Belize Sustainable Agriculture, Ltd.
Joint Venture Farming Report – August 26, 2013

General Overview

During the week ended August 24, 2013 weather conditions were sunny in the beginning of the week, but then at the end of the week we got heavy rains. San Carlos and Blue Creek received from 3 to 4 inches of rainfall Friday night and Saturday morning; the forecast is for some isolated thunder showers Tuesday to Thursday and clearing later in the week. Soil moisture is currently at the "water logged" stage in Blue Creek and "wet" in San Carlos.

Our reports between now and harvest will continue to refer to the methodology used to estimate yields, which was described in detail in our August 19, 2013 report and is based on the following Purdue University paper:

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

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. 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.

Dekalb 7088 (Aug 26, 2013)

Thiessen Corn Field – August 26, 2013

Ear Comparison: selection of corn ears from Thiessen fields

The Thiessen crop continues to look very good! 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.

Preliminary Yield Data for Thiessen fields

A second and more extensive series of crop Surveys was performed in both the irrigated and non-irrigated portions of the Thiessen fields on August 26. The ear count and kernel count were as follows:

Irrigated: 46.25 ears with a kernel average of 520 – Theoretical Yield: 164 bushels / acre

Non-Irrigated: 38.25 ears with a kernel average of 453 – Theoretical Yield: 118 bushels / acre

Given recent rainfall, it is unlikely that anything but a complete drought or torrential rain over the remaining 35 days to harvest would affect the corn crop going forward from a weather viewpoint. Of course there is always the risk of a hurricane or severe tropical storm that could cause major crop damage. While these are possible, and entirely beyond our control, we shall simply have to hope that the low but not immaterial odds of these risks work in our favor…

As for pests and disease, as stated above, the corn crop is past its most vulnerable stage to corn worms, spider mites, and other infestations. Nonetheless, the Thiessens will be vigilantly monitoring their fields and any remedial spraying will be promptly implemented.

Accordingly, **we are now slightly increasing our weighted average yield forecast from the Thiessen fields to 120 to 140 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.

One fairly straightforward conclusion from data taken in the Thiessen fields is that raising the planting seed count from 25,000/acre to 32,000/acre could lead to a 20%+ increase in yields, all of this at a very modest cost. A higher germination rate, likely to result from better quality seed, would also have a materially positive impact on yields.

Lastly, we note with considerable interest the differentiation between irrigated and non-irrigated yields. Although less than 3 inches of irrigation were applied to the Thiessen fields, these came at crucial stages in the plants' development cycle. It is worth noting that if an additional 40 bushels of corn (and its soybean equivalent) per crop can be grown thanks to irrigation, the incremental annual revenues of a 170 acre fixed center pivot area would be over $75,000, which would practically pay for an irrigation pivot in the first year! And in a setting like the 2012 summer season, where drought conditions prevailed in August through October, a single crop saved would more than pay for the cost of an irrigation pivot… This is clear validation of a core part of our strategy: maximize the amount of acreage under irrigation!

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. A couple inches of rain were received at the TF farm this past week and the soil has good moisture levels.

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.

<u>Preliminary Yield Data for TF Plantations Fields TF1 - TF2T - TF3</u>

Another detailed survey was performed in both the irrigated and non-irrigated (Aug 19, 2013) portions of the TF Plantation fields on August 26, 2013. We did a highly detailed survey of the TF2T field looking at each of the portions

planted with different seed varieties (Dekalb 7088, Pioneer 30F35, Syngenta). The ear count and kernel counts were as follows:

TF1 / Irrigated: 41 ears with a kernel average of 500 – Theoretical Yield: 140 bushels / acre

TF2T / Irrigated (Dekalb): 37 ears with a kernel average of 540 – Theoretical Yield: 136 bushels / acre

TF2T / Irrigated (Syngenta): 49 ears with a kernel average of 493 – Theoretical Yield: 165 bushels / acre

TF2T / Irrigated (Pioneer): 42.5 ears with a kernel average of 466 – Theoretical Yield: 135 bushels / acre

TF3 / Irrigated: 48 ears with a kernel average of 481 – Theoretical Yield: 158 bushels / acre

Compared with the 8/19 Survey, we note a significant reduction in kernel count. A substantial portion of this is likely to be due to corn worm, and there is little than can be done in terms of remedial spraying once the worms are in the ears. However, as the kernels harden damage reduces considerably, and we believe that the bulk of any crop loss from worms has already taken place. We will be incorporating lessons from this development into next year's crop to intensify monitoring and spray more aggressively as well as considering a preventative spraying program that does not wait until there is evidence of worms and attacks the pests when they are still at the moth stage.

Given the above data, **we are now reducing the weighted average yield from the TF Plantations fields TF 1-2-3 to 125 to 145 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.

TF Plantation Field TF4 (Aug 26, 2013)

TF Plantation Field TF4 (Aug 26, 2013)

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

TF Plantation fields on left – Thiessen fields on right

(Aug 19, 2013)

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 in TF1/2/3. The plants are now fully grown, 8.5 feet (102 inches) tall. Silking is now almost over. In the above picture, 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.

A detailed survey to obtain a first yield estimate from TF4, which at 203 acres is the largest of all of our JV fields, will be carried out on September 2.

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

Soybeans

The soybeans were planted June 27-28 and they are currently about 24 - 28 inches tall. A couple inches of rain fell this week on this field and soil conditions are now distinctly in the wet category. This field still has a bit of a grass problem; it does not seem to be affecting the plants too much in the flowering at this time. Plants are looking good: they have grown nicely this last week and have improved in color. However, we continue to find no nitrogen fixing nodules 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. Plants are smaller than expected but as can be seen in the pictures, full of blossoms.

D&H Soybean Field (Aug 25, 2013)

D&H Soybean Field (Aug 25, 2013)

D&H soybean field (Aug 25,2013)

D&H Soybean Flowering (Aug 25, 2013)

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 several 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)

Sample of ears (August 25, 2013)

A second, extensive data survey was performed on Aug 25, 2013. The ear count and kernel count were as follows:

All non-irrigated land: 32 ears with a kernel average of 534 – Theoretical Yield: 117 bushels / acre

As this was a very different number from the August 18 survey, we queried the farmer (Pete Dyck). When he asked where the surveys were taken last week and was given the information, he replied “Oh, there were a few rows where I went over twice with the pre-plant fertilizer and the planter. That must be why you had a higher ear count and bigger ears”. We immediately took this to heart and are now doing trials in the late planted D&H 100 acre corn field to apply three different levels of Nitrogen. This should provide some good information as to the impact of additional N. Also, just before harvest we will re-sample the “double strip” to monitor its relative progress to the rest of the 25 acre plot. The above steps should provide additional useful data for next season as well as provide for some increase in yields this year.

Given the above, **we are now forecasting weighted average yield from this small D&H field of 100 to 120 bushels per acre**. This compares with our initial target of 71 bushels per acre (!), and historical blended yields of 70 bushels per acre.

D & H Field 2 (Aug 25, 2013)

D & H Field 2 (Aug 25, 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 varies in size, from 16 inches to 36 inches tall. This difference in height is mainly due to water logging at certain points of the field especially after heavy rains like last weekend. With some extra nitrogen we believe this field will still do well. The corn is looking greener this week than last week, a step in the right direction. This field received a glyphosate burn down application hours before planting. The field is cleaning up nicely from the burn down. An application of 46-0-0 was applied week and going forward we will be applying three different levels of nitrogen to the field, and will report on this as the season goes forward. 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 several inches of rain in the last week, although the red soils in the San Carlos area tend to drain very well. These beans are really looking good! As can be seen below the beans are starting to flower nicely. Plants are 30 - 36 inches tall.

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

JN1 Picture on the left you can see nitrogen fixing nodules growing. The root system had quite a few nodules. I only saw this in JN1.

As can be seen in the pictures below, the beans are almost finished with flowering. It looks like a lot of pods are forming.

JN1 at tail end of Flowering (Aug 26, 2013)

JN3 in full flowering (Aug 26, 2013)

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, and are the best our partners' can remember seeing! Blue Creek and San Carlos both continue to have high moisture levels, and in the San Carlos area most of the corn has sufficient moisture to take it through harvest barring a total drought over the next 4-8 weeks (highly unlikely). 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 remained unchanged from last week at the lower levels, 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 is maintaining an attractive premium to the Chicago near contract (~$5.00/bushel).

Early indications for corn yields continue to be very encouraging! Despite the corn ear worm impact at TF1/2/3, we are feeling more comfortable that achieving an average corn yield of >130 bushels/acre will be possible. As a reminder, 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 future crops to find new ways to enhance yields; we believe that many of the lessons being learned this summer will allow for further material yield improvement in 2014!

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	143.0 142.8 285.8	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 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 **Healthy, with some ear worm** **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 **Healthy, with some ear worm** **High Yield Forecast**
TF Plantations	SC	TF3	46.40 5.59 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 **Healthy, with some ear worm** **High Yield Forecast**

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 33.44 lbs/acre ~94,000 seed/acre	June 27-29	3-4" – 7/13 7-8" – 7/19 8-10" – 7/27 10-12" – 8/3 14-18"–8/19 24-28"–8/25	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 16-36"-8/25	192 lbs/ac 14-36-12 50 lbs/ac 46-0-0 50 lbs/ac 46-0-0	Same as DHC1 **Very Promising 8/19** **Some concern re water 8/26**
Neufeld	SC	JN1	60.73	N	Sandy loam (Red)	Soy	CARDI 1088 28 lbs /acre ~78,000 seed/acre	June 27	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 15-19" 8/3 27-33"-8/19 30-36"-8/26	120lbs/acre 15-15-15	Summer soybean trial in sandy red soil. Fertilizer program calls for moderate increase in base and foliar applications **Now looking very good given below average germination rate**

Neufeld	SC	JN2	20.17	N	Sandy loam (Red)	Soy	CARDI 1088 28 lbs/acre ~78,000 seed/acre	June 27	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 15-18" – 8/3 27-33"-8/19 30-36"-8/26	120lbs/acre 15-15-15	Same as JN1 **Now looking very good given below average germination rate**
Neufeld	SC	JN3	16.56	N	Sandy loam (Red)	Soy	Huasteca 400 28 lbs/acre ~78,000 seed/acre	June 27	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 16-19" – 8/3 27-33"-8/19 30-36"-8/26	120lbs/acre 15-15-15	Same as JN1 **Now looking very good given below average germination rate**
Neufeld	SC	JN4	19.82	N	Sandy loam (Red)	Soy	CARDI 1088 28 lbs/acre ~78,000 seed/acre	June 28	4-6" – 7/13 7-8" – 7/19 8-10" – 7/27 15-18" – 8/3 27-33"-8/19 30-36"-8/26	120lbs/acre 15-15-15	Same as JN1 **Now looking very good given below average germination rate**