

Belize Sustainable Agriculture, Ltd.
Joint Venture Farming Report – August 19, 2013

General Overview

During the week ended August 17, 2013 weather conditions were sunny with a few light rain showers. San Carlos and Blue Creek received from 1 ½ to 2 inches of rainfall this week; the forecast is for some isolated showers in the next couple of days and clear later in the week. Soil moisture is currently at the “moist” stage in Blue Creek and in San Carlos.

Preliminary Yield Estimates

This week we have obtained preliminary data from the Thiessen fields and part of the TF and D&H corn fields. The methodology used to estimate yields is based on the “Yield Component Method” as published by the Agronomy Department at Purdue University:

<http://www.agry.purdue.edu/ext/corn/news/timeless/yldestmethod.html>

The key data components we obtained are: 1) Ears per 30 linear feet; 2) Kernels per ear. Calculations are based on 30 inch beds (the standard used by all of our JV partners), which yields 17,400 linear feet of corn per acre; an estimated 85,000 kernels/bushel was used (being the number for an average quality harvest), although a more precise number will not be known until harvest. If weather conditions continue to be favorable and there are no material insect pressures, it is possible that kernel quality could be such that a lower kernel count/Bushel would occur. However, as stated above, kernel quality will not be known until very close to harvest time, and a higher kernel count (e.g. smaller corn kernels) would have a negative impact on yields.

As an example, if a field has 35 ears per 30 feet with a 525 kernel count, the estimated yield would be 125.38 Bu/Acre (7,021 lbs./Acre), derived as follows: $17,400/30 * 35/85,000$.

We are greatly encouraged by the preliminary yield estimates for the Thiessen, TF Plantations and D&H fields, as set out below, and believe that they are powerful harbingers of Belize’s potential for substantial increases in agronomic crop yields.

Thiessen Family Farms – 286 acres (143 Irrigated / 143 Dry – 100% Corn)

Corn was planted May 28, 2013. Despite an early problem with worms which affected all farmers in the area, the Thiessen corn does not appear to have been unduly impacted. The Thiessens are now finished with all major applications, and only periodic pesticide/fungicide spraying will occur, as needed.

The corn is now at its final height in the 8.5’-9.0’ range and the harvest now looks set for around the first of October. A very high percentage of corn plants produced 2 good quality ears, which is characteristic of the DeKalb 7088 under ideal growing conditions. Interestingly, as the corn matures in most cases only one ear of the doubles forms properly.

Spider mites were a problem recently, which caused concern for a short time mainly because of a Belize wide shortage of agro-chemicals to treat them. After considerable effort the necessary chemicals were obtained and following one spraying the mites are now under control. This is an important lesson for future crops, especially as the acreages become larger. Key agro-chemicals will have to be pre-purchased and stocked in secure locations to ensure they are available immediately when needed.

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Dekalb 7088 Double Ear (Aug 19, 2013)



Thiessen Corn Field – August 19, 2013



Ear Comparison: selection of corn ears from Thiessen fields

The Thiessen crop continues to look very good! The silk is drying off nicely. A light infestation of corn ear worm was seen, but is being managed through spraying. At this point the Thiessens can only sit back and wait for the corn to get ready for harvest. Insects and weeds should no longer be of major concern, as the corn has progressed through its more vulnerable stages, although the fields will be subject to regular inspection and prompt remedial spraying. The ears are drying nicely, kernels are getting hard. Harvest should be in the last week of September or the first week of October.

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Preliminary Yield Data for Thiessen fields

Surveys were performed in both the irrigated (Aug 9, 2013) and non-irrigated (Aug 19, 2013) portions of the Thiessen fields. The ear count and kernel count were as follows:

Irrigated: 38.5 ears with a kernel average of 561 – Theoretical Yield: 147 bushels / acre

Non-Irrigated: 32 ears with a kernel average of 533 – Theoretical Yield: 116 bushels / acre

Allowing for possible weather/insect issues and harvesting inefficiencies, **we are now forecasting weighted average yield from the Thiessen fields of 116 to 131 bushels per acre.** This compares with our initial blended (irrigated and non-irrigated) target of 100 bushels per acre, and historical blended yields of 85 bushels per acre.

Given the immediate proximity between the Thiessen and TF Plantation fields, their comparable soil types, and equal access to irrigation, we believe that, despite the remarkable increase in the yields of Thiessen fields, there is considerable additional scope for improvement. The simple juxtaposition in the above picture of the various Thiessen ears tells a compelling picture. We expect to conduct extensive post-crop analyses to determine what improvements in soil testing, seed selection, fertilizer programs, and agro-chemicals might provide the best ways to further improve yields. The one area we believe cannot be improved upon is the commitment, work ethic, and drive to succeed of the Thiessen family. They have been exemplary partners these past five months!

TF Plantations – 342 acres (259 Irrigated / 83 Dry – 100% Corn)



The above picture overlooks Fields TF1, TF2T and TF3, also known as “the small pivot field”, which was planted on June 10-12 with seed varieties DeKalb 7088, Syngenta and Pioneer 30F35. TF2T is a trial plot which has strips of all 3 varieties, about double the fertilizer, and is almost 100% irrigated. About 1 ½ inches of rain were received at the TF farm this past week and the soil has good moisture levels.

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This is really good looking corn! All scheduled treatments are now finished and no further work except remedial spraying is expected until harvest, which should be mid October. Corn stands at about 7.5 – 8.5 feet tall.

Preliminary Yield Data for TF Plantations Fields TF1 - TF2T - TF3

Extensive surveys were performed in both the irrigated and non-irrigated (Aug 19, 2013) portions of the TF Plantation fields on August 19, 2013. The ear count and kernel count were as follows:

TF1 / Irrigated: 37 ears with a kernel average of 636 – Theoretical Yield: 161 bushels / acre

TF2T / Irrigated: 38 ears with a kernel average of 619 – Theoretical Yield: 160 bushels / acre

TF3 / Irrigated: 48 ears with a kernel average of 565 – Theoretical Yield: 185 bushels / acre

Allowing for possible weather/insect issues and harvesting inefficiencies, **we are now forecasting weighted average yield from the TF Plantations fields of 140 to 170 bushels per acre.** This compares with our initial blended (irrigated and non-irrigated) target of 107 bushels per acre, and historical blended yields of 90 bushels per acre. The TF Plantations yields (historic and target) are higher than the Thiessen yields principally due to higher percentages of irrigated land.

As with the Thiessens, we are greatly encouraged by these preliminary data, although we are perplexed by the lack of materially higher yields in TF2T. We would have expected that the much higher fertilizer inputs would have generated higher yields. We also note with interest the much higher germination rate of the Pioneer corn planted in TF3, albeit with a lower kernel count. Detailed records of all activity in the TF fields have been maintained and we will be carefully analyzing these to attempt to understand as much as possible about the factors impacting local yields.

If the above yields are confirmed at harvest, they are a powerful indication of the potential for Belize’s agronomic crops!



TF Plantation Field TF4 (Aug 19, 2013)



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Corn Tasseling on TF Field TF4 (Aug 19, 2013)



TF Plantation fields on left – Thiessen fields on right

The above pictures are from Field TF4, also known as “the Large Pivot field”; it was planted 27-28 June, 2013. Seed varieties planted are Pioneer 30F35 - 75 acres, DeKalb - 7088 - 23 acres and Syngenta - 105 acres. The corn is very good looking! It seems that Brian Fehr (son of owner Henry Fehr) has been able to control the pests quite well even though worms have been problematic. On August 2nd 75 lbs/acre of nitrogen (46-0-0) were applied via airplane and on August 16th another 69 lbs/acre of nitrogen (46-0-0) were applied via airplane. The plants on the north side of the field are 80-84 inches tall and on the south side they are 8.5 feet (102 inches) tall. This is because of the time between planting from the south side to the north side. As can be seen on the picture the corn is tasseling and silking has started; accordingly no more fertilizer will be applied. A close eye will be kept on worms and mites. In picture #4 the Thiessen corn field is on the right and the TF Plantations corn is on the left; this provides a clear vision of the relevance of comparisons between the results of both growers.

D&H Farms – 224 acres (0 Irrigated / 223 Dry – 125 acres Corn / 99 acres Soybeans)

Soybeans

The soybeans were planted June 27-28 and they are currently about 14 - 18 inches tall. 1½ inches of rain fell this week on this field: soil conditions are nice and moist. Agrochemical grass control has been applied and another grass control via cultivator was done this past week. A part of the field still has a bit of a grass problem and another pass with the cultivator might be tried this week, although there is concern because the plants are starting to flower. Plants are looking good: they have grown nicely this last week and have improved in color. However, no nitrogen fixing nodules can be found on the roots, a phenomenon which we are attempting to understand. If this continues, it could indicate below average yields for this field’s soybean crop.

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D&H Soybean Field (Aug 18, 2013)



D&H Soybean Field (Aug 18, 2013)



Section of D&H field with grass problem (Aug 18,2013)



D&H Soybean Flowering (Aug 18, 2013)

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Corn

In the picture below, which shows corn from a small field of some 24 acres planted on June 11, the corn is above 7 - 8 feet high. This field received 2 inches of rain this week. It is very healthy looking corn, and even though Pete Dyck was not been able to cultivate for weed control due to the soil being quite waterlogged earlier this season, this does not seem to have affected the corn too much.. The corns silk is starting to dry off. Corn looks healthy, a few mites were present but an agrochemical application should take care of that.



D&H Corn (Aug 18, 2013)

A data collection survey was performed on Aug 18, 2013. The ear count and kernel count were as follows:

All non-irrigated land: 37 ears with a kernel average of 694 (!) – Theoretical Yield: 175 bushels / acre

Allowing for possible weather/insect issues and harvesting inefficiencies, **we are now forecasting weighted average yield from this small D&H field of 140 to 170 bushels per acre**. This compares with our initial target of 71 bushels per acre (!), and historical blended yields of 70 bushels per acre.

Several significant elements may have caused this early uptick in prospective yields: 1) highly fertile black soil; 2) extensive use of foliar micronutrient sprays; 3) unusually favorable weather after the initial wet period. We will be reviewing data from this field carefully and comparing them to the second D&H corn field as well as other JV fields for any potential lessons to be learned.

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D & H Field 2 (Aug 18, 2013)



D & H Field 2 (Aug 18, 2013)

The above pictures are of field DHC2, the last of the JV crops to be planted this season. This field was planted on Friday the 26th of July. Corn is 16 inches tall. This field received a glyphosate burn down application hours before planting. The field is cleaning up nice from burn down. It is a bit on the wet side at this point. An application of 46-0-0 will be applied this coming week. The late planting means that this crop will probably be harvested around December 1st, but our view was very much “better late than never”. Early growth is encouraging...

Neufeld Family Farms – 117 acres (0 Irrigated / 117 – 100% Soybeans)

Jacob Neufeld finished planting on June 28, 2013, and despite what looked at first like a low stand on his field, the crop is now looking very good. These fields have received about 1.5 inches of rain in the last week. These beans are really looking good!. As can be seen below the beans are starting to flower nicely. Plants are 27-33 inches tall.

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Field #JN4- Planted June 28, 2013: 20 acres



Field #JN3- Planted June 27, 2013: 17 acres



Field # JN2 - Planted June 27, 2013: 20 acres



Field #JN1 – Planted June 27, 2013: 60 acres



Soybean Flowering – Neufeld Field (Aug 19, 2013)

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Summary and Conclusion

Overall the crops continue to look really good; I continue to be very pleased with how all the fields have improved. All the corn fields are looking exceptionally good! Blue Creek and San Carlos both continue to have good moisture, a dramatic improvement on last year. Getting agro chemicals to deal with the mite problem has been problematic but that issue also has been resolved. The need to stock certain critical agro chemicals for future farming operations is an important lesson to be learned.

Grain prices have trended slightly lower, following the trend in the United States. Corn is now selling for BZD 0.265/lb (\$7.42/bushel); Soybeans are at BZD 0.57/lb. (\$17.10/bushel); Milo is at BZD 0.22/lb. Belize Corn continues to maintain an attractive premium to the Chicago near contract (~\$4.90/bushel). The Blue Creek corn COOP is in the process of finalizing a contract to sell corn to Caribbean Community based buyers. We understand that another feed mill in Cayo has started up a soybean processing mill, which will probably mean greater demand for soybeans. Generally speaking, the crops in the Cayo and Orange Walk Districts (where most of Belize's corn and soybeans are grown) continue to look good, which continues to indicate a large harvest. Silos remain quite empty at the moment, and earlier crops are likely to achieve a better price; nonetheless we are organizing storage for part of our crop so that it is not sold at a seasonally weak point. The Indian Creek corn COOP (Thiessen Farms) is in the process of setting up 2 large grain bins. There continue to be reports that Guatemalan trucks have been picking up any and all grain that is available within Orange Walk, as was the case recently with milo.

Early indications for corn yields are very encouraging! Although it is far too early to “count one's chickens”, the data we have collected to date lead us to believe that achieving a weighted average corn yield in the 130 bushels / acre is a distinct possibility. This would be 30% above our original JV target and 50% over historical yields in Orange Walk. We also see a number of areas on which to focus additional research in coming crops to find other ways to enhance yields.

Thanks!

Abe Dyck

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Grower	Location	Field #	Acres	Irr?	Soil Type	Crop	Seed Variety	Plant Date	Stand - Date	Fertilizer Program	Comments
Thiessen	SC	1	143.0 142.8 <hr/> 285.8	Y	Sandy loam (Red)	Corn	DeKalb 7088 (25,000 seeds/acre)	May 28	6.5' - 7/13 7.5' - 7/19 8.5' - 7/27 8.5' - 8/3 8.5' - 8/19	170lbs/acre 18-46-0 183lbs/acre 46-0-0	Fertilizing complete. Total pure N this season = 115lbs/acre, versus historic 40-50lbs/acre. Note lack of "K" vs TF fields. Silking underway late July Silk starting to dry off on some ears` Kernels are getting hard 8/19 Very Healthy High Yield Forecast
TF Plantations	SC	TF1	57.99 14.00 <hr/> 71.99	Y N	Sandy loam (Red)	Corn	DeKalb 7088 (31,000 seeds/acre)	June 10	18" - 7/13 36-42"-7/19 48" - 7/27 8' - 8/3	220lbs/acre 10-26-26 110lbs/acre 0-0-60 65lbs/acre 40-0-0-6 148lbs/acre 46-0-0	Fertilizer program calls for 330lbs/acre base Fertilizer and 150 lbs/acre pure N. This is over 150% higher than historic levels and consistent with requirements for 125-150Bu/acre yields Silking underway 8/3 Silking finished, silk drying off 8/19 Very Healthy High Yield Forecast
TF Plantations	SC	TF2T Test Plot	14.72	Y	Sandy loam (Red)	Corn	DeKalb 7088 Syngenta Pioneer 30F35 (38,000 seeds/acre)	June 11	18" - 7/13 36-42"-7/19 47" - 7/27 8' - 8/3 8' - 8/19	330 lbs/ acre 10-26-26 330 lbs/ acre 0-0-60 140lbs/acre 40-0-0-6 260lbs/acre 46-0-0	Test Plot getting major fertilizer boost (up to 100% extra) vs. TF1 and TF3 (which are already way above historic levels) Harvest will be monitored for different result vs. TF1 & TF3 Silking underway 8/3 Silking finished, silk drying off 8/19 Very Healthy High Yield Forecast
TF Plantations	SC	TF3	46.40 5.59 <hr/> 51.99	Y N	Sandy loam (Red)	Corn	Pioneer 30F35 (31,000 seeds/acre)	June 12	18" - 7/13 36-42"-7/19 46" - 7/27 7' - 8/3 8' - 8/19	220lbs/acre 10-26-26 110lbs/acre 0-0-60 65lbs/acre 40-0-0-6 148lbs/acre 46-0-0	Same strategy as TF1 Little bit slower in silking 8/3 Silking finished, silk drying off 8/19 Very Healthy VERY High Yield Forecast

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TF Plantations	SC	TF4	140.02 63.56 203.58	Y N	Sandy loam (Red)	Corn	Pioneer 30f35 75 acres DeKalb 7088 23 ac. Syngenta 105 ac. (27,000 seeds/ac).	June 27-28	7-8" – 7/13 12-14"-7/19 30-36"-7/27 42-46" – 8/3 7-8.5' -8/19	220lbs/ac 18-46-0 110lbs/ac 0-0-60 142lbs/acre 46-0-0	Same strategy as TF1, some difference in fertilizers due to local availability issues. Tasseling and silking 8/19 Very Healthy
D & H	BC	DHS1	99.37	N	Heavy Black	Soy	Huasteca 400 (Seeds/acre 33.44 lbs/ac)	June 27-29	3-4" – 7/13 7-8" – 7/19 8-10" – 7/27 10-12" – 8/3 14-18"-8/19	40lbs/ac 15-15-15	Summer soybean trial in heavy black Blue Creek soil. Limited Fertilizer program due to modest soybean needs and local soil conditions. Compare with JN. Crop Replanted June 27-28 after first seed had very low germination rates. Now looking promising
D & H	BC	DHC1	24.43	N	Heavy Black	Corn	DeKalb 7088 (Seeds/acre 26,000)	June 11	3.5' – 7/13 5' – 7/19 6.5' – 7/27 7-8' – 8/3 8'+ - 8/19	100lbs/acre 14-36-12 65lbs/acre 46-0-0	Summer corn trial in heavy black non-irrigated Blue Creek soil. Fertilizer program calls for 150lbs/acre base Fertilizer and 75 lbs/acre pure N. (low range but 50% above historic levels) Mostly Very Healthy
D & H	BC	DHC2	100.56	N	Heavy Black	Corn	DeKalb 7088 Syngenta Pioneer 30f35 (seed rate 28,000)	July 26- 27	4" – 8/3 16"-8/19	192 lbs/ac 14-36-12 50 lbs/ac 46-0-0	Same as DHC1 Very Promising 8/19
Neufeld	SC	JN1	60.73	N	Sandy loam (Red)	Soy	CARDI 1088 28 lbs /acre ~32,000 seed/acre	June 27	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 15-19" 8/3 27-33"-8/19	120lbs/acre 15-15-15	Summer soybean trial in sandy red soil. Fertilizer program calls for moderate increase in base and foliar applications Looking good given below average germination rate

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Neufeld	SC	JN2	20.17	N	Sandy loam (Red)	Soy	CARDI 1088 28 lbs/acre	June 27	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 15-18" – 8/3 27-33"-8/19	120lbs/acre 15-15-15	Same as JN1 Looking good given below average germination rate
Neufeld	SC	JN3	16.56	N	Sandy loam (Red)	Soy	Huasteca 400 28 lbs/acre	June 27	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 16-19" – 8/3 27-33"-8/19	120lbs/acre 15-15-15	Same as JN1 Looking good given below average germination rate
Neufeld	SC	JN4	19.82	N	Sandy loam (Red)	Soy	CARDI 1088 28 lbs/acre	June 28	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 15-18" – 8/3 27-33"-8/19	120lbs/acre 15-15-15	Same as JN1 Looking good given below average germination rate