Table 1. Stepwise regression analysis for sugar yield (SY) via studied traits in the two successive seasons.

Season	Independent traits	Model No.	Fitted Independent traits	R^2	Regression equation
Second ratoon crop	All traits	Mod.1	CY	0.982	$\hat{SY}$ = 0.236 + 0.131 SWE
		Mod.2	CY, SR	1.000	$\hat{SY}$ = - 6.696 + 0.136 CY + 0.492 SR
Third ratoon crop	All traits	Mod.1	CY	0.957	$\hat{SY}$ = 0.218 + 0.133 CY
		Mod.2	CY, SR	1.000	$\hat{SY}$ = - 6.017 + 0.135 CY + 0.445 SR
		Mod.3	CY, SR, SH	1.000	$\hat{SY}$ = - 5.966 + 0.136 CY + 0.444 SR + 0.000 SH
Over the two ratoons crop	All traits	Mod.1	CY	0.974	$\hat{SY}$ = 0.233 + 0.132 CY
		Mod.2	CY, SR	1.000	$\hat{SY}$ = - 6.391 + 0.135 CY + 0.472 SR
		Mod.3	CY, SR, PU	1.000	$\hat{SY}$ = - 4.997 + 0.135 CY + 0.527 SR - 0.024 PU
		Mod.4	CY, SR, PU, BR	1.000	$\hat{SY}$ = - 2.832 + 0.135 CY + 0.637 SR - 0.039 PU - 0.103 Br

Table 2. Stepwise regression analysis for cane yield (CY) via studied traits in the two successive seasons.

Season	Independent traits	Model No.	Fitted Independent traits	R^2	Regression equation
Second ratoon crop	All traits	Mod.1	SY	0.982	$\hat{CY}$ = - 0.900 + 7.476 SY
		Mod.2	SY, SR	1.000	$\hat{CY}$ = 49.301 + 7.357 SY - 3.622 SR
Third ratoon crop	All traits	Mod.1	SY	0.957	$\hat{CY}$ = 0.428 + 7.182 SY
		Mod.2	SY, SR	1.000	$\hat{CY}$ = 44.513 + 7.397 SY - 3.294 SR
		Mod.3	SY, SR, SH	1.000	$\hat{CY}$ = 43.949 + 7.367 SY - 3.274 SR + 0.002 SH
Over the two ratoons crop	All traits	Mod.1	SY	0.974	$\hat{CY}$ = - 0.477 + 7.367 SY
		Mod.2	SY, SR	1.000	$\hat{CY}$ = 47.249 + 7.392 SY - 3.489 SR
		Mod.3	SY, SR, PU	1.000	$\hat{CY}$ = 37.023 + 7.404 SY - 3.902 SR + 0.180 PU
		Mod.4	SY, SR, PU, BR	1.000	$\hat{CY}$ = 21.062 + 7.425 SY - 4.727 SR + 0.292 PU + 0.762 Br

Table 3. Stepwise regression analysis for sugar recovery (SR) via studied traits in the two successive seasons.

Season	Independent traits	Model No.	Fitted Independent traits	R^2	Regression equation
Second ratoon crop	All traits	Mod.1	SUC	0.983	$\hat{SR}$ = - 1.726 + 0.786 SUC
		Mod.2	SUC, BR	0.999	$\hat{SR}$ = 0.105 + 1.039 SUC - 0.312 BR
		Mod.3	SUC, BR, PO	1.000	$\hat{SR}$ = - 0.031 + 0.912 SUC - 0.304 BR + 0.150 PO
		Mod.4	SUC, BR, PO, SNF	1.000	$\hat{SR}$ = - 0.016 +0.889 SUC - 0.283 BR + 0.150 PO - 0.0000008 SNF
Third ratoon crop	All traits	Mod.1	SUC	0.996	$\hat{SR}$ = -3.653 + 0.862 SUC
		Mod.2	SUC, BR	0.998	$\hat{SR}$ = 0.519 + 1.015 SUC - 0.309 BR
Over the two ratoons crop	All traits	Mod.1	SUC	0.996	$\hat{SR}$ = - 2.878 + 0.834 SUC
		Mod.2	SUC, BR	0.999	$\hat{SR}$ = 1.616 + 1.113 SUC - 0.444 BR

Table 4. Actual and expected sugar yield (SY) for all models of stepwise regression analysis across the two successive ratoon crops.

Genotypes	Second ratoon crop			Third ratoon crop				over the two ratoons crop				
	Actual SY	Expected SY		Actual SY	Expected SY			Actual SY	Expected SY			
		Mod. 1	Mod. 2		Mod. 1	Mod. 2	Mod. 3		Mod. 1	Mod. 2	Mod.3	Mod. 4
GT54-9	**5.61**	5.65	5.60	**5.87**	5.83	5.87	5.95	**5.74**	5.75	5.73	5.77	5.79
1	**7.29**	7.48	7.31	**7.05**	7.11	7.03	7.12	**7.17**	7.30	7.16	7.20	7.22
2	**6.17**	6.20	6.17	**5.56**	5.64	5.56	5.63	**5.87**	5.92	5.85	5.89	5.92
3	**6.82**	6.54	6.82	**6.52**	6.33	6.50	6.58	**6.67**	6.44	6.65	6.69	6.71
4	**7.33**	6.96	7.32	**6.84**	6.17	6.82	6.90	**7.09**	6.58	7.08	7.11	7.14
5	**4.76**	4.69	4.81	**4.57**	4.72	4.56	4.63	**4.66**	4.71	4.68	4.69	4.70
6	**5.92**	5.92	5.91	**5.97**	6.14	5.96	6.04	**5.94**	6.03	5.93	5.96	5.99
7	**7.68**	7.66	7.68	**7.19**	7.37	7.19	7.28	**7.43**	7.52	7.42	7.46	7.48
8	**8.4**	8.45	8.42	**8.75**	8.78	8.72	8.82	**8.57**	8.62	8.56	8.59	8.62
9	**5.3**	5.40	5.28	**6.34**	6.10	6.33	6.41	**5.82**	5.75	5.81	5.86	5.87
10	**6.96**	7.04	6.97	**7.78**	7.87	7.77	7.86	**7.37**	7.46	7.35	7.40	7.42
11	**4.83**	4.91	4.83	**4.66**	4.89	4.63	4.71	**4.75**	4.91	4.72	4.76	4.79
t test	-	0.75	0.52		0.86	0.00	0.00		0.90	0.00	0.00	0.00
r	-	0.991	1.000	-	0.978	1.000	1.000	-	0.987	1.000	1.000	1.000

Table 5. Actual and expected cane yield (CY) for all models of stepwise regression analysis across the two successive ratoon crops.

Genotypes	Second ratoon crop			Third ratoon crop				over the two ratoons crop				
	Actual CY	Expected CY		Actual CY	Expected CY			Actual CY	Expected CY			
		Mod. 1	Mod. 2		Mod. 1	Mod. 2	Mod. 3		Mod. 1	Mod. 2	Mod.3	Mod. 4
GT54-9	**41.34**	41.04	41.46	**42.23**	42.59	42.15	42.20	**41.79**	41.81	41.78	41.76	41.70
1	**55.29**	53.60	55.16	**51.79**	51.06	51.83	51.82	**53.54**	52.34	53.50	53.53	53.49
2	**45.5**	45.23	45.54	**40.73**	40.36	40.68	40.73	**43.11**	42.77	43.15	43.18	43.09
3	**48.14**	50.09	48.19	**45.98**	47.25	46.03	46.00	**47.06**	48.66	47.11	47.13	47.09
4	**51.36**	53.90	51.47	**44.75**	49.55	44.78	44.75	**48.05**	51.76	48.06	48.09	48.03
5	**33.98**	34.69	33.61	**33.84**	33.25	33.85	33.82	**33.91**	33.85	33.72	33.86	33.89
6	**43.37**	43.36	43.45	**44.5**	43.30	44.50	44.48	**43.93**	43.28	43.95	43.99	43.91
7	**56.68**	56.52	56.72	**53.77**	52.07	53.66	53.74	**55.23**	54.26	55.21	55.23	55.20
8	**62.72**	61.90	62.60	**64.35**	63.27	64.44	64.44	**63.53**	62.66	63.50	63.56	63.53
9	**39.4**	38.72	39.58	**44.24**	45.96	44.21	44.29	**41.82**	42.40	41.81	41.75	41.80
10	**51.91**	51.13	51.90	**57.54**	56.30	57.53	57.48	**54.72**	53.82	54.73	54.72	54.73
11	**35.67**	35.21	35.72	**35.15**	33.90	35.27	35.25	**35.41**	34.52	35.54	35.52	35.45
t test	-	1.00	0.93	-	1.00	0.86	0.40	-	1.00	0.87	0.25	0.14
r	-	0.991	1.000	-	0.978	1.000	1.000	-	0.987	1.000	1.000	1.000

Table 6. Actual and expected sugar recovery (SR) for all models of stepwise regression analysis across the two successive ratoons crop.

Genotypes	Second ratoon crop					Third ratoon crop			over the two ratoons crop		
	Actual SR	Expected SR				**Actual SR**	Expected SR		**Actual SR**	Expected SR	
		Mod. 1	Mod. 2	Mod. 3	Mod. 4		Mod. 1	Mod. 2		Mod. 1	Mod. 2
GT54-9	**13.56**	13.53	13.54	13.56	13.54	**13.9**	13.91	13.87	**13.73**	13.72	13.70
1	**13.19**	13.19	13.20	13.19	13.17	**13.61**	13.62	13.59	**13.4**	13.39	13.39
2	**13.57**	13.53	13.57	13.58	13.56	**13.65**	13.66	13.64	**13.61**	13.59	13.61
3	**14.16**	14.18	14.17	14.17	14.15	**14.18**	14.14	14.16	**14.17**	14.17	14.16
4	**14.29**	14.30	14.29	14.29	14.27	**15.28**	15.22	15.24	**14.79**	14.76	14.78
5	**14**	13.96	14.00	14.00	13.99	**13.5**	13.50	13.48	**13.75**	13.74	13.73
6	**13.64**	13.63	13.65	13.65	13.63	**13.41**	13.37	13.40	**13.53**	13.51	13.52
7	**13.55**	13.58	13.55	13.55	13.54	**13.37**	13.32	13.35	**13.46**	13.45	13.45
8	**13.39**	13.37	13.39	13.40	13.38	**13.6**	13.60	13.58	**13.5**	13.48	13.49
9	**13.45**	13.56	13.45	13.46	13.44	**14.33**	14.40	14.38	**13.89**	13.96	13.89
10	**13.42**	13.47	13.42	13.42	13.41	**13.52**	13.50	13.50	**13.47**	13.49	13.45
11	**13.56**	13.56	13.56	13.55	13.55	**13.27**	13.26	13.26	**13.42**	13.42	13.41
t test	-	0.58	0.94	0.03	0.00	-	0.34	0.06	-	0.68	0.00
r	-	0.992	1.000	1.000	1.000	-	0.998	0.999	-	0.998	1.000

Table 7. Correlation between each pair for studied traits of somaclones and their parent (check) in 2013 harvest plant cane crop.

		SD	SW	SNF	CY	SY	BR	SUS	PU	PO	SR
	2018/19	-0.163	0.901**	-0.083	0.672*	0.674*	-0.340	-0.143	0.308	-0.112	-0.070
	2019/20	-0.404	0.558	0.364	0.606*	0.576*	-0.064	-0.086	-0. 238	-0.121	-0.102
SH	Over years	-0.453	0.818**	0.264	0.707*	0.667*	-0.351	-0.301	-0.304	-0.315	-0.281
	2018/19		0.078	-0.022	0.045	0.008	-0.265	-0.312	-0.251	-0.329	-0.318
	2019/20		-0.639*	-0.055	-0.419	-0.482	-0.388	-0.322	-0.182	-0.274	-0.313
SD	Over years		-0.432	-0.060	-0.313	-0.354	-0.205	-0.241	-0.295	-0.211	-0.255
	2018/19			-0.035	0.772**	0.802**	-0.133	0.037	0.352	0.050	0.93
	2019/20			-0.014	0.532	0.521	-0.020	-0.039	-0.122	-0.091	-0.025
SW	Over years			0.048	0.678*	0.688*	-0.130	-0.018	0.052	-0.037	0.023
	2018/19				0.605*	0.560	-0.172	-0.400	-0.676*	-0.407	-0.474
	2019/20				0.836**	0.820**	-0.087	-0.050	-0.133	-0.028	-0.048
SNF	Over years				0.763**	0.740**	-0.133	-0.172	-0.331	-0.163	-0.193
	2018/19					0.991**	-0.245	-0.249	-0.152	-0.244	-0.249
	2019/20					0.978**	-0.100	-0.077	-0.185	-0.083	-0.068
CY	Over years					0.987**	-0.200	-0.155	-0.216	-0.161	-0.142
	2018/19						-0.126	-0.117	-0.056	-0.111	-0.117
	2019/20						0.099	0.130	0.013	0.122	0.140
SY	Over years						-0.043	0.007	-0.063	0.000	0.021
	2018/19							0.929**	0.356	0.913**	0.875**
	2019/20							0.971**	0.884**	0.960**	0.959**
BR	Over years							0.984**	0.894**	0.985**	0.972**
	2018/19								0.676*	0.991**	0.992**
	2019/20								0.943**	0.987**	0.998**
SUS	Over years								0.942**	0.994**	0.998**
	2018/19									0.684*	0.763**
	2019/20									0.944**	0.948**
PU	Over years									0.935**	0.954**
	2018/19										0.988**
	2019/20										0.983**
PO	Over years										0.990**

Where, * and ** mean significance at 5 and 1% levels.

Table 8. Partitioning of correlation coefficients into direct and indirect effects by path coefficient analysis for sugar yield (SY) in 2018/19, 2019/20 and over the two years.

		2018/19	2019/20	Combine
1- Cane yield vs sugar yield	**r =**	**0.991**	**0.978**	**0.987**
Direct effect,	P15 =	0.1690	0.5056	0.1090
Indirect effects via stalk number/fed.,	r12 p25 =	0.2882	0.3465	0.5127
Indirect effects via stalk weight ,	r13 p35 =	0.6056	0.1480	0.5008
Indirect effects via stalk height ,	r14p45 =	**-0.0718**	**-0.0221**	**-0.1355**
	Total =	**0.991**	**0.978**	**0.987**
2- Stalk number/fed. vs sugar yield	**r =**	**0.560**	**0.820**	**0.740**
Direct effect,	P25 =	0.4763	0.4145	0.6720
Indirect effects via cane yield,	r12 p15 =	0.1022	0.4227	0.0832
Indirect effects via stalk weight ,	r23 p35 =	-0.0275	-0.0039	0.0355
Indirect effects via stalk height ,	r24p45 =	**0.0089**	**-0.0133**	**-0.0506**
	Total =	**0.560**	**0.820**	**0.740**
3- Stalk weight vs sugar yield	**r =**	**0.802**	**0.521**	**0.688**
Direct effect,	P35 =	0.7845	0.2782	0.7386
Indirect effects via cane yield ,	r13 p15 =	0.1305	0.2690	0.0739
Indirect effects via stalk number/fed.,	r23 p25 =	-0.0167	-0.0058	0.0323
Indirect effects via stalk height,	r34 p45 =	**-0.0962**	**-0.0204**	**-0.1568**
	Total =	**0.802**	**0.521**	**0.688**
4- Stalk height vs sugar yield	**r =**	**0.674**	**0.576**	**0.667**
Direct effect,	P45 =	-0.1068	-0.0365	-0.1916
Indirect effects via cane yield ,	r14 p15 =	0.1136	0.3064	0.0771
Indirect effects via stalk number/fed.,	r24 p25 =	-0.0395	0.1509	0.1774
Indirect effects via stalk weight,	r34 p35 =	**0.7068**	**0.1552**	**0.6042**
	Total =	**0.674**	**0.576**	**0.667**
5-Residual factors	**X =**	**0.093**	**0.204**	**0.122**

Table 9. Partitioning of correlation coefficients into direct and indirect effects by path coefficient analysis for cane yield (CY) in 2018/19, 2019/20 and over the two years.

		2018/19	2019/20	Combine
1- Sugar yield vs cane yield	**r =**	**0.991**	**0.978**	**0.987**
Direct effect,	P15 =	0.0704	0.0633	0.0366
Indirect effects via stalk number/fed.,	r12 p25 =	0.3328	0.6505	0.5286
Indirect effects via stalk weight ,	r13 p35 =	0.5505	0.2674	0.4459
Indirect effects via stalk height ,	r14p45 =	0.0374	-0.0032	-0.0241
	Total =	**0.991**	**0.978**	**0.987**
2- Stalk number/fed. vs cane yield	**r =**	**0.605**	**0.836**	**0.763**
Direct effect,	P25 =	0.5942	0.7933	0.7144
Indirect effects via sugar yield,	r12 p15 =	0.0394	0.0519	0.0271
Indirect effects via stalk weight ,	r23 p35 =	-0.0240	-0.0072	0.0311
Indirect effects via stalk height ,	r24p45 =	-0.0046	-0.0021	-0.0095
	Total =	**0.605**	**0.836**	**0.763**
3- Stalk weight vs cane yield	**r =**	0.772	0.532	0.678
Direct effect,	P35 =	0.6864	0.5133	0.6481
Indirect effects via sugar yield ,	r13 p15 =	0.0565	0.0330	0.0252
Indirect effects via stalk number/fed.,	r23 p25 =	-0.0208	-0.0111	0.0343
Indirect effects via stalk height,	r34 p45 =	0.0499	-0.0031	-0.0296
	Total =	**0.772**	**0.532**	**0.678**
4- Stalk height vs cane yield	**r =**	**0.672**	**0.606**	**0.707**
Direct effect,	P45 =	0.0554	-0.0056	-0.0361
Indirect effects via sugar yield ,	r14 p15 =	0.0474	0.0365	0.0244
Indirect effects via stalk number/fed.,	r24 p25 =	-0.0493	0.2888	0.1886
Indirect effects via stalk weight,	r34 p35 =	**0.6185**	**0.2864**	**0.5302**
	Total =	**0.672**	**0.606**	**0.707**
5-Residual factors	**X =**	**0.060**	**0.072**	**0.071**

Table 10. Partitioning of correlation coefficients into direct and indirect effects by path coefficient analysis for sugar recovery (SR) in 2018/19, 2019/20 and over the two years.

		2018/19	2019/20	Combine
1- Sucrose vs sugar recovery	**r =**	**0.992**	**0.998**	**0.998**
Direct effect,	P15 =	1.1053	1.2083	1.2275
Indirect effects via pol,	r12 p25 =	0.1335	-0.0810	-0.0087
Indirect effects via brix ,	r13 p35 =	-0.2635	-0.1543	-0.2632
Indirect effects via purity ,	r14p45 =	0.0166	0.0251	0.0424
	Total =	**0.992**	**0.998**	**0.998**
2- Pol vs sugar recovery	**r =**	**0.988**	**0.983**	**0.99**
Direct effect,	P25 =	0.1348	-0.0821	-0.0087
Indirect effects via sucrose,	r12 p15 =	1.0954	1.1926	1.2202
Indirect effects via brix ,	r23 p35 =	-0.2590	-0.1526	-0.2635
Indirect effects via purity,	r24p45 =	0.0168	0.0251	0.0420
	Total =	**0.988**	**0.983**	**0.990**
3- Brix vs sugar recovery	**r =**	**0.875**	**0.959**	**0.972**
Direct effect,	P35 =	-0.2836	-0.1589	-0.2675
Indirect effects via sucrose,	r13 p15 =	1.0268	1.1732	1.2079
Indirect effects via pol,	r23 p25 =	0.1230	-0.0788	-0.0086
Indirect effects via purity,	r34 p45 =	0.0088	0.0235	0.0402
	Total =	**0.875**	**0.959**	**0.972**
4- Purity vs sugar recovery	**r =**	**0.763**	**0.948**	**0.954**
Direct effect,	P45 =	0.0246	0.0266	0.0450
Indirect effects via sucrose,	r14 p15 =	0.7472	1.1394	1.1563
Indirect effects via pol,	r24 p25 =	0.0922	-0.0775	-0.0082
Indirect effects via brix,	r34 p35 =	-0.1010	-0.1405	-0.2391
	Total =	**0.763**	**0.948**	**0.954**
5-Residual factors	**X =**	**0.000**	**0.045**	**0.026**