2017 Annual Report

PARLIAMENT OF FIJI
PARLIAMENTARY PAPER NO. 170 OF 2019

FOREWORD

Major rehabilitation of cane farms was carried out in 2017 after the devastation caused by tropical cyclone Winston previous year. There was an increase in the area planted compared to previous years. The development of new varieties is a very passionate work that requires a lot of patience. Theoretically, it would take 12 years to develop a new variety but practically it takes much longer. New varieties are developed from sugarcane flowers by a process called crossing. In 2017, 219 crosses were made which is far less than what would usually be made in a year. This was due to the massive damages to the flowering beds at Dobuilevu. A total of 1,784 packets of fuzz were sown and this was from the previous year's stock. Poor germination of fuzz was noticed and only 156 packets germinated producing 4,000 seedlings. The evaluation and selection of varieties in the different stages of the plant breeding program were carried out with some difficulties. 423 varieties were selected from stage 1 and advanced to stage 2, 88 varieties were advanced from stage 2 to stage 3 and 12 varieties were selected from stage 3 and progressed to stage 4.

Nine nutrient budget trials were established to study the cost benefit of the agronomic practices and six sites were selected to collect information on fertilizer use and behaviour in the Fiji Sugar Industry. The analytical laboratory analyses soils from farmers' fields and provides fertilizer recommendations to the farmers and in 2017, 2075 soil and 45 plant samples were analysed for fertilizer recommendations and research trials. In addition 1,093 cane samples were analysed from the Research trials.

The Institute is responsible to protect the industry against diseases and pest incursions. Routine screening of Fiji leaf gall (FLG) disease continued during the year. Three hundred eighty soil samples from the four mill areas were analysed for plant parasitic nematodes. The rouging team based at the four mills inspected 2813 farms covering an area of 8363 hectares and removed 747 diseased FLG stools. Fiji is the only country in the world that has not been affected by SMUT disease. An incursion plan in collaboration with the Biosecurity has been put in place to encounter this disease.

The transfer of information to the growers is delivered through the Technology Transfer program wherein grower demonstration trials, field information days and meetings are held with groups of growers or individually. In 2017 another initiative was launched called Cane Development Programme. Under this program nil producers are provided with the technical support to get back into farming. The Institute staff were assigned a certain number of growers under this program and advice was provided to the nil producers to plant cane.

My sincere appreciation to all the staff for their valuable contribution towards the progress of the Institute and I also thank the Chairman and other board members for their guidance and support.

Acting Chief Executive Officer
Prem N Naidu

MISSION STATEMENT

Board Members

Professor Rajesh Chandra - Chairman (re-appointed 2 March 2018)
Dr K.S Shanmugha Sundaram (term expired on 1 March 2018)
Professor Paras Nath (resigned on 7 December 2017)
Mr Daniel Elisha (term expired on 1 March 2018)
Mr Abdul Khan (resigned on 18 July 2017)
Mr Sundresh Chetty (term expired on 1 March 2018)
Mr Manasa Tagicakibau (resigned on 18 July 2017)
Mr Graham Clark (appointed 18 July 2017)
Ms Reshmi Kumari (appointed 18 July 2017)
Dr Sanjay Anand (appointed on 7 December 2017)
Mr Raj Sharma (appointed on 12 June 2018)
Mr Ashween Nischal Ram (appointed on 18 June 2018)
Professor Ravendra Naidu (appointed on 13 March 2018)

Science Audit Committee Members

Dr. Shanmugha Sundaram
Mr. Sundresh Chetty
Mr. Graham Clark
Dr Paras Nath
Mr. Abdul Khan
Dr. Sanjay Anand

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ABBREVIATIONS

SRIF	-	Sugar Research Institute of Fiji
FSC	-	Fiji Sugar Corporation Ltd
SIT	-	Sugar Industry Tribunal
SCGC	-	Sugar Cane Growers Council
SCGF	-	Sugar Cane Growers Fund
MoS	-	Ministry Of Sugar
SPF	-	South Pacific Fertilisers
FMS	-	Fiji Meteorological Services
EU	-	European Union
CIRAD	-	Centre de coopération internationale en recherche agronomique pour le
POCS or pocs	-	Pure obtainable cane sugar
NPK	-	Nitrogen, Phosphorus, Potassium
N	-	Nitrogen
P	-	Phosphorus
K	-	Potassium
RCBD	-	Randomized Complete Block Design
Rep	-	Replication
Trt or Trts	-	Treatment(s)
Tph or Tpha	-	Tonnes cane per hectare
Tsh or Tsha	-	Tonnes sugar per hectare
TC/TS or tc/ts	-	Tonnes cane per tonnes sugar (tonnes of cane required to produce 1 ton of sugar)
AVG./Avg.	-	Average
LF[YEAR]	-	Lautoka Fiji [year in which the fuzz was planted], e.g. LF2014
G x E	-	Genetic by Environment
FFE	-	Farmer Feel Effect
QBPS	-	Quality Based Payment Scheme
FSI	-	Fijian Sugar Industry
ASPAC	-	Australian Soil and Plant Analysis Council
LBC	-	Lime Buffering Capacity
FTIR	-	Frontier Transform Infra-Red
CQD	-	Cane Quality Department
IMG	-	Industry Management Group
UV-VIS	-	Ultra violet visible light spectrum
RMSECV	-	Root Mean Square Error of Cross validation
SOI	-	Southern Oscillation Index
ENSO	-	El Niño Southern Oscillation

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1.0 RESEARCH & DEVELOPMENT

1.1 METEOROLOGY

The Meteorological Stations at Sugar Research Institute of Fiji is equipped with a range of l instruments and maintained with the help of the Fiji Meteorological Service (FMS). The stations are located at its head office in Drasa, Lautoka, Rarawai, Labasa and Penang. . The climatological stations are manned by observers who take climate readings of temperatures (dry, wet, maximum and minimum, earth temperatures at 5cm, 10cm and 50cm, rainfall, amount of cloud, visibility and wind force and direction) at 9am daily.

At the end of each month, data is compiled and forwarded to the Fiji Meteorological Service (FMS). Similarly, rainfall figures from each sector from the eight districts are compiled and kept for our records. The climatic data is used to produce climate summary and predicting of weather forecast for the country. The Research Institute provides a summary statement towards the Fiji Sugar Cane Rainfall Outlook which becomes an advice to farmers on possible farm activities such as land preparation, planting, cultivation, fertilizer application, weedicide application and harvesting from sugarcane belt areas.

El Niño Southern Oscillation (ENSO)

ENSO is an irregular cycle of persistent warming and cooling of Sea surface temperatures in the tropical Pacific Ocean. The warm extreme is known is El Niño and the cold extreme, La Niña. Scientists now refer to an El Niño event as sustained warming over a large part of central and eastern equatorial Pacific Ocean.

This warming is usually accompanied by persistent negative values of Southern Oscillation Index (SOI), a decrease in the strength or reversal of the trade winds, increase in cloudiness in the Pacific and a reduction in rainfall over most of Fiji which can, especially during moderate to strong events, lead to drought. La Niña is a sustained cooling of the Pacific Ocean. The cooling is usually accompanied by persistent positive values of SOI, and increase in strength of the trade winds, decrease in cloudiness and higher than average rainfall for most of Fiji with frequent and sometimes severe flooding, especially during the wet season (November to April).

Rainfall

Fiji enjoys a tropical maritime climate without extremes of heat or cold. The peak period for cyclones in the region is usually from November to April. The annual average rainfall is usually between the ranges 2000mm to 3000mm. From the table below, it can be seen that the total rainfall for all mills was either very close to or in the annual average rainfall range.

Table 1: 2017 Rainfall (mm) figures for All Mills

MONTH	Lautoka Mill		Rarawai Mill		Labasa Mill		Penang Mill	
	Rainfall (mm)	Rain Days	Rainfall (mm)	Rain Days	Rainfall (mm)	Rain Days	Rainfall (mm)	Rain Days
January	166	13	347	12	122	29	171	22
February	697	20	631	20	779	26	540	21
March	370	17	374	15	361	21	440	24
April	11	6	89	4	16	6	32	10
May	66	4	43	1	125	11	167	18
June	31	5	14	3	83	5	10.6	7

Table 1: 2017 Rainfall (mm) figures for All Mills CONT'D								
MONTH	Lautoka Mill		Rarawai Mill		Labasa Mill		Penang Mill	
	Rainfall (mm)	Rain Days	Rainfall (mm)	Rain Days	Rainfall (mm)	Rain Days	Rainfall (mm)	Rain Days
July	10	2	0	0	2	2	1.4	5
August	27	5	40	5	93	7	48.7	14
September	2	1	9	1	130	7	60.6	8
October	25	5	17	6	29	6	8.1	9
November	130	13	186	13	261	18	187.2	22
December	187	14	244	13	120	7	133.0	24
Total	1721	105	1993	93	2122	145	1799.1	184
Average	143	9	166	8	177	12	150	15

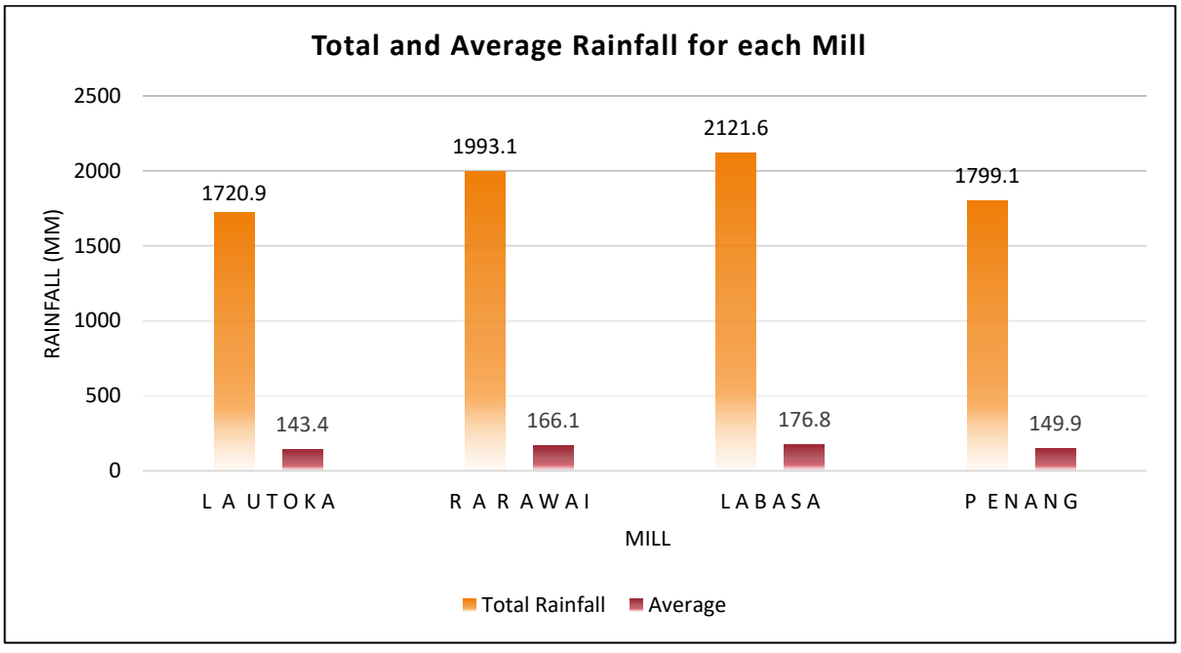
Table 2.1: Monthly Rainfall figures for Lautoka Mill with the Long Term Averages														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Monthly rainfall	166	697	370	11	66	31	10	27	2	25	130	187	1721	265
No. of rain days	13	20	17	6	4	5	2	5	1	5	13	14	105	16
47 yrs avg (1970-2016)	363	329	319	191	88	69	51	71	75	99	136	196	1987	306
% of avg	46	212	116	6	75	45	20	38	3	25	95	95	87	66.2

Table 2.2: Monthly Rainfall figures for Rarawai Mill with the Long Term Averages														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Monthly rainfall	347	631	374	89	43	14	0	40	9	17	186	244	1993	307
No. of rain days	12	20	15	4	1	3	0	5	1	6	13	13	93	14
47 yrs avg (1970-2016)	378	358	358	196	92	77	40	66	73	104	152	240	2135	329
% of avg	92	176	105	46	47	18	0	61	12	16	122	102	93	68

Table 2.3: Monthly Rainfall figures for Penang Mill with the Long Term Averages														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Monthly rainfall	171	540	440	32	167	11	1	49	61	8	187	133	1799	277
No. of rain days	22	21	24	10	18	7	5	14	8	9	22	24	184	28
47 yrs avg (1970-2016)	414	360	362	253	151	93	49	68	85	108	152	264	2358	363
% of avg	41	150	122	13	110	11	3	72	71	7	123	50	76	65

Table 2.4: Monthly Rainfall figures for Labasa Mill with the Long Term Averages														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Monthly rainfall	122	779	361	16	125	83	2	93	130	29	261	120	2122	326
No. of rain days	29	26	21	6	11	5	2	7	7	6	18	7	145	22
47 yrs avg (1970-2016)	389	365	363	237	107	75	49	55	76	119	183	257	2275	350
% of avg	31	214	99	7	117	111	4	171	172	24	143	47	93	95

Relook at year…average should be up to 2017



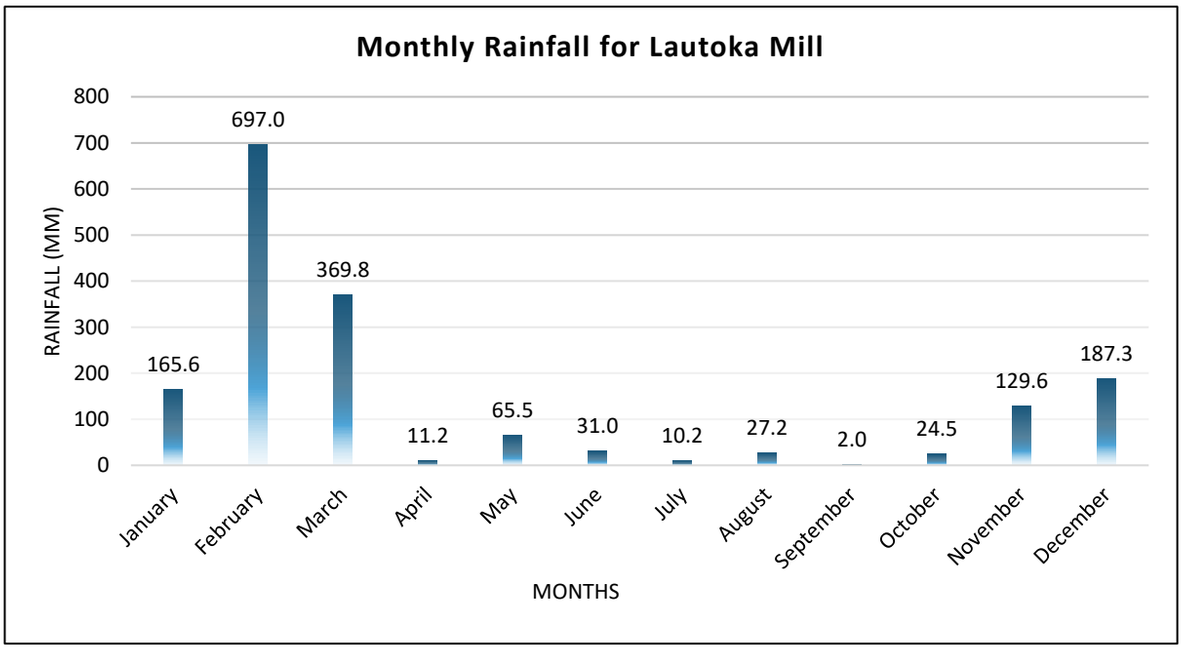
Graph 1: shows the total and the average rainfall figures for all the 4 mills.

The tables and graph above indicates the total and the average rainfall figures for all the sugar mills across the sugarcane belt areas. The highest rainfall of 779mm was recorded for the month of February at Labasa mill while the least rainfall of 0mm was recorded for the month of July at Rarawai mill.

Lautoka Mill

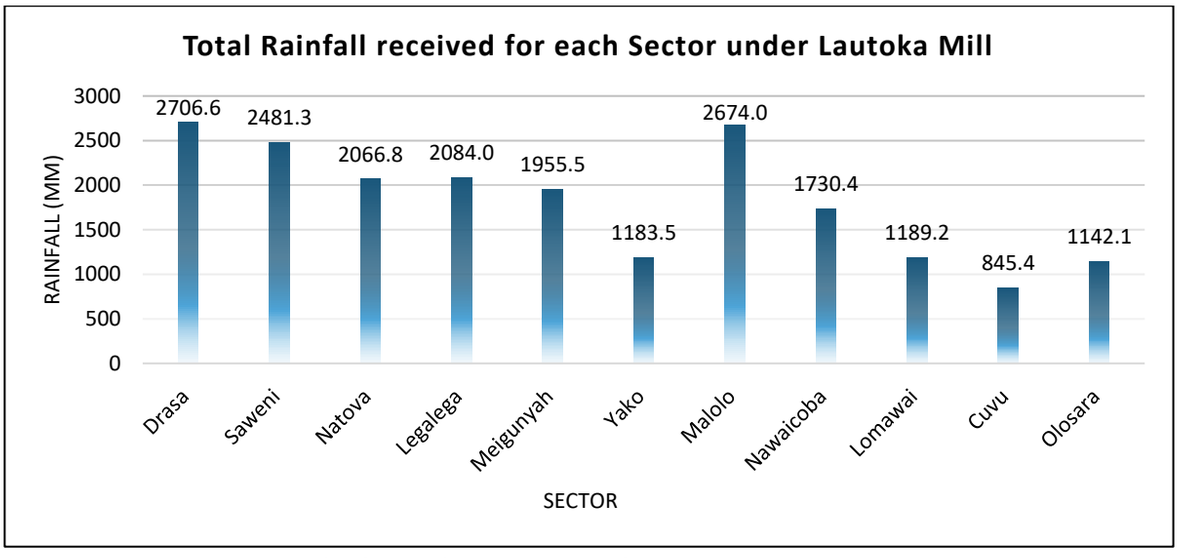
Table 3: Rainfall (mm) data for Lautoka Mill

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Rainfall (mm)	166	697	370	11	66	31	10	27	2	25	130	187	1721	143
Rain (days)	13	20	17	6	4	5	2	5	1	5	13	14	105	8.8

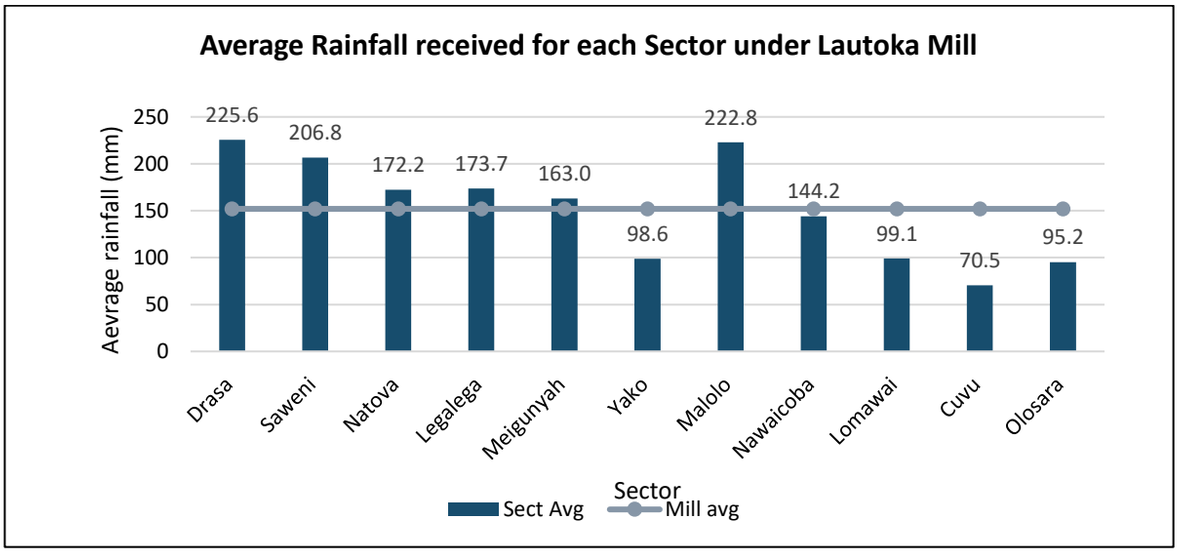


Graph 2: Shows the monthly rainfall received by Lautoka mill.

Table 4: Rainfall (mm) figures for each Sector of the Lautoka Mill														
Sector	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Sector Avg.
Drasa	349	1143	639	13	107	40	6	35	17	20	163	174	2707	226
Saweni	184	1368	478	29	99	1	15	62	14	0	116	114	2481	207
Natova	198	775	479	84	61	11	18	37	0	4	206	194	2067	172
Legalega	297	699	414	73	61	0	21	56	0	21	262	180	2084	174
Meigunyah	328	703	437	69	56	0	28	58	0	12	150	117	1956	163
Yako	172	508	246	57	6	0	23	7	8	0	109	50	1184	99
Malolo	428	1176	426	78	85	0	36	59	0	2	206	179	2674	223
Nawaicoba	368	785	289	45	29	0	20	38	9	16	100	32	1730	144
Lomawai	170	400	210	0	43	4	28	33	21	5	194	81	1189	99
Cuvu	83	293	121	12	94	0	35	55	16	18	69	50	845	71
Olosara	135	303	176	12	172	0	51	68	24	28	124	49	1142	95

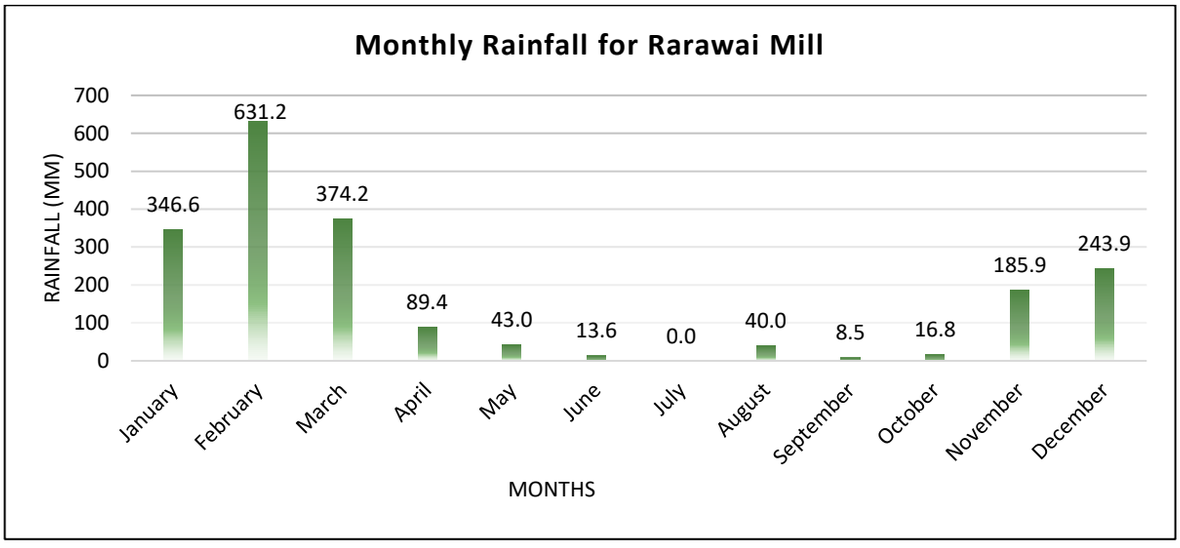


Graph 3: Shows the total rainfall figures for each sector of the Lautoka Mill



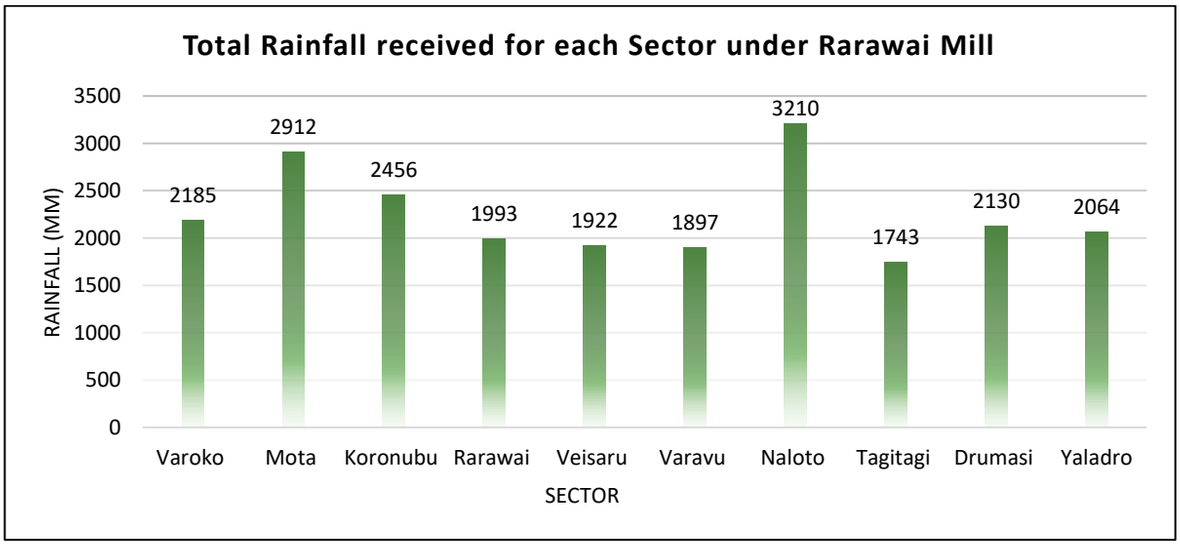
Graph 4: Shows the average rainfall figures for each sector and the *deviation compared to the overall mill average for Lautoka Mill*

Table 5: Rainfall (mm) data for Rarawai Mill														
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Rainfall (mm)	347	631	374	89	43	14	0	41	9	17	186	244	1993	166.3
Rain (days)	12	20	15	4	1	3	0	5	1	6	13	13	93	7.8

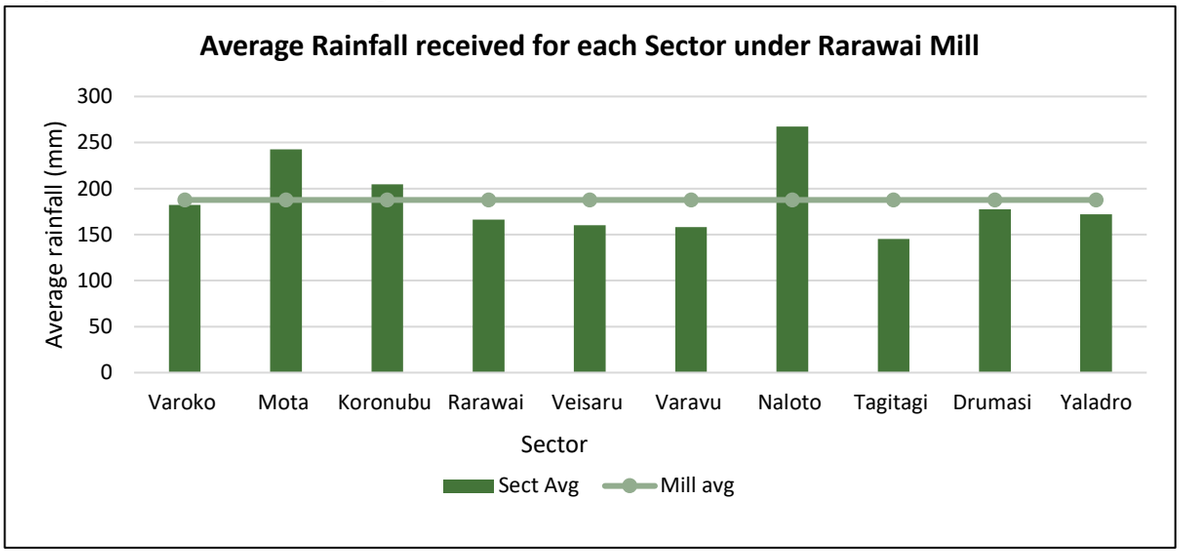


Graph 5: Shows the monthly rainfall received by Rarawai mill.

Table 6: Rainfall (mm) figures for each sector of the Rarawai Mill														
Sector	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Sect Avg.
Varoko	227	1011	315	37	59	12	0	50	14	39	183	238	2185	182
Mota	493	1069	673	72	78	0	0	43	18	44	222	200	2912	243
Koronubu	549	764	391	40	58	17	0	61	15	120	267	174	2456	205
Rarawai	347	631	374	89	43	14	0	40	9	17	186	244	1993	166
Veisaru	245	698	312	56	63	108	4	40	26	24	89	257	1922	160
Varavu	254	771	333	17	47	37	4	62	21	18	135	198	1897	158
Naloto	550	992	730	55	70	0	0	35	20	70	328	360	3210	268
Tagitagi	154	862	253	34	50	24	0	101	20	32	106	107	1743	145
Drumasi	322	920	356	30	45	18	0	34	30	36	142	197	2130	178
Yaladro	245	1013	348	57	47	18	0	41	29	8	136	122	2064	172

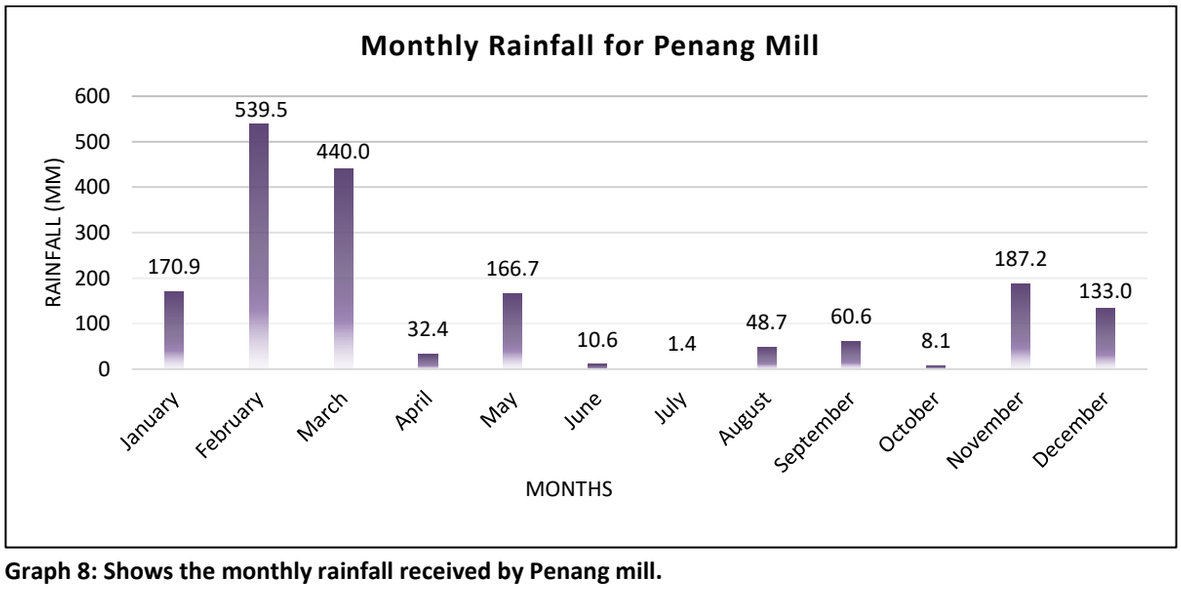


Graph 6: Shows the total rainfall figures for each sector of the Rarawai Mill



Graph 7: Shows the average rainfall figures for each sector and the deviation compared to the overall mill average for Rarawai Mill

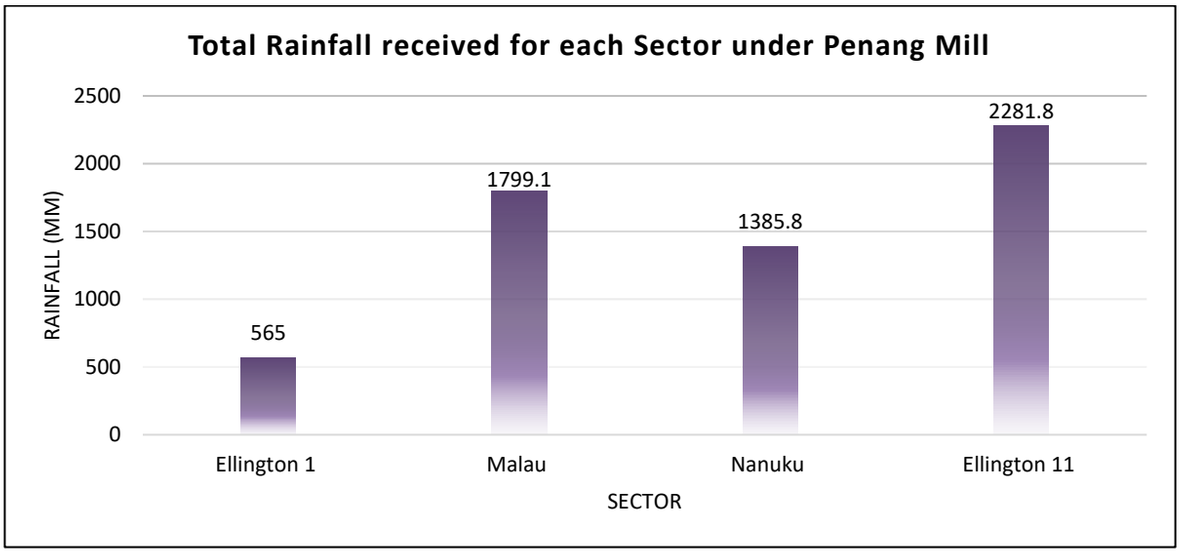
Table 7: Rainfall (mm) data for Penang Mill														
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Rainfall (mm)	171	540	440	32	167	11	1	49	61	8	187	133	1799	150
Rain (days)	22	21	24	10	18	7	5	14	8	9	22	24	184	15



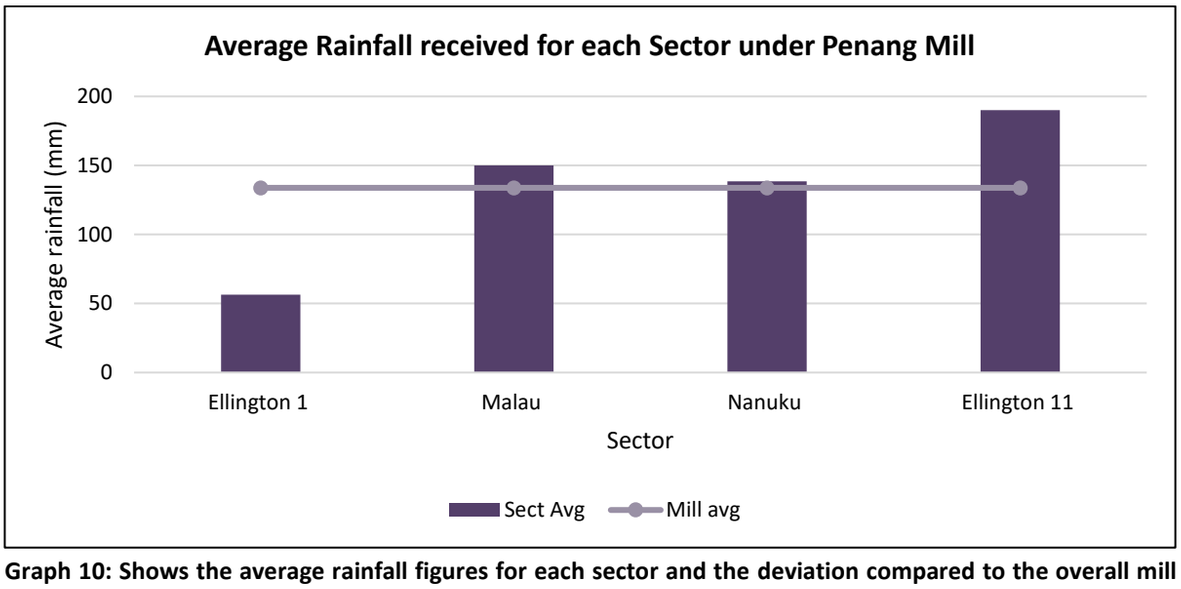
Graph 8: Shows the monthly rainfall received by Penang mill.

Table 8: Rainfall (mm) figures for each sector of the Penang Mill														
Sector	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Sect Avg
Ellington 1	45	162	115	20	77	38	14	15	25	53	NR	NR	565	57
Malau	171	540	440	32	167	10.6	1	49	61	8	187	133	1799	150
Nanuku	56	600	289	NR	83	8.2	NR	44	46	42	126	91	1386	139
Ellington 11	336	423	346	88	142	56	21	112	92	42	435	188	2282	190

Note: NR – no reading



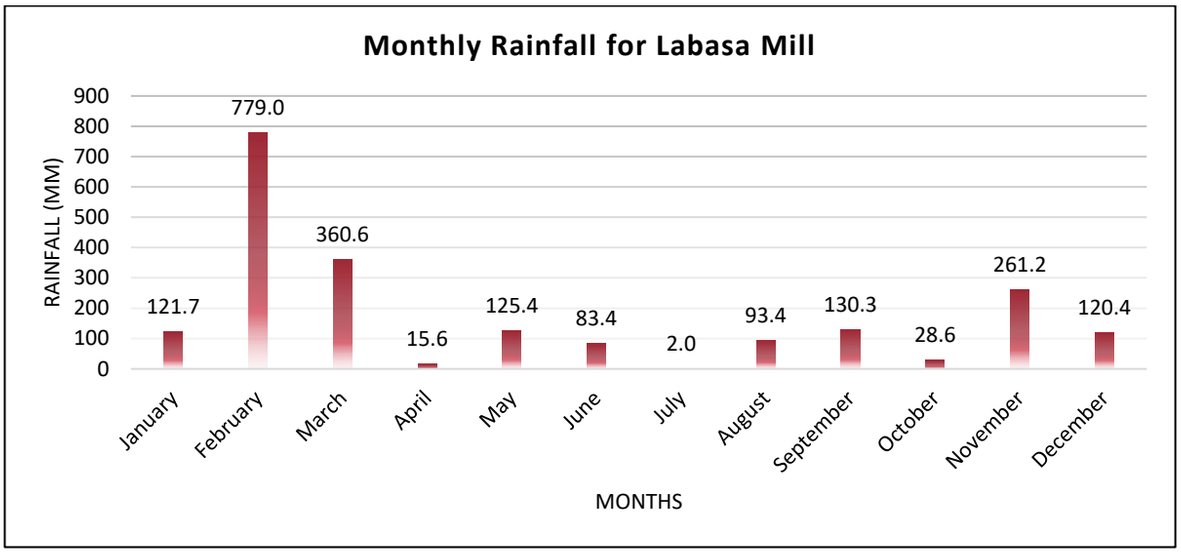
Graph 9: Shows the total rainfall figures for each sector of the Penang Mill



Graph 10: Shows the average rainfall figures for each sector and the deviation compared to the overall mill average for Penang Mill

Table 9: Rainfall (mm) data for Labasa Mill

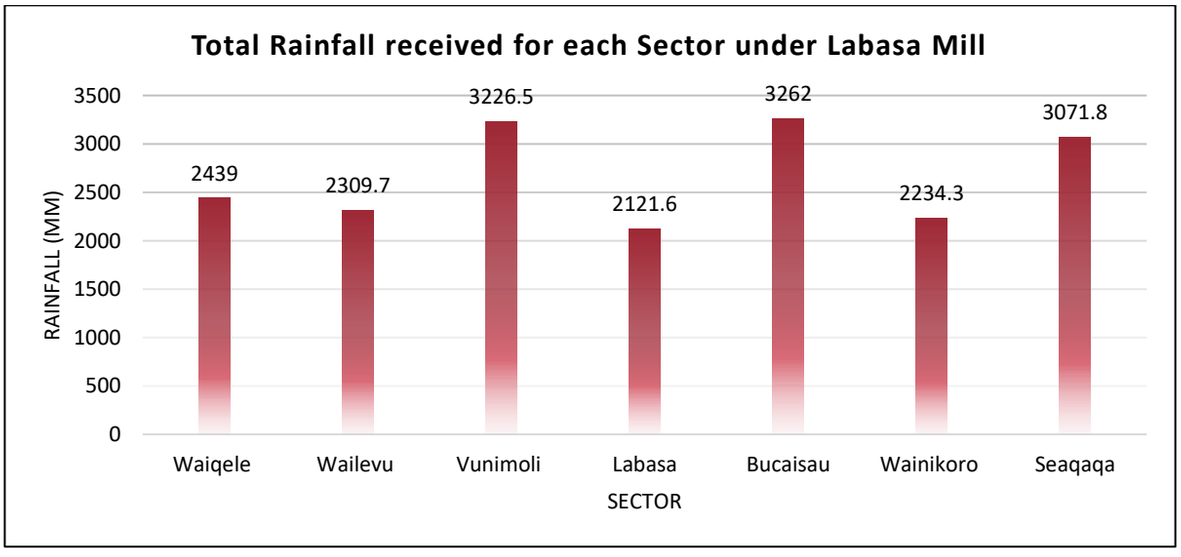
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Avg.
Rainfall (mm)	122	779	361	16	125	83	2	93	130	29	261	120	2122	176.8
Rain (days)	29	26	21	6	11	5	2	7	7	6	18	7	145	12.1



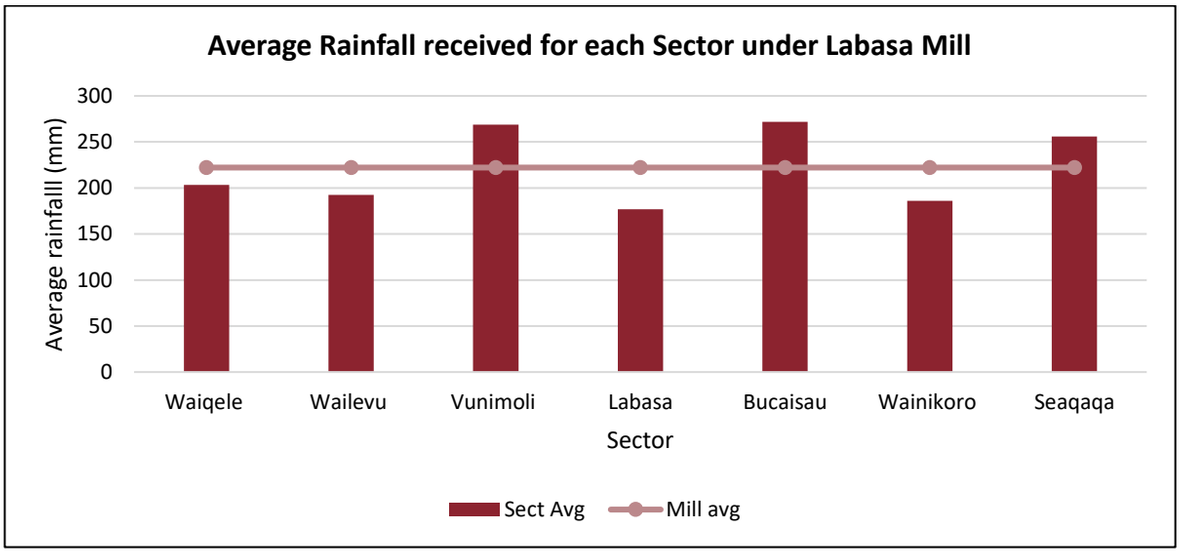
Graph 11: Shows the monthly rainfall received by Labasa mill.

Table 10: Rainfall (mm) figures for each sector of the Labasa Mill

Sector	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Sect Avg
Waiqele	316	800	359	43	98	27	8	96	41	62	327	263	2439	203.3
Wailevu	316	747	292	62	136	36	4	101	42	55	259	259	2310	192.5
Vunimoli	301	1073	611	65	179	82	7	73	69	80	298	390	3227	268.9
Labasa	122	779	361	16	125	83	2	93	130	29	261	120	2122	176.8
Bucaisau	350	875	352	814	85	56	3	142	32	77	272	204	3262	271.8
Wainikoro	233	741	378	53	103	55	0	131	44	58	225	213	2234	186.2
Seaqaqa	336	840	515	130	121	100	12	56	131	84	437	311	3072	256



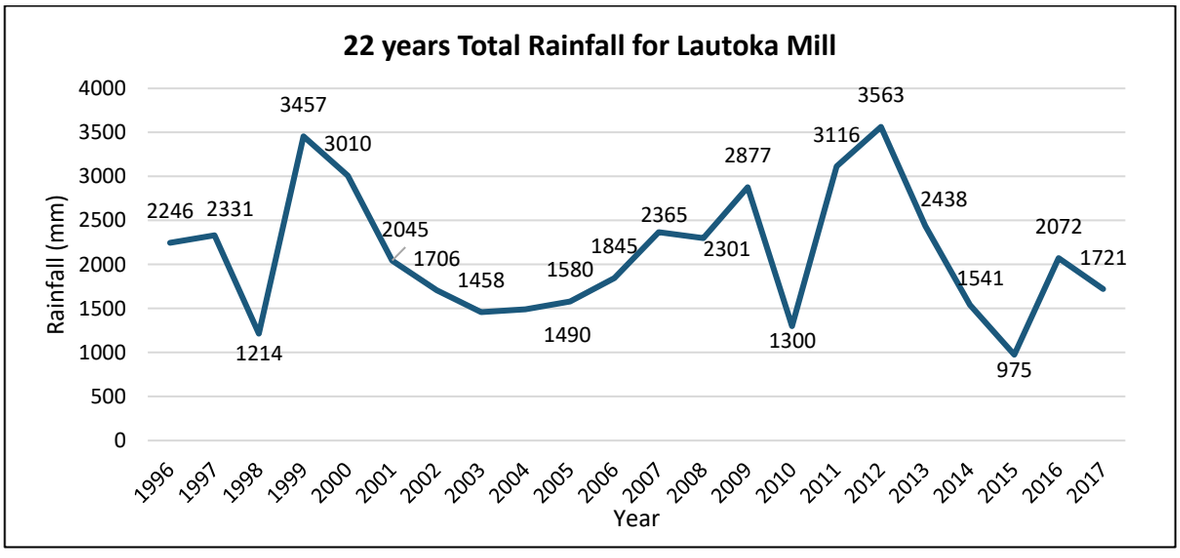
Graph 12: Shows the total rainfall figures for each sector of the Labasa Mill



Graph 13: Shows the average rainfall figures for each sector and the deviation compared to the overall mill average for Labasa Mill

Table 11: Past 22 years met data for the Lautoka Mill

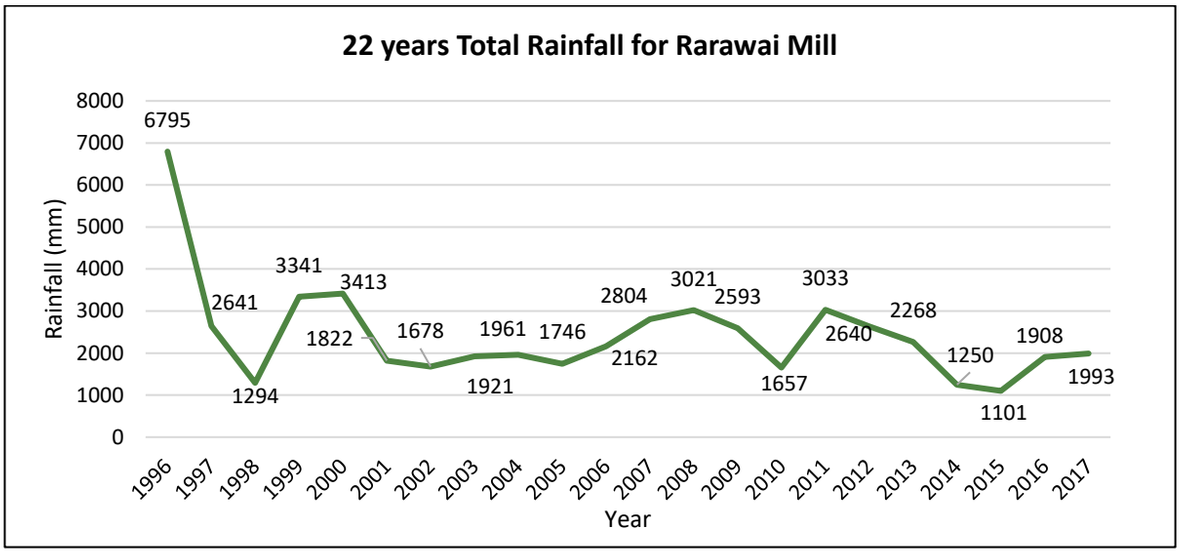
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1996	417	194	453	118	234	213	90	20	60	11	102	334	2246
1997	967	218	323	271	86	25	34	233	59	40	3	72	2331
1998	164	117	63	82	37	5	7	1	23	38	481	196	1214
1999	1018	517	139	388	26	50	115	136	92	149	354	473	3457
2000	408	250	421	124	367	40	180	147	97	142	167	667	3010
2001	236	356	405	170	62	22	106	123	19	259	96	191	2045
2002	317	339	223	247	132	33	64	43	164	39	54	51	1706
2003	136	91	507	123	53	82	13	134	6	76	52	185	1458
2004	34	366	245	180	22	60	98	277	84	6	38	80	1490
2005	244	96	104	437	4	98	52	91	31	103	142	178	1580
2006	718	223	140	119	105	40	28	77	52	115	113	115	1845
2007	61	439	674	224	42	1	49	22	202	111	268	272	2365
2008	672	554	232	118	112	122	26	1	26	103	216	119	2301
2009	1280	262	384	110	116	72	34	65	223	42	52	237	2877
2010	95	93	138	144	24	3	55	7	10	206	299	226	1300
2011	560	425	407	288	275	123	122	131	92	112	275	306	3116
2012	854	579	894	406	78	210	14	53	296	120	35	24	3563
2013	106	544	531	84	127	82	17	33	46	75	354	439	2438
2014	310	300	196	194	203	10	7	0	30	53	37	201	1541
2015	212	342	130	64	10	9	27	35	43	19	2	82	975
2016	169	436	279	434	7	19	6	210	3	153	87	269	2072
2017	166	697	370	11	66	31	10	27	2	25	130	187	1721



Graph 14: Shows the total rainfall received by Lautoka Mill for the past 22 years.

Table 12: Past 22 years met data for the Rarawai Mill

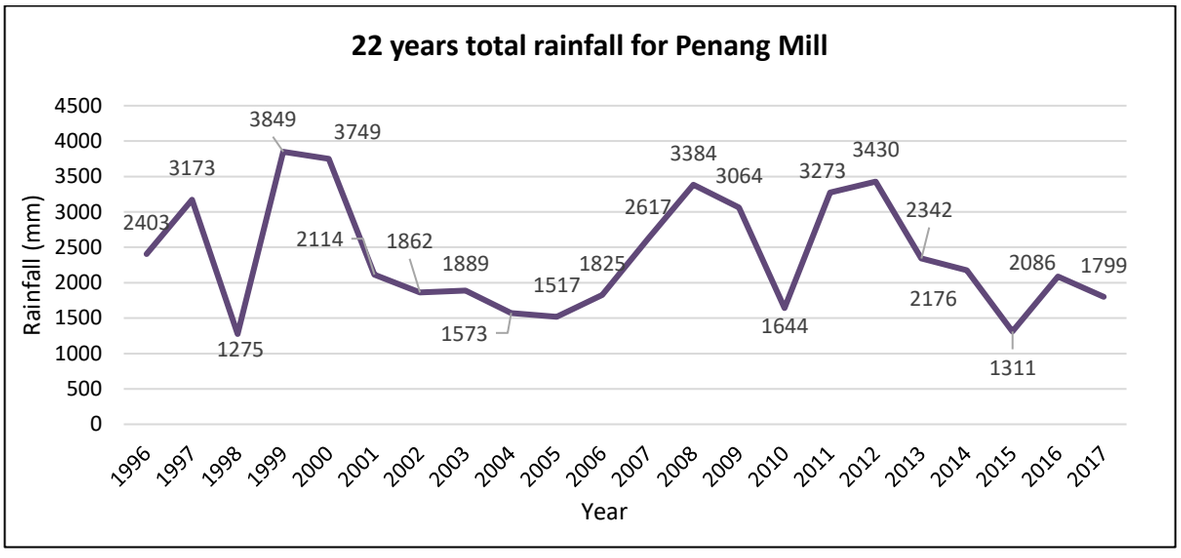
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1996	678	424	451	81	346	233	75	24	43	8	110	231	2704
1997	1029	280	442	311	116	4	26	202	55	82	9	85	2641
1998	155	55	49	54	13	4	1	1	82	46	498	336	1294
1999	1033	558	302	360	25	56	95	108	67	138	226	373	3341
2000	712	324	478	134	278	124	211	84	92	177	153	646	3413
2001	306	242	212	332	35	26	59	79	22	224	85	200	1822
2002	242	347	439	83	122	45	77	44	145	49	38	47	1678
2003	103	207	590	218	128	41	6	72	2	63	64	427	1921
2004	52	481	427	157	54	100	128	378	63	21	3	97	1961
2005	368	66	140	381	1	96	53	63	40	72	237	229	1746
2006	607	270	213	169	95	53	19	91	57	120	143	325	2162
2007	110	583	904	161	14	7	42	14	239	140	305	285	2804
2008	827	605	372	271	173	55	52	9	21	81	375	180	3021
2009	944	358	353	91	150	77	28	27	237	57	48	223	2593
2010	123	141	166	167	57	1	53	24	32	141	485	267	1657
2011	738	393	421	218	149	124	92	114	41	268	299	176	3033
2012	825	710	275	4	80	173	0	46	238	173	100	16	2640
2013	218	355	468	111	159	88	9	30	31	96	277	426	2268
2014	322	256	186	85	145	4	5	0	6	46	57	138	1250
2015	196	246	143	82	13	8	5	22	53	43	7	283	1101
2016	196	412	134	487	14	29	6	148	10	128	17	327	1908
2017	347	631	374	89	43	14	0	40	9	17	186	244	1993



Graph 15: Shows the total rainfall received by Rarawai Mill for the past 22 years.

Table 13: Past 22 years met data for the Penang Mill

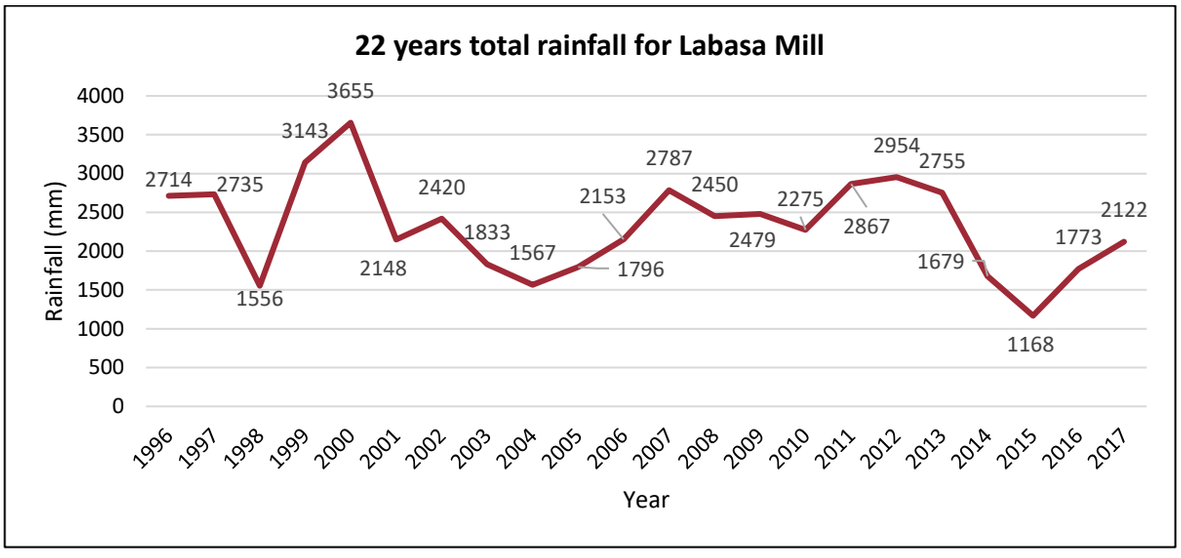
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1996	340	343	450	144	224	237	85	40	78	53	216	193	2403
1997	911	382	695	345	440	22	37	135	59	71	9	67	3173
1998	179	112	199	121	46	37	12	13	170	22	125	239	1275
1999	730	409	274	318	437	72	102	55	324	379	287	462	3849
2000	447	307	565	303	582	263	148	67	71	203	187	606	3749
2001	315	295	233	182	111	51	82	109	38	323	119	256	2114
2002	378	396	301	130	164	17	163	70	100	50	27	66	1862
2003	163	63	537	471	129	29	25	41	6	46	82	297	1889
2004	54	371	292	254	11	149	95	196	79	1	30	41	1573
2005	264	78	72	556	8	101	31	36	113	54	96	108	1517
2006	481	405	149	172	65	59	24	83	81	108	34	164	1825
2007	64	343	716	186	80	25	36	30	204	45	330	558	2617
2008	1241	570	200	222	271	104	19	75	38	21	381	242	3384
2009	1255	305	184	188	276	79	68	52	114	22	28	493	3064
2010	59	307	84	154	62	40	23	14	57	249	430	165	1644
2011	695	592	322	278	385	75	39	99	44	185	388	171	3273
2012	990	477	235	576	41	165	19	75	215	147	60	430	3430
2013	311	462	414	290	140	103	62	31	37	122	116	254	2342
2014	354	483	242	124	207	42	24	16	0	99	65	520	2176
2015	150	364	143	102	72	15	5	53	59	124	28	196	1311
2016	84	634	120	370	58	57	13	-	1	73	126	550	2086
2017	171	540	440	32	167	11	1	49	61	8	187	133	1799



Graph 16: Shows the total rainfall received by Penang Mill for the past 22 years.

Table 14: Past 22 years met data for the Labasa Mill

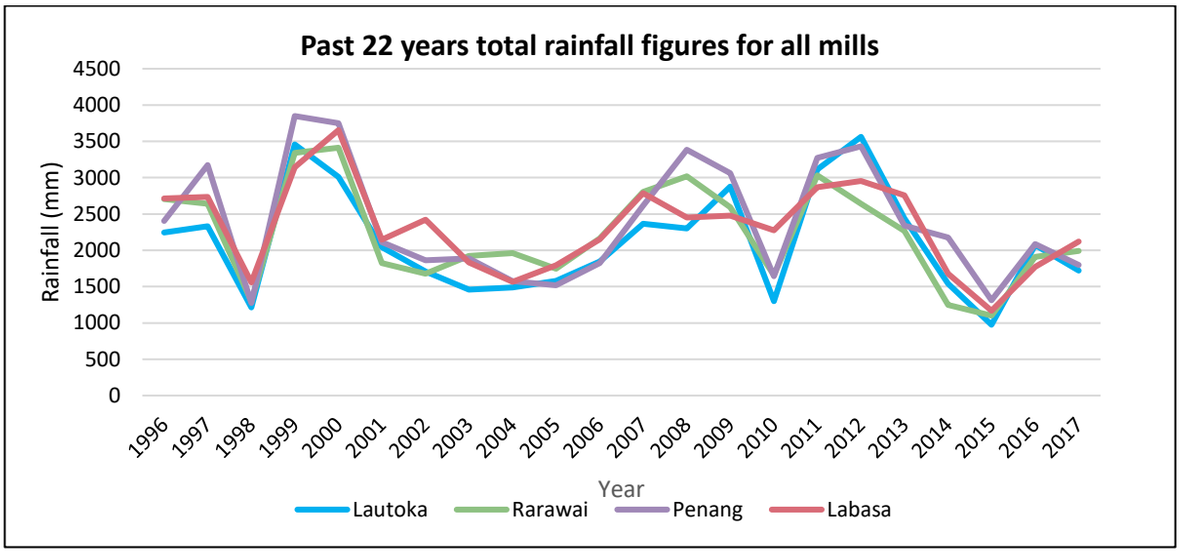
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1996	500	356	557	82	185	258	86	4	72	186	140	288	2714
1997	686	367	512	443	306	4	38	100	50	140	34	55	2735
1998	422	13	91	32	31	67	1	3	85	84	182	545	1556
1999	897	452	154	182	125	99	119	81	89	271	435	239	3143
2000	670	451	617	643	223	51	122	10	73	100	176	519	3655
2001	337	339	246	336	54	59	68	55	21	162	140	331	2148
2002	438	814	292	223	77	16	103	62	74	109	118	94	2420
2003	484	92	351	334	134	16	19	16	15	25	86	261	1833
2004	40	312	392	167	31	163	92	113	48	47	53	109	1567
2005	287	113	213	275	20	107	111	18	51	85	262	254	1796
2006	550	677	91	310	46	47	17	50	64	69	46	186	2153
2007	100	458	619	167	101	56	30	49	327	131	310	439	2787
2008	655	333	305	256	232	97	10	3	45	47	168	299	2450
2009	805	454	259	211	94	111	93	16	153	14	106	163	2479
2010	213	73	314	325	108	104	88	42	17	165	425	401	2275
2011	698	476	362	84	198	89	100	81	60	161	314	244	2867
2012	567	754	411	229	37	99	12	38	175	189	167	276	2954
2013	329	334	937	40	83	96	27	115	105	216	227	246	2755
2014	293	405	183	125	88	14	18	2	6	275	116	154	1679
2015	185	404	175	105	59	2	0	82	36	7	27	86	1168
2016	4	0	257	560	1	22	1	203	0	104	111	510	1773
2017	122	779	361	16	125	83	2	93	130	29	261	120	2122



Graph 17: Shows the total rainfall received by Labasa Mill for the past 22 years.

Table 15: Total Rainfall Figures for all the Four Mills for the past 22 years

Year	Lautoka	Rarawai	Penang	Labasa
1996	2246	2704	2403	2714
1997	2331	2641	3173	2735
1998	1214	1294	1275	1556
1999	3457	3341	3849	3143
2000	3010	3413	3749	3655
2001	2045	1822	2114	2148
2002	1706	1678	1862	2420
2003	1458	1921	1889	1833
2004	1490	1961	1573	1567
2005	1580	1746	1517	1796
2006	1845	2162	1825	2153
2007	2365	2804	2617	2787
2008	2301	3021	3384	2450
2009	2877	2593	3064	2479
2010	1300	1657	1644	2275
2011	3116	3033	3273	2867
2012	3563	2640	3430	2954
2013	2438	2268	2342	2755
2014	1541	1250	2176	1679
2015	975	1101	1311	1168
2016	2072	1908	2086	1773
2017	1721	1993	1799	2122



Graph 18: Shows the total rainfall received by the 4 mills for the past 22 years.

Table 16: Meteorological data for Sugar Research Institute of Fiji, Lautoka 2017

Months → / Parameters ↓	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Relative Humidity (%)	67	79	81	69	70	71	64	66	64	57	69	72	69
48 yrs avg	75	77	75	74	74	72	69	68	69	66	69	72	72
Air Temperature													
Mean Maximum	32	30	33	32	31	30	29	30	31	32	31	31	31
48 yrs avg	32	31	31	31	30	28	28	28	29	31	31	31	30
Mean minimum	23	24	23	23	22	21	20	20	21	22	24	24	22
48 yrs avg	24	24	24	24	22	20	20	20	21	26	23	23	23
Mean	27	27	28	27	27	25	24	25	26	27	27	27	26
Highest maximum	33	33	35	33	33	32	33	34	33	35	34	33	33
Lowest minimum	20	19	19	21	19	18	17	15	19	18	21	20	19
Raised pan	265	348	116	158	134	117	138	164	187	214	160	151	179
Earth thermometers													
5cm	0	28	28	29	27	26	25	25	28	31	29	29	25
48 yrs avg	28	29	29	27	26	24	24	24	26	27	29	29	27
10cm	28	27	0	28	26	25	25	25	28	29	28	28	25
48 yrs avg	29	28	27	27	24	24	23	24	28	27	28	28	26
50cm	NR	28	29	29	28	27	27	27	NR	30	29	29	23
2 yrs avg	15	29	29	15	14	14	27	13	13	29	29	14	20

*NR – not recorded

Earth Thermometers

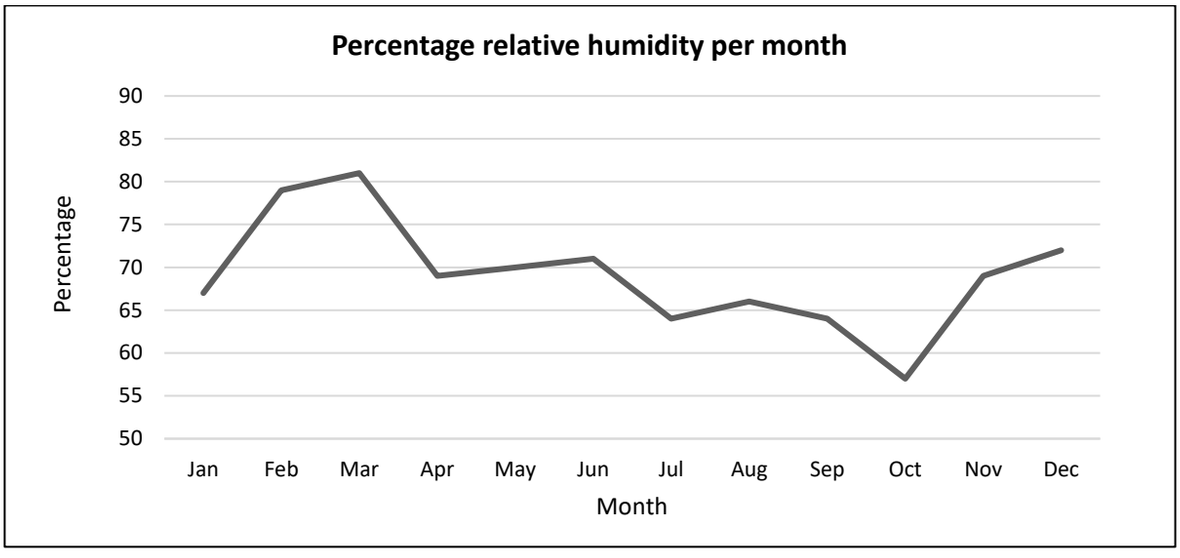
The earth thermometers at SRIF are at depths of 5cm, 10cm and 50cm. The 48 years average of thermometers at depths 5cm and 10cm were calculated to be 27°C and 26°C respectively. The 50cm thermometer was recently installed in 2016, thus, the 2 years' average calculated was 20°C.

Evaporation

The raised pan average for this year was calculated to be 179mm. Jan, Feb, Sept and Oct recorded above average evaporation while the remainder of the months recorded below average evaporation.

Relative Humidity

This year's humidity is calculated to be 69% but the 48 years average has been calculated to be 72%; thus making this year's reading as below average.



Graph 19: Shows the total rainfall received by the 4 mills for the past 22 years.

1.2 CROP IMPROVEMENT

1.2.1 Plant Breeding

Crossing

Due to various problems, 2017 crossing season have few obstacles such as:

- Low intensity of flowering.
- Un-matured stalks posing problems to survival in crossing solutions.
- Low pollen viability.

The breeding plots were ratooned in late November 2016 contrary to recommended ratooning and planting of new plots to be by August every year. The farmer failed to harvest the cane as well as give advance notice on his incapability to do so. More than 400 varieties including officinarum were available however only 15-20% flowering due to late ratooning. In conjunction to the shortage of flowers, other alternative sources were used to supply flowers:

1. Dobuilevu Advanced stage trial – LF2009 series Stage 4
2. Rarawai Advanced stage and Stage 3 Trial – LF2009, LF2010, LF2011 and LF2013 series.
3. Drasa Advanced Stage and Germplasm core collection.
4. Commercials at all 3 stations.

Cross setting

Due to the insufficient amount of varieties flowered in Dobuilevu, crossing sheds were centralized in two location. Temporary shed was constructed in Rarawai to cater male flowers from Lautoka and Rarawai while crossing Dobuilevu was continue as usual. Temporary shed was also erected at Rakesh residence in Vunikavikaloa due to the unavailability of the crossing shed. Total of 219 crosses were set during the 2017 crossing season, 116 crosses set in Rarawai and 103 crosses set in Dobuilevu. The main source of flowers for Rarawai was from the germplasm in Drasa and the advance stages in Rarawai whereas flowering bed was the source for Dobuilevu. The total breakdown are as follows:

Table 1.2.1: Cross type and distribution by location

Location	Total cross set	Total bi-parental crosses	Total poly crosses
Rarawai	116	90	26
Dobuilevu	103	57	46

All the dried female flowers from the 219 crosses were harvested and sent to Rarawai for fuzz sowing.

Fuzz Sowing

The fuzz sowing was begun on 20th March 2017 and proceed until 18 August 2017. The prolong period of sowing was due to the availability of man power and fuzz since all the fuzz in store were sown are from 2017 crossing season was also used. Total of 1784 packet were sown, 156 manage to germinate.

Table below summarise parentage combination of germinated fuzz.

Table 1.2.2: Summary of parentage combination of germinated fuzz								
DATE	Commercial Crosses		Experimental Crosses					Total
	Poly	Bi- parental	Robustum	Erianthus	IJ/IK hybrids	KT-BT	Officinarum	
20/03/2017	2	6	4	3	none	2	none	17
28/03/2017	6	6	none	5	7	none	none	24
4/4/2017	9	8	1	8	16	none	none	42
5/4/2017	none	none	none	1	1	none	none	2
10/4/2-17	none	2	none	1	none	none	none	3
25/4/2017	none	none	none	none	2	none	none	2
26/4/2017	2	6	3	2	none	none	none	13
4/8/2017	22	2	none	none	none	none	5	29
11/8/2017	19	5	none	none	none	none	none	24
Total								156

Out of the 156 germinated fuzz, 95 were commercial crosses (60 – poly crosses, 35 bi-parental) and 61 are from experimental crosses such as commercial varieties crosses with IJ/IK, Erianthus, KT-BT or Officinarums. The overall germination percentage was 9%.

The germinated seedling was transferred to the green house for hardening and later potted. Potting started in December with the total of 130 trays potted which has the total of 4,000 seedlings.

Stage 1 Trial

Stage 1 trial is the seedling stage of the Plant breeding program. The seedlings from the crosses are planted side by side in the field with the standards in rows of 100 seedlings. The selection criterion is limited to the most basic inherited character i.e. sugar which is estimated on the basis of the brix which is a measure of total soluble solids in cane juice which includes sucrose in greater component. In some cases, the clone appeal is taken into consideration in terms of physical appeal and agronomic desirability.

The clones are selected against the brix of the standards (commercial varieties) and advanced as Stage 2 i.e. the clones that have brix close to or greater than the standards are selected. In some cases, clones with lower brix are considered based on its appeal i.e. agronomic desirability in terms of stalk height, thickness, tillering, and vigour. No biochemical evaluation is carried out in this stage as due to cane stalk limitations.

This LF2014 series was evaluated (brixed) and the selected clones were advanced and planted as LF2014 Stage 2 in Rarawai. On the other hand, LF2016 series Stage 1 seedlings were also planted in Rarawai. The following is a detailed account on these projects.

LF2016 Stage 1

The LF2016 Stage 1 was planted at Rarawai Estate field 6 in January 2017. The seedling was from 2016 fuzz sowing. Due to the devastating effect of cyclone Winston in 2016, the fuzz sowing facilities such as green house and germination chamber were partly/full damage which causes many delays in fuzz sowing and hardening process. Power disruptions also occur frequently which disturb consistent operation of the germination chamber.

Seedling Distribution

Figure 1.2.1 & 1.2.2: Stage 1 seedling distribution

A total of 3100 seedlings from various crosses were planted followed by irrigation. The trial was planted in three Bed where Bed 1 and Bed two have the same plot size of 12 meters per plot whereas Bed 3 have the plot size of 6 meters. Evaluation and selection will be carried out in 2018.

Trial planting

Figure 1.2.3: Stage 1 seedling planting

LF2014 Stage 1

This trial was deem for evaluation in 2016 since it was planted in 2015 however due to the devastating effect of cyclone Winston and post cyclone drought, the assessment and evaluation of this trial was delayed in 2016 and the trial was end up slashed. Therefore the evaluation was done on the first ratoon in 2017. Total 5520 one eye sett seedling was planted on this trial which to be evaluated. Based on the brixed obtain and field observation, 423 varieties were selected for LF2014 Stage 2. Clone from selected varieties were harvested and planted as LF2014 Stage 2 trial.

Stage 2 Trial

Stage 2 trial is the first clonal stage after selection from the seedlings. The selected clones from the crosses in Stage 1 are advanced to this trial and given an index that becomes its identity for the rest of the breeding program. The selection and evaluation is carried out in the Plant crop.

The first part of evaluation in Stage 2 is to conduct brixing on all clones as well as the standards and also recording the phenotypic characters and agronomic desirability i.e. the growth, appeal, stalk height/ diameter, flowering tillering. The varieties are selected on the basis of the above parameters compared to the data of the standard varieties (commercials). This phase is known as ***preliminary selection***.

The selected varieties are then sampled with the standards and brought to the small mill where bio-chemical analysis is done. Final selection is based on comparison of the bio-chemical data (Brix, POCS, and Fibre), the field observations are noted during brixing in the field of the sampled varieties with the standards. These selected varieties are then advanced to the observation plots.

The main activities for stage 2 trial this year was the evaluation of 2015 Series and the planting of 2014 Series.

LF2014 Stage 2

The LF2014 Stage 2 is located in field 5, Rarawai Estate and was planted from 29th of September, 2017. Total of 423 clones was planted with Mana and Naidiri as standard. The field was occasionally submerged in flood waters in December but no effects observed on cane growth.

LF2015 series Stage 2

The LF2015 series trial was located in Rarawai Field 6 Bed 2 and was planted from 27th November 2016. It has 599 varieties planted as 1row x 6m plots in one beds. The cane was 9 months old when selection was initiated in July 9th. Initially the trial was irrigated and discontinued after the rain.
The trial was generally weed free during time of selection. Timely cultivation and implementation of trial activities was carried out and monitored.

Preliminary selection

Six stalk samples of the 599 selected varieties were harvested and send to the small mill for biochemical evaluation with the standards. The phenotypic and agronomic characters of all varieties were also recorded during field assessment.

Final Selection

Final selection was carried on the 599 varieties based on the bio-chemical data received from the small mill as well as field data recorded during field assessment. The field notes on the agronomic characters were consolidated with the biochemical data (see Appendix) and 88 clones were selected and advanced to Stage 3.

Stage 3 Trial

The ultimate goal of sugarcane breeding is to develop genetically improved varieties that have a positive impact on the sugar industry. In the early, segregating generations the breeder selects the progeny of the crosses so as to remove those with undesirable or inferior genotypes, progressively moving towards a smaller number of elite lines. This third stage is the largest part of a breeding program and involves identifying the products of genetic segregation and recombination and finding the 'best of the bunch' as reliably and as quickly as possible, while minimizing the risk of failing to retain a superior line.

LF2013 Stage 3

Total of 92 clones from selected varieties of LF2013 Stage 2 was planted in 2015. However, due to the devastating effect of cyclone Winston the evaluation was not able to be carried out in 2016. The trial was slashed in February 2016 and the ratoon was also harvest and send to the mill during 2016 harvesting season.

Evaluation and selection

Six stalk samples of the 92 selected varieties were harvested and taken to the small mill for biochemical evaluation (table 1.2.3) with the standards. The phenotypic and agronomic characters of all varieties were also recorded during field assessment. Samples were also sent to crop protection department for disease screening. Based on the data gathered, 12 varieties were selected, harvest and planted as stage 4 seed bed for the 2013 series.

Table 1.2.3: Biochemical data of LF2013 series (12 varieties)

Variety Name	Std	Rep	Trt	Brix	Pol	Purity	Fibre	Pocs	OTHER COMMENTS
LF13-116	BRD	1	41	18.4	15.79	85.66	9.19	12.23	PURPLE CANE
LF13-238	BRD	1	10	19.8	17.05	86.24	9.94	13.15	SUCKERS GROWING UP
LF13-405	BRD	1	71	18.4	15.51	84.49	10.24	11.76	
LF13-410	BRD	1	45	18.4	15.92	86.62	8.80	12.48	LOOK LIKE MANA
LF13-427	BRD	1	58	19.8	17.85	90.17	10.37	14.09	
LF13-441	BRD	1	65	19.1	16.27	85.31	8.82	12.63	
LF13-452	BRD	1	66	18.2	15.48	85.21	7.82	12.14	
LF13-454	BRD	1	55	22.2	19.95	89.75	12.69	15.26	
LF13-460	BRD	1	62	19.7	17.05	86.71	11.60	12.93	
LF13-468	BRD	1	44	20.7	17.90	86.57	11.43	13.59	
LF13-485	BRD	1	38	18.4	16.23	88.35	9.55	12.77	SIDE SHOOT
LF13-543	BRD	1	52	19.4	17.02	87.63	9.98	13.25	

LF2015 Stage 3

Total of 88 clones was selected from LF2015 Stage 2 and planted as LF2015 Stage 3. Post planting irrigation was done followed by pre-emergent spray and fertilizer application.

Germplasm

Germplasm is a collection of useful genetic material which are kept and maintained in terms of the whole plant or part of the plant being the reproductive/ vegetative part of the plant. It is used generally for breeding and conservation purpose. In breeding, germplasm is crucial for maintaining important varieties that would be used as parents for crossing (inter-specific and/ or inter-generic). On the other hand a consistent and well monitored upkeep of the germplasm sees that the seed material of the important varieties are available if the reserves elsewhere had been affected by unforeseen disasters. In such case the variety could be propagated to revive the loss. In sugarcane, germplasm is as important to breeders who continuously exploit the gene expression by important hybrids through various combinations and crossing. As a result the ISSCT (International Society for Sugarcane Technologists), one of the major organizations governing world sugar research, administers two such collections in India and USA. The germplasm material is available to all participating member countries for further research. Germplasm collection expeditions has also been widely supported and financed by ISSCT.

Like all major breeding organizations, Sugar Research Institute of Fiji also has its own germplasm collection located in Lautoka, Fiji Islands. It used to have more than 4000 clones in it which involved pure species of sugarcane genera as well as other related genera (*Erianthus spp.)* and local and imported commercial hybrids. However, due to mechanical harvesting and inconsistent monitoring over the past, the correct identification of the varieties has become questionable as plots and roadways had become heavily infested with volunteer canes whereas some plots have no cane.
This project will be aimed to resurrect germplasm in terms of characterizing the restored clones from the core collection whereby valuable information on desirable characteristics would be gathered and a database created. Also the imported fuzz and varieties will be sown and planted respectively and included in the trial if available during trial planting. The project has different phases which 2017 was mainly focus on phase one which is the resurrection of germplasm from its current status. .

Plant replicated trial.

Total of 320 clones were harvested from the old germplasm in Drasa Field 24 plot 4 bed 3 and transplanted to Field 24 plot 3 bed 1 and also 320 clones to Rarawai field 7 bed 1 and field 9 bed 2. These clones were planted in replicate therefore a total of 640 (1 x 8 meters) plots was planted for each locality. Post planting management practices was well organized and monitored. The remaining 200 clones will be transplant to Dobuilevu in 2018.

Visa cane

Through visa cane initiative program agreement, total of 38 varieties were received from CIRAD Visa, France. With the close monitoring of biosecurity personals, the clone, setts were treated prior to planting, each set (which contains two/three eye sett) was treated.

The treatments are as follows:

- Dip in hot water (58 degree Celsius) for 5 minutes
- Treated with insecticide
- Treated with fungicide
- Plant 2 or 3 one eye sett per pot.
- Left for 30 minutes and watered with fresh water and transfer into germination chamber with a constant moderate temperature on 36 degree Celsius.

Individual varieties were planted in three pots where two pots consist of 2 eye setts each and the third pot has 3. Total of 7 eye sett per variety were planted and kept in the germination chamber with a constant temperature of 37 degrees Celsius for 21 days.

Germination

Only 2 out of the 38 varieties planted fail to germinate. Total of 94% germination, however, few varieties were vigorously germinates and other were obviously in slow grow mode. Seedlings were transferred to temporary shed after three weeks for further assessment and monitoring in collaboration with biosecurity.

Evaluation

Few varieties have symptoms which were suspected cause by some disease such as:

- Iron deficiency
- Red stripe
- Bunchy tops

These varieties were continuously monitored for the development of the suspected diseases but they were clear as they develop.

1.3 CROP MANAGEMENT

1.3.1 Agronomy

Nutrient Budget for Sugar cane in Fiji - Labasa

This study will provide insight to the sugar industry as a whole on the cost benefit of the agronomic practices in response to crop yield and finally carryover to sugar and molasses yields. Growers will be able to better understand the importance of nutrient management, while a quantification of carryover of nutrients into the final milling products is determined. Total of nine sites were selected for the trial planting of which three trials were planted in Vanua Levu. The treatments were selected according to the current scenario to differentiate the nutrient deficit and surplus added by the farmers during the crop cultivation. This will also highlight the importance of soil analysis and the recommendation that needs to be followed by the farmers. The treatments used are given in the table below:

Table 1: Treatment details

Treatments	Fertilizer Rates	Time of Application
1	Nil	8 weeks after planting
2	Farmer Practice (Actual usage)	8 weeks after planting
3	75% of recommended rate	8 weeks after planting
4	Recommended rate	8 weeks after planting

All sites planting was carried out by November, 2017 and cultivation work will be carried out as per work plan. The growth measurements will be recorded at 3, 5 and 7 months. Rain water samples will be collected at all sites as per rain days. The biochemical and yield attributes will be taken on maturity. The sugar, mill mud, molasses, waste water and mill ash samples will be collected on daily basis as the mill will commence. Trial planting pictures of Waiqele site are shown below:

Figure 1: Trial marking

Figure 2: Trial planting

Also all sites were sampled and land preparation was done accordingly. Soil profile of each site was conducted to see the nutrient status of each horizon present at the trial site. This was done before the trial planting phase and the results are shown below:

Table 2: Labasa and Seaqaqa districts soil profile information			
Profile No.	SRIF 7 – Solove	SRIF 8 – Wailevu	SRIF 9 - Waiqele
Described by	RRK, MLV	RRK, MLV	RRK, MLV
Date	25.08.17	28.08.17	08.09.17
Location	Vunimako, Solove sector, Seaqaqa	Movo, Tabia, Wailevu Sector	Kaba road, Waiqele central, Waiqele sector
Topography	Hilly flat	Very flat and smooth	Hilly flat
Land use/ Vegetation	Long fallow (7 years) – Para grass land	Long fallow (5 years) – Para grass land	Fallow for 7 years before planning rice last year
Parent Material	River alluvium	River alluvium	River alluvium
Drainage	Good	Good	Needs more drains
Rockiness/ Stones	None	None	None
Soil colour	Reddish brown in colour	Greyish brown in colour	Greyish brown in colour
Cultivability	Good – easily cultivated and top soil is friable	Good but top soil is large and cloggy	Good – easily cultivated. Top soil is friable
Mechanical cane harvester	Best when land is dry	Best when land is dry	Best when land is dry
Traffic ability	Best when land is dry	Best when land is dry	Best when land is dry
Improvements suggested	Minimum tillage Trash blanketing Aglime and NPK (Recommended rates)	Subsoiling Aglime and NPK (Recommended rates)	More drains needed Subsoiling Trash blanketing NPK (Recommended rates)
Topsoil/ Subsoil texture	Ferruginous (Sandy clay)	Loamy clay	Topsoil is moist and friable. Sandy clay soil type
Other observations	More drains needed Control the spread of paragrass from neighboring fields	More deeper drains required	More deeper drains required
Soil series	Korovuli	Tiri	Labasa
FAO Soil Legend	Dystric Nitosols	Thionic Fluvisols	Dystric Gleysols
Soil Taxonomy (USDA, 2003)	Typic Paleustults clayey, ferruginous, isohyperthermic	Typic Sulfaquept clayey over fine loamy, mixed, isohyperthermic	Humic Epiaquepts clayey over sandy, mixed, isohyperthermic
Sampling for analysis	All horizons	All horizons	All horizons

Soil Profile Study – Labasa & Seaqaqa

The images and tables that follows shows the soil profile and description of each pit.

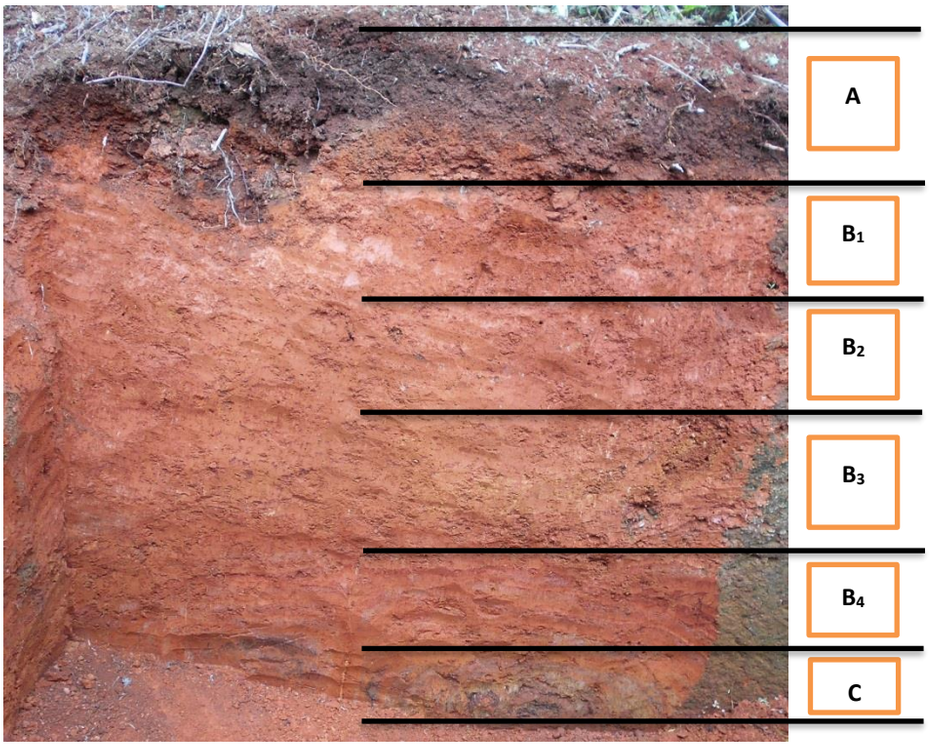


Figure 3: SRIF 7 – Solove soil profile

Table 3: SRIF 7 – Solove soil profile description			
Layers	Horizon	Depth	Description
Layer 1	A	0 – 11cm	Dark brown soil (7.5YR 4/2), moist sandy clay, soils are medium, granular and moderately formed, friable, clear horizontal boundary.
Layer 2	B_1	11 – 48cm	Red soil (2.5YR 5/6), moist sandy clay, medium, granular and moderately formed, friable, indistinct horizontal boundary.
Layer 3	B_2	48 – 81cm	Reddish brown in colour (5YR 5/4), moist sandy clay, medium, granular and moderately formed, friable, distinct yellowish mottle, distinct horizontal boundary.
Layer 4	B_3	81 – 101cm	Red in colour (2.5YR 5/8), moist sandy clay, medium, granular and moderately formed, firm, small distinct yellowish brown mottle. Distinct horizontal boundary
Layer 5	B_4	101 – 120cm	Reddish brown in colour (5YR 5/4), moist, sticky sandy clay, medium, granular and moderately formed, firm, wavy horizontal boundary.
Layer 6	C	120 – 130cm	Very dark grey in colour (7.5YR N3), moist and silty, medium, aggregates and strongly formed, very firm, clear horizontal boundary.

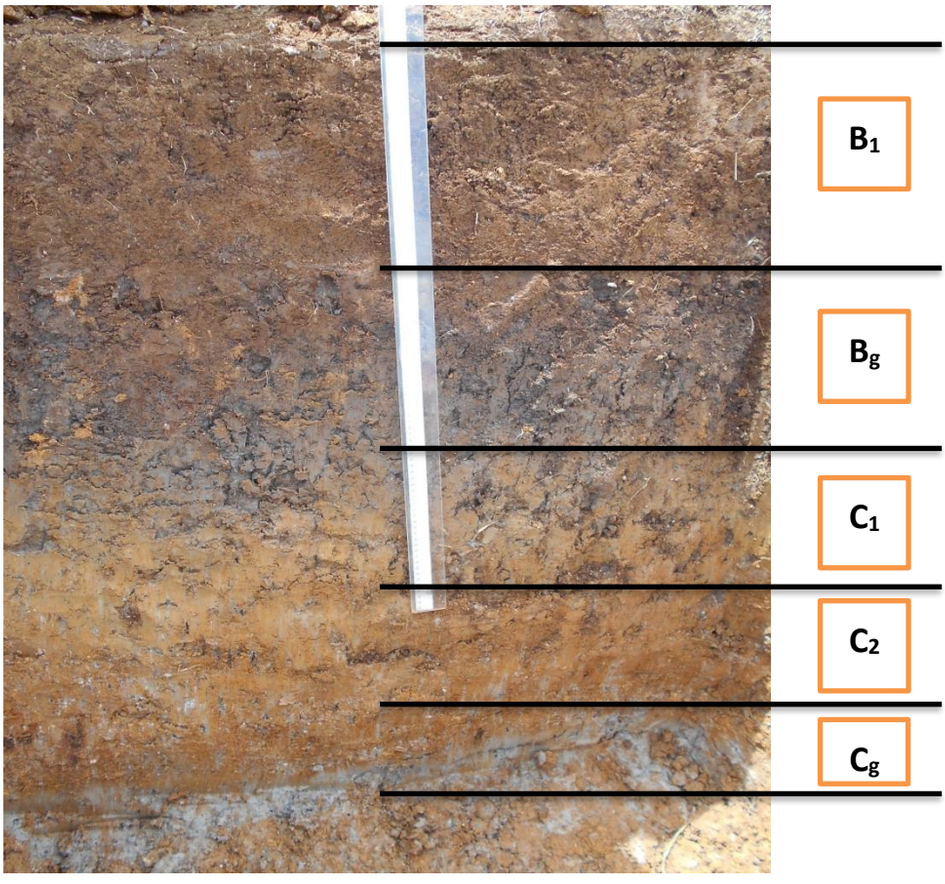


Figure 4: SRIF 8 – Wailevu sector soil profile

Table 4: SRIF 8 – Wailevu sector soil profile description			
Layers	Horizon	Depth	Description
Layer 1	B_1	0 - 47cm	Dark brown (10YR 3/3), moist, loamy clay, medium, granular and moderately formed, friable, distinct horizontal boundary.
Layer 2	B_g	47 – 69cm	Dark greyish brown (10YR 4/2), moist, loamy clay, medium, granular and moderately formed, friable, grey mottles visible, wavy horizontal boundary.
Layer 3	C_1	69 – 99cm	Brown in colour (10YR 5/3), very moist, heavy clay, medium, granular, moderately formed, sticky clay (can easily be molded into shapes), clear horizontal boundary.
Layer 4	C_2	99 – 130cm	Reddish brown in colour (5YR 5/3), very moist and heavy clay, medium, granular and strongly formed, very sticky clay (can easily be molded into shapes), greyish mottles visible, distinct horizontal boundary.
Layer 5	C_g	130 – 160cm	Greyish colour soil (5YR 6/1), very moist and heavy clay, medium, granular and strongly formed, very sticky clay (can easily be molded into shapes), clear wavy boundary.

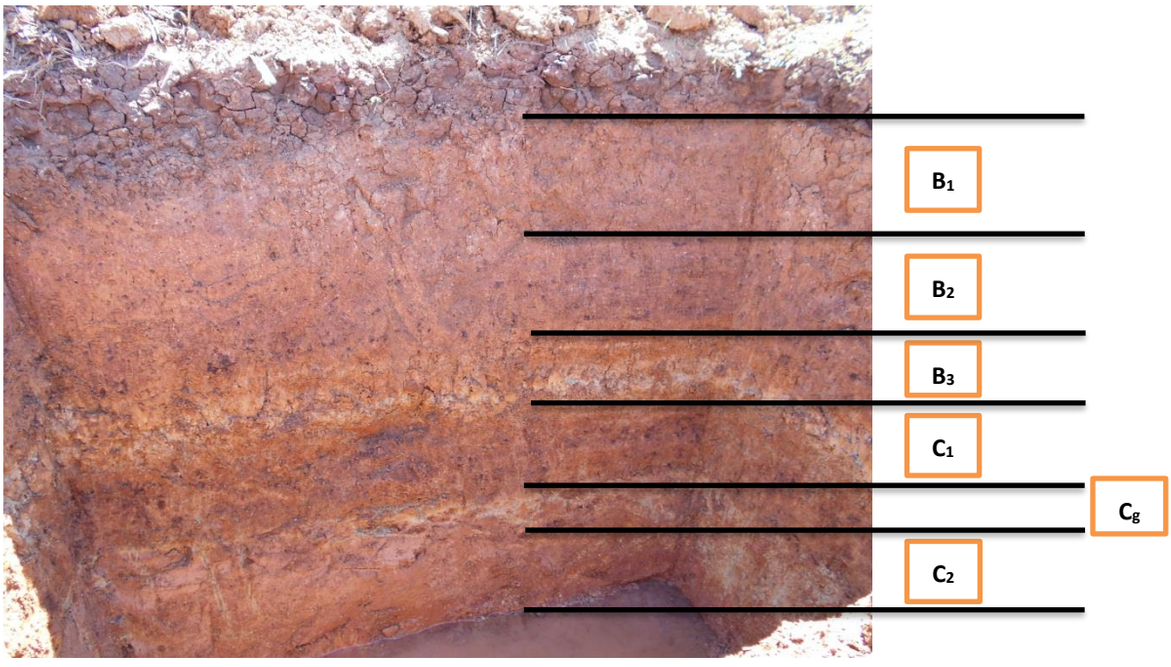


Figure 4: SRIF 9 – Waiqele sector soil profile

*Table 4: SRIF 9 – Waiqele sector soil profile description			
Layers	Horizon	Depth	Description
Layer 1	B_1	0 - 32cm	Dark grayish brown (10YR 4/2), moist, clay, medium, granular and moderately formed, friable, clear horizontal boundary
Layer 2	B_2	32 – 64cm	Brown in color (7.5YR 5/3), moist, clay, medium, granular and moderately formed, friable, clear horizontal boundary.
Layer 3	B_3	64 - 76cm	Brown in color (7.5YR 5/3), moist, clay, medium, granular and moderately formed, friable, black mottles, clear horizontal boundary.
Layer 4	C_1	76 - 86cm	Grayish brown in color (10YR 5/2), very moist, sticky and heavy clay, medium, granular, moderately formed, friable, grey mottles visible, clear horizontal boundary.
Layer 5	C_g	86 - 108cm	Brown in color (10YR 5/3), very moist, sticky and heavy clay (can easily be molded into shapes), small grey mottles visible, distinct horizontal boundary.
Layer 6	C_2	108 – 142cm	Brown in color (10YR 5/3), very wet, sticky clay (can easily be molded into shapes), clear horizontal boundary.

Note: Presence of water hindered further digging of the pit

Nutrient Budget for Sugar cane in Fiji - Lautoka, Ba and Nadi

Sugar has been the major agricultural export form Fiji for over 100 years, as well as being a major source of employment and of foreign exchange. A number of reasons have been proposed for the decline including changes in land leasing arrangements, limits in the number of people entering the cane-growing sector workforce, increasing lengths of ratoons, extreme weather events and poor extension support for farmers. Concern has also been expressed in some quarters about the fertilizer

regime in use – the advice given to farmers and the practices of the farmers themselves. There has also been a move towards cane quality payment system, where higher quality cane production is rewarded financially.

Information is readily available on the imports of nutrients and the distribution of elements as fertilizers (ex-South Pacific Fertilizers). Once the fertilizers leave the factory, the situation becomes much less clear. While it is known how much fertilizer is delivered to particular farms, there is no certainty, in many locations, about how much fertilizer is added to a particular field. Yields of cane per field are collected at harvest time and recorded by the FSC, but there is very limited information in how much nutrient is removed along with the cane (analyses of fresh cane are very few in number and are really only available for the Lautoka and Labasa mill areas), how much might be lost in trash burning, and what happens at the mills is poorly understood. A recent survey (Morrison and Gawander, unpublished data) has shown that the sugar produced by the different mills contains different amounts of nutrients (in some cases substantially different), such that an accurate assessment of the overall mill outputs cannot be completed using a single concentration for each element.

Soil Profile Study – Lautoka, Ba & Nadi

A 2m x 2m hole was dug up by an excavator at all the 6 sites. A vertical cross section of the soil was studied. Various soil horizons became apparent.

Table 5: SRIF 1 – Waqadra estate trial site details	
Parameters	Details
Date	09/08/17
Topography	Smooth, flat, ploughed, harrowed
Location	Waqadra alluvial basin along Nadi river west bank. Approx. 200m west of Nadi backroad bridge and cement works
Top soil / Subsoil texture	clay loam on silty clay
Soil series name	Nadi
FAO Soil Legend name	Orthic Ferralsols
Soil Taxonomic (USDA, 2003)	Tropeptic Eutrustox clayey, mixed, isohyperthermic

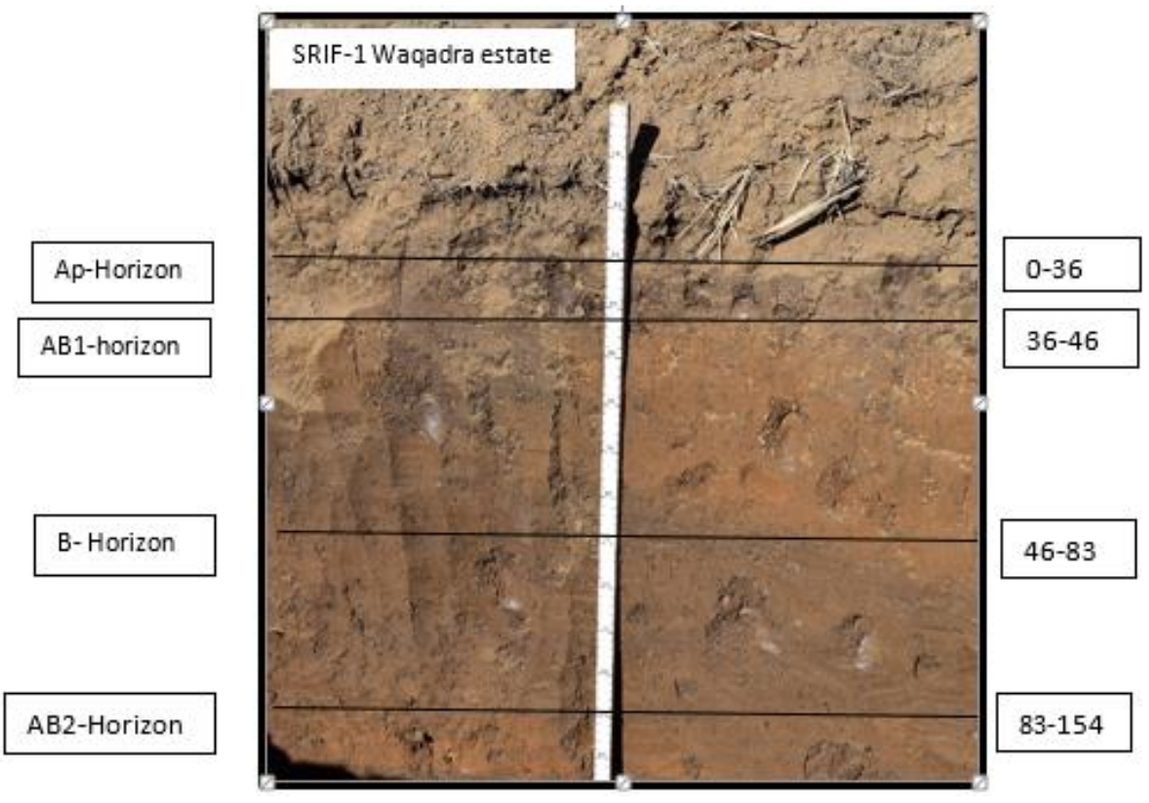


Figure 5: SRIF 7 – Waqadra estate soil profile

Table 6: SRIF 5 – Rarawai FSC estate trial site details	
Parameters	Details
Date	17/08/17
Topography	Level
Location	40 chains south east of Rarawai Sugarmill-300 yards west of Ba-Koronubu Road
Top soil / Subsoil texture	mostly silty clay
Soil series name	Veisaru
FAO Soil Legend name	Dystric Gleysols
Soil Taxonomic (USDA, 2003)	Aeric Epiaquept, fine, kaolinitic
Note	water table at 200cm

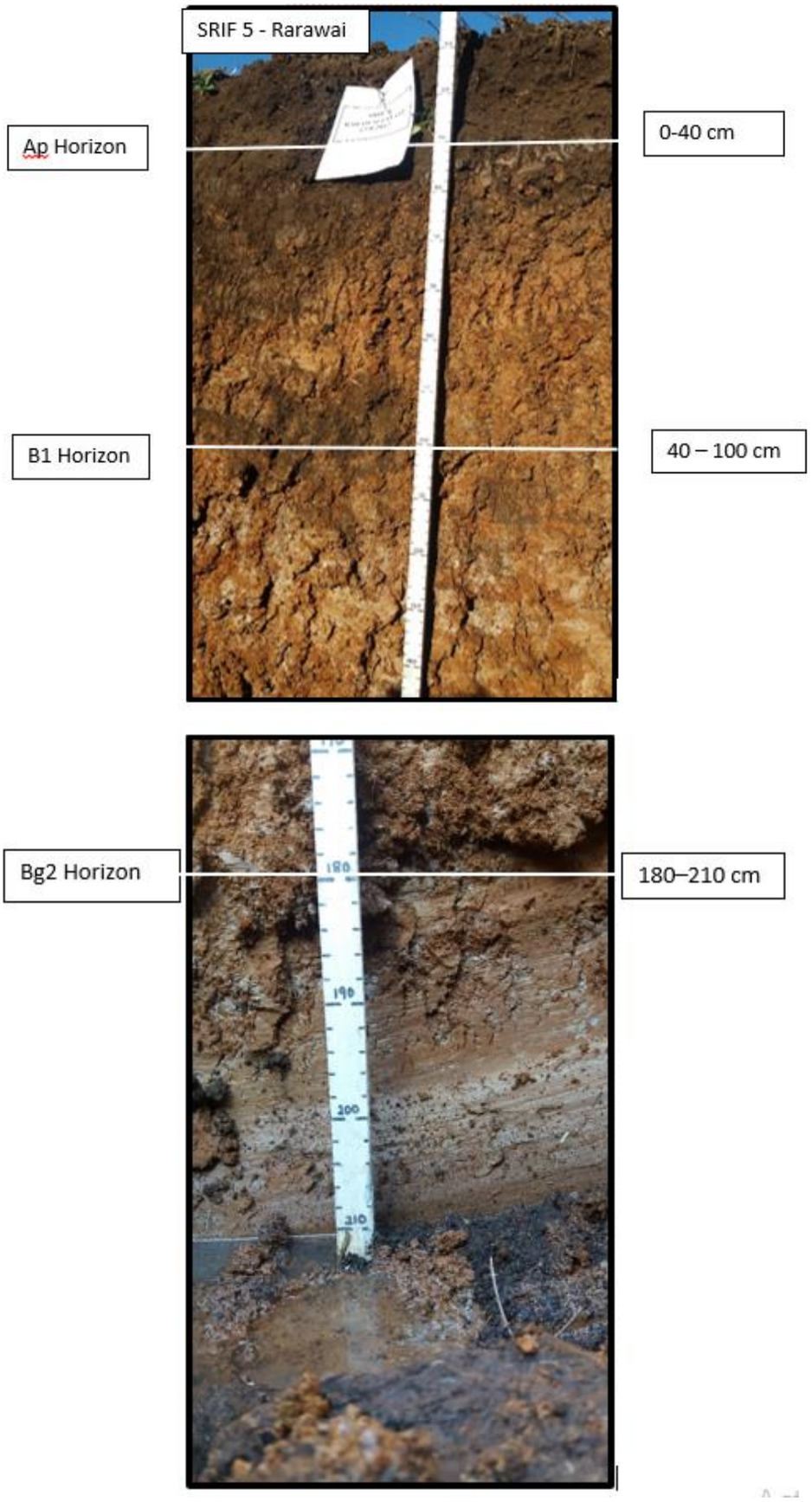


Figure 6: SRIF 5 – Rarawai FSC estate soil profile

Table 7: SRIF 4 – Etatoko trial site details	
Parameters	Details
Date	17/08/17
Topography	very flat and smooth
Location	Etatoko Locality near the Wailailai River system between Vadravadra and Ba town, 400m west of highway going to Tavua
Top soil / Subsoil texture	Clay throughout
Soil series name	Matavelo
FAO Soil Legend name	Dystric Gleysols
Soil Taxonomic (USDA, 2003)	Aeric Epiaquepts, fine, kaolinitic isohyperthermic
Note	More drains required and deeper

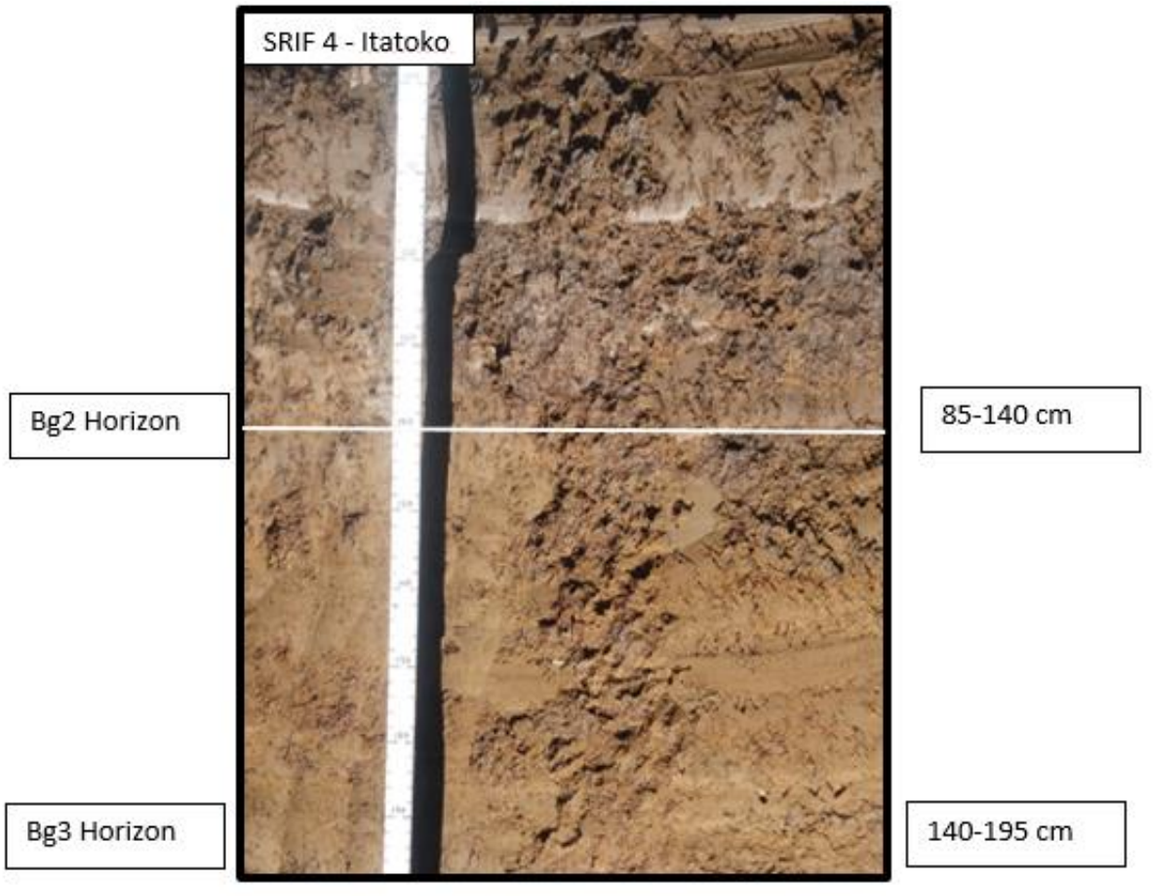


Figure 7: SRIF 4 – Etatoko/Itatoko soil profile

Table 8: SRIF 3 – Koronubu trial site details	
Parameters	Details
Date	17/08/17
Topography	Very flat
Location	Gyan Singh Cane Farm, Koronubu, about 4.7km southeast of Rarawai sugar mill where the Ba River meets the Nadrou drainage system
Top soil / Subsoil texture	Clay loam over clay
Soil series name	Vatuma
FAO Soil Legend name	Hasplic Kastanozem
Soil Taxonomic (USDA, 2003)	Fluventic Haplustolls fine, mixed Isohyperthermic
Note	Very versatile land for horticulture using irrigation

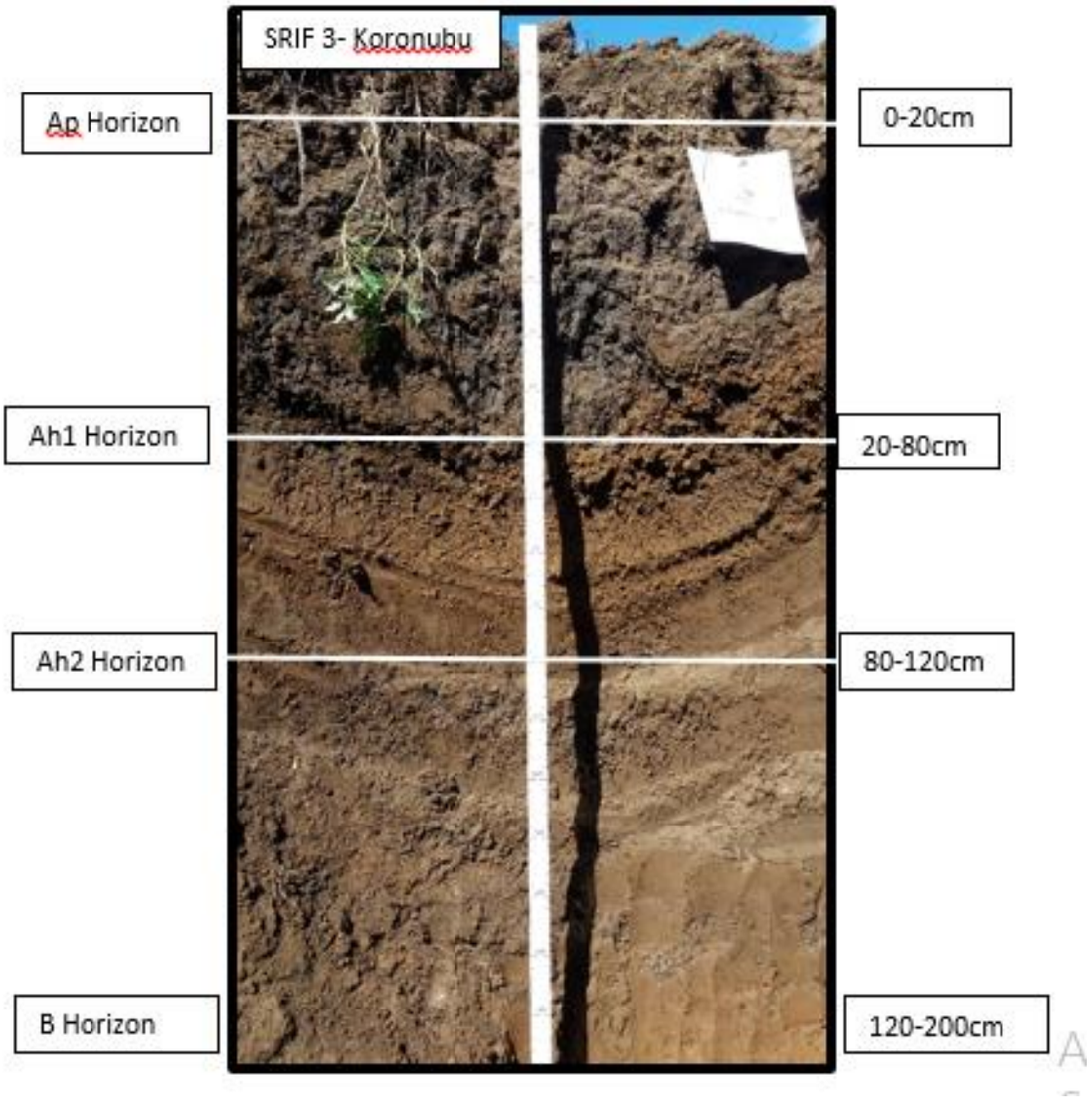


Figure 8: SRIF 3 – Koronubu soil profile

Table 9: SRIF 2 – Buabua trial site details	
Parameters	Details
Date	09/08/17
Topography	Gentle slope of 0.5 degrees sloping south towards north
Location	Base of Buabua foothills near Lautoka 2km inland from highway
Top soil / Subsoil texture	Clay loam on clay
Soil series name	Drasa
FAO Soil Legend name	Eutric Nitosols
Soil Taxonomic (USDA, 2003)	Ultic Haplustalfs, fine ferruginous, Isohyperthermic

Figure 9: SRIF 2 – Buabua soil profile

Soil sampling at all site

Soil sampling was carried out at all the 6 sites. Standard SRIF soil sampling procedure was used whereby a zigzag pattern was used to dig out core soil samples from the top layer (at a depth of 20cm). The core samples were thoroughly mixed and sub sampled to make one composite sample. This sample was submitted for chemical analysis.

Chemical analysis of soil samples

Soil was brought to the analytical laboratory for chemical analysis. Analysis carried out was pH, phosphorus, macronutrients (Calcium, Magnesium and Potassium), particle size analysis and organic carbon.

1.3.2 Effect of lime on soil properties and sugarcane yield in Fiji

Table 10: Trial details	
Parameters	Details
Location	Drasa, Lautoka
Variety	Aiwa
Trial Design	Randomized Complete Block Design
Replications	4
Plot size	6 rows x 10 m x 1.37 m
Date Planted	16 April 2014
Crop Stage	Second ratoon
Number of treatment	4

Table 11: Treatment details	
Treatment No.	Details
1	No lime was applied
2	0.7 tonnes per hectare of lime was applied in furrows
3	1.4 tonnes per hectare of lime was applied in furrows
4	2.1 tonnes per hectare of lime was applied in furrows

Objectives

The objectives of this project was to determine the effects of applying lime on soil properties, sugar and cane yield in sugarcane belt of Fiji,

Issues and background

Fiji soils are acidic in nature which may be one of the reasons attributed to the declining productivity of sugarcane. There are various reasons for declining productivity and low pH such as:

- Continuous mono-culturing of sugarcane on Fiji soils
- Soil erosion
- Continuous use of ammonia based fertilisers on sugarcane cultivated soils

In Fiji, sugarcane has been mono-cropped for past 125 years. Soil test result from Fertilizer Advisory Service indicates that majority of the soil pH are well below 5.5 - 6.5 pH range which is usually the preferred pH required by sugarcane. Despite the alarming low pH values of sugarcane cultivated soils, the growers do not use ameliorants such as lime to improve the soil pH.

A trial was laid out in Drasa to study the effect of lime application on soil chemical properties, crop productivity and grower profitability. The results of the study will be used to educate growers on application of lime in their fields.

A trial site at Drasa was selected. Soil sample was carried out for the nutrient status and pH of the soil. The pH buffering capacity carried out to determine the amount of lime required to increase the pH of the soil. Amount of agricultural lime was calculated for each plot and applied in furrows.

The plots were marked out in the field and cane was planted manually with 3 eye bud setts and covered with soil using a hoe. Pre-emergent herbicide (diuron 80 @ a rate of 4kg/ha) was applied to control weeds in the field. Fertilizers Blend A and B were applied as per the laboratory recommendation to supply cane with the required nutrients. Likewise, Blend C fertilizer was applied to ratoon cane. Growth measurements were carried out at 3, 5 and 7 months. Samples of sugarcane leaves were collected for laboratory analysis and recommendation for ratoon cane. Trial maintenance including weed, pest and disease control were carried out throughout the project. The trial suffered damages from the strong wind of Tropical cyclone Winston in 2016 that led to broken tops and lodging of cane.

2014 -2015 Plant crop data

Trial was laid out in April after which the dry weather conditions settled in. Thus poor germination with an average of 35.5% was noticed as per table below.

Table 12: Germination percentage

Rep → / Treatment ↓	1	2	3	4	Total	Avg
1	30	43	27	37	136	34
2	46	41	28	26	140	35
3	36	38	39	32	144	36
4	39	49	35	24	146	37

Growth measurements were taken at 3, 5 and 8 months after plnating cane. The results obtained are tabulated below.

Table 13: Growth measurements

Treatment (tonnes/ha)	Tillers per stool			Stalk					
				Height			Population (x 10^3/ha)		
	3m	5m	8m	3m	5m	8m	3m	5m	8m
0	4	5	8	33	53	119	14.1	15.5	17.5
0.7	4	6	6	30	51	112	13.1	14.1	17.1
1.4	3	5	7	32	52	111	13.0	14.0	16.3
2.1	5	7	7	33	59	122	16.1	16.9	20.2

Table 14: Cane analysis results

Treatment (tonnes/ha)	%brix in juice	%pol in juice	%fiber in cane	%pocs	tc/ha	ts/ha
0	21	20	10	16	84	14
0.7	20	18	10	15	100	14
1.4	20	19	10	15	80	12
2.1	21	20	10	16	94	15

2017 Second ratoon crop data

Table 15: Growth measurements									
Treatment (tonnes/ha)	Tillers per stool			Stalk					
				Height			Population (x 10^3/ha)		
	3m	5m	8m	3m	5m	8m	3m	5m	8m
0	8	9	7	52	89	125	18.2	21.3	21.6
0.7	7	8	6	55	90	127	19.2	21.9	21.9
1.4	8	7	7	61	85	124	20.1	19.2	21.8
2.1	7	8	8	65	87	130	20.1	22.2	22.9

Table 16: Cane analysis results						
Treatment (tonnes/ha)	%brix in juice	%pol in juice	%fiber in cane	%pocs	tc/ha	ts/ha
0	19	18	11	14	81	12
0.7	19	18	11	14	83	12
1.4	19	18	11	15	84	12
2.1	20	19	11	15	82	13

There was no significant difference in plant growth, stalk population, tiller production, cane and sugar yield between the treatments. Lime is slow reacting.

1.3.3 NUTRIENTS IN THE FIJI SUGAR INDUSTRY

Table 17: Trial details	
Parameters	Details
Variety	Naidiri
Trial design	Randomized Complete Block Design
Replications	4
Plot size	6 rows x 10m x 1.37m

Table 18: Treatment details	
Treatment No.	Details
1	No fertilizer was applied
2	Farmer practice
3	80% recommended rate
4	Recommended rate

A project has been designed to gather information about fertilizer use and behaviour in Fiji. Most of the work done in Fiji in regards to fertilizer has focused on determining optimal fertilizer requirements for cane production in Fiji. Much less focus has been paid to the issue of nutrient budgeting and the behaviour of nutrient elements within the various sectors of the industry as a whole.

There is very little information on how much nutrient is removed along with the cane during harvesting (analyses of fresh cane are very few in number and are really only available for the Lautoka and Labasa mill areas), how much might be lost in trash burning, and what happens at the mills is poorly understood. Hence, the project is designed to understand to gather information on behaviour of nutrients within Fiji sugar industry.

A total of six sites within Lautoka and Rarawai mill area has been selected for the project. Soil profile studies has been carried out for the sites prior to planting to determine the physical and chemical properties of the soil at a depth of 1 meter. All six sites were planted in the replanting season after a thorough land preparation. Seed cane were obtained from seed cane nursery at SRIF. Naidiri- an early maturing variety was used for planting. Three different rates of fertilizer treatments; farmer usual practice rate, 80% recommended rate and recommended rate of Blend A, B and C along with a control were used at each trial site.

Table 19: Trial site details

Site	Mill Area	Farmer's name	Farm No	Sector	Location
1	Rarawai	Gyan Singh	6303	Koronubu	Koronubu flat
2	Rarawai	Rarawai estate	1696	Rarawai estate	Field 18, plot 2
3	Lautoka	Rajendra Prasad	35	Drasa	No. 18 road
4	Lautoka	Waqadra estate	129	Waqadra estate	Waqadra estate
5	Lautoka	Rajnesh Naicker	19025	Lovu	Buabua
6	Rarawai	Subra Mani	1416	Rarawai	Etatoko

1.3.4 Biochemical Lab

The sugar laboratory analyses sugarcane samples from Research projects. The laboratory may either analyse sugarcane as a whole or as a part (juice). The analysis considered is dependent on the requirement of the researcher.

Biochemical Analysis

The small mill aims to provide necessary information on cane such as %pol, %brix, %fibre and %POCS on various ongoing trials. Moreover, it is a vital aspect of variety selection from the initial stages till the final selection of breeding trials. In addition, analysis is carried out to quantify the quality of sugarcane in response to various agronomic practices, impacts of Pest & Disease or as a field audit.

A total of 1093 cane samples were crushed for the year which was 50% more compared to 2016. The small mill and laboratory had forecasted to analyse a total of 2000 samples but this target was not achieved due to the aftermath recovery of T.C Winston on almost 80% of the forecasted crop. Thus samples were only received from a few of the Rarawai and Lautoka research trials. Majority of the samples crushed were received from the variety selection program as displayed in chart 1.

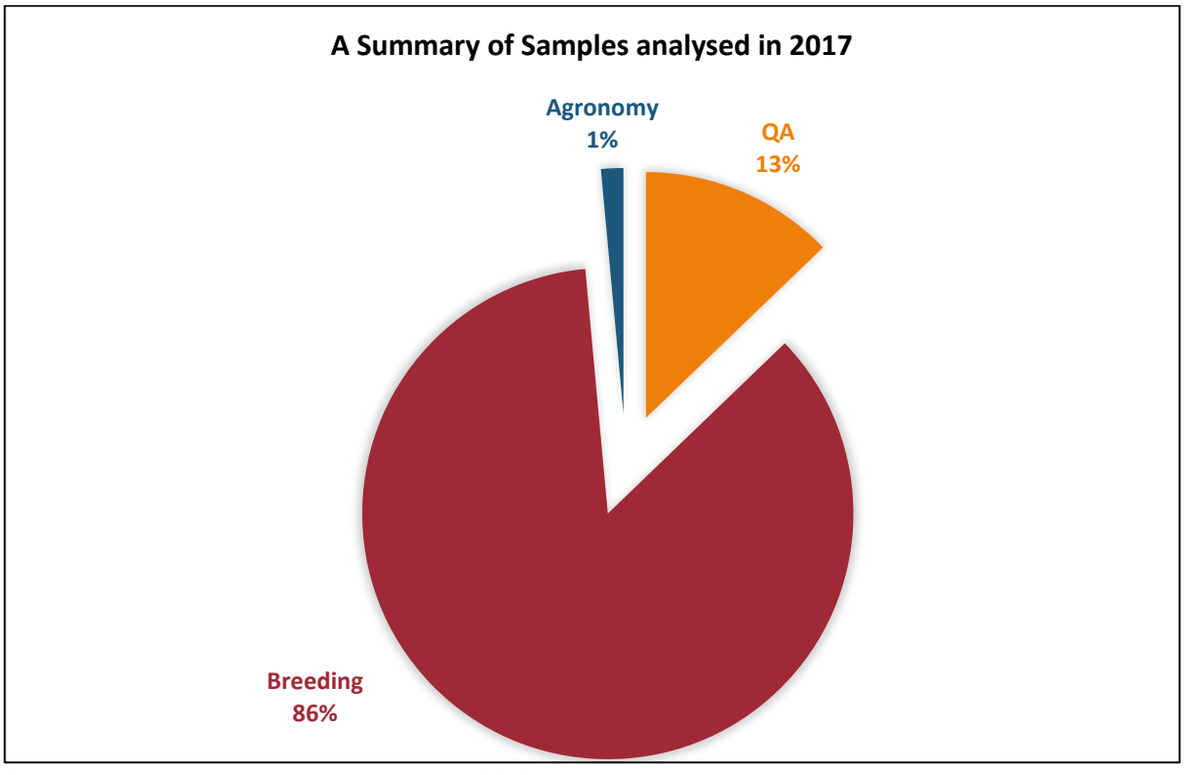


Chart 1: Percentage of samples received for 2017.

During the season all the samples were analysed by the FT-NIR analysis via the Spectracane.

Table 20: A detailed presentation of sample received in 2017		
Trial Name	No. of samples	Total
QA samples	140	140
LF2010 - stage 4	80	937
LF2011 - stage 4	96	
LF2013 - stage 3	92	
LF2009 - stage 4	72	
LF2015 - stage 2	597	
Lime Trial	16	16
Grand Total		1093

Training

Analytical Instrument Training

A one-day training was conducted by the Perkin Elmer engineer on the use of the UV-Visible spectrophotometer (Lamda 365), including familiarization of the range of analysis the software offers. The training also included hardware maintenance and basic servicing.

A three-day training was conducted on the use of the Alpha-P FT-NIR, facilitated by the Bruker Optics servicing manger. The training involved use of the software, maintenance and basic servicing of the hardware and a few hands-on analysis practical.

1.3.2 Fertilizer Advisory

Analytical Laboratory

SRIF is a leading provider of independent analytical services. The analytical laboratory acts as a link between the growers and the industry by providing analytical services for advisory and research programs. This service is essential due to the rising cost of fertilizers and to maintain optimum production in the future. Analytical services provided at SRIF analytical laboratory includes soil, foliar and cane analysis. Soil and leaf samples are received from all sugar cane districts including Penang, Rarawai, Lautoka and Labasa for fertilizer recommendation and from SRIF research trials.

At the analytical laboratory at SRIF, all analytical procedures are fully documented. The in-house validated analytical methods deliver consistent and reliable lab reports on the samples. Grower service team has created a detailed sample and report tracking system to assure prompt communication to our growers on lab results and to maintain traceability on samples and reports. Soil and leaf testing for recommended fertilizer – all cane farmers planning to plant must have their soils analysed to get the correct recommendation to improve yield.

Beneficiaries

Farmers - fertilizer advisory service which includes fertilizer recommendation and new farm assessment is provided to all the sugarcane farmers. The laboratory gives fertilizer recommendations to growers in the cane belt area on the basis of soil and leaf sample analysis from their fields.
The FAS service is linked to the grower and the sugar industry stakeholders in terms of soil nutrient data and fertilizer usage.

Major Instrument List

- ✓ pH meter
- ✓ VELP Digestion system
- ✓ Lachat FIA instrument
- ✓ PerkinElmer AAS (Analyst 400)
- ✓ NIR Spectracane
- ✓ Schmidt and Haehcsh Polarimeter
- ✓ FTIR

3.1.1 Soil Analysis

A total of two thousand and seventy five soil samples were received for analysis comprising of one thousand six hundred and nine advisory soil samples and four hundred and sixty six research soil samples. Reports are released by email as soon as they become available from the laboratory to the FSC extension staffs. The laboratory staffs understand the importance of timely advice; therefore the staffs are equipped and staffed to process samples quickly and efficiently. The sample requests are completed within two weeks from the date sample received.

Table 21: Summary of soil samples for 2017			
Mill	Advisory	Research	Total
Lautoka	804	296	1100
Rarawai	347	65	412
Penang	46	0	46
Labasa	412	105	517
Total	1609	466	2075

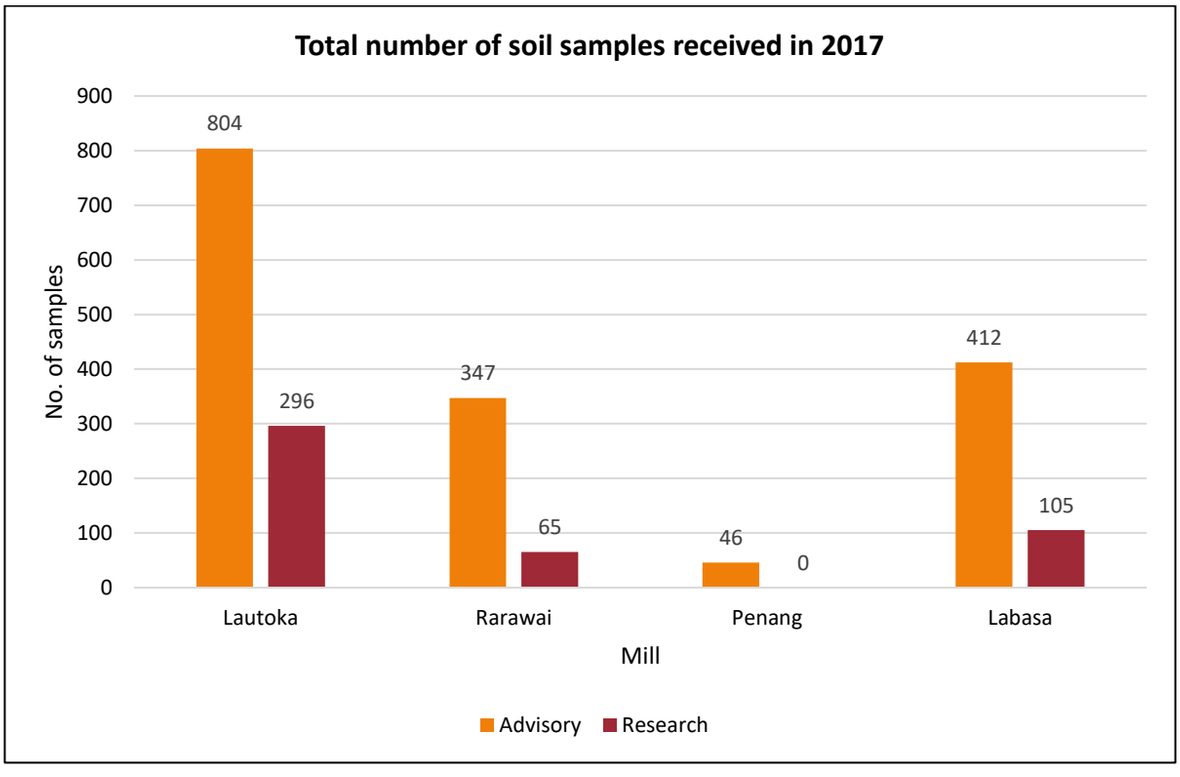
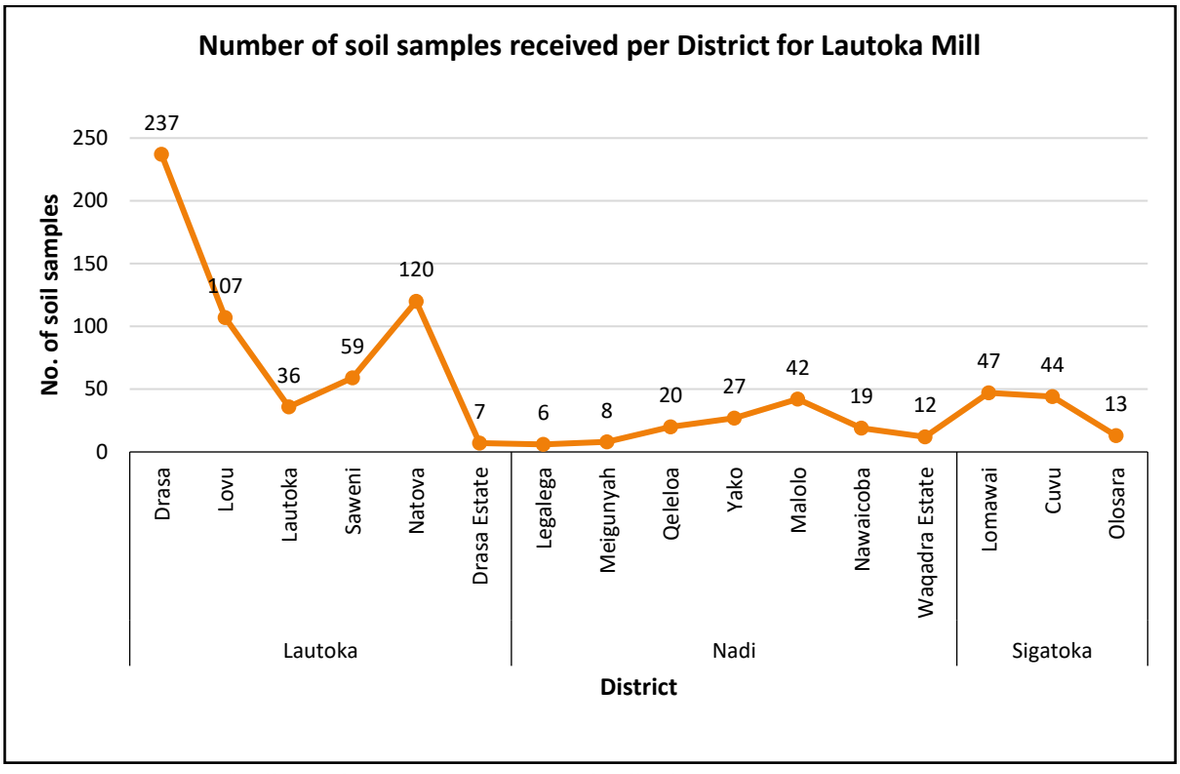
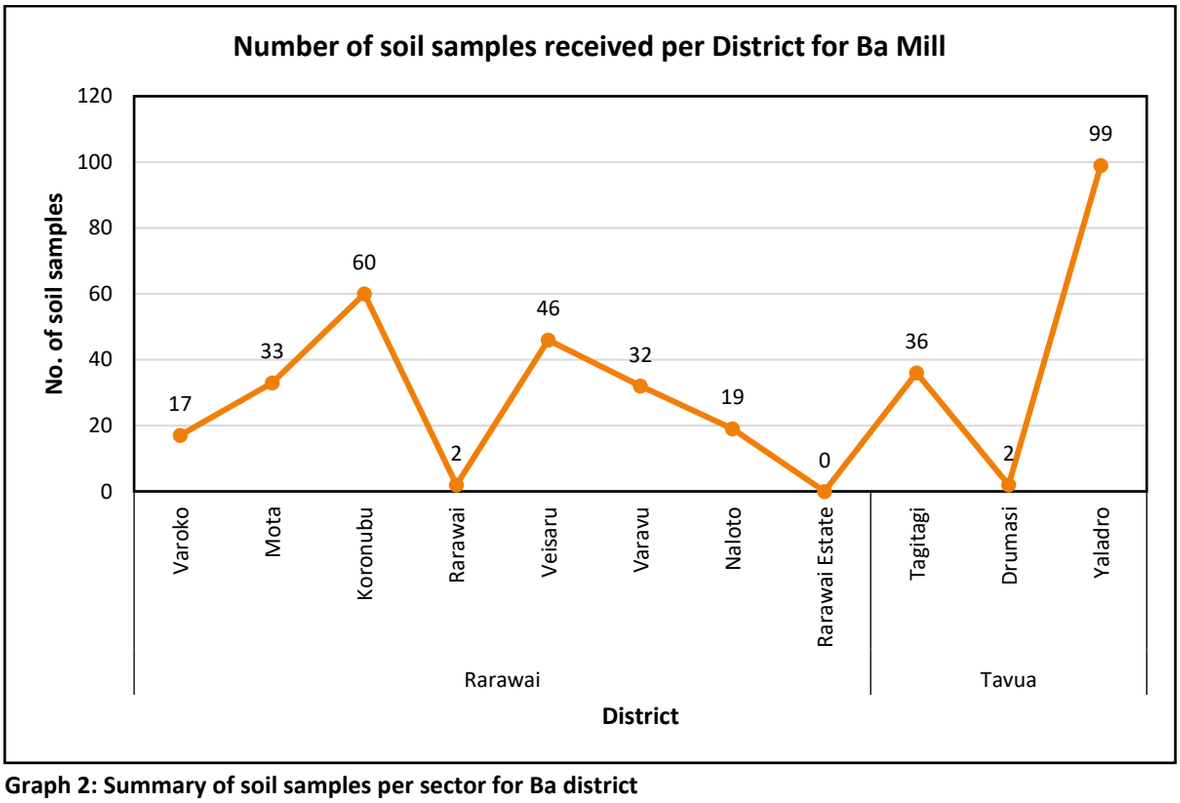


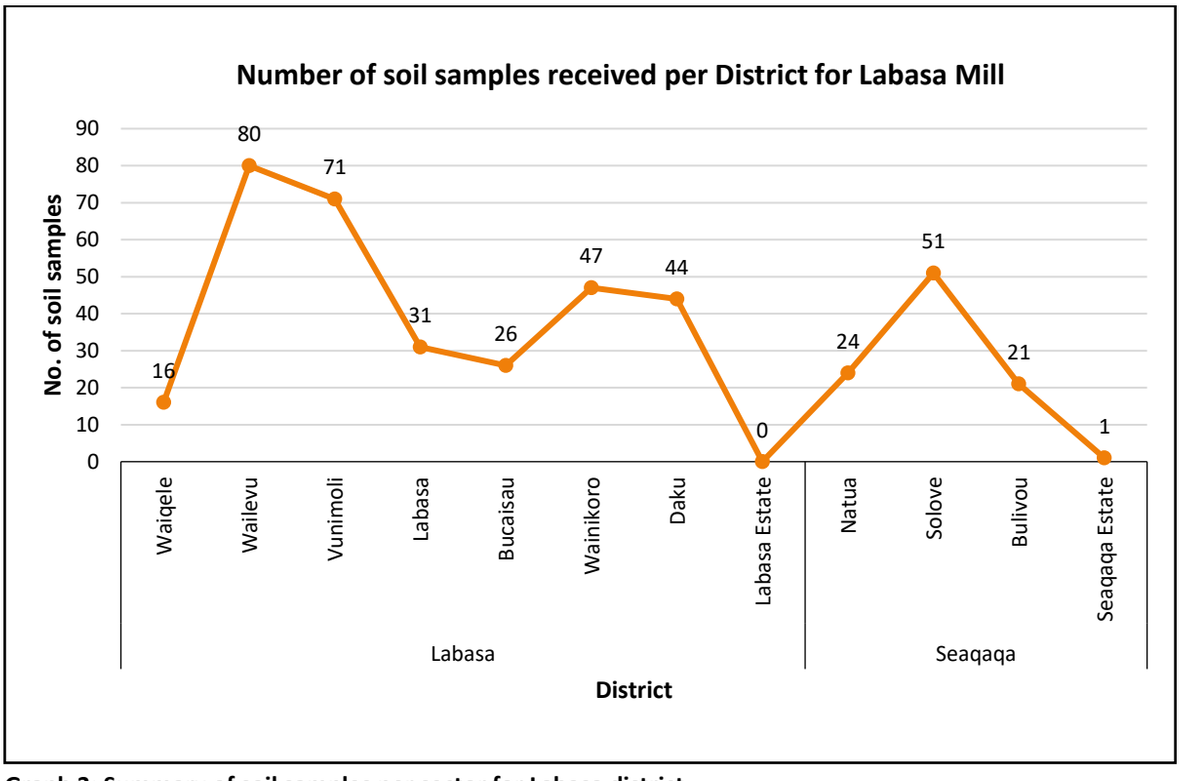
Table 21: Summary of soil samples per sector per district for 2017			
District	Sector Name	No. of soil samples	Total
Lautoka	Drasa	237	566
	Lovu	107	
	Lautoka	36	
	Saweni	59	
	Natova	120	
	Drasa Estate	7	
Nadi	Legalega	6	134
	Meigunyah	8	
	Qeleloa	20	
	Yako	27	
	Malolo	42	
	Nawaicoba	19	
	Waqadra Estate	12	
Sigatoka	Lomawai	47	104
	Cuvu	44	
	Olosara	13	
Rarawai	Varoko	17	210
	Mota	33	
	Koronubu	60	
	Rarawai	2	
	Veisaru	46	
	Varavu	32	
	Naloto	19	
	Rarawai Estate	0	
Tavua	Tagitagi	36	137
	Drumasi	2	
	Yaladro	99	
Labasa	Waiqele	16	315
	Wailevu	80	
	Vunimoli	71	
	Labasa	31	
	Bucaisau	26	
	Wainikoro	47	
	Daku	44	
	Labasa Estate	0	
Seaqaqa	Natua	24	97
	Solove	51	
	Bulivou	21	
	Seaqaqa Estate	1	
Penang	Ellington 1	16	46
	Malau	4	
	Nanuku	3	
	Ellington 2	23	
TOTAL			1609



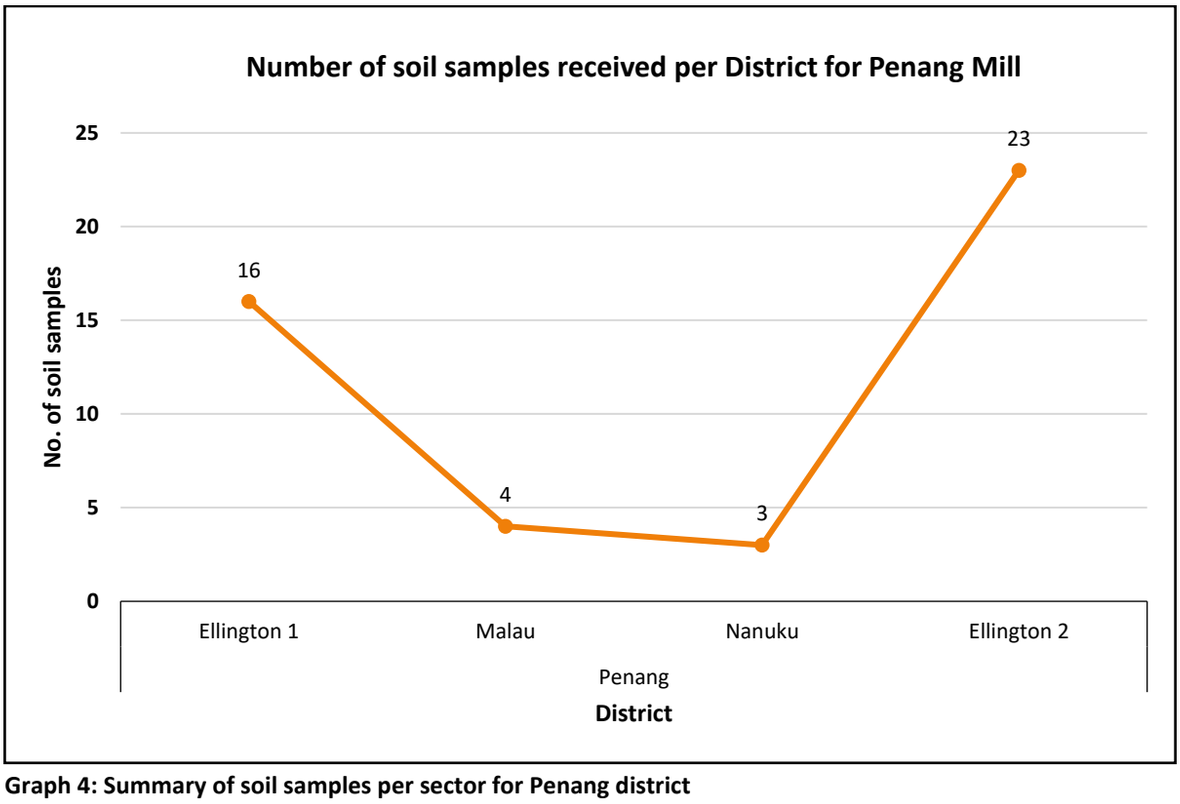
Graph 1: Summary of soil samples per sector for Lautoka district



Graph 2: Summary of soil samples per sector for Ba district



Graph 3: Summary of soil samples per sector for Labasa district



Graph 4: Summary of soil samples per sector for Penang district

Trainings

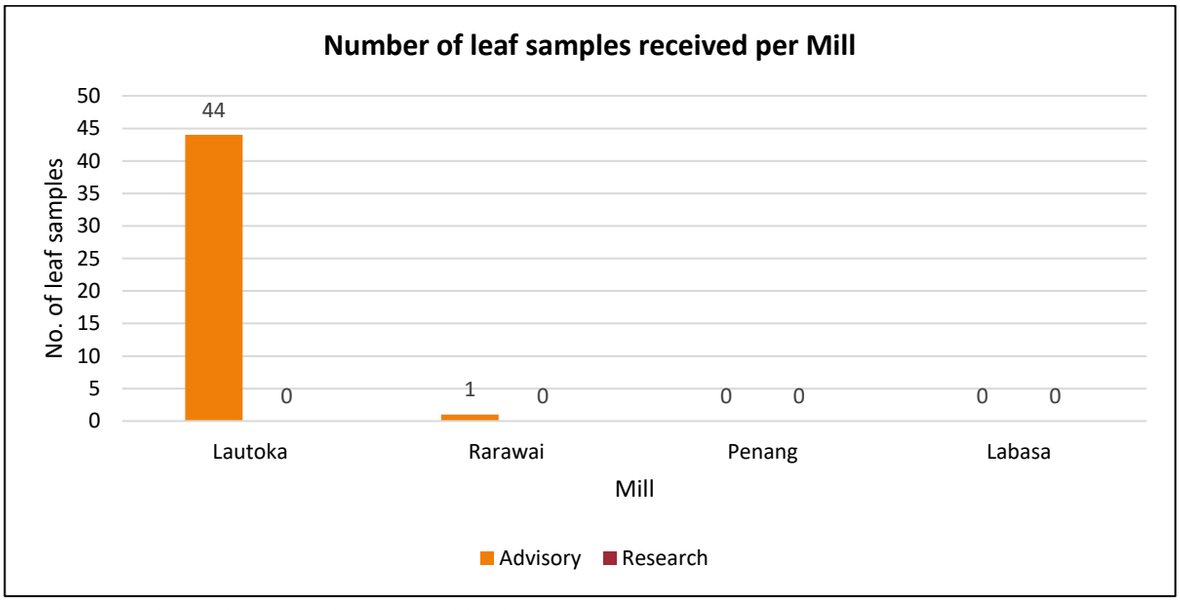
- Soils training was provided by Mr. Seru, a consultant previously employed as a soil scientist for Ministry of Agriculture, Koronivia Research Station.
- Soil identification and classification workshop by Prof John Morrison held at Waterfront Hotel, Lautoka on 5th July, 2017.

3.1.2 Leaf Analysis

The analytical laboratory had received 45 plant samples for advisory analysis. The samples have been analyzed and fertilizer recommendation sent for the next year ratoon crop.

Table 22: Summary of Plant samples for 2017

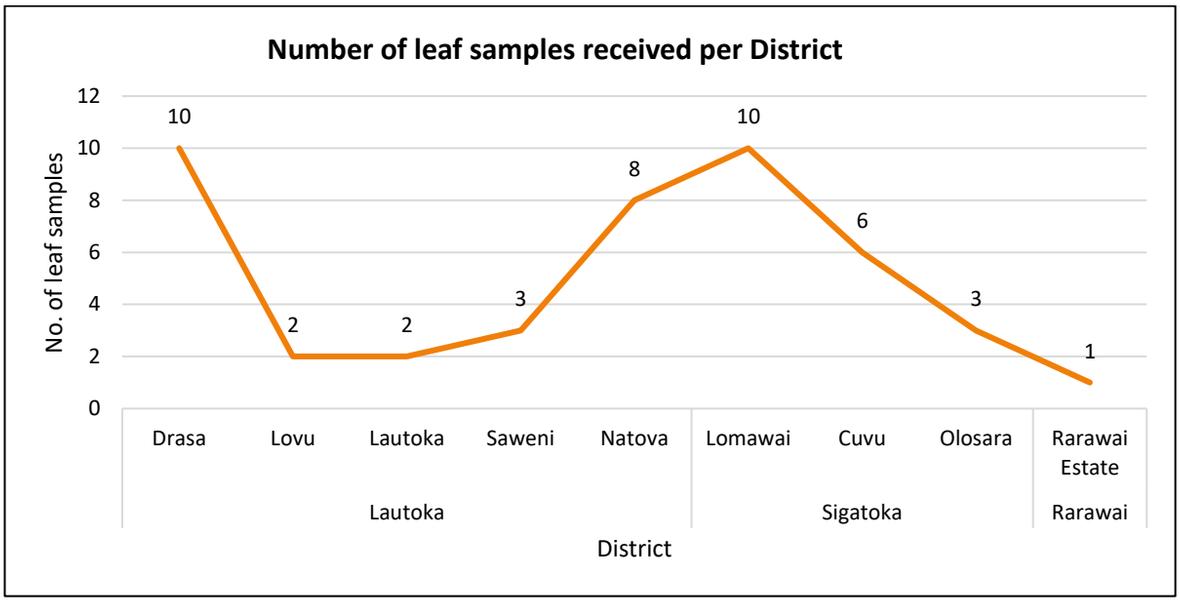
Mill	Advisory	Research	Total
Lautoka	44	0	44
Rarawai	1	0	1
Penang	0	0	0
Labasa	0	0	0
Total	45	0	45



Graph 5: Number of leaf samples received by district

Table 23: Summary of Leaf Samples per Sector per District for 2017

District	Sector Name	No. of soil samples	Total
Lautoka	Drasa	10	25
	Lovu	2	
	Lautoka	2	
	Saweni	3	
	Natova	8	
Sigatoka	Lomawai	10	19
	Cuvu	6	
	Olosara	3	
Rarawai	Rarawai Estate	1	1
TOTAL			45



Graph 6: Summary of Leaf Samples per Sector per District for 2017

Trainings

Facilitated training for FSC Extension Staffs on leaf sampling held at Penang, Tavua, Ba and Lautoka from 23rd - 29th March, 2017.

3.1.3 Small Mill Analysis

The small mill laboratory is established to analyze research cane samples for cane and sugar yield for determination of percentage pure obtainable cane sugar (%POCS).

A number of activities were carried out as follows,

- ✓ Cane receiving and unloading (receive the cane at the mill and unload it from the transport vehicle)
- ✓ Cane preparation (cutting and shredding cane to prepare it for juice extraction)
- ✓ Juice extraction – pressing shredded cane
- ✓ Juice clarification - remove suspended solids from the juice
- ✓ Take reading using polatronic and refractometer
- ✓ Data was dispatched to the respective staff through email.

3.1.4 Quality Assurance

The analytical laboratory took part in ASPAC proficiency programs. The laboratory continues to adhere to quality control checks in every analysis. The laboratory conducts the QC checks by having standards as well as random control samples and referring to the accepted range of values for QC samples. Any value out of the range is investigates and corrective measures are undertaken to ensure the criteria set for quality assurance is followed.

We also specialize in Method Development and Validation Testing. All work completed by the laboratory undergoes a stringent Quality Control and Quality Assurance review process prior to final report release. As a full service laboratory, SRIF staff is committed to meeting quality requirements with accuracy and quick turnaround times.

Impacts of the sucrose post-harvest deterioration in sugarcane by Leuconostoc sp. bacteria on the Fijian Sugar Industry profitability

The postharvest deterioration in sugarcane results in loss of sucrose content, lower purity and higher acidity of juice and then decrease in mill efficiency. Thus in turn it has a financial impact to the millers and growers. According to the literature, the sucrose postharvest deterioration is mainly caused by the bacteria *Leuconostoc* and under favorable conditions such as high temperature and humidity, amount of mud clinging to the culm and leaves, length of sugarcane billets, and degree of burning, sucrose is degraded into dextran plus fructose.

According to the FSC data in 1989 preliminary experiments showed that as the crushing season progresses and the proportion of burnt cane increases, there is a concomitant dramatic rise in the dextran content. This was confirmed by regressing dextran levels against both delay to crush and percentage burnt (R^2 of 0.77). This has been further supported by experiments on dextran accumulation over time conducted by FSC which showed that the dextran content of cut green cane remains roughly constant at minimal levels (<30 ppm) for a week, while for burnt cane dextran levels reach 700 ppm after 2 days and 2,400 ppm after 7 days (John Davies, 1996).

According to previous experiments, we formulate the following hypotheses:
The amount of dextran or moreover deterioration would be most obvious in burnt sugarcane and billet cane than in green and whole stalk canes.
The extent of delay in cut-to-crush would be the main activator of an increase of the rate of sucrose deterioration, along with the influence of very low or very high temperatures and high humidity.
The greater the length of mill breakdowns would be expected to increase the amount of sucrose deterioration during milling processes.

Thus a study to evaluate the impact of sucrose deterioration on the Fiji sugar industry profitability caused by *Leuconostoc* sp. has been established through the AAP2013 funding. It will be carried out by FSC and SRIF, within 4 years. The study focuses on 4 common commercial varieties across the Fijian sugarcane belt. Thus a 4.0ha trial consisting of the four varieties namely; Mana, Naidiri, LF91-1925 and Qamea has been planted in November at the SRIF estate in Drasa. The trial follows the split-split randomized block design. The sugarcane samples will be harvested during the 2018 harvesting season of which the Juice and mill products will be analyzed at the SRIF sugar laboratory.

The chemical results will quantify sucrose deterioration as a function of different factors and identify the main factors causing loss of sugar purity and mill efficiency in Fiji and of the indicators that can be used to check the process quality.

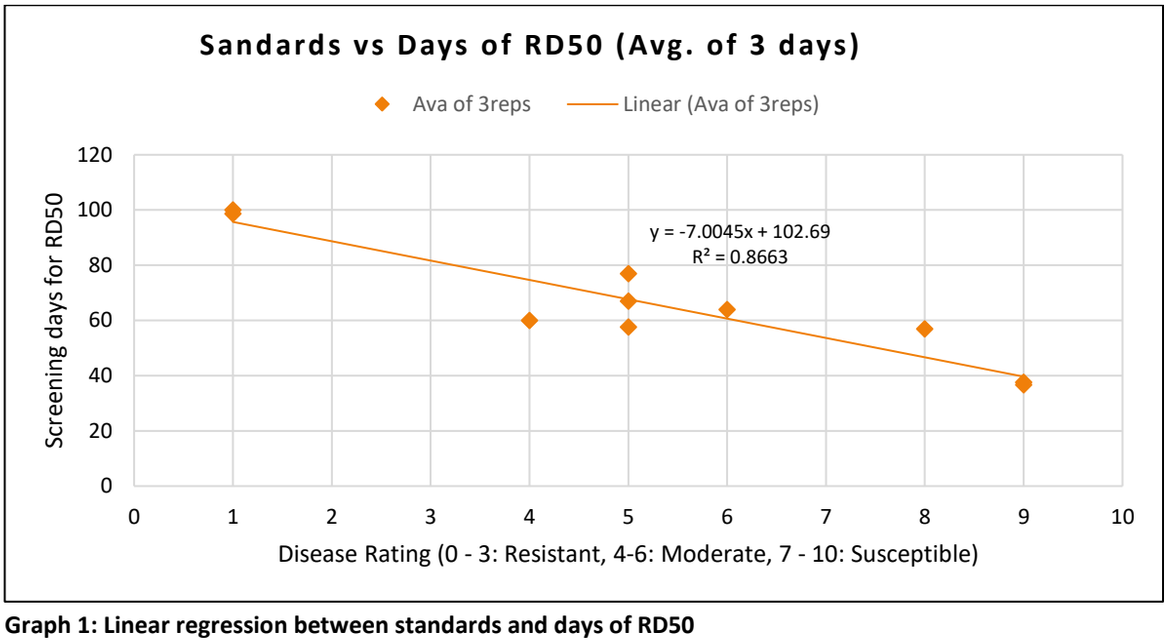
This project intends also to enlighten farmers on the best management practices that would reduce the loss of financial benefits and also the problems it would impose on milling processes and eventually the revenue for the industry and the nation.

1.4 CROP PROTECTION

1.4.1 Pathology

Fiji leaf gall (FLG, Fiji disease) was first described in Fiji and is widespread in the Fijian islands. FLG threatened the existence of the Fijian Sugar industry in the late 1800s and there have been periodic outbreaks whenever a susceptible variety has been released. The primary method of managing FLG is varietal resistance. Resistant varieties have been successfully used in Australia and Fiji to manage outbreaks of FLG. Mana the dominant variety in the Fijian sugar industry is intermediate to susceptible to FLG. FLG is spread by a vector (disease carrying agent), called plant hopper (*Perkinsiella vitiensis).*

The screening was carried out for LF2013 series. There were negative linear relationships between standards and days (R^2=0.8663) as shown in figure 2 below. The linear equation is y=-7.0045x+102.69 resistance to FDV. Out of 97 varieties, 85 varieties were resistant, 13 varieties were moderate, and 2 varieties were susceptible.



Graph 1: Linear regression between standards and days of RD50

The values represented on the graph is the average number of days of screening the test varieties with standards. These results show that transmission of the virus was successful in the sugarcane varieties and the standard varieties reacted as expected.

1.4.2 Nematology

Nematological surveys were carried out in Penang, Rarawai, Lautoka and Labasa mill districts of Viti Levu and Vanua Levu from October 2015 to August 2018. All fields from which a sample was collected had a long history of sugarcane production. A total of 380 soil samples were collected representing 3800 fields from the rhizosphere region, 10cm from base of the sugarcane plant and at a depth of 20cm. Soil samples were collected using shovels. The soil samples were collected from four sectors of Penang, ten sectors of Rarawai, fourteen sectors of Lautoka and ten sector of Labasa mill districts respectively, from each sector 10 soil samples were collected and each sample was a composite of 20 soil cores.

Total numbers of free-living nematodes and numbers of plant parasitic nematodes (by genus) were obtained from fresh samples. Nematodes were counted and identified at 40X and 100X magnifications using a compound microscope. Root-knot nematodes, Lesion nematodes and other species were recorded.

Data analysis

The data were analyzed according to the occurrence of nematode population based on two factors; frequency and relative density. The survey was conducted to assess the frequency occurrences of root knot and lesion nematodes on sugarcane fields of Penang, Rarawai, Lautoka and Labasa mill regions. The frequencies of the nematodes species in all the surveyed areas highly varied from one area to another (Table 1).

Out of 380 analyzed samples, 320 and 295 were found infested with lesion and root knot nematodes respectively in all the 38 sectors, therefore, the overall frequency occurrence of these species were 84.21% and 77.63% respectively. The frequency occurrence of lesion nematodes was 100% in Koronubu, Tagitagi, Nawaicoba, Yako, Waiqele, Wailevu, Vunimoli, Bucaisau and Daku sectors while rootknot was 100% in Mota, Yaladro, Drasa, Lovu, Natova, Nawaicoba, Yako, Waiqele, Wailevu and Vunimoli sectors. In the Labasa sector, frequency occurrence of lesion nematode was minimum at 50% whereas occurrence of Rootknot in Cuvu and Ellington 2 sectors were 30% and 10% respectively.

Table 1: Number of root knot and lesion nematodes present in 200cc soil samples from different sectors.

S/N	Name of Sectors	Mill Region	%population density for RKN	%population density for Lesion	%Frequency for RKN	%Frequency for Lesion
1	Rarawai	Rarawai	44.9	55.1	90	80
2	Drumasi	Rarawai	22.1	77.9	80	90
3	Mota	Rarawai	55.9	44.1	100	70
4	Koronubu	Rarawai	31.8	68.2	90	100
5	Naloto	Rarawai	46.7	53.3	80	70
6	Varoko	Rarawai	39.5	60.5	90	90
7	Yaladro	Rarawai	36.7	63.3	100	90
8	Tagitagi	Rarawai	42.0	36.3	90	100
9	Varavu	Rarawai	40.0	59.6	90	80
10	Veisaru	Rarawai	38.0	75.0	90	90
11	Nanuku	Penang	80.2	19.8	90	80
12	Malau	Penang	69.3	30.7	90	90
13	Ellington 1	Penang	31.0	69	40	90
14	Ellington 2	Penang	15.7	84.3	10	90
15	Drasa	Lautoka	60.7	39.29	100	90
16	Lovu	Lautoka	62.6	37.4	100	90
17	Lautoka	Lautoka	40.4	59.57	70	80
18	Saweni	Lautoka	57.4	42.59	70	80
19	Legalega	Lautoka	71.3	28.66	70	60
20	Natova	Lautoka	36.6	63.4	100	90
21	Meigunyah	Lautoka	38.1	61.9	40	60
22	Qeleloa	Lautoka	58.2	41.84	70	80

Table 1: Number of root knot and lesion nematodes present in 200cc soil samples from different sectors.						
S/N	Name of Sectors	Mill Region	%population density for RKN	%population density for Lesion	%Frequency for RKN	%Frequency for Lesion
23	Malolo	Lautoka	67.9	32.11	60	90
24	Nawaicoba	Lautoka	57.2	42.78	100	100
25	Yako	Lautoka	43.8	56.2	100	100
26	Lomawai	Lautoka	46	54	40	60
27	Olosara	Lautoka	23.6	76.39	50	60
28	Cuvu	Lautoka	19.4	80.65	30	80
29	Waiqele	Labasa	66	34.02	100	100
30	Wailevu	Labasa	43.9	56.07	100	100
31	Vunimoli	Labasa	36.8	63.24	100	100
32	Labasa	Labasa	50	50	50	50
33	Bucaisau	Labasa	40.7	59.3	90	100
34	Wainikoro	Labasa	42	57.97	70	80
35	Daku	Labasa	38.6	61.42	80	100
36	Natua	Labasa	55.1	44.9	80	90
37	Solove	Labasa	51	49	80	90
38	Bulivou	Labasa	30	70	70	70

The population density of root knot and lesion nematodes on all the surveyed sectors of four mill regions highly varied from field to field on sugarcane crops. The highest population density of Rootknot was recorded from Nanuku sector (80.2%), Lesion nematodes were recorded from Ellington 2 (84.3%) and Cuvu sector (80.65) of Penang and Lautoka mill region (Table 1). Thus, the individual farms in different sectors that had high population of Root knot are Waiqele (960) and Lesion nematodes were found in Wailevu (1485). Hence, overall the average incidence of the plant parasitic nematodes (Lesion and Rootknot) in Penang mill region was 5.54%, in Rarawai mill region it was 19.93%, in Lautoka mill region it was 34.42% and in Labasa mill region it was 40.12%. However, soil collected at Ellington 2, had a ratio of one farm out 10 farms with *Meloidogyne* spp.

Overall, 52.46% of the sample had lesion populations and 47.54% of the sample had root knot population which was high enough to indicate a potential for damage contributing to the largest portion of risk towards sugarcane plants. The survey results showed that sugarcane is a host plant to economically important Plant Parasitic Nematodes which might decrease production of sugarcane in Fiji, with very slight difference in their population densities. The survey provides information on frequency occurrences and population density of lesion and root knot nematode associated with sugarcane in four mill regions. Plant parasitic nematodes (PPN) cause annual yield losses of about $100 billion worldwide, with 70% of the damage attributed to root-knot nematodes. In Fiji, no such data is available indicating the infestation level. The survey of four mill districts has indicated that there is a need to establish the management practices to determine the extent of damage contributing to the current yield decline. The study area has shown the presence of PPN and stated that sugarcane in Fiji is a good host of lesion and root-knot nematode.

The high density of the lesion and root-knot nematode species and the frequency occurrence of this nematode population in this survey were expected in the study areas, since farmers have not been using any control measures for reducing the population. Moreover, it is observed that the practice of

mono cropping with long number of ratooning years is too common. Thus, a nematode management practice in Fiji hasn't been successful. Lack of use of nematode control interventions, inadequate knowledge and technical knowhow by farmers could also have contributed to high nematode densities.

1.4.3 Disease Control

The system used in the protection of crops against diseases and pests remains the same as that of previous years. The disease control unit is involved in intensive rouging programme to eradicate all traces of Fiji disease from commercial fields. The roguing of disease fields and intensive checking of all farms within a mile radius of the known diseased fields and intensive checking of all farms within a mile radius of the known diseased farms. However, the disease remains endemic in wild canes and *Saccharum edule* (Duruka) in the neighbourhood of commercial plantings and is always transmitted to the cultivated crop by the Fijian sugarcane leaf hopper, *Perkinsiella vitiensis*. The Disease Control Unit covered an area of 8363 ha during their crop inspection. Of this total 1489 ha plant crops and 6874 ha were ratoon cane.

Table 2: Rouging Report from January-December 2017

Months	Lautoka		Nadi		Labasa	
	Plant	Ratoon	Plant	Ratoon	Plant	Ratoon
Jan	0.5	145.20	2.85	52.74	69.77	157.19
Feb	8.14	86.27	20.73	83.41	70.55	121.35
Mar	9.8	145.59	31.42	120.74	142.90	154.73
Apr	2.2	118.83	23.65	72.75	72.60	131.06
May	7.84	186.02	19.61	119.55	78.72	165.29
Jun	4.39	168.80	19.31	104.34	66.87	156.01
Jul	12.74	166.04	41.64	86.39	52.39	172.91
Aug	9.4	123.58	39.82	100.25	55.71	177.13
Sept	0	110.10	1.94	88.06	55.29	169.81
Oct	0	182.44	0	62.37	43.96	159.03
Nov	0	176.71	11.07	72.71	42.32	162.34
Dec	1.43	114.56	24.15	48.16	0	0
Total	56.44	1724.10	236.20	1011.47	751.08	1726.9

Table 2: Rouging Report from January-December 2017 – CONT'D

Months	Sigatoka		Ba/Tavua		Penang	
	Plant	Ratoon	Plant	Ratoon	Plant	Ratoon
Jan	14.44	86.53	20.90	177.82	24.49	80.11
Feb	3.61	69.03	3.1	59.51	20.64	24.95
Mar	10.97	79.82	7.6	118.32	21.87	70.02
Apr	11.95	64.97	13.1	97.39	0.56	56.57
May	8.54	67.63	13.8	114.46	15.24	65.10
Jun	32.39	69.66	3.03	110.73	13.46	95.89
Jul	55.83	31.80	43.50	99.3	16.46	51.83
Aug	14.39	79.23	25.6	146.50	12.85	79.87
Sept	14.04	56.33	6.14	31	0	0
Oct	1.5	72.77	4	43.76	0	6.45
Nov	5.48	53.76	0	22.38	0	56.35
Dec	4.5	33.81	1.34	38.01	0	0
Total	177.6	765.34	142	1059.20	125.57	586.69

The incidence of Fiji Leaf Gall Disease is increasing in the sugarcane farms given the availability of the pathogen *(Fiji Disease virus*) from infected seed cane, high leaf hopper population and weather conditions. Also the planting of *Saccharum edule* (Duruka), an alternate host of Fiji Leaf Gall Disease planted along and near cane fields contributes to the spread of the disease found in some Districts.

Table 3: Summarized Rouging Report from January-December 2017

Mill District	No. of Farms Inspected	Area Rouged (Ha)		No. of FLGD stools Rouged
		Plant	Ratoon	
Lautoka	483	56.44	1724.14	59
Nadi	277	236.19	1011.47	120
Labasa	748	751.08	1726.85	0
Sigatoka	350	177.64	765.34	520
Ba/Tavua	421	142.18	1059.18	48
Penang	534	125.57	586.69	0
Total	2813	1489	6874	747

Sigatoka have the most stools infected in 2017. Out of the total 2813 farms inspected 747 stools were rouged.

Rouging was carried out at its normal routine basis. There was no major disease outbreak in Vanua Levu except for minor incidences of Brown rust which alleviated after the rains. There was no yield loss reported by the farmers.

1.4.5 Biosecurity

Sugarcane smut

Sugarcane smut is a disturbing, fungal disease caused by *Sporisorium scitamineum* (*Ustilago scitamineum*). Smut, the most easily recognized disease of sugarcane has a black whip that is of pencil thickness. It is sliver- greyish black and powdery in colour.

On maturity it ruptures and a large number of the minute black smut spores (teliospores) are liberated and disseminated by the wind. It causes a great deal of damage to susceptible varieties.

The teliospores may survive in the soil for long periods, up to 10 years. The spores and sporidia are also present in the infected plant debris in the soil. The smut spores and dormant mycelium also present in or on the infected setts.

The primary spread of the disease is through diseased seed-pieces (setts). Spores present in the soil also spread through rain and irrigation water and cause soil-borne infection.

The secondary spread in the field is mainly through the smut spores developed in the whips, aided by air currents. Favourable Conditions -continuous ratooning and dry weather during tillering stage favours the disease.

The Burkard 7 - day Spore samplers are used for an early detection of smut pathogen in the country. Spore traps consists of a tape which has a sticky surface thus traps the spores. Spore identification is done by the two techniques: light microscopy and molecular tests.

A molecular test intensifies capacities of spore trapping and is a certain method for smut spore confirmation. The polymerase chain reaction test will be used. PCR can detect small amounts of sugarcane smut DNA extracted from spores fixed on the spore trap tape.

Three Spore traps were procured on the 16th of June, 2016. These traps contain a jelly coated tape placed in the periphery of the drum which will be inspected under microscope as well as through a molecular diagnosis known as PCR the tapes will be changed every changed every 7 days. The DNA samples will initially be screened with the universal ITS primers ITS1F and ITS4. The specific sugarcane smut test will use the primers ITS1F and Rev2 (5'-GATCCGCCAGCTCTTTCGTAAT-3').

The three smut traps will be moved around every three months (subject to changes) to international importing vicinities to ensure all possible areas is covered.

A draft SMUT incursion plan for the Fijian Sugar Industry has been put in place to encounter the disease. SRIF is working closely with BAF to make certain all precautions are taken. An MOU between the two organizations is underway.

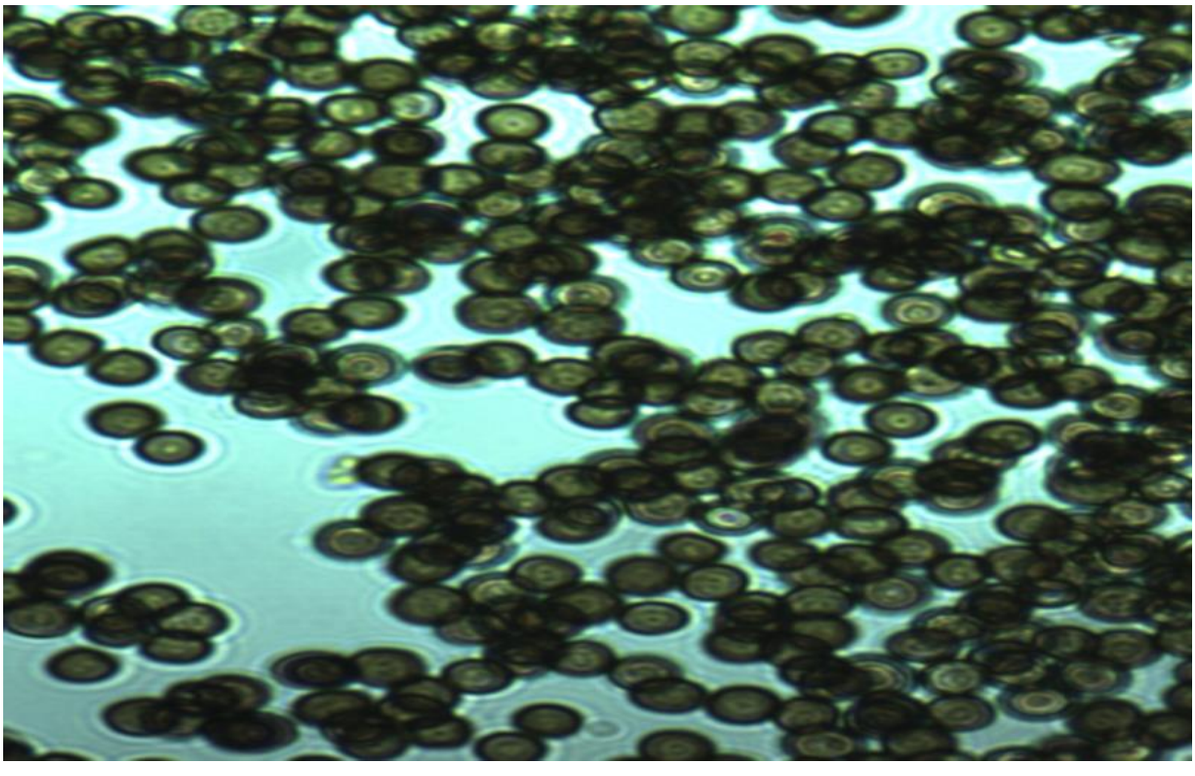


Figure 1: *Sporisorium scitamineum* spores from Woodford, Australia, viewed under microscope 10x objective at SRIF, Lautoka, Fiji.

Figure 2: First spore trap placed at meteorology station, SRIF, Lautoka.

Figure 3: second smut spore trap placed at the Fiji Ports Authority, Lautoka, Fiji.

Figure 4: Second spore trap from an altered angle.

Table 4: Resistance rating of Fijian sugarcane varieties to Sugarcane Smut		
Variety	Rating Number	Rating Class*
KIUVA	1	HR
VOMO	1	HR
VATU	4	IR
AIWA	5	I
BEQA	5	I
GALOA	5	I
LF94-694	5	I
MANA	5	I
RAGNAR	5	I
MQ33-371	6	IS
KABA	7	S
LF91-1925	7	S
NAIDIRI	7	S
YASAWA	7	S
LF05-1502	8	HS
MALI	8	HS

Rating classes – HR= highly resistant, IR = intermediate to resistant, I = intermediate, IS = intermediate to susceptible, S = susceptible, HS = highly susceptible

Table 4 above shows the resistance rating of Fijian sugarcane varieties sent to Sugar Research Australia (SRA) for testing. The testing was carried out against resistance to Sugarcane Smut which produced results ranging from highly resistant (rating number 1) to highly susceptible (rating number 8) varieties.

2.0 CROP PRODUCTION

2.1 SEED CANE PRODUCTION

2.1.1 Labasa

As the weather was favorable for the (March – April) planting season in 2016, the available seed cane at SRIF Labasa estate was around 1000 tonnes. Total of 752 tonnes of cane was sent to the mill for crushing which passed the age of 7 – 9 months and was not of good quality seed cane for planting. Around 100 tonnes of Qamea/ Viwa was sold to farmers during Oct – Nov planting window. In estate 40 tonnes of seed cane was used for planting (Viwa/ Qamea). About 10 tonnes of seed cane (Qamea), 2 tonnes Naidiri, 5 tonnes Viwa, 4 tonnes Ragnar and 2 tonnes of LF91 - 1925 was used to plant demonstration plots at 8 different locations of Vanua Levu.

2.1.2 Lautoka

It is important that quality seed cane is used for establishment of good crop. Surveys were carried out in the replanting season in Penang district and Drasa sector to assess quality of seed cane material. Teams comprising of SRIF research staffs and FSC extension staffs visited individual farms with seed cane. The assessment was based on healthy growth of cane, healthy eye buds, absence of growth cracks, amount of green leaves, and age of cane in terms of months, weeds and general upkeep of farm.

2.1.3 Rarawai

The following table summarises the seedcane nurseries developed in the Rarawai/ Tavua district in 2017.

Table 2.1.3: Seedcane nurseries

Variety	Farmer	Sector	Farm No.	Area	Date Planted
Mana	Jai Krishna	Rarawai	1566	0.3	Dec-17
Qamea, LF91-1925	Salesh	Mota	903	0.7	Nov-17
Kaba	Estate - Kaba	Estate	1695	0.7	Dec-17
Mana	Estate - Mana	Estate	1695	0.3	Dec-17

The nurseries were developed with seedcane from mother plots established from Hot Water Treated seedcane. Generally all the seedcane nurseries were well kept in terms of timely husbandry practices advised, implemented and monitored.

2.1.4 Penang

A visit was made to Penang district on 05th October, 2017 to inspect the quality of available seed material for replanting season in October. Four SRIF staffs accompanied by FSC field staffs carried out the assessment in all four sectors.

Quality seed cane were identified by the team in each sector. Poor seed cane that were under stress were not selected. The following table provides details of the seed cane that were assessed;

Table 2.1.4: Seed cane assessment								
Mill	**Sector**	**Locality/Zone**	**Farm No.**	**Ha**	**Tonnes**	**Age**	**Crop**	**Comments**
Penang	412	Naria	121	2.8	140	7	Plant	0.8ha accepted
Penang	412	Rewasa	272	0.4	20	7	Plant	Harvested
Penang	412	Dugavatu	236	0.4	20	8	Plant	Young cane, seed materials can be used in next year planting season
Penang	412	Malau	200	2	100	7	Plant	Not good quality seed materia, notice that eye buds drying and cane are lodge.
Penang	412	Malau	193	0.4	20	7	Plant	Young cane, seed materials can be used in next year planting season
Penang	412	Malau	1002	0.4	20	8	Plant	Harvested
Penang	412	Ellington	44	0.6	30	8	Plant	Young cane, seed materials can be used in next year planting season
Penang	412	Labau	32	0.4	20	7	Plant	Young cane, seed materials can be used in next year planting season
Penang	412	Dugavatu	264	0.4	20	7	Plant	Young cane, seed materials can be used in next year planting season
Penang	412	Korotale	11285	0.4	20	7	Plant	Harvested
Penang	412	Korotale	1360	0.4	20	7	Plant	Harvested
Penang	412	Waimari	474	0.4	20	6	Plant	Rejected
Penang	412	Malau	190	0.6	30	7	Plant	Harvested
Penang	412	Malau	177	0.4	20	7	Plant	Accepted
Penang	412	Malau	179	0.4	20	7	Plant	Young cane, seed materials can be used in next year planting season
Penang	413	Vunitogoloa	15056	0.2	10	9	Plant	Young cane, seed materials can be used in next year planting season
Penang	413	Vunitogoloa	15090	0.2	10	8	Plant	Young cane, seed materials can be used in next year planting season
Penang	413	Nanuku	868	0.2	10	7	Plant	Accepted
Penang	413	Nanuku	878	0.2	10	7	Plant	Rejected
Penang	413	Wailevu	888	1.2	40	7	Plant	0.2ha accepted
Penang	413	Wailevu	934	0.8	30	6	Plant	Young cane, seed materials can be used in next year planting season
Penang	413	Nanuku	881	0.2	10	7	Plant	Accepted
Total of 22 farms				**13**	**640**			

3.0 TECHNOLOGY TRANSFER

The aim of this project is to effectively transfer research outputs to cane growers in all the sugar mill areas. Demonstration plots are laid out where farmers visit the demo sites to see, learn and adopt ways to improve their unit production.

The key focus areas of the demonstration plots are to cover following topics

- ✓ Weed control
- ✓ Varieties
- ✓ Effect of clean seed
- ✓ Application of recommended fertilizers

In recent years the cane production and yield per hectare has declined drastically in the Fiji Sugar Industry. Keeping this in mind, Sugar Research Institute of Fiji has embarked on technology transfer meetings to educate farmers in all aspects of sugar cane husbandry so that farmers can increase and sustain production at reasonable levels which will be beneficial for all.

Various training was held by SRIF, and SRIF and other stakeholders such as FSC. Meetings were held by inviting farmers in a locality in various sectors. Research staffs participated actively in the trainings by giving presenting on best farming practices, soil fertility, weeds, quality seed cane, varieties and pest and diseases. 17 grower meetings were held from the month of April to June in several sectors. The meetings were generally held at farmers' residence in the evenings. Demonstrations on leaf and soil sampling, quantity of weedicide used per knapsack, pests and diseases were shown to farmers. Meetings were followed by question and answer sessions where farmers were allowed to raise their issues and concerns in regards to sugarcane farming. Farmers concerns were noted, and best advices were provided to improve productivity. Booklets and pamphlets were distributed among the farmers to enhance their knowledge. Details of the meetings are attached in appendix.

Fertilizer application is vital for healthy growth of cane. Sugarcane removes a large quantity of nutrients from soil at harvest. Sugarcane leaf sampling is conducted to determine correct amount of fertilizer required for the ratoon crop. Thus, it is important to conduct leaf sampling appropriately.

FSC extension staffs were trained on importance of leaf sampling, leaf sampling period, correct procedure for leaf sampling and treatment of samples. A demonstration of correct leaf sampling procedure was demonstrated in the field. The training was well received by the participants. Questions were raised about leaf sampling as well as in other areas such as fertilizer, varieties, and soil sampling.

2.1 LABASA EXTENSION

Strategies have been put in place by the Institute to assist in Labasa mill achieving the 1Mt of cane. This includes:
Improving technology transfer and farmer training
Training Staff
Decreasing production cost (Economies of scale)

Increasing cane yield of productive growers – vertical growth to 75 t/ha by timely operations and best management practices.
Increase area for early and mid-maturing cane varieties
Application of recommended fertilizers and conditioners
Maintain vigilance in field control of pest and diseases.
Zero tolerance to weed
Intercropping and relay cropping
Rehabilitation of unproductive cane land via Joint Venture

Farmers were met during field days and the Institute representative meets them on a one-to-one basis which is more effective as discuss individual challenges with specific remedies recommended.

The millers requested the Institute to take surveys from time to time on issues of concern such as cane quality in the field compared to mill figures. A preliminary survey was conducted by Sugar Research Institute of Fiji to investigate the sugarcane quality in the Labasa mill area in the ten sectors (Daku, Wainikoro, Bucaisau, Labasa, Vunimoli, Waiqele, Wailevu, Natua, Solove and Bucaisau)

The results of the preliminary survey showed that the sugarcane quality collated from the field sample were similar to the mill results. It showed that Bulivou, Solove and Daku had a higher POCS compared to the other sector while Naidiri, Ragnar and Vatu varieties had a higher POCS compared to the other varieties.

Naidiri variety had the highest average number of suckers or bull shoots compared to the other varieties. It was noted that the climatic conditions favored tillering in the sugar cane plants. The presence of gaps and the lodging of the sugar cane plant resulted in the profuse tillering of sugar cane stools as they became exposed to sunlight and cool night temperatures. The effects of tillering (suckers and bull shoots) during the harvesting season may dilute sugar extraction by adding to the extraneous matter and fibre content of the cane that is being milled.

Capacity building for the Field team in terms of cane quality and other best management practices for field activities are usually coordinated by FSC with facilitators from the Institute. The Institute had a workshop on sugarcane variety identification and leaf sampling for the Field team in the last quarter of 2017.

Figure 1: Variety identification refresher with FSC Field team

2.1.1 Labasa Grower Demonstration

Planting of demonstration plots in the ten different sectors are used as capacity building opportunities by the industry stakeholders and an avenue where farmers are updated on issues concerning the industry.

Figure 2: Sugar stakeholders lending a hand in a demonstration trial planting in Seaqaqa

2.2 LAUTOKA EXTENSION

Sustainable production is required to maintain viability of the sugarcane industry but in the last decade cane production has been declining and is now at a critical level. Major improvement and turn around in production is needed immediately. The unit cane production has reached an all-time low of less than 40tc/ha in the past few years. Mono-cropping of sugarcane over long periods has been a trend that is likely to continue in the future.

To mitigate this problem and provide constant improvement in crop productivity, quality and profitability for the sugar industry, research findings have to be disseminated to the growers in order to lift the production. The research findings can be relayed to the growers through the technology transfer program. It is expected that the major outputs of the technology transfer program will be providing the growers with sound "hands-on" knowledge that could be adopted and applied in improving their productivity.

Green manuring is a process whereby leguminous plants such as Pulses, Lentils, Peas, Peanuts and Mucuna that are capable of trapping Nitrogen from the atmosphere are incorporated within the soil. The green manure will convert to organic matter.

During the year a major field day was held in Drasa Lautoka where the following was demonstrated:

- ✓ Incorporation of green manuring crop urd
- ✓ Results of planting on raised bed that was planted with a green manure urd during fallow period
- ✓ Application of lime
- ✓ Mechanical planting of sugarcane
- ✓ Pre-emergence application of weedicides

More than 120 farmers attended this field day.

2.3 RARAWAI EXTENSION

Sugar Research Institute of Fiji is actively involved with Technology Transfer initiative which involves visit to growers, attending farmer complaints, planting demonstration plots and seedcane nurseries. Rarawai sub-station was extensively involved with Technology transfer as discussed below. The following table summarizes the notes on visits carried out by Rarawai team:

Table 2.3: Grower visit report			
Farm survey for Nil producing Farmers	Total of 13 farmers were visited and interviewed.	Major finding through famer interview are as follows: 1. Portable irrigation system could be provided and can be managing by cooperative. 2. Loose stones lying all over the field which causes damage to farming implements, suggestion given if this stone can be crushed and used for cane access road. 3. Interested in planting cane but availability of tractor to plough is a major concern. 4. Due to top soil compaction and cover with shrubs and weeds in few places farmers request if they can be assist with bulldozer to ripper. 5. The cane farm property under Estate and the beneficiaries most of them in overseas. The caretaker or cultivator does not get fair share.	The most common problem raised by farmers is financial constraints. If authorities can provide alternative commodities to subsidizing income. Strongly recommend mix cropping.

The visits were mostly for nil producers who were identified by FSC. There is an important need to keep visiting these growers and provide morale boost to bring back these lands under cane again.

2.3.1 Rarawai Grower Demonstration

The following farms were planted with demonstration plots:

Table 2.3.1: Summary of grower demonstration plots						
Sector	**Topic**	**Farmer**	**Farm No.**	**Area**	**Date Planted**	**Field Day**
Tagitagi	Varietal spread	Vinod Kumar	3172	0.4	19/04/2017	14/7/2017
Koronubu	Varietal Spread	Munsami	6198	0.4	28/04/2017	21/7/2017
Naloto	Inter-cropping	Surya Sharma	18393	0.4	05/03/2017	26/7/2017
Koronubu	Varietal spread	Rajesh	6404	0.6	Jul-17	Abandoned
Veisaru	Inter-cropping	Gyan Singh	1795	0.56	Aug, 2017	27/10/2017
Rarawai	Weed control	Salesh		0.4	23/11/2017	Pending

The field days were carried out to elaborate on the topics specified in above table. The adoption of these technologies by the attending farmers need to be monitored since there is no proper mechanism in place to do so. One way this could be done is to provide the list of farmers attending to FSC extension officers also and then making routine visits to see any of the technologies has been adopted/ not adopted and noting down the reasons and working towards addressing the same.

2.4 CANE DEVELOPMENT PROGRAMME

A collaboration project with the Fiji Sugar Cooperation (FSC) kick-started in October, 2017. Meetings were conducted between stakeholders to the way-forward for the joint project. It was discussed that FSC will provide SRIF with 4 nil producers per sector. Activity started with sector level introductory visits. Gang and locality meetings were also attended with FSC extension team. Any issues/queries/questions raised by the grower was solved then-and-there. These issues were reported. The main objective was to increase sugarcane production from the present 40 tons/ha to at least 70tons/ha. These nil producers had other factors that affected the uptake of advice given. The most common ones were the dispute within the family members, lack of labour and; the diversion of tenants to other industries.

2.4.1 Lautoka District

A target was set for bringing five nil producing farms per sector into production. The sectors allocated included five sectors from Lautoka district; Drasa, Lovu, Lautoka, Saweni and Natova. A total of 12 farms were visited during the period October to December. This project was started officially in October. Farmers were interviewed and survey forms were filled to collect data.

Table 2.4.1: List of farmers visited in Lautoka District

Farm no.	Farmer names	Location	Sca	Gang no.
9024	Est Satya Nand	Drasa Dam	4.3	131
18859	Satyia Narayan	Lololo	2.8	90
18891	Kamal Kumar	Vakabuli	6.5	568
8321	Est Sesaiya	Raviravi	2	38
18130	Morawa Sauqaqa	Lovu	4	39
18173	Morawa Sauqaqa	Lovu	4	39
18247	Taniela Bolatama	Natabua	4	36
18220	Mohd Kamal	Wairabetia	2	33
702	Est. Muniappa	Lomolomo	4.9	211
721	Est Ram Sukh	Lomolomo	4.7	190
709	Lakeshwari Sundresh	Lomolomo	3.6	41
856	Est. Ishnirankar	Sabeto Central	4.8	216

Discussions were held with farmers on constraints they faced in farming. The issues were further analyzed and ways to improve their production was discussed. Information on best farming practices were deliberated. Nine farmers were keen to improve their production provided assistance is available to them in terms of machinery and labour. It was noted that farmers could not continue producing sugarcane due to unavailability of farm machinery and labour in their sector. Each farm will be surveyed further to draw plan on improving individual farm productivity.

2.4.2 Nadi District

- A total of 12 nil producer farmers were selected and given by FSC for Nadi district. Out of 12 farmers only five farmers have showed interest to plant sugarcane.
- From five farmers, two have already planted sugarcane. A mini demonstration was also carried out on pre-emergent application after planting.

Plan

- Revisit all the interested farmers

- Conduct post-emergent application on planted field.

Table 2.4.2: List of Farmers visited in Nadi District				
Farm No	Contract name	Location	Date visited	Comments
Legalega Sector				
18482	Kavekini Navaibaibai	Votualevu	16/11/17	Will be meeting this farmer on Monday 20th November. Visited this farmer and he is interested to do the planting of sugarcane. On 7th December field measurement was carried out using GPS -
21017	Tevita Usa	Votualevu	Pending	Farmer is working for Sofitel resort. Visited his place but he was not at home. Need to revisit.
Meigunyah Sector				
18767	Pauliasi Navau	Solovi	16/11/17	Interested in planting sugarcane. Requested if we could measure the field and advise the area that he can do the planting. Issue is that his waiting for the Will paper under his name. He need support to start with sugarcane farming such as assistant in land preparation, seed cane material, fertilizer & chemical. On 7th December field measurement was carried out using GPS -
23124	Arun Saheb	Tovatova	Pending	On 20/11 visited farmer who have already prepared field of 0.9ha for planting On 22/11 visited the prepared field, it was infested with weeds. Advise farmer through phone conversation regarding weed control. Apply Amine and Velpar king after planting and take out deep drills. On 30/11 did mini demo on pre-emergent application. The dosage of Velpar K 200g and Amine 250ml per 15L Knapsack.

The farms were visited for confirmation on their interest in planting. A follow up visit will be conducted from 15/11/17 to 17/11/17 for detailed discussion on the plan to be conducted on the respective farm.

Table 2.4.2: List of Farmers visited in Nadi District CONT'D				
Farm No	Contract name	Location	Date visited	Comments
Nawaicoba Sector				
10535	Jone Nalabe	Navo	15/11/17	Farmer is interested to do sugarcane. Currently, carried out 1st ploughing more than 2ac. Requesting if support is provided such fund to start with planting, seed materials & land preparation. He did not get any grant money for 1st ploughing. On 7th December field measurement was carried out using GPS – 0.93ha. Identified the clean seed material for the farmer. On 13th December visited with FSC T/L and arrange truck, Blend A. farmer stared planting on 18th December. On 21st December conducted mini demonstration pre-emergent application. Applied Diuron at a rate of 200g/ 15L knapsack.

4419	Est. of Bishamber	Nacovi	15/11/17	Farmer is bed ridden. Wife is managing the farm. 2017 crop she was not able to harvest. Farmer complaint that half of the field is swampy which no planting can take place.
10563	Binesh Singh & Ravindra Singh	Nacovi	15/11/17 & 16/11/17	Farmer complaint that the salt water is causing trouble. Sugarcane field is getting field with sea water since hotels are made.
4405	Est. of Bishamber Nacovi		15/11/17	Farmer is interested in sugarcane farming. But have issues with the trustee.
Malolo Sector				
2604	Est.of Jai Raji			T/L will replace this farm since he started working with this farmer
12673	Tuliana Saukuru		07/11/2017	Farm is developing in residential plot according to Ratu Meli
3450	Alipate Tora Ravudra		07/11/2017	Farmer was not at home, he was driving taxi
2607				T/L will replace this farm since he started working with this farmer

The farms were visited for confirmation on their interest in planting. Follow up visits were conducted from 15/11/17 to 17/11/17 for detailed discussion on individual plans for respective farm.

2.4.3 Rarawai

The following table summarizes the notes on visits carried out by Rarawai team:

Table 2.4.3: Notes on farms visited in Rarawai district

Farm survey for Nil producing Farmers	Total of 13 farmers were visited and interviewed.	Major finding through famer interview are as follows: 1. Portable irrigation system could be provided and can be managing by cooperative. 2. Loose stones lying all over the field which causes damage to farming implements, suggestion given if this stone can be crushed and used for cane access road. 3. Interested in planting cane but availability of tractor to plough is a major concern. 4. Due to top soil compaction and cover with shrubs and weeds in few places farmers request if they can be assist with bulldozer to ripper. 5. The cane farm property under Estate and the beneficiaries most of them in overseas. The caretaker or cultivator does not get fair share.	The most common problem raised by farmers is financial constraints. If authorities can provide alternative commodities to subsidizing income. Strongly recommend mix cropping.

The visits were mostly for nil producers who were identified by FSC. There is an important need to keep visiting these growers and provide morale boost to bring back these lands under cane again.

2.4.4 Labasa

The selection of farms in Labasa was made in conjunction with the FSC Field division who knew the farmers in their different sectors. A weekly meeting with the FSC Field division highlighted the challenges faced and solutions agreed to.

Figure 3: Cane Development Programme discussion with FSC Field staff

Table 2.4.4: List of farmers visited in Labasa		
Sector	Farmer's name	Farm no.
Wainikoro	Tarusila Delanimati	25006
	Est Vishnu V Deo	7592
	Krishna Nand	1338
	Asvin S Chand	25121
Daku	Lakshmeer N Sudhakar	28091
	Tui Balivanua	7810
	Apolosi Ratu	1257
	Deo Dutt	7855
Bucaisau	Salen G. Singh	22230
	Losena Watisai	22040
	Ajay Nand	22045
	Muni Deo	882
	Jang B Singh	2744
	Jagdish Reddy	22239
	Laisiasa Tuicokoti	22163
	Rakesh R Prasad	22172
Labasa	Ana Sorovi & Brian Collin	19178
	Azam M Azim	19074
	Vinay V Chand	19010
	Vishal Prasad	19019
Waiqele	Jitendra Kumar	3223
	James H C Ratudoi	10196
	Est Tomasi Maiwini	3591
	Taniela Levea	10214
Vunimoli	Mohd N Khan	4965
	Rosa Wainoqolo	4958
	Est of Pooran	2175
	Amka Prasad	4815
Wailevu	Sobhagiam	137
	Yellamma	41
	Narendra Prasad	13223
	Moti Lal	4279
	Nivendran Pillay	119
	Nilesh Chand	69
Natua	Kiran Wati	8535
Solove	Jovolisi Katonibau	9180
	Est Ram Narayan	9008
	Est David Sahayam	8860
	Narend Deo	9262
Bulivou	Narendra Prasad	8827

2.4.5 Penang

The farms that were selected in the Penang mill area were based on the criteria agreed to between SRIF and FSCs Field division. The farms were selected by FSC.

Table 2.4.5: List of farmers visited in Penang

Sector	Farmer Name	Farm No.	Date Visited	Area Under Cane	Notes
Nanuku	Samuela Sago	15051	06/11/17	4 acres	- individual farmer - water source (river) nearby but dry. Farmer has no irrigation facility also. - 4 acres' fallow land. Farmer plans to plant Mana next year. - farmer interested intercropping and asking SRIF to provide watermelon seeds.
Malau	Matu	5		1 acre	-undulating land - creek at edge of the field - farmer sprayed weedicide
	Francis Warren	11315		4 hectares	-water tank in middle of field -undulating land -famer applied weedicide
	Estate of Appal Sami	441	06/11/17	2 acres	- farm ownership – family - lease area is 18 acres but area under cane is 2 acres only while the other 6 acres is ploughed for planting. - fallow land has been left for 2 years - farmer has irrigation facility and it is in use. River is nearby.
	Estate of Pachappan Goundar	390	16/11/17	8 acres	- individual farmer - farm has no proper drainage system - river source nearby but farmer has no irrigation facility. - 2 acres of fallow land - weedicide used was amine, diuron and glyphosate
Ellington 2	Joint Venture	Joint Venture		13 acres	- joint venture farming - planted in Dreketi - planted with Naidiri

4.0 SRIF ESTATES

3.1 DRASA ESTATE

Drasa estate has a total area of 34 hectares for cane production. This report presents all the activities of Drasa Estate during 2017 season. The total cane produced by Drasa in 2017 was 1565 tonnes from an area of 30 hectares that gave a yield of 52.2 tonnes per hectare. The cane included commercial varieties and research cane. Harvesting was carried out mechanically. Out of 1565 tonnes, all were green cane.

The research trials occupied 2.7 hectares (7.9%) of available area and the cane production was 100.71 hectares that gave 37.3 tonnes per hectare. The research trials consisted of germplasm and stage 4 trial. 4 hectares of the available area is under fallow condition.

It is important that soil fertility is improved to enhance cane productivity. Efforts are being undertaken to improve soil fertility in Drasa estate by ploughing out sections of the field and planting cover crops using urd, moong and Mucuna. Farmers were invited for field days to learn on the importance of planting cover crops, methods of planting and incorporating cover crops into the soil.

3.2 LABASA ESTATE

The Labasa Estate was fully utilized under the Seed cane program with a total of 1000 tonnes produced. Of these, 752 tonnes was sent to the mill because it had gone past the 7 – 9 month old for good seed material.

5.0 MEDIA & PUBLICATION

4.1 MEDIA & PUBLICATION

This project involves in shooting videos and taking pictures to help SRIF in marketing, updating SRIF website, providing farmers with relevant information on activities carried out by SRIF on the farmer field day and TT services and also to the stakeholders. Pictures and footage taking occurs only weekly/daily/ monthly and depending on which projects are ongoing and also depending on staff requests. To update and Keep the library of footage and all videos/pictures must be copyright protected. Video which has been produced and also in process are as follows:

Smut and cane grubs - smut video shows the symptoms of the disease, how it's spread and the best method to control it.

Cane grub - video explains what cane grubs look like, the impact of the insect pest on the sugarcane fields and the husbandry practices to keep the insect population minimal.

FLG - what Fiji leaf Gall disease is, its symptoms, how it is spread and management practices involved.

Green Manuring (finalize the final draft) – is the use of leguminous plants (up to 4 months) to improve soil health.

Leaf Sampling (finalize the final draft) – is done for ratoon canes only. This is carried out for optimum fertilizer application recommendation for next year's cane.

These SRIF videos listed are under SRIF volume 2 which will contain the contents, this DVD are given to the farmers on the field days with the information package and also in the Technology transfer. For past years the university and secondary schools has been visiting our institute, so a DVD package is given to school or university and also SRIF video is shown during the introduction. This way both farmers and young generation will have the fair idea of what problems and issues is faced, challenges and goals achieved by the institute for this many years of services and also method of improving it in future with new better technology.

The videos which are produce and distributed under SRIF volume 1 are as follows:

- Best farming practice
- Seed cane
- Termite
- Intercropping
- Soil sampling

Extra videos done under EU/SRIF funding for visibility:

- ACP-SRP projects
- ISSCT Promotional video

Figure 1: Cane Grubs

Figure 2: Fiji Leaf Gall

Figure 3: Typical symptom of SMUT
(Not in Fiji)

Figure 4: Green Manuring

Figure 5: farmer interview

4.1.1 DISTRIBUTION OF DVD

SRIF VOL 1 DVD is given to farmers in the informative folder together with leaflets, factsheets and bouncers. This take place in the events such as farmer field day, when visitors from other countries comes to visit the Institute or in any events or function related to the industry and which benefits the farmers. This helps our institute in many ways such as promoting, visiblity, to be aware of whats happening and most importantly to provide farmer with the best knowledge and resources.

6.0 FACP

Appendix 1: Main features of 2017 season compared with 2016										
	Lautoka		Rarawai		Labasa		Penang		All mills	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Total registrations (Numbers)	5398	5408	5306	5328	5129	4087	1728	1737	17561	16560
Total farm basic allotments (tonnes)	942611	945713	950812	958811	903305	916035	270131	273085	3066859	3093644
Total registered area (hectares)	22840	22927	22270	22093	18897	19268	7983	8017	71990	72305
Total area cultivated (hectares)	11326	10990	12259	12218	14039	13666	3557	3428	41181	40302
Total area harvested (hectares)	10122	10113	10013	10277	13450	14246	3209	3404	36794	38040
Total farm harvest quotas (tonnes)	Open									
Sugar make actual (tonnes)	39057	54174	27266	55596	73181	64332	N/A	N/A	139504	174102
Tonnes 94 N.T sugar	40595	52021	25979	57167	76466	67011	N/A	N/A	143040	176,199
Yield tonnes 94 N.T.sugar per hectare	4.0	5.1	2.6	5.6	5.7	4.6	N/A	N/A	3.9	5.1
Tonnes cane per tonnes sugar 94 N.T.	10.1	8.4	12.4	8.7	8.5	9.3	N/A	N/A	10.3	8.8
%POCS	10.8	11.84	9.8	11.4	11.7	11.1	N/A	N/A	10.8	11.4
Cane purity average for season	81.8	83.2	78.5	82.2	84.6	82.0	N/A	N/A	81.6	82.5
Tonnes cane harvested	372288	429570	269800	407861	653353	675731	91806	118231	1387247	1631393
Tonnes cane crushed	395646	429570	338038	499806	653353	675371	NIL	NIL	1387037	1604747

Appendix 2: Monthly rainfall(mm) for 2017 compared with long term average														
Mills	No. of years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Lautoka	2017 actual	166	697	370	11	66	31	10	27	2	25	130	187	1721
	108 yrs avg. to 2017	306	327	321	183	97	65	51	69	72	90	126	190	1897
Rarawai	2017 actual	347	631	374	89	43	14	0	40	9	17	186	244	1993
	131 yrs avg. to 2017	356	361	358	284	79	38	29	94	101	143	218	239	2299
Labasa	2017 actual	122	779	361	16	125	83	2	93	130	29	261	120	2122
	128 yrs avg. to 2017	360	363	378	233	109	65	47	52	101	101	204	253	2266
Penang	2017 actual	171	540	440	32	167	11	1	49	61	8	187	133	1799
	119 yrs avg. to 2017	432	359	401	375	123	69	52	91	85	143	153	247	2439

Appendix 3: Crop production details										
	Lautoka		Rarawai		Labasa		Penang		All mills	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Areas harvested (hectares)										
Plant	515	637	403	1799	1027	2008	302	226	2247	4670
First ratoon	924	539	919	1340	1772	1286	474	456	4089	4160
2nd ratoon	577	817	648	400	1252	1616	191	398	2668	3231
Other ratoons	8105	8120	8044	6686	9399	9335	2243	2325	27790	26466
Total	10121	10113	10014	10225	13450	14246	3210	3405	36794	38527
Cane harvested (tonnes)										
Plant	25214	34370	14298	96398	56637	97027	9714	8420	615863	236152
First ratoon	42834	28068	30791	70173	101907	65538	13105	15019	188637	178798
2nd ratoon	24100	37557	19765	18662	61477	71563	4257	12256	109599	140148
Other ratoons	280140	329185	204946	294392	433332	441603	64730	82537	983148	2732643
Total	372288	429570	269800	479625	653353	675731	91806	118232	1897247	1703158
Yield tonnes cane per hectare (tch)										
Plant	48.9	54.6	49.6	53.6	55.1	48.3	32.2	37.2	46.5	48.5
First ratoon	46.3	52.1	49.8	52.4	57.5	51.0	27.6	33.0	45.3	47.1
2nd ratoon	41.7	46.0	30.5	46.7	49.1	44.3	22.3	30.8	35.9	42.0
Other ratoons	34.6	40.5	25.5	44.0	46.1	47.3	28.9	35.5	33.8	41.8
Avg. yield/ha	36.8	42.5	26.9	46.9	48.6	47.4	28.6	34.1	35.2	42.7
Varieties crushed (% of total cane harvested)										
Ragnar	0.7	0.6	0.7	0.4	23.5	21.0	0.1	1.2	8.8	5.8
Aiwa	0.7	0.7	0.3	0.6	0.3	0.2	0.8	0.1	0.5	0.4
Beqa	0.1	0.1	nil	nil	nil	nil	nil	Nil	nil	0.0
Galoa	0.2	0.2	nil	nil	7.0	5.9	0.7	0.1	2.6	1.8
Kaba	3.2	2.5	6.1	6.3	0.5	0.5	0.8	0.4	2.7	2.5
Mali	nil	nil	0.6	nil	11.1	9.7	nil	0.1	4.2	2.5
Mana	90.0	91.0	89.5	89.5	nil	nil	89.0	94.6	57.2	68.8
Naidiri	2.3	2.4	1.1	1.0	33.9	40.7	8.1	2.8	13.2	11.7
Vatu	nil	nil	nil	Nil	14.6	12.4	0.1	0.0	6.1	3.1
Waya	nil	0.0	0.3	0.1	6.4	6.4	0.5	0.4	2.8	1.7
LF91-1925	1.8	1.5	0.9	1.2	1.8	2.2	0.5	0.3	1.3	1.3
Kiuva	0.9	0.5	nil	nil	0.7	0.5	0.3	0.0	0.5	0.3
Viwa	nil	0.0	nil	nil	nil	nil	nil	Nil	nil	0.0
Qamea	nil	0.2	nil	nil	nil	nil	nil	Nil	nil	0.1
Expt./Others	0.3	0.4	0.5	0.3	0.3	0.5	0.1	0.0	0.3	0.3
Total	100	100	100	100	100	100	100	100	100	100

Appendix 4: Rainfall (mm) at mill centres										
Mill	For 12 months ended 31st December					For 12 months ended 30th September				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Lautoka	2438	1541	974	2072	1721	1570	1250	991	1666	1380
Rarawai	2268	1250	1101	1908	1993	1469	1009	998	1768	1547
Labasa	2752	1679	1167	1773	2122	2066	1134	1519	1167	1471
Penang	2342	2179	1310	2086	1799	1850	1490	5452	1685	1711

Appendix 5: Rainfall distribution affecting 2017 crop(mm)					
Month	**Period**	**Lautoka**	**Rarawai**	**Labasa**	**Penang**
Jul-16	Early	6	5	2	1.36
	Mid	….	….	7	0.5
	Late	220	….	34	1
Aug-16	Early	388.25	248	335.25	
	Mid	190	210.67	165.5	
	Late	….	….	298.75	
Sep-16	Early	….	10	….	0.6
	Mid	1	….	63.34	….
	Late	….	96	25	0.6
Oct-16	Early	272.25	445	0568	26.75
	Mid	98.34	103	106.86	2.5
	Late	269.5	67.67	111.8	7.5
Nov-16	Early	137.5	15.34	140	1.375
	Mid	291.5	11	284	18.5
	Late	86	34	101.6	40.5
Dec-16	Early	64	14.4	231.4	0.47
	Mid	318.75	11	363.4	67.163
	Late	24	34	80.2	2.16
Jan-17	Early	311.4	496.34	102.17	15.08
	Mid	54.43	182	305.4	1.837
	Late	136	291.25	213.2	8.44
Feb-17	Early	511.8	567.75	314.25	37.76
	Mid	204.8	237.23	249.5	22.53
	Late	126	96.6	445.17	19
Mar-17	Early	350.3	383.63	233.87	29.53
	Mid	165	194	127.5	7.8
	Late	95	140.5	132.72	8.3
Apr-17	Early	38.34	86.67	27	0.867
	Mid	18	65	15.5	7.467
	Late	55	60.6	35.5	1.85
May-17	Early	8	….	138.5	3.88
	Mid	100	9	15.58	2.07
	Late	184.67	147	251	32.75
Jun-17	Early	350	13	87.2	4.2
	Mid	….	….	8	2
	Late	….	57.5	0276	1.2
Early - 1st to 10th of the month Mid - 11th to 20th of the month Late - 21st to end of the month					

Appendix 6 : hectares harvested

Mills	Crop	Average for period of five seasons					Last four seasons individually			
		1991/ 1995	1996/ 2000	2001/ 2005	2006/ 2010	2011/ 2015	2014	2015	2016	2017
Lautoka	P	3634	2944	1042	788	775	681	1006	515	637
	R	20580	19701	19730	14614	10630	10337	9876	8105	9476
	Total	24214	22645	20772	15402	11405	11018	10882	10122	10113
Rarawai	P	2899	3164	1055	1127	953	803	1095	403	1309
	R	17360	14613	17585	14553	11367	11170	10754	9610	8968
	Total	20259	17777	18640	15680	12320	11973	11849	10013	10277
Labasa	P	3120	2597	1269	1116	1403	1035	1756	1027	2008
	R	19604	18348	15911	14039	11500	11044	11216	12423	12238
	Total	22724	20945	17180	15155	12903	12079	12972	13450	14246
Penang	P	1386	1120	542	339	368	260	580	302	226
	R	4958	4674	4568	3991	3142	3098	3008	2907	3178
	Total	6344	5794	5110	4330	3510	3358	3588	3209	3404
All mills	P	11039	9825	3908	3369	3499	2780	4437	2247	4180
	R	62502	57336	57794	47197	36640	35647	34854	35292	33860
	Total	73541	67161	61702	50567	40139	38427	39291	36794	38040

Appendix 7: Tonnes of cane harvested

Mills	Average for period of five seasons					Last four seasons individually			
	1991/ 1995	1996/ 2000	2001/ 2005	2006/ 2010	2011/ 2015	2014	2015	2016	2017
Lautoka	1283569	1216597	971454	763321	516159	520264	521065	372288	429570
Rarawai	1017374	957507	878509	738316	551682	596350	490765	269800	407861
Labasa	1166055	1017061	840388	695728	547372	544353	662600	653353	675731
Penang	291206	309205	239044	213253	170698	171214	170129	91806	118231
All mills	3758204	3500370	2929395	2410619	1785912	1832181	1844559	1387247	1631393

Appendix 8 : Tonnes of cane per hectare harvested

Mills	Crop	Average for period of five seasons					Last four seasons individually			
		1991/ 1995	1996/ 2000	2001/ 2005	2006/ 2010	2011/ 2015	2014	2015	2016	2017
Lautoka	P	64.7	64.2	63.9	67.2	57.7	59.8	55.5	48.9	54.6
	R	51.2	51.4	45.9	47.6	44.3	46.4	47.1	35.0	46.2
	Total	52.4	53.7	46.8	49.1	45.2	47.2	47.9	36.8	42.5
Rarawai	P	61.2	62.1	59.6	58.8	56.7	61.6	49.6	49.6	47.8
	R	48.1	52.9	46.4	44.8	43.8	49.0	40.6	26.6	43.0
	Total	50.1	53.9	47.1	46.5	44.8	49.8	41.4	26.9	39.7
Labasa	P	59.3	56.5	59.7	56.7	53.4	58.3	58.9	55.1	48.3
	R	50.4	47.4	47.6	43.5	41.4	43.8	49.9	46.1	47.5
	Total	51.3	48.6	48.9	45.8	42.7	45.1	51.1	48.6	47.4
Penang	P	57.2	62.6	54.2	56.3	50.6	60.4	52.2	32.2	37.2
	R	43.1	51.2	46.4	48.3	48.4	50.2	46.5	28.9	33.1
	Total	46.0	53.3	46.8	49.1	48.6	51.0	47.4	28.6	34.7
All Mills	P	61.2	61.8	58.3	59.5	55.3	59.8	54.9	46.5	47.0
	R	48.1	50.0	46.0	45.8	43.5	46.7	45.9	37.1	42.5
	Total	50.2	52.1	47.5	47.3	44.5	47.7	46.9	35.2	41.1

Appendix 9 : Hectares harvested in relation to registered area and cultivated area (ha)					
Mills	**2017 hectares (A)**			**Hectares harvested as % of various categories "A"**	
	Registered (1)	**Cultivated (2)**	**Harvested**	**(1)**	**(2)**
Lautoka	22927	10990	10113	44.1	92.0
Rarawai	22093	12218	10277	46.5	84.1
Labasa	19268	13666	14246	73.9	104.0
Penang	8017	3428	3404	42.5	99.3
Total	72305	40302	38040	52.6	94.4

Appendix 10 : Plant cane harvested as percentage of total cane harvested									
Mills	**Average for period of five seasons**					**Last four seasons individually**			
	1991/ 1995	**1996/ 2000**	**2001/ 2005**	**2006/ 2010**	**2011/ 2015**	**2014**	**2015**	**2016**	**2017**
Lautoka	15.0	13.0	5.0	5.5	8.5	7.8	10.7	6.8	6.3
Rarawai	14.0	18.0	6.0	8.2	9.7	8.3	11.1	5.3	12.7
Labasa	14.0	12.0	7.0	8.2	13.4	11.1	15.6	8.7	14.1
Penang	23.0	19.0	11.0	8.2	10.7	9.2	17.8	10.6	14.0
All mills	16.0	15.0	7.0	7.4	10.5	9.1	13.2	6.1	11.8

Appendix 11: Plant, ratoon yields and percentage of total area harvested - 2017 Crop											
Mills	**Plant**			**First ratoon**			**Other ratoons**			**All cane**	
	tch	**Area ha**	**% of Area**	**tch**	**Area ha**	**% of Area**	**tch**	**Area ha**	**% of Area**	**tch**	**Area ha**
Lautoka	54.6	637	6.3	52.1	539	5.3	43.3	8937	44.2	42.5	10113
Rarawai	47.8	1309	12.8	48.0	475	4.6	40.5	4247	41.3	39.7	6031
Labasa	48.3	2008	14.1	51.0	1286	9.0	45.8	5476	38.4	47.4	8770
Penang	37.2	226	6.6	33.0	457	13.4	33.2	2722	40.0	34.0	405
All Mills	47.0	4180	10.0	46.0	2757	8.1	40.7	21382	41.0	40.9	28319

Appendix 12 : Seasonal %POCS in cane									
Mills	**Rough average for period of five seasons**					**Last four seasons individually**			
	1991/ 1995	**1996/ 2000**	**2001/ 2005**	**2006/ 2010**	**2011/ 2015**	**2014**	**2015**	**2016**	**2017**
Lautoka	12.5	11.4	11.5	10.8	11.4	12.9	12.4	10.7	11.8
Rarawai	12.9	11.4	11.9	10.9	11.3	12.0	12.6	9.7	11.4
Labasa	12.1	11.1	11.5	10.7	11.5	12.3	12.1	11.7	11.1
Penang	12.6	11.1	11.9	11.1	11.1	11.9	11.9	NIL	NIL
All Mill Avg.	12.5	11.2	11.7	11.0	11.4	12.3	12.3	10.6	11.6

Appendix 13: Weekly POCS in cane 2017 season					
week	**Lautoka**	**Rarawai**	**Labasa**	**Penang**	**Week average**
1	9.5	9.4	11.5	NA	10.1
2	10.0	10.0	9.6	NA	9.9
3	10.6	10.0	10.5	NA	10.4
4	10.8	10.3	11.1	NA	10.7
5	10.9	10.6	10.6	NA	10.7
6	11.4	11.4	10.5	NA	11.1
7	11.8	11.7	11.1	NA	11.5
8	11.8	12.2	11.2	NA	11.7
9	12.1	12.2	11.1	NA	11.8
10	12.1	12.2	11.3	NA	11.9
11	11.8	12.2	11.4	NA	11.8
12	11.9	12.0	11.4	NA	11.8
13	12.3	12.2	11.5	NA	12.0
14	12.2	12.1	11.6	NA	12.0
15	12.1	11.8	11.6	NA	11.8
16	12.9	12.0	11.7	NA	12.2
17	12.8	11.7	11.6	NA	12.0
18	13.2	11.7	11.6	NA	12.2
19	12.4	11.4	11.6	NA	11.8
20	13.0	11.3	11.4	NA	11.9
21		11.2		NA	11.2
22		11.1		NA	11.1
23		10.6		NA	10.6
		10.6		NA	10.6
Average	11.8	11.4	11.1	NA	11.5

Note – Penang mill did not operate damaged by Cyclone Winston

Appendix 14 : Sugar produced (tonnes 94 N.T. equivalent)									
Mills	**Tonnes sugar 94 N.T equivalent**								
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Lautoka	53313	43384	50306	48129	41874	76456	63784	40595	52021
Rarawai	42222	31580	61028	45732	60039	68277	61083	25979	57167
Labasa	57548	40943	45146	45398	63423	69647	82744	76466	67011
Penang	22818	18530	16838	19908	19258	21684	18731	nil	19142
All mills	175901	134436	173318	159166	184594	236065	226342	143040	

Appendix 15 : Sugar tonnes 94 N.T equivalent per hectare (tsh)										
Mills	**Average for period of five seasons**					**Last five seasons individually**				
	1991/ 1995	**1996/ 2000**	**2001/ 2005**	**2006/ 2010**	**2011/ 2015**	**2013**	**2014**	**2015**	**2016**	**2017**
Lautoka	6.2	5.6	4.9	4.4	4.9	3.8	6.9	5.9	4.0	8.4
Rarawai	6.3	5.6	5.4	4.0	4.9	4.7	5.6	5.2	2.6	8.7
Labasa	6.0	5.0	5.0	4.0	5.1	5.3	5.6	6.4	5.7	9.3
Penang	5.5	5.4	4.7	5.4	5.5	5.9	6.5	5.2	NIL	5.7
Average	6.1	5.4	5.1	4.3	5.1	4.9	6.1	5.8	3.9	

Appendix 16 : Length of season (weeks) - Start and finish of crushing (date)										
Mills	Average length of season (5 yearly)					Last four seasons individually				
	1991/ 1995	1996/ 2000	2001/ 2005	2006/ 2010	2011/ 2015	2014	2015	2016	2017	
Lautoka	28.0	29.7	27.6	27.0	27.9	19	21	21	19.1	
						01/07/14 To 08/11/14	02/07/15 To 24/11/15	20/06/16 To 16/11/16	06/06/17 to 17/10/17	
Rarawai	25.3	26.5	24.2	28.0	22.1	21.5	19.4	19	20.5	
						19/06/14 To 17/11/14	23/06/15 To 28/10/15	20/07/16 To 31/11/16	07/06/17 to 28/10/17	
Labasa	29.4	30.7	24.1	25.9	18.7	16.5	19.2	20.4	24.4	
						17/06/14 To 11/10/14	17/06/15 To 28/10/15	16/06/16 To 06/11/16	01/06/17 To 19/11/17	
Penang	21.5	26.2	20.4	22.5	18.1	16.9	15.9			
						27/06/14 To 11/10/14	29/06/15 To 19/10/15	No crushing	No crushing	
All mills	26.1	28.2	24.1	25.9		18.5	18.9	20.1	21.3	

Appendix 17 : Varieties Percent of hectares harvested										
Mills →	Lautoka		Rarawai		Labasa		Penang		All Mills	
Varieties ↓	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Ragnar	0.7	0.6	0.7	0.4	23.5	21.0	0.2	1.2	6.3	5.8
Waya			0.4	0.1	6.4	6.4	0.5	0.4	1.8	1.7
Mali			0.6		11.1	9.7		0.1	2.9	2.5
Galoa	0.2	0.2			7.0	5.9	0.7	0.1	2.0	1.6
Aiwa	0.7	0.7	0.3	0.6	0.3	0.2	0.2	0.1	0.4	0.4
Kiuva	0.8	0.5			0.7	0.5	0.3	0.0	0.5	0.
Mana	89.8	91.0	89.5	89.5			88.6	94.6	67.0	68.8
LF91-1925	1.7	1.5	0.9	1.2	1.8	2.2	0.5	0.3	1.2	1.3
Kaba	3.2	2.5	6.1	6.3	0.5	0.5	0.8	0.4	2.7	2.4
Vatu					14.6	12.4	0.1	0.0	3.7	3.1
Beqa	0.1	0.1						0.0		0.0
Naidiri	2.3	2.4	1.1	1.0	34	40.7	8.1	2.8	11.4	11.7
Qamea		0.2						0.0		0.1
Viwa								0.0		0.0
Exp.	0.3							0.0	0.1	0.0
Other var.	0.2	0.4	0.8	0.3	0.3	0.5	0.1	0.1	0.4	0.3

Appendix 18: Area planted in hectares as % of registered and cultivated areas									
Mills	Hectares planted			Hectares planted as % of registered area			Hectares planted as % of cultivated area		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Lautoka	574.0	753.3	892.4	2.5	3.3	3.9	5.0	6.7	8.1
Rarawai	546.4	1450.4	2163.2	3.0	6.6	9.8	4.4	12.4	18.2
Labasa	1255.5	1566.5	2160.2	6.7	11.1	11.2	9.4	11.3	15.2
Penang	354.8	247.7	418.2	4.4	3.1	5.2	8.9	7.0	12.2
Total	2730.7	4017.9	5634	3.8	5.6	7.8	6.5	9.8	14.0

Appendix 19: Percentage of total area planted by different varieties over three years											
		Lautoka		Rarawai		Labasa		Penang		All mills	
Year	Varieties	%	Area ha	%	Area ha	%	Area ha	%	Area ha	%	Area ha
2015	Ragnar	0.7	3.8	2.8	15.3	25.0	313.9	0.1	0.4	12.2	333.1
2016		-	-	0.3	3.8	-	-	-	-	-	-
2017		0.2	1.7	0.1	1.8	13.5	291	-	-		
2015	Waya	-	-	0.9	4.8	5.6	70.9	-	-	2.8	75.7
2016		-	-	1.1	15.8	-	-	-	-	-	-
2017		-	-	0.2	4.0	1.8	38.7	-	-		
2015	Mana	80.8	464.0	60.0	328.0	-	-	62.3	221.2	37.1	1013.2
2016		-	-	85.5	1240.7	-	-	-	-		
2017		93.2	831.4	92.7	2005.5	-	-	88.5	370.0		
2015	Galoa	0.3	2.0	-	-	8.2	102.5	2.9	10.4	4.2	114.9
2016		-	-	-	-	-	-	-	-	-	-
2017		0.0	0.4	-	-	3.7	79.8	-	-		
2015	Vatu	-	-	-	-	7.9	98.7	-	-	3.6	98.7
2016		-	-	-	-	-	-	-	-	-	-
2017		-	-	-	-	12.4		-	-		
2015	Mali			-	-	6.2	77.9	0.1	0.4	2.9	78.3
2016		-	-	-	-	-	-	-	-	-	-
2017		-	-	-	-	5.2	112.7	-	-		
2015	Aiwa	1.4	8.0	0.5	2.8	0.1	1.4	0.7	2.4	0.5	14.6
2016		-	-	0.6	8.3	-	-	-	-		
2017		0.6	5.7	0.0	1.0	0.4	0.0	-	-		
2015	Beqa	-	-	-	-	--	-	-	-		
2016		-	-	-	-	-	-	-	-		
2017		-	-	-	-	0.0	0.0	-	-		
2015	Kaba	7.1	41.0	16.1	88.1	0.4	4.7	2.5	8.8	5.2	142.6
2016		-	-	8.4	121.8	-	-	-	-		
2017		0.8	7.4	5.2	112.2	0.3	6.4	-	-		
2015	Naidiri	4.0	23.0	5.0	27.2	37.4	470.1	29.1	103.1	22.8	623.4
2016		-	-	1.9	28.0	-	-	-	-		
2017		3.6	32.5	1.1	24.3	62.3	1347	8.8	36.8		
2015	Kiuva	-	-	1.4	7.6	0.5	6.9	0.1	0.4	0.5	14.9
2016		-	-	-	-	-	-	-	-		
2017		-	-	-	-	0.2	5.3	-	-		
2015	LF91-1925	3.8	22.0	11.0	60.1	6.9	86.8	2.1	7.6	6.5	176.5
2016		-	-	1.3	19.0	-	-	-	-		
2017		0.8	7.2	0.4	7.9	6.3	136	0.4	1.8		
2015	Experiment	-	-	2.3	12.4	1.8	22.1	-	-	1.3	34.5
2016		-	-	0.9	13.0	-	-	-	-		
2017						0.0	0.0	-	-		
2015	Others	-	-					-	-		
2016		-	-	-	-	-	-	-	-	-	-
2017		0.5	4.1	0.3	6.5	1.1	23.2	-	-		

Appendix 20 : Cane transport in Fiji (tonnes of cane harvested and actual method of delivery)									
Mills	Year	Delivered portable line		Winch trailer or lorry to mainline		Lorry direct to mill carrier		Total	
		Tonnes	% of Total	Tonnes	% of Total	Tonnes	% of Total	Tonnes	% of Total
Lautoka	2009	12464	2.0	168852	23.0	544730	75.0	726046	100
	2010	3964	1.0	129410	25.0	394094	75.0	527468	100
	2011	9491	1.5	144569	22.2	498273	76.4	652333	100
	2012	2065	0.4	113819	23.6	365599	75.9	481483	100
	2013	12464	1.7	168852	23.3	544730	75.0	726046	100
	2014	1436	0.3	116328	22.4	402500	77.4	520264	100
	2015	nil	nil	111036	21.3	410029	78.7	521065	100
	2016	50	.01	85410	22.9	286831	77.0	372291	100
	2017	168	0.0	73141	17.0	356261	83.0	429570	100
Rarawai	2009	23827	4.0	164490	25.0	471034	71.0	659351	100
	2010	25106	5.0	126450	24.0	370460	71.0	522016	100
	2011	23586	3.6	332792	50.1	307396	46.3	663774	100
	2012	14772	3.6	106393	24.9	387485	71.4	508650	100
	2013	22054	6.3	104779	30.2	220584	64.0	347417	100
	2014	14006	2.2	113691	18.0	468653	79.8	596350	100
	2015	12032	2.5	93635	19.1	385098	78.5	490765	100
	2016	8189	3.0	45598	16.6	221077	80.4	274864	100
	2017	5577	1.4	52370	12.8	349914	85.8	407861	100
Labasa	2009			230735	34.0	448849	66.0	679584	100
	2010			171042	34.0	383485	66.0	554527	100
	2011	nil	nil	162856	29.0	407610	71.0	570466	100
	2012	840	0.2	117543	28.4	294902	71.4	413285	100
	2013	nil	nil	137018	25.1	409138	75.0	546156	100
	2014	nil	nil	149353	27.4	395000	72.6	544353	100
	2015	nil	nil	181420	27.4	481180	72.6	662600	100
	2016	nil	nil	178355	26.0	508736	74.0	687091	100
	2017	12012	1.8	130502	19.3	533217	78.9	675731	100
Penang	2009	11145	6.0	30977	17.0	139528	77.0	181650	100
	2010			44447	25.0	131254	75.0	175701	100
	2011	nil	nil	55422	26.5	153438	73.5	208860	100
	2012	nil	nil	38712	27.0	104856	73.0	143568	100
	2013	nil	nil	40797	26.0	118923	75.0	159720	100
	2014	nil	nil	36454	21.3	134760	78.7	171214	100
	2015	nil	nil	31707	18.6	138422	81.4	170129	100
	2016	nil	nil	nil	nil	91806	100.0	91806	100
	2017	nil	nil	nil	nil	118231	100	118231	100
All mills	2009	47436	2.0	595054	26.0	1604141	71.0	2246631	100
	2010	29070	1.6	471349	26.5	1279293	72.0	1779712	100
	2011	33077	1.6	695639	33.2	1366717	65.2	2095433	100
	2012	17677	1.1	376467	24.3	1152842	74.5	1546986	100
	2013	8630	2.0	451446	26.2	1293375	74.1	1779339	100
	2014	15442	0.8	415826	22.7	1400913	76.5	1832181	100
	2015	12032	0.7	417798	22.7	1414729	76.6	1844559	100
	2016	8239	0.5	309363	21.7	1108450	77.7	1426052	100
	2017	1775.7	1.1	256013	15.7	1357623	83.7	1631393	100

Appendix 21: Percentage burnt cane of total tonnes crushed										
Year	Lautoka		Rarawai		Labasa		Penang		Average	
	%	Total	%	Total	%	Total	%	Total	%	Total
1981	17.6	1444504	21.2	1248910	19.4	930265	17.0	307753	18.8	3,931,432
1982	23.2	1507831	24.8	1100133	13.6	1140552	13.2	326348	18.7	4,074,864
1983	18.3	639823	18.4	561774	18.0	761454	12.0	239482	16.7	2,202,533
1984	25.1	1731580	8.2	1146140	12.9	1136737	10.0	382030	14.1	4,396,487
1985	28.6	947593	25.2	864264	22.4	934166	16.2	296418	23.1	3,042,441
1986	29.5	1526648	15.1	1204661	15.1	1017372	11.3	360284	17.8	4,108,965
1987	23.8	1090111	34.2	685994	20.9	877652	19.0	306706	24.5	2,960,463
1988	37.7	1116916	15.2	742128	16.0	1034788	19.2	291440	22.0	3,185,272
1989	20.6	1537337	13.6	1250977	12.7	974201	10.0	336418	14.2	4,098,933
1990	24.3	1347531	30.4	1148070	13.7	1171817	14.6	348110	20.8	4,015,528
1991	42.5	1112957	46.4	961961	32.0	1029223	27.6	276261	37.1	3,380,402
1992	52.5	1109778	52.1	962936	44.4	1162108	41.1	297818	47.5	3,532,640
1993	35.6	1341537	33.4	1013627	29.2	1124357	19.4	224383	29.4	3,703,904
1994	39.0	1337977	36.0	1104246	27.0	1298285	19.8	323743	30.5	4,064,251
1995	43.4	1515880	42.5	1044098	37.6	1216290	28.7	333790	38.1	4,110,058
1996	54.8	1561446	48.1	1229978	39.9	1238443	33.2	349348	44.0	4,379,215
1997	50.7	1160879	49.1	906495	33.5	910137	34.8	302095	42.0	3,279,606
1998	67.0	625763	67.7	406811	54.5	832622	44.6	232825	58.5	2,098,021
1999	41.6	1433143	39.8	992968	17.0	1192735	26.3	339292	32.4	3,958,138
2000	56.1	1301752	54.6	1251282	37.8	911370	49.0	322475	50.6	3,786,879
2001	56.7	906743	50.3	844411	18.9	845444	49.5	208183	42.9	2,804,781
2002	46.8	1137123	41.8	1071579	21.4	938450	33.9	275431	37.1	3,422,583
2003	40.1	890499	32.8	836728	29.3	638851	22.0	243602	33.4	2,609,680
2004	42.7	1032127	39.5	878121	18.3	848533	35.5	242408	34.3	3,001,189
2005	44.4	890779	38.4	761704	25.0	910663	34.9	225594	35.7	2,788,740
2006	60.5	1051097	58.5	1039474	34.4	871031	46.5	264498	51.7	3,226,100
2007	39.0	741231	40.5	738478	39.1	769138	53.5	229844	40.8	2,478,691
2008	50.9	770569	53.6	732165	49.1	604314	48.5	214572	51.1	2,321,620
2009	43.5	726046	33.3	659351	18.6	679584	28.8	181650	31.8	2,246,631
2010	30.4	527663	33.6	522114	18.6	554575	16.3	175701	25.0	1,780,053
2011	28.5	652333	28.2	663774	17.9	570468	26.6	208860	25.3	2,095,435
2012	43.8	481483	44.7	508638	18.7	413285	28.3	143568	35.9	1,546,974
2013	77.8	726046	31.9	347417	14.2	546156	27.0	159720	37.7	1,779,339
2014	50.7	520264	49.9	596350	22	544353	28	171214	39.9	1,832,181
2015	47.0	244680	48.5	238167	27.7	183840	31.0	52688	39.0	719375
2016	75.7	281824	89.7	242008	81.6	220034	50.2	85336	74.3	829202
2017	24.9	214436	20.9	170472	30.5	206433	34.3	40552	34.3	40552

7.0 APPROVED VARIETIES

The list of sugarcane varieties approved for planting during 2016 has been revised to include maturity trend. Varieties that are no longer planted have been removed from the approved varieties list. The varieties are recommended to growers on their soil type. The growers have a choice of at least three varieties to plant on their farms as laid down in the Master Award.

Mill/Sectors	Soil types	Varieties recommended on maturity trends	
		Early – mid maturing	Mid – late maturing
Lautoka/Olosara	Rich alluvial soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Lautoka/Cuvu	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Viwa
Lautoka/Lomawai	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Galoa
Lautoka/Yako	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Galoa
Lautoka/Nawaicoba	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Galoa
Lautoka/Malolo	Flat Fertile soil	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Lautoka/Qeleloa	Rich alluvial soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Lautoka/Meigunyah	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Lautoka/Legalega	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Lautoka/Natova	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Galoa
Lautoka/Lautoka	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa

Mill/Sectors	Soil types	Varieties recommended on maturity trends	
		Early – mid maturing	Mid – late maturing
Lautoka/Saweni	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
Lautoka/Saweni	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Galoa
Lautoka/Lovu	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Lautoka/Drasa	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Sandy soils	LF91-1925	Kaba, Mana, Galoa
Rarawai/Varoko	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Mota	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Naloto	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Koronubu	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Veisaru	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Rarawai	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Varavu	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Tagitagi	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Mana, Kaba, Vatu, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Saline areas	Naidiri, LF91-1925	Kaba, Mana, Galoa
Rarawai/Yaladro	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
Rarawai/Drumasi	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Mana, Kaba, Vatu, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Saline areas	Naidiri, LF91-1925	Kaba, Mana, Galoa
Labasa/Waiqele	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Mali, Viwa

Mill/Sectors	Soil types	Varieties recommended on maturity trends	
		Early – mid maturing	Mid – late maturing
Labasa/Wailevu	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Mali, Viwa
	Saline soils	Naidiri, LF91-1925	Galoa, Vatu
Labasa/Vunimoli	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Mali, Viwa
Labasa/Labasa	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Mali, Viwa
	Saline soils	Naidiri, LF91-1925	Galoa, Vatu, Mali
Labasa/Bucaisau	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Waya, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Waya, Mali, Viwa
	Saline soils	Naidiri, LF91-1925	Galoa, Vatu, Mali
Labasa/Wainikoro	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Waya, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Waya, Mali, Viwa
	Saline soils	Naidiri, LF91-1925	Galoa, Vatu, Mali
Labasa/Daku	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Waya, Viwa
	Poor soils	Naidiri, LF91-1925, Qamea	Kaba, Waya, Mali, Viwa
Labasa/Natua	Poor soils	Aiwa, Naidiri, LF91-1925, Qamea	Ragnar, Kaba, Mali, Viwa
Labasa/Solove	Poor soils	Aiwa, Naidiri, LF91-1925, Qamea	Ragnar, Kaba, Mali, Viwa
Labasa/Bulivou	Poor soils	Aiwa, Naidiri, LF91-1925, Qamea	Ragnar, Kaba, Mali, Viwa
Penang/Nanuku	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Salt affected areas	Naidiri, LF91-1925	Galoa
	Viti Vanua area	Naidiri, LF91-1925, Qamea	Mana, Kaba, Kiuva, Mali, Viwa
Penang/Malau	Rich alluvial soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Mali, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Salt affected areas	Naidiri, LF91-1925	Galoa
Penang/Ellington	Flat Fertile soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Kiuva, Viwa
	Medium soils	Aiwa, Beqa, Naidiri, LF91-1925	Ragnar, Kaba, Vatu, Kiuva, Mali, Viwa
	Poor soils	LF91-1925, Qamea	Kaba, Mana, Viwa
	Salt affected areas	Naidiri, LF91-1925	Galoa

8.0 GLOSSARY

Clones / Varieties	The distinct individual sugarcane type that can be identified by numerous attributes or a combination of it, such as stalk color, stalk shape, leaf type, etc.
Series	When used in the context of plant breeding, it refers to a set of clones or varieties distinguished by the year in which those clones or varieties were initially planted from fuzz (seed) stage.
Germplasm	A collection of clones that has recorded desirable traits such as high fiber, disease tolerant, etc.
Fuzz	Sugarcane seeds, not to be confused with seeds commonly referred to in the sugar industry as the stalks of sugarcane used for planting. Seeds in this case are all different varieties, much like seeds of beans, cucumbers or chilies.
Ratoon	Commonly referred to the sugarcane crop that established or grew after the initial plant crop was harvested.
Breeding Plots / Flowering Beds	Small areas planted with sugarcane for the purpose of harvesting flowers from.
Gene Pool	Basically referring to the Germplasm from a genetics point of view.
Standards	Sugarcane varieties that have already been released to growers to plant for commercial use.
Brix	Measure of dissolved solids in sugar juice, liquor or syrup using a refractometer.
G X E trials	Genetic by Environment trials to test the interaction of the genetic attributes of varieties against environmental conditions.
Supply	The term is normally used when “supplying” seedcane referring to sugarcane field that have
Phytotoxic	Poisonous to plants.
Farmorganix/Stand Up SummaGrow	Brand names of new organic fertilisers being tested at SRIF.
Spectra-Cane	High-speed fully automated sugarcane analyser that uses Near-Infrared (NIR) to monitor the sugar content upon analyzing disintegrated cane. The instrument requires minimal intervention from the operator once the sample has been fed into the disintegrator at the start of the process.
%brix	Total soluble solutes in cane juice
Polarisation (or Pol)	The apparent sucrose content expressed as a mass percent measured by the optical rotation of polarized light passing through a sugar solution.
%pol	Percent total sucrose in cane juice
Fiber	The dry fibrous insoluble structure of the cane plant. Generally taken to mean all insoluble material in the cane delivered to a mill, and therefore includes soil or other extraneous insoluble matter in cane.
%fiber	Percent of fiber present in sugarcane
Purity	The true purity is the sucrose content as a percent of the dry substances or dissolved solids content. The solids consist of sugar plus non-sucrose components such as invert, ash and colorants. Apparent purity is expressed as polarization dived by refractometer Brix multiplied by 100.

POCS	Pure Obtainable Cane Sugar. A measure of total recoverable sugar in the cane. A formula based on assumption that sugarcane contains pure sugar, impurities, water and fiber only. It assumes that only pure sugar is made, and that for every kilogram of impurities which goes to the factory, half a kilogram of sugar accompanies it.
LBC	Lime Buffering Capacity. It is modified from the original method which is used for the purpose of agricultural crops. It is a potentiometric method used for determining the amount of lime required for the soil to raise the pH based on the buffering capacity of the soil. LBC is a more efficient routine determination as compared to pH buffering capacity method in regards to result throughput.
RMSECV	RMSECV: errors are calculated on test/train splits using a cross validation scheme for the splitting. If the splitting of the data is done correctly, this gives a good estimate on how the model built on the data set at hand performs for unknown cases. However, due to the resampling nature of the approach, it actually measures performance for unknown cases that were obtained among the calibration cases. In simple, it is a formula used to build a model from a data set, as a validation of two data set. Thus confirms data set from a new approach against the data set of the original method validating the performance of the origin of the new data set as similar to the existing method.
CQD	The body within the Fiji Sugar Industry Tribunal charged with implementing the QBPS procedures.
IMG	A group set up within each mill area, comprising representatives of the mill owner, the cane growers and the Tribunal to act as a point of contact between the CQD and the local industry.
UV-VIS spectrophotometer	Ultra violet visible light spectrum instrument. Is used to determine analyte concentrations by the absorption of light across the ultraviolet and visible light wavelengths through sugar cane juice, sugar and sugar by-products.
Nematology	The scientific study of nematode worms.
Pathology	The science of the causes and effects of diseases

9.0 FINANCIAL REPORT

Sugar Research Institute of Fiji

Financial Statements

For the year ended 31 December 2017

Sugar Research institute of Fiji

Contents

Sugar Research Institute of Fiji

Directors' Report

Board report

In accordance with a resolution of the Board of Directors, the Directors herewith submit the statement of financial position of Sugar Research Institute of Fiji (the "Institute") as at 31 December 2017 and the related statement of profit or loss and comprehensive income and statement of cash flows for the year ended on that date and report as follows:

Board members

The Board members in office during the year end at the date of this report are:
Professor Rajesh Chandra - Chairman (re-appointed 2 March 2018)
Dr K.S Shanmugha Sundaram (term expired on 1 March 2018)
Professor Paras Nath (resigned on 7 December 2017)
Mr Daniel Elisha (term expired on 1 March 2018)
Mr Abdul Khan (resigned on 18 July 2017)
Mr Sundresh Chetty (term expired on 1 March 2018)
Mr Manasa Tagicakibau (resigned on 18 July 2017)
Mr Graham Clark (appointed 18 July 2017)
Ms Reshmi Kumari (appointed 18 July 2017)
Dr Sanjay Anand (appointed on 7 December 2017)
Mr Raj Sharma (appointed on 12 June 2018)
Mr Ashween Nischal Ram (appointed on 18 June 2018)
Professor Ravendra Naidu (appointed on 13 March 2018)

State of affairs

In the opinion of the Board the accompanying statement of financial position gives a true and fair view of the state of affairs of the Institute as at 31 December 2017 and the accompanying statement of profit or loss and other comprehensive income and statement of cash flows give a true and fair view of the results and cash flows of the Institute for the year then ended.

Principal activity

The functions of the Institute are outlined under the Sugar Research Institute of Fiji Act No 14 of 2005, which includes promoting by means of research and investigation, the technical advancement, efficiency and productivity of the sugar industry, and to provide its functions, powers, administration and finance and for related matters.

Current assets

The Directors took reasonable steps before the Institute's financial statements were made out to ascertain that the current assets of the Institute were shown in the accounting records at a value equal to or below the value that would be expected to be realised in the ordinary course of business.

At the date of this report, the Directors are not aware of any circumstances which would render the values attributable to the current assets in the financial statements to be misleading.

Receivables

The Directors took reasonable steps before the Institute's financial statements were made out to ascertain that all known bad debts were written off and adequate allowance was made for impairment losses.

At the date of this report, the Directors are not aware of any circumstances which would render the above assessment inadequate to any substantial extent.

Directors' Report (continued)

Related party transactions
All related party transactions have been adequately recorded in the financial statements.

Other circumstances
At the date of this report, the Directors are not aware of any circumstances not otherwise dealt with in this report or financial statements which would render any amounts stated in the accounts to be misleading.

Unusual circumstances
The results of the Institute's operations during the financial year have not in the opinion of the Directors been substantially affected by any item, transaction or event of a material and unusual nature other than those disclosed in the financial statements.

Going concern
The Institute's ability to continue to operate on a going concern basis is dependent on it receiving ongoing financial support from the Government, Stakeholders in the Sugar Industry and other Doner Agencies. The Board Members consider the application of the going concern principle to be appropriate in the preparation of these financial statements as the Institute will continue to receive ongoing support from the Government and the Stakeholders in the Sugar Industry, which will enable the Institute to meet its funding requirements for operations and to meet its obligations as and when they fall due. The Institute receives funds from the Government, Fiji Sugar Corporation, and Growers through Fiji Sugar Corporation.

Further, the Institute has a positive working capital of $7,114,808 after excluding deferred income of $11,144,379 (2016: $6,400,748 after excluding deferred income of $10,393,323).

Accordingly, these financial statements have been prepared on a going concern basis and do not include any adjustments relating to the recoverability and classification of recorded asset amounts or to the amounts and classification of liabilities that may be necessary should the Institute be unable to continue as a going concern.

Events subsequent to balance date
There is a draft Sugar Industry Bill before the Parliament that is proposing major changes in the functioning of Sugar Research Institute of Fiji and until this bill is passed, the Board cannot give assurance about the future of Sugar Research Institute of Fiji in its present form.

Apart from the above, there has not arisen in the interval between the end of the year and the date of this report any item, transaction or event of a material and unusual nature likely, in the opinion of the Board Members, to affect significantly the operations of the Institute, the results of those operations or the state of affairs of the Institute in subsequent financial years.

Dated at Lautoka this 11th day of March 2019 .

Signed in accordance with a resolution of the Board.

Chairman **Board member**

Independent Auditors' Report

To the Board Members of Sugar Research Institute of Fiji

Report on the Audit of the Financial Statements

Opinion

We have audited the accompanying financial statements of Sugar Research Institute of Fiji ("the Institute"), which comprise the statement of financial position as at 31 December 2017, the statements of profit or loss and other comprehensive income and cash flows for the year then ended, and notes, comprising significant accounting policies and other explanatory information as set out in notes 1 to 21.

In our opinion, the accompanying financial statements give a true and fair view of the financial position of the Institute as at 31 December 2017, and of its financial performance and its cash flows for the year then ended in accordance with International Financial Reporting Standards (IFRS).

Basis for Opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the *Auditors' Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of the Institute in accordance with International Ethics Standards Board for Accountants Code of Ethics for Professional Accountants (IESBA Code) and the ethical requirements that are relevant to our audit of the financial statements and we have fulfilled our other ethical responsibilities in accordance with these requirements and the IESBA Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Emphasis of Matter – comparative information

We draw attention to Note 20 to the financial statements which indicates that the comparative information presented as at and for the year ended 31 December 2016 has been restated. Our opinion is not modified in respect of this matter.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with IFRS, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Institute's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the institute or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Institute's financial reporting process.

Report on the Audit of the Financial Statements (continued)

Auditors' Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with International Standards on Auditing (ISAs) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Institute's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Institute to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

KPMG

Independent Auditors' Report

To the Board Members of Sugar Research Institute of Fiji (continued)

Report on Other Legal and Regulatory Requirements

We have obtained all the information and explanations which, to the best of our knowledge and belief, were necessary for the purposes of our audit.

In our opinion:

i). proper books of account have been kept by the Institute, sufficient to enable financial statements to be prepared, so far as it appears from our examination of those books; and

ii). to the best of our knowledge and according to the information and explanations given to us the financial statements give the information required by the Sugar Research institute of Fiji Act, 2005, in the manner so required.

KPMG.

Sharvek.

KPMG

11 March 2019

Nadi, Fiji

Sharvek Naidu

Partner

Sugar Research Institute of Fiji
Statement of profit or loss and other comprehensive income
For the year ended 31 December 2017

	Note	2017 $	** *Restated* 2016 $
Contributions and grants	5	2,347,161	3,586,226
Estate income		245,496	111,705
Other income	6	6,709	5,794
Total income		2,599,366	3,703,725
Cost of operations	7	(1,394,434)	(1,375,798)
Administrative expenses	8 (a)	(1,244,297)	(2,365,264)
Deficit from operations		(39,365)	(37,337)
Finance income	9	39,365	37,337
Deficit before tax		-	-
Income tax benefit		-	-
Balance at the beginning of the year		-	-
Deficit for the year		-	-

**** Refer Note 20***

The notes on pages 9 to 26 are an integral part of these financial statements.

Sugar Research Institute of Fiji
Statement of financial position
As at 31 December 2017

	Note	2017	** *Restated* 2016
Assets		$	$
Current assets			
Cash and cash equivalents	13	2,240,430	2,995,486
Receivable and prepayments	14	77,098	78,770
Receivable from related parties	18 (b)	7,167,499	5,724,999
Total current assets		9,485,027	8,799,255
Non-current assets			
Property, plant and equipment	11	4,027,118	3,992,575
Intangible assets	12	2,453	-
Total non-current assets		4,029,571	3,992,575
Total assets		13,514,598	12,791,830
Liabilities			
Current liabilities			
Deferred income	15	11,144,379	10,393,323
Employee benefits	16	18,716	11,162
Trade and other payables	17	85,818	121,660
Payable to related parties	18 (c)	2,265,685	2,265,685
Total current liabilities		13,514,598	12,791,830
Total liabilities		13,514,598	12,791,830

Signed on behalf of the board

Chairman **Board Member**

** *Refer Note 20*

** *Refer Note 20*

The notes on pages 9 to 26 are an integral part of these financial statements.

Sugar Research Institute of Fiji
Statement of cash flows
For the year ended 31 December 2017

	Note	2017 $	2016 $
Operating activities			
Receipts from stakeholders and donors		1,566,514	1,252,535
Payment to suppliers and employees		(2,342,888)	(2,416,834)
Interest received		32,756	37,337
Net cash used in operating activities		(743,618)	(1,126,962)
Investing activities			
Acquisition of property, plant and equipment	11	(359,845)	(278,447)
Payment for intangible assets	12	(2,480)	-
Received from related parties		350,887	400,000
Net cash (used in) / from investing activities		(11,438)	121,553
Net decrease in cash and cash equivalents		(755,056)	(1,005,409)
Cash and cash equivalents at the beginning of the year		2,995,486	4,000,895
Cash and cash equivalents at the end of the year	13	2,240,430	2,995,486

The notes on pages 9 to 26 are an integral part of these financial statements.

Sugar Research Institute of Fiji
Notes to the Financial Statements
For the year ended 31 December 2017

1. Reporting entity

Sugar Research Institute of Fiji (the "Institute") is a body corporate domiciled in Fiji, established under the Sugar Research Institute of Fiji Act 2005. The address of the Institute's registered office is Drasa, Lautoka, Fiji.

The functions of the Institute are outlined under Sugar Research Institute of Fiji Act No 14 of 2005, which includes promoting by means of research and investigation, the technical advancement, efficiency and productivity of the sugar industry, and to provide its functions, powers, administration and finance and for related matters.

2. Basis of preparation

(a) Statement of compliance

The financial statements have been prepared in accordance with International Financial Reporting Standards (IFRS) as adopted by the International Accounting Standards Board (IASB).

The financial statements were authorised for issue by the Board on 11 March 2019.

(b) Going Concern

The Institute's ability to continue to operate on a going concern basis is dependent on it receiving ongoing financial support from the Government, Stakeholders in the Sugar Industry and other Doner Agencies. The Board Members consider the application of the going concern principle to be appropriate in the preparation of these financial statements as the Institute will continue to receive ongoing support from the Government and the Stakeholders in the Sugar Industry, which will enable the Institute to meet its funding requirements for operations and to meet its obligations as and when they fall due. The Institute receives funds from the Government, Fiji Sugar Corporation, and Growers through Fiji Sugar Corporation.

Further, the Institute has a positive working capital of $7,114,808 after excluding deferred income of $11,144,379 (2016: $6,400,748 after excluding deferred income of $10,393,323).

Accordingly, these financial statements have been prepared on a going concern basis and do not include any adjustments relating to the recoverability and classification of recorded asset amounts or to the amounts and classification of liabilities that may be necessary should the Institute be unable to continue as a going concern.

(c) Basis of measurement

The financial statements have been prepared on the historical cost basis.

(d) Functional and presentation currency

The financial statements are presented in Fiji dollars, rounded to the nearest dollar, which is the Institute's functional currency.

2. Basis of preparation (continued)

(e) Use of estimates and judgments

The preparation of financial statements in conformity with IFRS requires management to make judgments, estimates and assumptions that affect the application of accounting policies and the reported amount of assets, liabilities, income and expenses. Actual results may differ from these estimates.

Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the period in which the estimate is revised and in any future period affected.

3. Significant accounting policies

The accounting policies set out below have been applied consistently to all periods presented in these financial statement.

(a) Foreign currency transactions

Transactions in foreign currencies are translated to Fiji dollars at exchange rates at the dates of the transactions. Monetary assets and liabilities denominated in foreign currencies at the reporting date are retranslated to Fiji dollars at the exchange rate at that date. The foreign currency gains or losses on translation are recognised in profit or loss.

(b) Property, plant and equipment

Recognition and measurement

Items of property, plant and equipment are measured at cost less accumulated depreciation and impairment losses. Cost includes expenditure that is directly attributable to the acquisition of the asset. Any gain and loss on disposal of an item of plant and equipment (calculated as a difference between net proceeds from disposal and carrying amount of the item) is recognised in profit or loss.

Subsequent costs

The cost of replacing part of an item of property, plant and equipment is recognised in the carrying amount of the item if it is probable that the future economic benefit embodied within the part will flow to the Institute and its cost can be measured reliably. The cost of the day-to-day servicing of property, plant and equipment are recognised in profit or loss as incurred.

Depreciation

Depreciation is calculated to write off the costs of items of property, plant and equipment less their estimated residual values using the straight-line method over their estimated useful lives, and is recognised in profit or loss. The estimated useful lives of property, plant and equipment for current and comparative periods are as follows:

3. Significant accounting policies (continued)

(b) Property, plant and equipment (continued)

Depreciation (continued)

Land and building	80 years
Computers	5 years
Fixtures and fittings	10 years
Motor vehicles	6.67 years
Plant and equipment	6.67 - 10 years

Depreciation methods, useful lives and residual values are reassessed at reporting date and adjusted if appropriate.

(c) Intangible assets

Recognition and measurement

Intangible assets that are acquired by the Institute have a finite useful life and are measured at cost less accumulated amortisation and impairment losses.

Amortisation

Intangible assets are amortised on a straight-line basis in profit or loss over their estimated useful lives, from the date that they are available for use.

The estimated useful life for the current and comparative years is as follows:

Software	5 years

(d) Financial instruments

(i) Non-derivative financial assets

The Institute initially recognises receivables on the date that they are originated. All other financial assets are recognised initially on the trade date at which the Institute becomes a party to the contractual provisions of the instrument.

The Institute derecognises a financial asset when the contractual rights to the cash flows from the asset expire, or it transfers the rights to receive the contractual cash flows on the financial asset in a transaction in which substantially all the risks and rewards of ownership of the financial asset are transferred. Any interest in transferred financial assets that is created or retained by the Institute is recognised as a separate asset or liability.

Financial assets and liabilities are offset and the net amount presented in the statement of financial position when, and only when, the Institute has a legal right to offset the amounts and intends either to settle on a net basis or to realise the asset and settle the liability simultaneously.

3. Significant accounting policies (continued)

(d) Financial instruments (continued)

The Institute classifies non-derivative financial assets into loans and receivables.

Receivables

Receivables are financial assets with fixed or determinable payments that are not quoted in an active market. Such assets are recognised initially at fair value plus any directly attributable transaction costs. Subsequent to initial recognition loans and receivables are measured at amortised cost using the effective interest method, less any impairment losses.

Receivables comprise receivables from related party, staff advances and deposits.

Cash and cash equivalents

Cash and cash equivalents comprises cash at bank and cash on hand.

(ii) Non-derivative financial liabilities

Financial liabilities are initially recognised on the trade date when the Institute becomes a party to the contractual provisions of the instrument. The Institute derecognises a financial liability when its contractual obligations are discharged or cancelled or expire. Financial liabilities are initially measured at fair value less any directly attributable transaction costs. Subsequent to initial recognition these liabilities are measured at amortised cost using the effective interest method.

The Institute has the following non-derivate financial liabilities: trade and other payables and payable to related parties.

(e) Impairment

(i) Non-derivative financial assets

A financial asset not carried at fair value through profit or loss is assessed at each reporting date to determine whether there is objective evidence that it is impaired. A financial asset is impaired if objective evidence indicates that a loss event has occurred after the initial recognition of the asset, and that the loss event had a negative effect on the estimated future cash flows of that asset that can be estimated reliably.

Objective evidence that financial assets are impaired includes default or delinquency by a debtor, restricting of an amount due to the Institute on terms that the Institute would not consider otherwise, indications that a debtor or issuer will entre bankruptcy or the disappearance of an active market for a security because of financial difficulties.

3. Significant accounting policies (continued)

(e) Impairment (continued)

(ii) Non-financial assets

At each reporting date non financial assets are reviewed to determine whether there is any indication of impairment. If any such indication exists, then the asset's recoverable amount is estimated. If estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

(f) Contributions and grants

Grants are recognised in the statement of financial position initially as deferred income when there is reasonable assurance that it will be received and that the Institute will comply with the conditions associated with the grant. It is then recognised in the profit or loss as grant income on a systematic basis as the Institute recognises expenses by achieving the relevant conditions of the grant.

Grants that relate to the acquisition of an asset are recognised in profit or loss as the asset is depreciated or amortised. The Institute chooses to present grant income on a gross method that is, recognising entire grant income and than offsetting against expenses.

(g) Employee benefits

Superannuation

Obligations for contributions to a defined contribution plan are recognised as an expense in profit or loss when they are due.

Employee entitlements

Liability for annual leave is recognised and measured as the amount unpaid at the reporting date at current pay rates in respect of employee services up to that date.

Short-term benefits

Short-term employee benefit obligations are measured on an undiscounted basis and are expensed in the profit or loss as the related service is provided.

A liability is recognised for the amount to be paid under short-term benefit if the Institute has a present or constructive obligation to pay this amount as a result of past services provided by the employee and the obligations can be measured reliably.

(h) Receivable from related parties

The amounts receivable from related parties are recognised when there is a contractual receivable or a right to receive.

3. Significant accounting policies (continued)

(i) Standards issued but not yet effective

A number of new standards and amendments to standards are effective for annual periods beginning after 1 January 2016 and earlier application is permitted, however, the Institute has not early adopted the following new standards in preparing these financial statements.

IFRS 9 *Financial Instruments*

IFRS 9 is effective for annual periods beginning on or after 1 January 2018, with early adoption permitted. The standard partly replaces IAS 39 and introduces requirements for classifying and measuring financial assets and liabilities; it also includes an expected credit losses model that replaces the current incurred loss impaired model.

IFRS 15 Revenue from Contracts with Customers

IFRS 15 is effective for annual periods beginning on or after 1 January 2018, with early adoption permitted. The standard will provide a single source of requirements for accounting for all contracts with customers (expect for some specific exceptions, such as lease contracts, insurance contracts and financial instruments) and will replace all current accounting pronouncements on revenue. New revenue disclosures are also introduced.

IFRS 16 *Leases*

IFRS 16 is effective for annual periods beginning on or after 1 January 2019. Early adoption is permitted if IFRS 15 *Revenue from Contracts with Customers* is applied at or before the date of initial application of IFRS 16. The standard removes the classification of leases as either operating leases or finance leases - for the leasee - effectively treating all leases as finance leases. Short term leases (less than 12 months) and leases of low-value assets are exempt from the lease accounting requirements. There are also changes in accounting over the life of the lease. In particular, companies will now recognise a front-loaded pattern of expenses for most leases, even when they pay constant annual rentals. Lessor accounting remains similar to current practice i.e. lessors continue to classify leases as finance and operating lease.

The Institute has not performed a preliminary assessment of the potential impact of adoption of the above standards on these financial statements.

4. Financial risk management

Overview

The Institute has exposure to the following financial risks:

(i) Credit risk
(ii) Liquidity risk
(iii) Market risk

4. Financial risk management (continued)

This note presents information about the Institute's exposure to each of the above risks, the Institute's objectives, policies and processes for measuring and managing risk. Further quantitative disclosures are included throughout these financial statements.

The Institute's overall risk management programme focuses on having sufficient liquidity to achieve the Institute's objectives. Risk management is carried out by the Directors. Directors identify, evaluate and monitor financial risks in close cooperation with management. The Institute operates in the Sugar Industry for the research and development of the Sugar Industry. Consequently, regardless of the impact of the risks below, the risks are largely managed by the Ministry of Sugar. However, Directors exercise due care in dealing with these risks so as to minimise their impact on the Institute.

(i) Credit risk

Credit risk is the risk of financial loss to the Institute if a customer or counterparty to a financial instrument fails to meet its contractual obligations, and arises principally from the Institute's cash at bank, trade and other receivables, and receivable from related parties.

Exposure to credit risk

The carrying amount of financial assets represents the maximum credit exposure. The maximum exposure to credit risk at the reporting date was:

	2017	2016
	$	$
Cash at bank	2,240,420	2,995,476
Staff advance and deposits	27,208	24,858
VAT receivable	43,281	53,912
Interest receivable	6,609	-
Receivable from related parties (see Note 18 (b))	7,167,499	5,724,999
	9,485,017	8,799,245

The aging of receivable from related parties at the reporting date that were not impaired was as follows:

	2017	2016
	$	$
Current - within 1 year	1,442,500	900,000
Between 1 and 4 years	3,600,000	2,700,000
Between 4 and 5 years	-	900,000
Greater than 5 years	2,124,999	1,224,999
	7,167,499	5,724,999

4. Financial risk management (continued)

(i) Credit risk (continued)

Cash at bank

The cash at bank is held with Westpac Corporation Limited which is a reputable bank and has a strong credit rating.

Staff advance and deposits

Management believes that the amounts from staff advance and deposits are collectable.

Interest receivable

Interest receivable is from Westpac Corporation Limited which is a reputable bank and has a strong credit rating.

Receivable from related parties

Management believes that the amounts past due by more than 1 year is still collectable in full as in the case of default the Institute would be able to call upon the Ministry of Sugar to provide directive to FSC and Growers to pay the outstanding balance.

(ii) Liquidity risk

Liquidity risk is the risk that the Institute will not be able to meet its financial obligations as they fall due. The Institute's approach to managing liquidity is to ensure, as far as possible, that it will always have sufficient liquidity to meet its liabilities when due, under both normal and stressed conditions.

The following are the contractual maturities of financial liabilities of the Institute:

	2017	2016
	$	$
Payable to related parties	2,265,685	2,265,685
Trade and other payables	85,818	121,660
	2,351,503	2,387,345

The above are payable within a year and largely dependent on cash inflows and donor agencies in meeting the financial commitments.

(iii) Market risk

The Institute's exposure to market risk is not material .

5. Contributions and grants

Contributions from stakeholders and grants that compensate the Institute for revenue and capital expenditure are recognised from deferred income as follows:

		*** Restated*
	2017	**2016**
	$	**$**
Contribution from the Fiji Government	544,795	1,033,888
European Union	712,776	484,562
Fiji Sugar Corporation (FSC)	544,795	1,033,888
Sugar Cane Growers	544,795	1,033,888
	2,347,161	3,586,226

6. Other income

	2017	**2016**
	$	**$**
Sundry income	6,709	5,794
	6,709	5,794

7. Cost of operations

Advertising	1,468	4,168
Amortisation	27	-
Bank charges	5,205	3,039
Consultancy fees	-	13,419
Depreciation	306,026	305,188
Electricity	39,777	44,150
EU Cost	454,146	232,200
Communication expenses	31,607	27,297
Material costs	24,422	129,551
Motor vehicle running expenses	156,357	198,100
Repairs and maintenances	8,729	18,531
Subcontract expenses	75,822	48,972
Travel	400	27,782
Wages and salaries	290,448	323,401
Total cost of operations	1,394,434	1,375,798

8. Expenses

(a) Administrative expenses

		*** Restated*
	2017	**2016**
	$	**$**
Auditors remuneration	9,500	9,000
Accounting fees	40,627	10,675
Accommodation and meals	2,163	12,101
ACP cost	-	26,234
Balance carried forward	**52,290**	**58,010**

8. Expenses (continued)		*** Restated***
	2017	**2016**
(a) Administrative expenses (continued)	**$**	**$**
Balance brought forward	**52,290**	**58,010**
Annual leave expense	7,554	-
Board allowance	10,926	-
Office security	48,526	8,210
Director's fees	79,109	-
Doubtful debts	-	825,688
Fiji National Provident Fund contributions	96,437	116,546
Freight	35,648	32,212
Fringe benefit tax	13,174	10,989
General expenses	142,141	225,416
Hire of services	4,503	79,957
ICT consumables	4,561	16,335
Insurance	60,241	42,940
Legal fees	750	10,000
Loss on disposal	19,276	-
Medical expense	546	-
Media and publication	2,335	-
Other expenses	4,579	71,297
Postage	897	-
Repair and maintenance	2,119	1,220
Rent expense	63,241	-
Staff expenses	-	9,200
Stationery	998	2,797
Training and Productivity Authority of Fiji	8,821	9,136
Travel	-	18,343
Tuition fees	-	10,325
Uniforms	-	7,166
Utilities	4,641	3,213
Value added tax receivable written off		159,462
Wages and salaries (refer note 7(b))	580,984	646,802
	1,244,297	2,365,264

***** Refer Note 20***

8. Expenses (continued)

	2017	2016
(b) Personnel expenses	**$**	**$**
Fiji National Provident Fund contributions	96,437	116,546
Training and Productivity Authority of Fiji	8,821	9,136
Key management compensation - short term benefits	99,687	87,432
Wages and salaries	771,745	882,771
Other staff related costs	-	16,366
	976,690	1,112,251

9. Finance income

Interest received	39,365	37,337

10. Income tax benefit

In 2012 the Fiji Revenue and Customs Authority confirmed that the entity is not subject to income tax.

11. Property, plant and equipment

	Land and building	Fixtures and fittings	Plant and equipment	Motor vehicles	Computers	Work in Progress	Total
	$	$	$	$	$	$	$
Cost							
Balance at 1 January 2016	2,809,132	43,932	1,884,431	1,203,909	330,675	22,722	6,294,801
Acquisitions	45,968	87,007	118,513	-	26,959		278,447
Transferred during the year	22,722	-	-	-	-	(22,722)	-
Balance as at 31 December 2016	2,877,822	130,939	2,002,944	1,203,909	357,634	-	6,573,248
Acquisitions	-	9,181	226,689	116,752	7,223	-	359,845
Disposal	(20,835)	-	-	-	-	-	(20,835)
Balance as at 31 December 2017	2,856,987	140,120	2,229,633	1,320,661	364,857	-	6,912,258
							-
Depreciation							-
Balance at 1 January 2016	133,155	28,161	778,814	1,069,382	265,973	-	2,275,485
Depreciation charge	32,223	12,369	196,419	44,770	19,407	-	305,188
Balance at 31 December 2016	165,378	40,530	975,233	1,114,152	285,380	-	2,580,673
Depreciation charge	32,223	11,452	211,855	28,310	22,186	-	306,026
Disposal	(1,559)	-	-	-	-	-	(1,559)
Balance at 31 December 2017	196,042	51,982	1,187,088	1,142,462	307,566	-	2,885,140
Carrying amount							
At 1 January 2016	2,675,977	15,771	1,105,617	134,527	64,702	22,722	4,019,316
At 31 December 2016	2,691,609	90,409	1,027,711	89,757	72,254	-	3,992,575
At 31 December 2017	2,660,945	88,138	1,042,545	178,199	57,291	-	4,027,118

12. Intangibles

	Software	Total
	$	$
Cost		
Balance at 1 January 2016	-	-
Acquisition	-	-
Balance at 1 January 2017	-	-
Acquisition	2,480	2,480
Balance at 31 December 2017	2,480	2,480
Accumulated amortisation		
Balance at 1 January 2016	-	-
Amortisation	-	-
Balance at 1 January 2017	-	-
Amortisation	27	27
Balance at 31 December 2017	27	27
Carrying amounts		
At 1 January 2016	-	-
At 31 December 2016	-	-
At 31 December 2017	2,453	2,453

	2017	2016
13. Cash and cash equivalents	$	$
Cash at bank	2,240,420	2,995,476
Cash on hand	10	10
Cash and cash equivalents in the statement of cash flows	2,240,430	2,995,486

	2017	** *Restated* 2016
14. Receivables and prepayments	$	$
Staff advances	24,458	22,108
Deposits	2,750	2,750
VAT receivable	43,281	53,912
Interest receivable	6,609	-
	77,098	78,770

Staff advances are recovered through payroll deductions.

**** Refer Note 20***

15. Deferred income

The Institute's deferred income comprises of cash received or receivable from the stakeholders and donor agencies. Each grant received or receivable has its specific conditions that the Institute needs to comply with. The movement in deferred income is as follows:

	2017	*** Restated* 2016
	$	$
Balance at the beginning of the year	10,393,323	10,448,540
Funds received or receivable during the period	3,400,418	2,903,911
Utilised during the period	(2,649,362)	(2,959,128)
Balance at 31 December	11,144,379	10,393,323
This is comprised as follows:		
Fiji Government	145,471	122,991
Fiji Sugar Corporation (FSC)	6,297,062	5,940,830
Sugar Cane Growers	2,700,000	1,800,000
European Union grant	1,869,154	2,388,832
Estate income	130,834	140,670
Insurance income	1,858	-
	11,144,379	10,393,323

16. Employee benefits

	2017	2016
	$	$
Balance at 1 January	11,162	45,933
Provision created / utilised during the year	7,554	(34,771)
Balance at 31 December	18,716	11,162

17. Trade and other payables

Trade payables	25,200	39,293
Other payables	60,618	82,367
	85,818	121,660

18. Related parties

Related parties of the Institute include key stakeholders in the Fiji Sugar Industry, namely, the Government of Fiji, Fiji Sugar Corporation, South Pacific Fertilizers Limited, Sugar Cane Growers Fund and Sugar Cane Growers Council.

Transactions with these parties and outstanding balances at year end are disclosed below.

***** Refer Note 20***

18. Related parties (continued)

(a) Board members

The following are the Board members of the Institute during the financial year:
Professor Rajesh Chandra - Chairman (re-appointed 2 March 2018)
Dr K.S Shanmugha Sundaram (term expired on 1 March 2018)
Professor Paras Nath (resigned on 7 December 2017)
Mr Daniel Elisha (term expired on 1 March 2018)
Mr Abdul Khan (resigned on 18 July 2017)
Mr Sundresh Chetty (term expired on 1 March 2018)
Mr Manasa Tagicakibau (resigned on 18 July 2017)
Mr Graham Clark (appointed 18 July 2017)
Ms Reshmi Kumari (appointed 18 July 2017)
Dr Sanjay Anand (appointed on 7 December 2017)
Mr Raj Sharma (appointed on 12 June 2018)
Mr Ashween Nischal Ram (appointed on 18 June 2018)
Professor Ravendra Naidu (appointed on 13 March 2018)

		2017	2016
(b)	**Amounts receivable from related parties**	**$**	**$**
	Fiji Sugar Corporation	6,267,499	5,724,999
	Sugar Cane Growers	2,700,000	1,800,000
	Allowance for uncollectability - Sugar Cane Growers	(1,800,000)	(1,800,000)
		7,167,499	5,724,999
	Reconciliation of Allowance for Uncollectability		
	Balance at the beginning of the month	1,800,000	900,000
	Provision created during the year	-	900,000
	Balance at the end of the year	1,800,000	1,800,000

Receivables from related parties are interest free and receivable as and when required.

		2017	2016
		$	**$**
(c)	**Amounts payable to related parties**		
	Fiji Sugar Corporation	2,265,685	2,265,685
		2,265,685	2,265,685

(d) Outstanding debts owed from Fiji Sugar Corporation Limited

Net receivable from Fiji Sugar Corporation Limited ("FSC") amounts to $4,001,814 as at 31 December 2017. Subsequent to year end on 26 February 2019, a Deed of Payment was signed between the Institute and FSC. FSC agreed and acknowledged that it owed a sum amounting to $4,009,314 to the Institute which was FSC's contribution towards SRIF's operations as per Section 11(2) of the Sugar Research Institute of Fiji Act 2005.

18. Related parties (continued)

(d) Outstanding debts owed from Fiji Sugar Corporation Limited (continued)

The amount stipulated in the agreement is $4,009,314 which is the amount as at 31 October 2018 and is reconciled as follow:

	$
Balance at 31 December 2017	4,001,814
Contributions during the year till October 2018	750,000
Payments made in 2018	(742,500)
Balance at 31 October 2018	4,009,314

The payment terms were agreed as follow:

(i) The amount of $250,000 will be paid by FSC in 2019, with 2 equal instalments of $125,000 each payable on 30 August and 31 December respectively;

(ii) The remaining balance of $3,759,314 will be payable by FSC over the next 4 years (2020 - 2023) in 8 equal instalments of $469,914 each payable half yearly on 30 August and 31 December each year; and

(iii) the repayments will be at zero interest.

(e) Transactions with related parties	**2017**	**2016**
Deferred income	**$**	**$**
Grant income - Fiji Sugar Corporation	825,688	825,688
Grant income - Fiji Government	1,238,532	825,688
Grant income - Sugar Cane Growers	825,688	825,688
Estate income - Fiji Sugar Corporation	225,993	252,375
	3,115,901	2,729,439
Impairment Loss		
Sugar Cane Growers	-	825,688

(f) Key management personnel

Key management personnel include the Chief Executive Officer and Finance and Administration Manager of the Institute.

Transactions with key management personnel are no favourable than those available, or which might be reasonably be expected to be available, on similar transactions to third parties on an arm's length.

Key management compensation is disclosed under Note 8(b).

19. Capital commitments and contingencies

Capital commitments and contingent liabilities as at 31 December 2017 amounted to $Nil (2016: $Nil).

20. Correction of errors

During the year, the Company discovered that VAT receivable had been erroneously overstated in its financial statements for the year ended 31 December 2016. As a consequence, VAT receivable balance and deferred income balances were overstated by $159,462. The error has been corrected by restating each of the financial statement line items for prior periods. The following tables summarise the impacts on the financial statements:

Statement of financial position

	Impact of correction of error		
31 December 2016	**As previously reported $**	**Adjustments $**	**As restated $**
Current assets			
Receivables and prepayments	238,232	(159,462)	78,770
Others	8,720,485	-	8,720,485
	8,958,717	(159,462)	8,799,255
Non-current assets	3,992,575	-	3,992,575
Total assets	12,951,292	(159,462)	12,791,830
Current liabilities			
Deferred income	10,552,785	(159,462)	10,393,323
Others	2,398,507	-	2,398,507
	12,951,292	(159,462)	12,791,830
Total Liabilities	12,951,292	(159,462)	12,791,830

20. Correction of errors (continued)

Statement of profit or loss and other comprehensive income

	Impact of correction of error		
31 December 2016	**As previously reported $**	**Adjustments $**	**As restated $**
Contributions and grants	3,426,764	159,462	3,586,226
Administrative expenses	(2,205,802)	(159,462)	(2,365,264)
	1,220,962	-	1,220,962

Note: There are no adjustments made to statement of cash flows for the year ended 31 December 2016.

21. Events subsequent to balance date

There is a draft Sugar Industry Bill before the Parliament that is proposing major changes in the functioning of Sugar Research Institute of Fiji and until this bill is passed, the Board cannot give assurance about the future of Sugar Research Institute of Fiji in its present form.

Apart from the above, there has not arisen in the interval between the end of the year and the date of this report any item, transaction or event of a material and unusual nature likely, in the opinion of the Board Members, to affect significantly the operations of the Institute, the results of those operations or the state of affairs of the Institute in subsequent financial years.