APPENDIX

TABLE A 2.1 : Sweet sorghum syrup production and composition as affected by the stage of maturity at harvesting (Stokes et al. 1957).

Stage of maturity	Percent Extraction	Percent Sucrose	Percent Purity	Litres of syrup / ton of stalk
Early flowering	57.3	4.70	41.9	50.8
Flowering	57.8	5.64	46.7	62.1
Late Flowering	58.0	6.92	52.7	67.5
Grain early milk	58.5	8.86	60.1	76.5
Late milk	57.5	9.57	63.0	77.9
Dough	57.9	10.28	65.2	80.1
Hard dough	56.8	10.94	67.0	82.4
Ripe	56.2	11.29	68.3	82.8
Post ripe 1 week	55.7	10.64	67.4	78.3
Post ripe 2 weeks	56.1	10.11	66.6	75.6
Post ripe 3 weeks	54.4	9.32	63.6	71.1

TABLE A 2.2 : The effect of stage of maturity of sweet sorghum cane and of delay of milling on the sugar composition of sweet sorghum juice (Jonson et al., 1961)

		% of sugar on a dry matter basis			
Variety	Stage of maturity cane when cut	Time of extraction	Reducing sugars	Sucrose	Total sugars
Brawley	Soft dough	Immediately after cutting	25.5	57.4	82.9
Tracy	"	"	57.9	19.3	77.2
Sart	"	"	25.7	57.9	83.6
Williams	"	"	47.3	41.1	88.4
Honey	"	"	48.2	37.9	86.1
Sugar	"	"	26.9	57.9	84.8
Brawley	soft + 10 days	"	13.2	68.8	81.9
Tracy	"	"	51.0	30.7	81.7
Sart	"	"	45.7	30.5	76.2
Williams	"	"	37.5	35.7	73.2
Honey	"	"	36.9	35.8	72.7
Sugar	"	"	26.3	51.7	78.0
Brawley	soft dough	10 days after cut.	33.9	44.2	78.1

TABLE A2.3 Performance of three Texan varieties and a local variety in a trail at Dalton (Inman-Bamber,1980).

Variety name	**Roma**	**Ramada**	**Rio**	**PNR989**
Yield Components				
Age (months)	5.0	4.6	4.6	4.6
Fibre % stalk	14.2	14.9	15.9	18.6
Dry matter % stalk	27.3	25.5	27.8	21.1
Sucrose % stalk	9.3	6.0	9.0	0.4
ERS % stalk	6.7	2.8	6.7	-
Juice Purity %	71.2	55.6	75.3	16.3
Stalk population ('000/h)	88.0	92.0	80.0	-
Stalk length (m)	2.38	1.74	1.42	2.05
stalk yield (t/ha)	37.0	20.0	14.0	25.0
DM yield (t/ha)	10.0	5.1	3.9	5.3
Sucrose yield (t/ha)	3.4	1.2	1.3	-

Table A3.1 Details of the seedlots of the sixty six different sweet sorghum landraces collected from Botswana.

Code	Production area	Harvesting date	Harvesting Stage	Seed treatment	Seed Storage
A	Mushana	Feb., 1997	Milk	ash	plastic bags
B	Tlokweng	April, 1997	Milk	ash	plastic bags
C	Kgagodi	April, 1996	Dough	ash	plastic bags
D	Gobojango	April, 1997	Milk	ash	plastic bags
E	Maunatlal	March, 1997	Milk	ash	tin
F	Kgagodi	April, 1996	Dough	ash	sack
G	Sefare	April, 1997	Milk	ash	plastic bags
H	Mokgomane	April, 1997	Milk	none	plastic bags
I	Semolale	May, 1997	Milk	ash	sack
J	Shakawe	April, 1996	Milk	none	plastic bag
K	Madinare	March, 1997	Milk	none	plastic bag
L	Machaneng	April, 1997	Milk	none	tree shade
M	Sefare	May, 1997	Dough	none	tree shade
N	Machaneng	May, 1997	Milk	none	floor drying
O	Maunatlala	May,1997	Dough	none	plastic bag
P	Tautsure	April, 1997	Milk	ash	plastic bag
Q	Machaneng	May, 1997	Milk	none	tree shade
R	Gobojango	April, 1997	Milk	ash	seed bag
S	Gobojango	May, 1997	Milk	none	tree shade
T	Madinare	April, 1997	Milk	ash	plastic bag
U	Sefophe	April, 1996	Milk	none	tree shade
V	Sefophe	April, 1996	Milk	ash	seed bag
W	Sefophe	April, 1997	Milk	none	plastic bag
X	Matebeleng	April, 1997	Milk	none	tree shade
Y	Otse	April, 1996	Milk	ash	plastic cont.
Z	Thamaga	May, 1997	Milk	ash	plastic bag
A1	Thamaga	April, 1997	Milk	none	tree shade
B1	Malolwane	April, 1996	Milk	ash	tin
C1	Malolwane	April, 1996	Milk	ash	tin
D1	Iyaiyane	May, 1997	Milk	none	tree shade
E1	Malolwane	April,1996	Milk	ash	plastic bag
F1	Matebeleng	April, 1997	Milk	none	roof drying

Code	Production area	Harvesting date	Harvesting Stage	Seed treatment	Seed Storage
G1	Logaganeng	May, 1997	Milk	none	roof drying
H1	Tutume	May, 1997	Milk	none	roof drying
I1	Zwenshambe	May, 1997	Milk	none	roof drying
J1	Gabane	April, 1996	Milk	ash	plastic bag
K1	Mapoka	May, 1997	Milk	none	roof drying
L1	Siviya	April, 1997	Milk	none	roof drying
M1	Logaganeng	April, 1997	Milk	none	roof drying
N1	Mathubulukwane	May, 1997	Milk	ash	tin
O1	Mmogobane	March, 1997	Milk	none	plastic bag
P1	Mokgomane	April, 1997	Milk	none	plastic bag
Q1	Siviya	April, 1997	Milk	none	roof drying
R1	Tutume	April, 1997	Milk	none	roof drying
S1	Mapoka	May, 1997	Milk	none	roof drying
T1	Sebina	April, 1997	Milk	ash	plastic cont.
U1	Tutume	April, 1997	Milk	none	floor drying
V1	Siviya	April, 1997	Milk	ash	plastic bagg
W1	Siviya	April, 1997	Milk	none	roof drying
X1	Gamagangwa	April, 1997	Milk	ash	plastic bag
Y1	Malolwane	March, 1996	Milk	ash	tin
Z1	Mathubulukwane	April, 1997	Milk	none	tree drying
A11	Moroka	May, 1997	Milk	none	roof drying
B11	Sebina	May, 1997	Milk	none	tree drying
C11	Mokgomane	April, 1997	Milk	none	tree drying
D11	Sebina	May, 1997	Milk	none	tree drying
E11	Tutume	May, 1997	Milk	none	roof drying
F11	Mogomane	April, 1997	Milk	none	tree drying
G11	Mogomane	April, 1997	Milk	ash	sack
H11	Mogomane	April, 1997	Milk	ash	sack
I11	Thutayaseko	April, 1997	Milk	ash	sack
J11	Mmsebele	April, 1997	Milk	none	floor drying
K11	Matebeleng	May, 1997	Milk	none	floor drying
L11	Oodi	April, 1997	Milk	none	floor drying
M11	Moshana	May, 1997	Milk	none	drum drying
N11	Zwenshambe	May, 1997	Milk	none	tree drying
O11	Moroka	April, 1997	Milk	none	floor drying

Code	Production area	Harvesting date	Harvesting Stage	Seed treatment	Seed Storage
P11	Sebina	April, 1996	Milk	none	tree drying.

Table A4.1: Standard germination test for dried untreated seeds and dried prechilled seeds

Grain sorghum			Sweet sorghum	
DAA	Untreated seeds germination (%)	Treated seeds germination (%)	Untreated seeds germination %)	Treated seeds germination (%)
20	12.5	55.5	12.5	12.0
25	13.0	69.5	26.5	48.5
30	17.0	51.5	15.0	26.5
35	29.5	36.5	5.0	55.0
40	21.5	63.5	12.0	71.0
45	21.5	82.0	35.5	99.0
50	25.0	97.5	31.0	98.0
55	26.5	99.0	57.5	98.0
60	69.5	90.0	21.0	98.5
65	37.5	98.5	54.0	93.5
70	61.5	98.0	54.0	98.5
75	80.0	96.0	65.5	80.0
80	76.5	98.0	49.0	84.0

Table A 5.1 Soil Characteristics of the experimental site

South African classification	Suurbekom family ; Hutton form
USDA Soil Taxonomy System	Loamy, mixed, thermic Rhodic Kandiudalf
Clay content	Ap=23%: B21=39%; B22=44%
Silt	14 %
Water holding capacity in the 1.2 m of soil	134 mm
pH in the top 0.2 m soil	6.0
Chemical analysis : P	21 mg kg^{-1}
: K	480 mg kg^{-1}
: Ca	126 mg kg^{-1}
: Mg	255 mg kg^{-1}

Source: Nel *et al*, 1996. Trends in maize grain yields in a long-term fertilizer trial. Field Crops Research. **47** : 53-64.

Table A5.2 Meteorological data for 1996/97 to 1998/99 growing seasons in the Experimental Farm.

RAINFALL (mm)						TEMPERATURE (°C)							
Months	**1996**	**1997**	**1998**	**1999**	**Long Term**	**1996**		**1997**		**1998**		**1999**	
						Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Jan		115.4	135.2	269.6	**121.6**			17.0	27.1	16.7	27.4	16.5	27.6
Feb		34.8	120.5	213.8	**92.6**			16.6	28.9	16.7	28.5	16.3	29.3
Mar		327.0	69.4	154.2	**86.1**			15.2	23.5	16.1	28.3	15.8	28.1
Apr		49.7	1.5	72.2	**51.2**			10.1	21.9	12.5	26.8	12.1	25.5
May		103.6	0.0	16.2	**21.7**			6.6	19.2	5.8	21.6	8.5	21.3
June		0.0	0.0	9.7	**8.9**			3.5	19.8	3.5	21.4	4.6	19.9
July	2.3	0.0	0.0		**8.4**	3.4	17.2	4.8	18.7	5.1	20.1		
Aug	3.8	0.0	0.0		**5.9**	6.7	20.3	7.4	22.7	6.6	21.9		
Sep	0.1	41.1	40.7		**20.9**	10.4	25.6	11.8	24.0	11.3	25.3		
Oct	72.8	23.4	50.0		**63.4**	14.3	27.5	12.7	25.4	13.1	24.6		
Nov	60.5	126.6	45.2		**109.3**	14.7	25.8	14.5	26.9	14.8	26.3		
Dec	139.6	98.7	148.4		**116.9**	15.8	26.7	16.0	27.8	15.4	25.5		

Table A6.1 Summary of ANOVA table for effect of deheading and floret removal of sweet sorghum inflorescence on the juice quality (SASA)

Source										
	Stalk Fibre %		Brix %		Purity %		Pol %		Suc %	
	df	F-prob.	df	F-prob.	df	F-prob.	df	F-prob.	df	F-prob.
Treatment	4	0.330	4	0.0030	4	0.0023	4	0.0029	4	0.0159
Rep	3	0.150	3	0.1262	3	0.0451	3	0.0451	3	0.3399
Error	12		12		12		12		12	
Total	19		19		19		19		19	
C.V.(%)		6.393		6.670		5.801		11.568		16.472

Table A7. 1 Summary of ANOVA table for the main effect of planting date and spacing on the juice quality of sweet sorghum (SASA)

Source										
	Stalk Fibre %		Brix %		Purity %		Pol %		Suc %	
	df	F-prob.	df	F-prob.	df	F-prob.	df	F-prob.	df	F-prob.
Treatment										
Spacing	2	0.3489	2	0.7057	2	0.4005	2	0.4560	2	0.2654
Planting date	2	0.0075	2	0.1584	2	0.0001	2	0.0001	2	0.0001
Spa. X Date	4	0.3580	4	0.9760	4	0.7784	4	0.9586	4	0.5846
Rep	2	0.8396	2	0.8332	2	0.0431	2	0.2826	2	0.3105
Error	16		16		16		16		16	
Total	26		26		26		26		26	
C.V.(%)	7.68		8.21		9.49		15.08		20.47	

Table A7.2 Summary of ANOVA table for effect of planting date and spacing on the stem and leaf components of sweet sorghum

Source										
	Stem fresh mass		stem dry mass		moisture content		Stem thickness		No of Tillers	
	df	F-prob.	df	F-prob.	df	F-prob.	df	F-prob.	df	F-prob.
Treatment										
Spacing	2	0.0056	2	0.0001	2	0.0001	2	0.1488	2	0.0015
Planting date	2	0.0174	2	0.0063	2	0.6073	2	0.0240	2	0.0680
Spa. X Date	4	0.6456	4	0.5209	4	0.5255	4	0.6958	4	0.1351
Rep	2	0.6839	2	0.0615	2	0.1906	2	0.8288	2	0.9635
Error	16		16		16		16		16	
Total	26		26		26		26		26	
C.V.(%)	40.762		26.531		2.539		11.042		45.31	

Table A7.3 The main effect of planting date on the stem fresh & dry mass, stem moisture content, number of tillers, plant height and mainstem thickness at boot stage

Treatment	Stem fresh mass per plant (g)	Stem dry mass per plant (g)	Leaf fresh mass per plant (g)	Leaf dry mass per plant (g)	Leaf area per plant (cm)	Mainstem height (cm)	Stem thickness (cm)	Number of tillers per plant
Planting date								
T1	1151.8a	236.0a	290.4a	106.1a	7338.7a	2.9a	3.1a	8.6a
T2	1058.6a	171.0b	186.3b	66.3b	5765.8a	2.3b	2.2b	7.8b
T3	865.1a	139.7b	180.0b	63.7b	5558.1a	2.1b	1.8b	7.8b
Spacing								
S1	1277.7a	233.7a	287.3a	98.6a	7054.3a	2.4a	3.1a	8.4a
S2	980.9a	166.8b	206.1b	76.1ab	5985.6a	2.4a	2.5a	8.2a
S3	816.9a	146.1b	163.3b	61.4b	5122.6a	2.5a	1.5b	7.6b
Mean	1025.2	182.2	218.9	78.7	6054.2	2.4	2.4	8.1
C.V.%	39.2	25.0	23.5	27.3	33.0	7.3	24.6	5.1
LSD	488.3	55.4	62.5	26.1	2433.0	0.2	0.71	0.5

TABLE A7.4 The effect of planting date on the stem fresh and dry mass, leaf fresh and dry mass and leaf area, plant height, stem thickness and number of tillers at panicle initiation stage

Treatment	Stem fresh mass per plant (g)	Stem dry mass per plant (g)	Leaffresh mass per plant (g)	Leaf dry mass per plant (g)	Leaf area per plant (cm)	Mainstem height (cm)	Stem thickness (cm)	Number of tillers per plant
Planting date								
T1	93.9b	6.6b	51.2b	7.8b	1844.7b	1.0b	3.3a	5.6b
T2	98.5b	9.5b	56.4b	10.1b	1507.3b	1.1ab	1.9b	6.6a
T3	212.8a	27.2a	107.3a	21.9a	3586.1a	1.2a	4.4a	6.8a
Spacing								
S1	144.8a	15.8a	65.2a	12.0 a	2032.6 a	1.2a	6.4a	2.0b
S2	130.6a	13.1a	66.4a	11.8 a	2344.8 a	1.1ab	6.2a	3.5a
S3	130.6a	14.3a	83.3a	16.0 a	2560.7 a	1.0ab	6.4a	4.0a
Mean	135.1	14.4	71.6	13.3	2312.7	1.1	6.3	3.2
C.V. %	23.7	24.3	30.7	30.5	29.3	12.3	10.5	35.1
LSD	38.9	4.3	26.8	4.9	824.6	0.2	0.8	1.4

TABLE A8.1 The effects of nitrogen, spacing and landrace treatments on number of leaves, leaf area, leaf dry mass, and mainstem height

Treatment	Number of leaves per plant	Leaf area per plant (cm ²)	Leaf dry mass per plant (g)	Mainstem height (cm)
Nitrogen				
N0	25.8c	5576b	56.0c	317a
N1	30.1ab	7605a	74.0a	307a
N2	26.6bc	6376ab	58.3bc	301a
N3	31.6a	7482a	66.6bc	318a
L.S.D.	4. 3	1515.4	8.95	25.3
Spacing				
S1	23.0b	4791b	45.4b	316a
S2	34.1a	8728a	82.0a	315a
L.S.D	2.3	809.0	4.78	0.11
Landraces				
L1	24.9b	5615b	53.2b	304b
L2	32.2a	7905a	74.2a 4.8	327a
L.S.D	2. 3 15.97	809	14.9	0.11
C.V.%		23.8		6.8

+ Means followed by different letters are significantly different at the 5% level by Tukey's Multiple Range Test.

Treatments: N0 = Control (zero nitrogen), N1 = 60kgN/ha (early application), N2 =120kgN/ha (early application), N3 = 60 kg N/ha (late application), S1 = 15 cm, S2 = 30 cm, L1= early maturing landrace, L2 = late maturing landrace

TABLE A8. 2 Interaction between nitrogen H spacing on stem fresh mass, stem dry mass and pol%

Attributes	Stem fresh mass per plant (g)		Stemdry mass per plant (g)		Pol %		Leaf area per plant cm²)		Leaf dry mass per plant (g)	
Spacing	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Nitrogen										
N0	1018.2	1853.2	256.5	433.8	4.3	6.2	4256	6896	40.5	71.6
N1	1178.8	2326.8	295.2	563.1	6.8	6.9	4739	10470	46.7	101.1
N2	1276.9	1790.7	312.0	430.9	5.6	6.6	5303	7449	48.4	68.2
N3	1199.2	2023.4	294.5	497.2	6.6	7.0	4867	10097	46.0	87.2
	**	**	**	**	**	**	**	**	**	**

**** significant at 0.01%**

TABLE A8. 3 Interaction between nitrogen H landrace on pol % and juice purity %

Attributes	Pol %		Purity %	
Landraces	L1	L2	L1	L2
Nitrogen				
N0	5.1	5.4	39.3	36.4
N1	6.4	7.6	55.1	42.7
N2	4.7	7.3	51.7	33.0
N3	5.9	7.5	51.1	40.0
	**	**	**	**

**** significant at 0.01%**

TABLE A 8. 4 Interaction between landrace H Spacing on leaf area, leaf dry mass and number of leaves

Treatment	leaf area per plant (cm ²)		leaf dry mass per plant (g)		number of leaves per plant	
Spacing	S1	S2	S1	S2	S1	S2
Landraces						
L1	4129.58	7099.87	37.71	68.66	20.88	29.00
L2	5452.79	10356.34	53.05	95.39	25.19	39.13
	**	**	**	**	**	**

**** significant at 001%**

TABLE A8. 5 Interaction between nitrogen H landrace H spacing on sucrose, brix dry mass, leaf dry mass, and number of leaves on final harvest

Treatments				
Nitrogen	Landraces	Spacing	Leaf dry mass per plant (g)	No of leaves per plant
N0	L1	S1	36.5	19.8
N0	L1	S2	50.1	23.5
N0	L2	S1	44.5	22.0
N0	L2	S2	93.1	38.0
N1	L1	S1	41.7	23.3
N1	L1	S2	79.3	28.8
N1	L2	S1	51.8	23.5
N1	L2	S2	122.9	45.0
N2	L1	S1	37.4	20.8
N2	L1	S2	64.3	28.5
N2	L2	S1	59.4	26.8
N2	L2	S2	72.0	30.5
N3	L1	S1	35.3	19.8
N3	L1	S2	80.9	35.3

Treatments				
N3	L2	S1	56.6	28.5
N3	L2	S2	93.5	43.5
			**	**

** significant at 0.01%

Table A8.6 Summary of ANOVA table for effect of planting date and spacing on the stem and juice components of sweet sorghum

Source								
	Stem fresh mass		Stem dry mass	Number of tillers	Stem fibre	Pol %	Brix %	Purity %
	df	Prob.	F-prob.	F-prob.	F-prob.	F-prob.	F-prop.	F-prob.
Treatment								
Nitrogen	3	0.0551	0.0160	0.1206	0.0011	0.0001	0.1002	0.0001
Landrace	1	0.0001	0.0001	1.0000	0.0001	0.0001	0.0001	0.0001
Spacing	1	0.0001	0.0001	0.0001	0.0748	0.0001	0.0021	0.0001
Rep	3	0.5564	0.2429	0.0560	0.7034	0.1794	0.4902	0.1097
N x LR	3	0.2528	0.4459	0.1462	0.2276	0.0001	0.0260	0.0016
N x SP	3	00675	0.0479	0.0933	0.2245	0.0056	0.7928	0.2008
LR x SP	1	0.2809	0.1760	1.0000	0.9888	0.3230	0.8032	0.6091
N x LR x SP	3	0.0010	0.0395	0.1131	0.5507	0.0023	0.9170	0.2342
Error	45							
Total	63							
C. V. (%)	20.481		18.989	26.893	8.896	11.274	5.322	12.676