JP SWEET POTPATO EXPERIENCE:
From Farm to Market: Post-Harvest Considerations

Dr. Damian Graham DBA, MPhil, PE
General Manager JP Tropical Foods Ltd

OUTLINE

- Quick Lessons Learned between 10ac pilot and 40ac first crop
- Supply Chain from Farm to Market
- Managing Inherent Bottlenecks
- Post Harvest Issues
- Resilience of Agronomy to support the Critical Chain
- Agribusiness and Economic Considerations

LESSONS LEARNED

Pilot 10ac and 40ac scaled up plot


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!


JP
Always there for you!

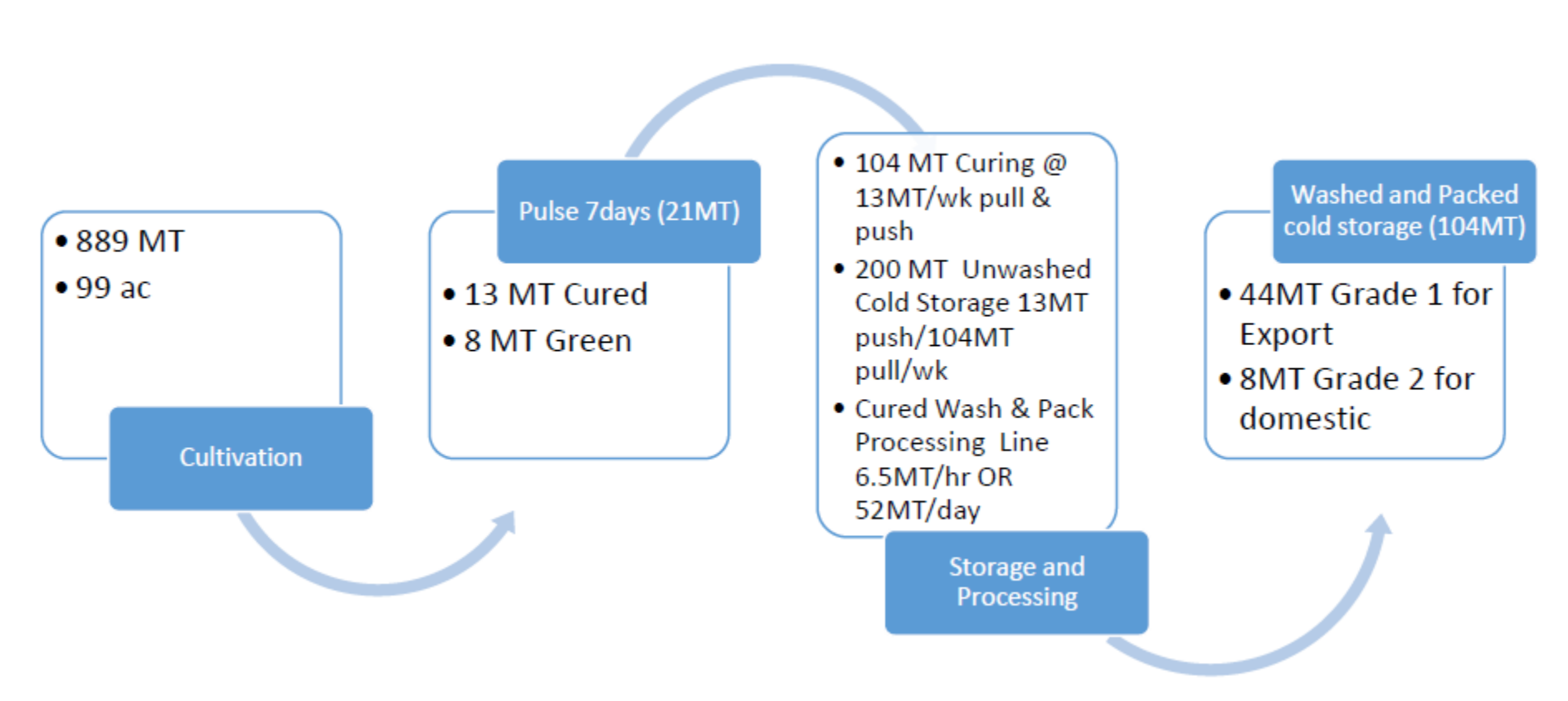

JP
Always there for you!


TROPICAL FOODS
JP
St Mary's

Lessons Learned from pilot and first crop of Sweet Potato July 2015-June 2016

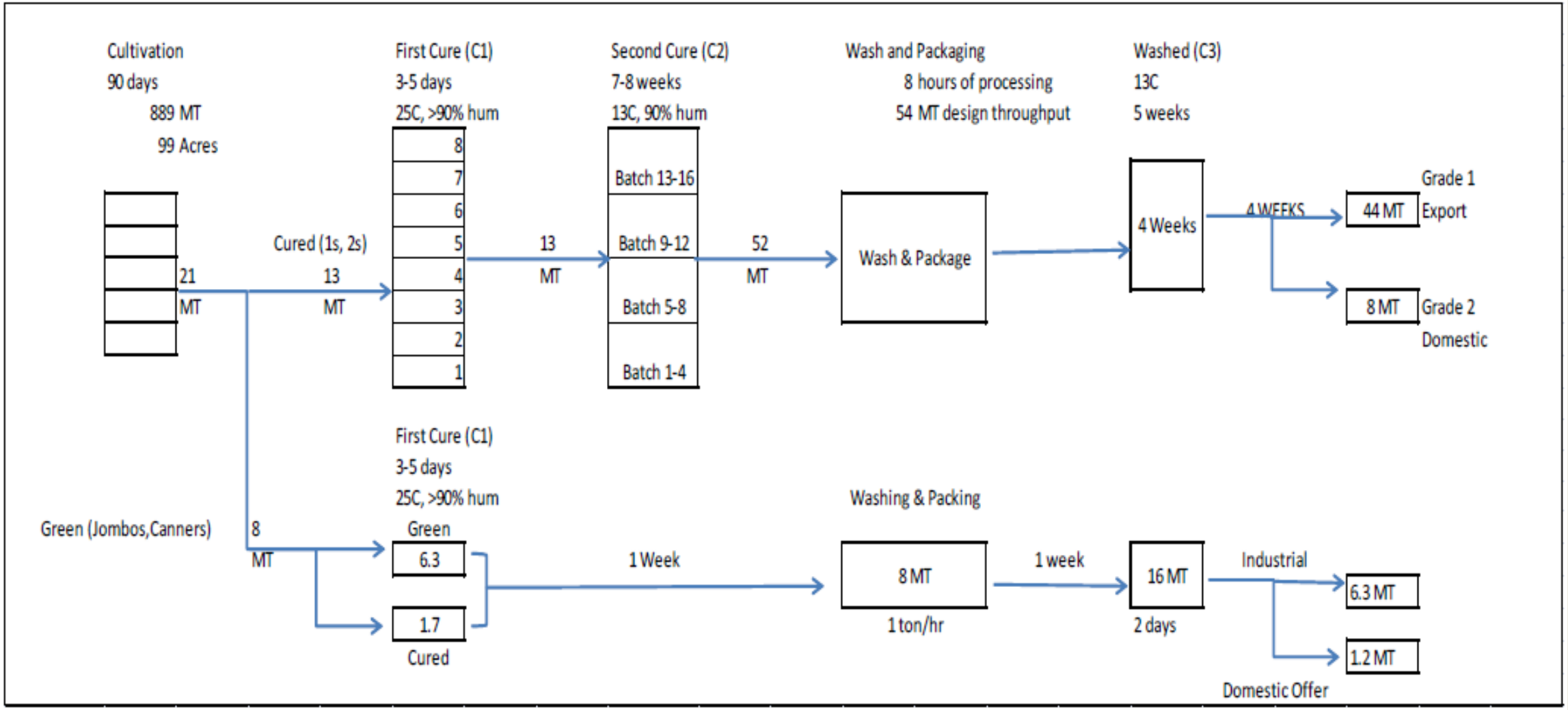
- Adopted agronomy works to cultivate at 42t/ha in 90-120 days
- Integrated Pest Management Program must composting of all spent material (foliage, un-saleable roots in ground) post harvest
- Rotation crop must be included to reduce bio-accumulation and soil conservation
- Cassava up-rooter and manual harvesting with pitch forks cannot harvest to scale 1ha each week. Cassava up-rooter operates slow and covers tubers with soil needing multiple passes increasing harvesting costs.
- Due to slow harvesting, economic pest built up resulting in loss of 30% of crop after 10 weeks of harvesting. (10 harvested, 4 lost).
- Flail mower, two-row slip planter, chain harvester are imperative to commercialize sweet potato planting and harvesting efficiently without losses

SUPPLY CHAIN OVERVIEW



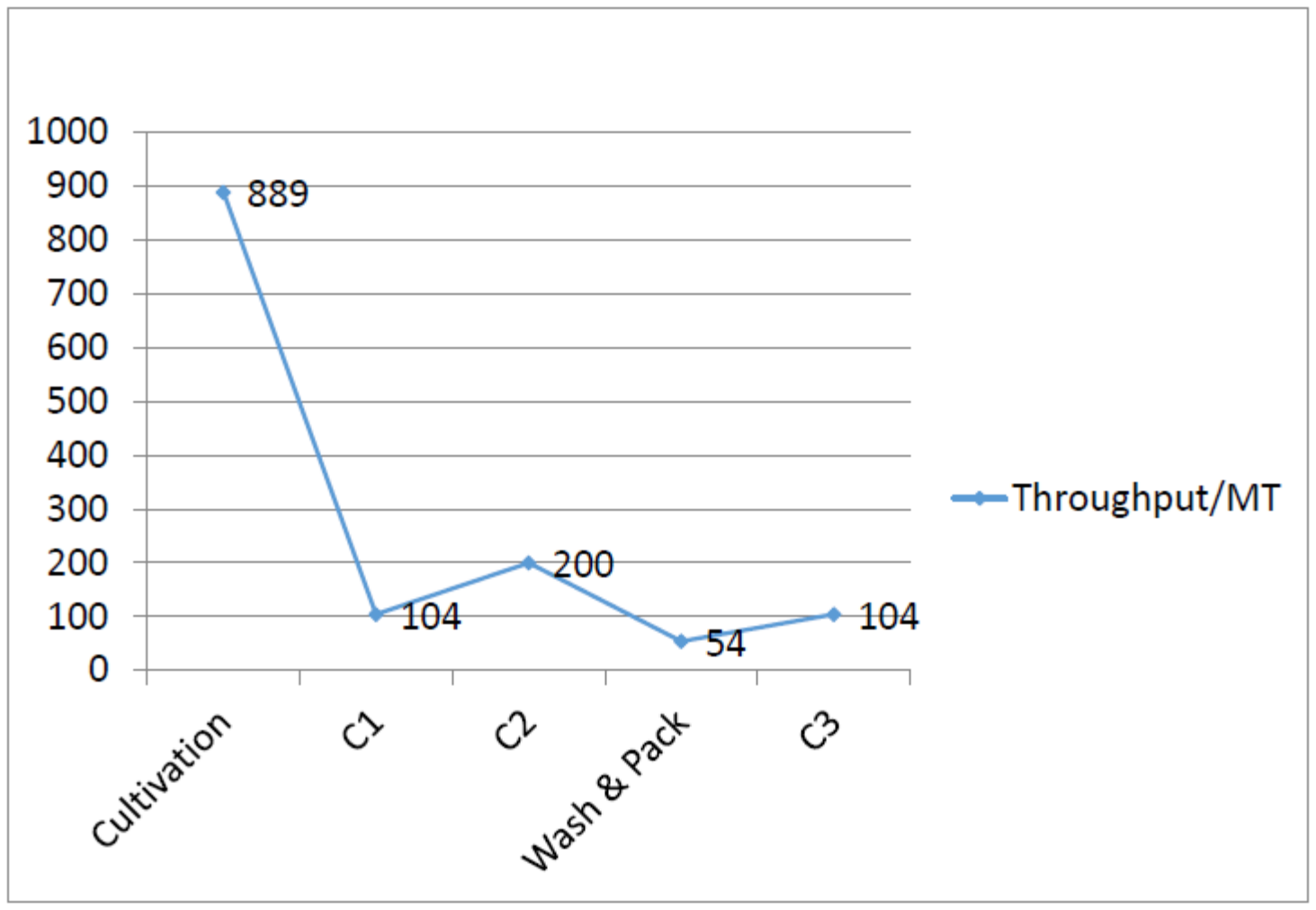
- Supply Chain Overview for 100ac farm to fork

SUPPLY CHAIN DESIGN FOR 1M lbs (454MT) SWEET POTATO GRADE 1 EXPORT OVER 10 MONTHS



MANAGING BN'S AND ISSUES OF POST HARVEST

Manufacturing Velocity Graph (V-Graph) for SP Supply Chain



Post Harvest Issues

- Effective removal of ALL remaining plant material from the field as part of IPM program
  - *Intervention of flail mower, composting, proper harvesting tools to completely remove material and cart away to a designed composting site*
- Application of suitable crop for rotation cover
  - *Above ground (Asparagales-Amaryls-Onion), Nitrogen fixing (Rhizobium-Legumes)*
- Grading in the field for curing and immediate green sales
  - *Adoption of in field callipers and grading boxes to aid same, farm gate sales*
- Curing 25C, >90% RH for 3-5 days, then Cold Storage <12C, RH >90% until washed.
  - *Food safe chill rooms with pallet handling design*
  - *Sufficient Redundancy to keep flow consistent*
- Washing and final grading to meet Consumer preferences (US#1's, US#2's and Jumbo's)
  - *Food safe and High efficiency washing and packing with redundancy*
- Investment and Working Capital to fully commercialise SP fresh and move up the value chain
  - *Curing, washing ,cold storage .....holding up to 8 weeks washed and cured and still cultivating.*
  - *Value chain outlets: flour, baking, school feeding etc.*

RESILIENCE OF AGRONOMY

Supporting feature of the agronomy to support the critical chain

Sweet Potato:

- Beauregard
- Uplifter
- Dor
- Yellow Belly
- 3-6 months

Onions:

- Short Day
- Intermediate Day
- 4 months

Legume:

- Snap peas
- Crotalaria
- Snow peas
- Macuya Beans
- 3 months

Rotation Plan A- 2 commercial + green cover

1	Onion-Legume-SP	Legume-SP-Onion	SP-Legume-Onion
2	Legume-SP-Onion	SP-Onion-Legume	Onion-Legume-SP
3	SP-Legume-Onion	Legume-SP-Onion	Onion-Legume-SP

17 Ha, block design
1.89 Ha

Onion- 500t saleable
Sweet Potato- 500t Sealable
Mucuna- 400t N as biomass

Rotation Plan B- 2 commercial + green cover

1	SP-Legume-SP	Legume-SP-Legume	SP-Legume-Legume
2	Legume-SP-Legume	SP-Legume-SP	Legume-Legume-SP
3	SP-Legume-SP	Legume-SP-Legume	Legume-Legume-SP

17 Ha, block design
1.89 Ha

Onion- 54t, 2Ha Trial
Sweet Potato- 500t Sealable
Mucuna- 800t N as biomass

AGRIBUSINESS CONSIDERATIONS

Economic considerations for cash conversion cycle

JPTF Mixed Rotation Sweet Potato- Onion- Mucuna Crop Cultivation

Conservative

Assumptions to be toggled

Parameter		2017 Budgeted P&L for 1 HA First Crop-Onion	Second Crop-SP	Total
Key Assumptions:				
# Producing Plants/ha		**666,900**	41,990	
Saleable Fruit %		**64%**	**64%**	
Months to harvest		**4**	**3**	
		0	0	
Yielding Plants	426816	426,816	26,874	**453,690**
Average Weight Harvested, Kg		**0.06**	**1.00**	
	J$/kg			
Yield, Grade 1	120.00	**60%**	**60%**	
Yield Grade 2	90.00	**40%**	**40%**	
Yield, Kg's:				
Grade A		15,878	16,124	
Grade B		10,585	10,749	
Total		**26,463**	**26,874**	**53,336**
Crop Revenues		**2,857,960**	**2,902,349**	**5,760,309**
	Per HA or Plant			
Establishment Costs	1,119,310	639,606	479,704	**1,119,310**
Cultivation Costs	10.28	1,088,546	829,090	**1,917,636**
Total Growing Costs		**1,728,152**	**1,308,794**	**2,757,312**
Harvest, Packing and Haulage Cost	**34.61**	**915,994**	**930,220**	**1,846,214**
Operating Margin		**1,129,808**	**663,334**	**1,793,142**
OM%		**40%**	**23%**	**31%**
	Total Harvest kgs	52,925	537,472	590,397
Planned Harvest for 2016		**2.00**	**20.00**	**22.00**
Revenues		5,715,920	58,046,976	63,762,896
Cost		5,288,291	44,780,292	50,068,583
Gross Margin		**427,629**	**13,266,684**	**13,694,313**
Administration Costs/Farm overheads		-	12,260,952	12,260,952
EBIDTA		**427,629**	**1,005,731**	**1,433,360**
		7%	2%	2%
ROI		8%	2%	2.3%

Cost Assumptions:	
Cost to Prepare 1 HA land	**1,119,310**
Cost to Cultivate 1 ha of plants	**1,919,750**
Cost/t slaeable/Month	**10.28**
HP & Distribution Cost/Kg	**34.61**

Share Grade A Sold at:	
180	**60%**
160	**40%**
Wgted. Ave. Grade A Sell Price	**172**
Grade B Sold at	**140**

Build up to Saleable Fruit:	**1st**	**2nd**
% Plants making it to baring	**80%**	**80%**
% of fruits harvested and useful	**80%**	**80%**
Overall % Saleable	**64%**	**64%**

JPTF Mixed Rotation Sweet Potato- Onion- Mucuna Crop Cultivation

Optimistic

Assumptions to be toggled

Parameter		2017 Budgeted P&L for 1 HA First Crop-Onion	Second Crop-SP	Total
Key Assumptions:				
# Producing Plants/ha		**666,900**	41,990	
Saleable Fruit %		**90%**	**76%**	
Months to harvest		**4**	**3**	
		0	0	
Yielding Plants	601877.25	601,877	31,912	**633,790**
Average Weight Harvested, Kg		**0.06**	**1.00**	
	J$/kg			
Yield, Grade 1	120.00	**60%**	**60%**	
Yield Grade 2	90.00	**40%**	**40%**	
Yield, Kg's:				
Grade A		22,390	19,147	
Grade B		14,927	12,765	
Total		**37,316**	**31,912**	69,229
Crop Revenues		**4,030,170**	**3,446,539**	**7,476,709**
	Per HA or Plant			
Establishment Costs	1,119,310	639,606	479,704	**1,119,310**
Cultivation Costs	7.92	1,182,632	758,526	**1,941,158**
Total Growing Costs		**1,822,237**	**1,238,230**	**2,780,833**
Harvest, Packing and Haulage Cost	**34.61**	**1,291,694**	**1,104,637**	**2,396,331**
Operating Margin		**2,207,933**	**1,103,672**	**3,311,605**
OM%		**55%**	**32%**	**44%**
	Total Harvest kgs	74,633	638,248	712,881
Planned Harvest for 2016		**2.00**	**20.00**	**22.00**
Revenues		8,060,340	68,930,784	76,991,124
Cost		6,227,862	46,857,342	53,085,204
Gross Margin		**1,832,478**	**22,073,442**	**23,905,920**
Administration Costs/Farm overheads		-	12,260,952	12,260,952
EBIDTA		**1,832,478**	**9,812,490**	**11,644,968**
		23%	14%	15%
ROI		29%	17%	17.8%

Cost Assumptions:	
Cost to Prepare 1 HA land	**1,119,310**
Cost to Cultivate 1 ha of plants	**1,919,750**
Cost/t slaeable/Month	**7.92**
HP & Distribution Cost/Kg	**34.61**

Share Grade A Sold at:	
180	**60%**
160	**40%**
Wgted. Ave. Grade A Sell Price	**172**
Grade B Sold at	**140**

Build up to Saleable Fruit:	**1st**	**2nd**
% Plants making it to baring	**95%**	**80%**
% of fruits harvested and useful	**95%**	**95%**
Overall % Saleable	**90%**	**76%**

Basic IRR - 5 year life no residual value, cost saving only (i.e no incremental acres, no review of yield improvements)

Equipment	Cash outflow				Annual Cost Saving/(Addition) (J$000s)					**Basic Pre Tax IRR** 5 year life, no residual value
	USD Cashflow (incl GCT)	Net Cost (USD)	Add 10% Conting	**Net Cost J$000s @116**	Labour	Equipt Rent	Other	Less Annual Operating Cost	**Net**	
Land Prep										
2 Row planter	5,928	5,200	5,720	**755**	800			-50		
Crop Topper-Flail mower	5,928	5,200	5,720	**755**	370			-50		
Chain Harvester	16,758	14,700	16,170	**2,134**	8,211.00			-50		
Seed Planter	5,928	5,200	5,720	**755**	1065			-25		
Irrigation Kit	103,030	103,030	113,333	**14,960**	5,800			-100		
	137,572	133,330	33,330	**17,600**	16,246	-	-	(275)	**15,971**	**87%**
Sweet Potato washing& packing line		53,250	58,575	**7,205**	10,000	0	0	(4,144)	**5,856**	**77%**
Cold Storage and Install.		43,050	47,355	**5,825**	-	0	23,219	(1,116)	**22,102**	**379%**
Overall Mechanisation project				30,629	26,246	-		(5,536)	43,929	**142%**

Key Points

- Crop Cycle 90 days
- Cash conversion cycle minimum 120 days to 160 days requiring working capital accordingly for 2 cycles
- Considering a 500t/annum SP supply chain:
  - *Investment capital 30M (Fixed),*
  - *Working Capital 46M (Cultivation start up boxed to consumer)*
- ROI 2.5% (conservative), 17.5% (realistically optimistic)
- Economic Return on 3 crop cycles in a year
- Invested capital of 30M could be paid for in 2 crop cycles

Thank You