans into storage and it appears many of them will be stored until demand increases; whether the quality of those beans deteriorates further in storage remains a key question. #1 Grade Soybeans are now firmly bid at 50.00/cwt (USD 550/mt), and lower grade #2 soybeans are steeply discounted, with bids difficult to secure even below \$40.00/cwt. (USD 440/mt).

Seed shortage remains a problem; we are actively looking for sources of supply for this winter's crop.

Edible Beans

Edible beans, with the exception of black eyed beans are almost sold out in Belize and there is very little activity at this point in time. We presume that prices continue to range in the USD 40-\$50/cwt.

We are relieved that the very wet weather in June has given way to a drier first half of July. A more typical weather pattern in July/August should help us offset the challenges of bad seed lots from Monsanto/DeKalb.

In the meanwhile, we are actively working on plans for the installation of drainage on at least 1,200 acres of farmland next dry season, as well as looking at how best to rapidly install our initial irrigation pivots. We have received preliminary commitments from core investors for part of the cost of this expansion and remain confident that we will secure the balance before the end of 2016.

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 <i>(For full details of applications, refer to Lot Records)</i>	Comments
BSA	Cayo One	1a	14	N	Black	Corn (Yellow)	DeKalb 7088 27,656	June 1	June 7	Base 13.3-30.3-13.2-1.8S 330lbs/acre Liquid Aporte-M 2L/Acre TRIAL Vermiplex 4L/Acre 46-0-0 100 lbs/acre 38.5-0-0-7.2S 136lbs/acre	Land Preparation underway May 1, 2016; continues May 17, 2016 under good conditions; finished May 23. Planting June 1. Vigorous emergence June 5-10. Above average June 25 plant count for DK-7088 at 24,000/acre. Clear signs of water stress after very wet June; starting to dry out July 11...
BSA	Cayo One	1b	24	N	Black	Corn (Yellow)	Dow 3383 27,656	May 31	June 7	Base 13.3-30.3-13.2-1.8S 330lbs/acre Liquid Aporte-M 2L/Acre 46-0-0 100 lbs/acre 38.5-0-0-7.2S 136lbs/acre	Land Preparation underway May 1, 2016; continues May 17, 2016 under good conditions; finished May 23. Planted May 31. Vigorous emergence June 5-10. June 25 plant count at 27,000/acre. Clear signs of water stress after very wet June; starting to dry out July 11...

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BSA	Cayo One	1c	24	N	Black	Corn (Yellow)	ASG R9000 27,656	May 31	June 7	Base 13.3-30.3-13.2-1.8S 330lbs/acre Liquid Aporte-M 2L/Acre 46-0-0 100 lbs/acre 38.5-0-0-7.2S 136lbs/acre	Land Preparation underway May 4, 2016; continues May 17, 2016 under good conditions; finished May 23. Planted May 31. Vigorous emergence June 5-10. Vigorous emergence June 5- 10. June 25 plant count at 26,000/acre. Clear signs of water stress after very wet June; starting to dry out July 11...
BSA	Cayo One	2	284	N	Black	Corn (Yellow)	Dekalb 7088 27,656	May 28-31	June 7	Base 13.3-30.3-13.2-1.8S 330lbs/acre Liquid Aporte-M 2L/Acre 46-0-0 100 lbs/acre 38.5-0-0-7.2S 136lbs/acre	Land Preparation underway May 4, 2016; continues May 17, 2016 under good conditions; finished May 27. Planted May 28-31. Vigorous germination but irregular emergence June 5-10 followed by disappointing June 25 plant count at 22,500/acre. After June's heavy rainfalls Field 2 also showed the highest amount of ponding as of July 11.

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Lot Records for Fields 1 & 2

GROWER: <u>BSA</u>		Date Planted: <u>5/31/2016 - 6/01/2016</u>	
FARM LOCATION: <u>Cayo One Estates I</u>		SECTION #: <u>1a, 1b, 1c</u>	SOIL TYPE: <u>Black Loam</u>
CROP: <u>Corn</u>		BLOCK #: _____	VARIETY: <u>DK 7088; Dow 3383; ASG R9000</u>
		# OF ACRES: <u>141+24+24</u>	

LAND PREPARATION					FERTILIZERS			PLANTING			
Discing	Harrowing	Leveling or Land Plane	Raking	Other	PREPLANT	AT PLANTING		Seed-Rate	Condition		
5/1/2016	23-May-16	5/9/2016	4-May-16		See Below		Aporte-M	27,656	Dry & Hot		
5/16/2016					See Below						
5/20/2016											

FERTILIZERS						Rain in inches		PESTICIDES					
Date	Analysis	Rate/Ac	Ground	Air	#	Date	Quantity	Date	Description	Rate/Ac	Ground	Air	#
26-May-16	13.3-30.3-13.2-1.8S	330lb	X		1	6/3/2016	0.6	3-Jun-16	Atrazine	1lb	X		3
31-May-16	Aporte-M	2L	X		2	6/5/2016	1.5	3-Jun-16	Prowl	1L	x		3
31-May-16	vermixplex (111 acres)	4L	X		2	6/8/2016	0.5	13-Jun-16	certero (perimeter only)	161 cc		x	4
22-Jun-16	46-0-0	100lb		x	6	6/9/2016	0.8	13-Jun-16	Aporté Pre-M	250 cc		x	4
8-Jul-16	38.5-0-0-7.2S	136lb		x	8	6/12/2016	0.7	13-Jun-16	Damoiil	250 cc		x	4
						6/17/2016	1.9	18-Jun-16	Primero	18 cc		x	5
						6/18/2016	1.3	18-Jun-16	Tordon	150 cc		x	5
						6/19/2016	3.8	18-Jun-16	Aporté Pre-M	122 cc		x	5
						6/22/2016	1.0	18-Jun-16	Surf-Ac	3 cc		x	5
						6/23/2016	0.8	26-Jun-16	Certero	161 cc		x	7
						6/24/2016	0.7	26-Jun-16	Surf-Ac	2 cc		x	7
						6/25/2016	0.7	26-Jun-16	Aporté Pre-M	80 cc		x	7
						6/26/2016	0.8						
						6/27/2016	1.9						
						7/3/2016	0.2						
						7/6/2016	0.2						
						7/9/2016	0.1						
						7/10/2016	0.3						

GROWER: <u>BSA</u>		Date Planted: <u>5/28-31/2016</u>	
FARM LOCATION: <u>Cayo One Estates I</u>		SECTION #: <u>2</u>	SOIL TYPE: <u>Black Loam</u>
CROP: <u>Corn</u>		BLOCK #: _____	VARIETY: <u>DeKalb 7088</u>
		# OF ACRES: <u>284</u>	

LAND PREPARATION					FERTILIZERS			PLANTING			
Discing	Harrowing	Leveling or Land Plane	Raking	Other	PREPLANT	AT PLANTING		Seed-Rate	Condition		
5/5/2016	23-May-16	5/12/2016 5/17/2016	6-May-16		See Below		Aporte-M	27,656	Dry & Hot		
5/10/2016					See Below						
5/16/2016											

FERTILIZERS						Rain		PESTICIDES					
Date	Analysis	Rate/Ac	Ground	Air	#	Date	Quantity	Date	Description	Rate/Ac	Ground	Air	#
20-May-16	13.3-30.3-13.2-1.8S	330lb	X		1	6/3/2016	0.6	2-Jun-16	Atrazine	1lb	x		3
28-May-16	Aporte-M	2L	X		2	6/5/2016	1.5	2-Jun-16	Prowl	1Lb	x		3
22-Jun-16	46-0-0	100lb		x	6	6/8/2016	0.5	13-Jun-16	ertero (perimeter only)	161 cc		x	4
8-Jul-16	38.5-0-0-7.2S	136lb		x	8	6/9/2016	0.8	13-Jun-16	Aporté Pre-M	250 cc		x	4
						6/12/2016	0.7	13-Jun-16	Damoiil	250 cc		x	4
						6/17/2016	1.9	18-Jun-16	Primero	18 cc		x	5
						6/18/2016	1.3	18-Jun-16	Tordon	150 cc		x	5
						6/19/2016	3.8	18-Jun-16	Aporté Pre-M	122 cc		x	5
						6/22/2016	1.0	18-Jun-16	Surf-Ac	3 cc		x	5
						6/23/2016	0.8	26-Jun-16	Certero	161 cc		x	7
						6/24/2016	0.7	26-Jun-16	Surf-Ac	2 cc		x	7
						6/25/2016	0.7	26-Jun-16	Aporté Pre-M	80 cc		x	7
						6/26/2016	0.8						
						6/27/2016	1.9						
						7/3/2016	0.2						
						7/6/2016	0.2						
						7/9/2016	0.1						
						7/10/2016	0.3						