

EIGHTH PROGRESS REPORT ON EXPERIMENTS AT UMFOLOZI.

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Four experiments were harvested on Farm 16, Umfolozi, during the past season. All these were harvested after one season's growth at ages varying from 11½ to 15 months. In addition, an experiment with unreleased varieties at the U.L.O.A. Estates, Umfolozi, was harvested and the results are included in this report.

The following tables give the usual data concerning each experiment, and at the end an attempt is made to indicate some of the general conclusions to be arrived at from a study of the results as a whole.

UMFOLOZI EXPERIMENTS Nos. 3 and 4.—Now combined as a Fertilizer Trial on Old Ratoons. Variety P.O.J.2725. Third Fertilized Ratoons, harvested at 15 months old, 12th—19th November, 1941.

	Controls. No fertilizer.	400 lbs. per acre ammonium sulphate in two top-dressings.	800 lbs. per acre ammonium sulphate in two top-dressings.
Tons cane per acre	37.52	43.62	46.33
Increase tons cane per acre over controls	—	6.10	8.81
Percentage tons cane per acre compared with controls	100.00	116.26	123.48
Tons pol. (sucrose) per acre	6.43	7.46	7.76
Increase tons pol. per acre over controls	—	1.03	1.33
Percentage tons pol. per acre compared with controls	100.00	116.02	120.68
Pol. (sucrose) per cent. cane	17.13	17.11	16.76
Fibre per cent. cane	11.76	11.69	11.67
Juice : Brix	22.23	22.13	21.83
Pol. (sucrose) per cent.	20.64	20.44	20.13
Purity	92.9	92.5	92.2
Reducing sugar ratio	0.83	0.78	0.79
Total value of sucrose per acre at £5.71 per ton	£36 14 4	£42 12 0	£44 6 2
Value of gain over controls for this crop	—	5 17 8	7 11 10
Cost of ammonium sulphate at £16 per ton	—	3 4 0	6 8 0
Nett gain over controls	—	2 13 8	1 3 10
General mean tons sucrose per acre = 7.22.			
Percentage of general mean	89.06	103.32	107.48

Significant difference between treatments at 19 : 1 odds = 0.356 tons sucrose per acre.

Significant difference between treatments at 99 : 1 odds = 0.475 tons sucrose per acre.

Percentage significant difference between treatments at 19 : 1 odds = 4.93 per cent. of general mean.

Percentage significant difference between treatments at 99 : 1 odds = 6.58 per cent. of general mean.

Value of significant difference between treatments for this crop at 19 : 1 odds = £2 0s. 8d. per acre.

Value of significant difference between treatments for this crop at 99 : 1 odds = £2 14s. 3d. per acre.

800 lbs. ammonium sulphate per acre > No fertilizer.

400 lbs. ammonium sulphate per acre > No fertilizer.

Summary of Yields of Three Top-dressed Ratoon Crops in Tons Sucrose per acre.

	Date of harvesting.	Age of crop in months.	Controls. No. fertilizer.	400 lbs. per acre ammonium sulphate.	800 lbs. per acre ammonium sulphate.
First top-dressed ratoons	23/29 Nov. 1938	12	5.30	5.64	5.84
Second top-dressed ratoons	6/19 Aug. 1940	21	7.73	8.80	9.12
Third top-dressed ratoons	12/19 Nov. 1941	15	6.43	7.46	7.76
Total for three crops			19.46	21.90	22.72
Increase over controls for three crops			—	2.44	3.26
Per cent. tons sucrose compared with controls for three crops			100.00	112.54	116.75
Value of three crops at £5.71 per ton of sucrose			£111 2 4	£125 1 0	£129 14 7
Value of increase over controls for three crops			—	13 18 8	18 12 3
Cost of ammonium sulphate for three crops at £16 per ton			—	9 12 0	19 4 0
Nett gain or loss over controls			—	+4 6 8	-0 11 9

In this third top-dressed crop the increases due to fertilizer are practically the same as obtained in the second top-dressed crop reported last year. Again the increase due to the application of 400 lbs. of ammonium sulphate was highly significant, whilst the further increase from 800 lbs. was not significant.

Both applications showed a profit on this crop after deducting the cost of ammonium sulphate at £16 per ton. 400 lbs. was more profitable than 800 lbs. with ammonium sulphate at this price, but at the old price of about £8 per ton both would have been about equally profitable.

UMFOLOZI EXPERIMENT Nos. 7 (A and B).—Variety Trial, Sixth Ratoon Crop.
Harvested at 11½ months old, 26th November to 4th December, 1941.

	Uba.	Co.281.	Co.290.	P.O.J. 2878.	P.O.J. 2725.
Tons cane per acre	34.93	38.37	43.14	36.53	36.04
Increase tons cane per acre over Uba	—	3.44	8.21	1.60	1.11
Per cent. tons cane per acre over Uba	100.00	109.85	123.50	104.58	103.18
Tons pol. (sucrose) per acre	4.60	5.41	6.13	5.81	5.73
Increase tons pol. per acre over Uba	—	0.81	1.53	1.21	1.13
Per cent. increase tons pol. per acre over Uba	100.00	117.61	133.26	126.30	124.57
Pol. (sucrose) per cent. cane	13.17	14.09	14.21	15.90	15.90
Fibre per cent. cane	14.35	14.85	12.82	11.50	12.50
Juice: Brix	18.7	19.4	19.7	21.1	21.2
Pol. (sucrose) per cent.	16.51	17.44	17.34	19.19	19.42
Purity	88.2	90.0	88.1	90.5	91.4
Reducing sugar ratio	2.49	1.99	1.74	1.58	1.61
Total value of sucrose per acre at £5.71 per ton	£26 5 4	£30 17 10	£35 0 0	£33 3 6	£32 14 4
Gain over Uba for this crop	—	4 12 6	8 14 8	6 18 2	6 9 0
General mean yield of all varieties for this crop = 5.536 tons sucrose per acre.					
Percentage of general mean	83.09	97.72	110.73	104.95	103.50

Significant difference between varieties at 19 : 1 odds = 0.318 tons sucrose per acre.

Significant difference between varieties at 99 : 1 odds = 0.425 tons sucrose per acre.

Percentage significant difference between varieties at 19 : 1 odds = 5.74 per cent. of general mean.

Percentage significant difference between varieties at 99 : 1 odds = 7.68 per cent. of general mean.

Value of significant difference between varieties at 19 : 1 odds = £1 16s. 4d. per acre.

Value of significant difference between varieties at 99 : 1 odds = £2 8s. 6d. per acre.

Co.290 > P.O.J.2878 > Co.281 >> Uba.
P.O.J.2725

Summary of Yields of Seven Crops in tons Sucrose per acre.

	Date of harvesting	Age of crop in months.	P.O.J. 2725.	Co.290.	Co.281	P.O.J. 2878.	Uba.
Plant cane	14/17 July 1935	19	11.00	9.72	9.34	8.88	5.72
First ratoons	27/30 Oct. 1936	15	8.20	7.16	7.59	6.67	4.93
Second ratoons	7/11 Dec. 1937	13½	6.96	6.79	6.47	5.74	4.72
Third ratoons	19/22 Nov. 1938	11½	6.29	6.18	5.53	5.63	4.82
Fourth ratoons	7/13 Dec. 1939	12½	4.98	5.45	5.45	5.45	4.46
Fifth ratoons	17/18 Dec. 1940	12	5.65	6.06	5.18	5.39	4.12
Sixth ratoons	26 Nov./4 Dec. 1941	11½	5.73	6.13	5.41	5.81	4.60
Total for seven crops			48.81	47.49	44.97	43.57	33.37
Increase over Uba in seven crops			15.44	14.12	11.60	10.20	—
Per cent. tons sucrose compared with Uba for seven crops			146.27	142.31	134.76	130.57	100.00
Value of seven crops at £5.71 per ton of sucrose			£278 14 1	£271 3 4	£256 15 7	£248 15 8	£190 10 10
Value of increase over Uba for seven crops			88 3 3	80 12 6	66 4 9	58 4 10	—

Co.290 is significantly better than all the others in this crop. There is no significant difference between P.O.J.2725 and P.O.J.2878. Both are significantly better than Co.281 and Co.281 is highly significantly better than Uba.

Turning to the summary for seven crops, P.O.J.2725 still holds the lead, followed by Co.290, Co.281 and P.O.J.2878 in that order, with Uba a long way behind.

It can be said that all the varieties are ratooning well. No fertilizer of any kind has been given to this experiment. In 1939 in the fourth ratoon crop P.O.J.2725 flowered rather early and very heavily, and this is shown in the low yield for that crop.

UMFOLOZI EXPERIMENT No. 10.—Variety Trial, Third Ratoon Crop.
Harvested at 15 months old, 19th—20th November, 1941.

	Co.301	Co.290	Co.281
Tons cane per acre	50.65	51.79	46.38
Increase tons cane per acre over Co.281	4.27	5.41	—
Percentage tons cane per acre compared with Co.281	109.2	111.7	100.0
Tons pol. (sucrose) per acre	7.88	8.02	7.11
Increase tons pol. per acre over Co.281	0.77	0.91	—
Percentage tons pol. per acre compared with Co.281	110.8	112.8	100.0
Pol. (sucrose) per cent. cane	15.56	15.49	15.33
Fibre per cent. cane	12.58	12.41	15.63
Juice: Brix	20.5	20.7	20.4
Pol. (sucrose) per cent.	18.59	18.57	18.82
Purity	90.6	89.9	92.0
Reducing sugar ratio	1.33	1.35	1.30

	Co.301	Co.290	Co.281
Total value of sucrose per acre at £5.71 per ton	£44 19 11	£45 15 11	£40 12 0
Value of gain over Co.281 for this crop	4 7 11	5 3 11	—
General mean yield of all varieties for this crop = 7.67 tons per acre			
Percentage of general mean	102.7	104.6	92.7

Significant difference between varieties at 19 : 1 odds = 0.666 tons sucrose per acre.

Significant difference between varieties at 99 : 1 odds = 0.947 tons sucrose per acre.

Percentage significant difference between varieties at 19 : 1 odds = 8.68 per cent. of general mean.

Percentage significant difference between varieties at 99 : 1 odds = 12.35 per cent. of general mean.

Value of significant difference between varieties at 19 : 1 odds = £3 16s. 0d. per acre.

Value of significant difference between varieties at 99 : 1 odds = £5 8s. 2d. per acre.

Co.290
Co.301 > Co.281.

Summary of Yields of Four Crops in tons Sucrose per acre.

	Date of harvesting.	Age of crop in months.	Co.301	Co.290	Co.281
Plant cane crop	24 Nov. 1937	12	4.70	4.32	4.22
First ratoons	3 Dec. 1938	12	7.07	6.08	5.55
Second ratoons	20/21 Aug. 1940	20½	8.31	10.22	9.01
Third ratoons	19/20 Nov. 1941	15	7.88	8.02	7.11
Total for four crops			27.96	28.64	25.89

Increase over Co.281 for four crops	2.07	2.75	—
Per cent. tons sucrose compared with Co.281 for four crops	108.0	110.6	100.0
Value of four crops at £5.71 per ton	£159 13 0	£163 10 8	£147 16 8

Co.290 is not significantly better than Co.301 for this crop, but both are significantly better than Co.281. This confirms the opinion expressed last year that Co.301 yields well if harvested each year, but is disappointing if kept over two seasons.

UMFOLOZI EXPERIMENT No. 11.—Second Ratoons, harvested at 11½ months, 21st—26th November, 1941.

This experiment comprises (1) a variety trial, (2) a comparison of four spacings of lines, (3) a fertilizer test.

No. 11 Variety Trial.

	P.O.J.2725	Co.301	Co.281	Co.290
Tons cane per acre	34.09	45.06	38.93	41.50
Increase or decrease tons cane per acre compared with P.O.J.2725	—	10.97	4.84	7.41
Percentage increase or decrease tons cane per acre compared with P.O.J.2725	100.0	132.2	114.2	121.7
Tons pol. (sucrose) per acre	5.84	6.95	5.77	6.50
Increase or decrease tons pol. per acre compared with P.O.J.2725	—	1.11	0.07	0.66
Per cent. increase or decrease tons pol. per acre compared with P.O.J.2725	100.0	119.0	98.8	111.3
Pol. (sucrose) per cent. cane	17.13	15.43	14.83	15.65
Fibre per cent. cane	12.23	12.66	14.48	12.23
Juice : Brix	20.04	18.44	18.37	18.85
Pol. (sucrose) per cent.	18.50	16.31	16.52	16.79
Purity	92.5	89.7	90.4	90.1
Reducing sugar ratio	1.55	2.31	1.75	1.56
Total value of sucrose per acre at £5.71 per ton	£33 6 11	£39 13 8	£32 18 11	£37 2 4
Value of gain or loss compared with P.O.J.2725 this crop	—	6 6 9	-0.12 0	3 15 5
General mean of all varieties for this crop = 6.26 tons sucrose per acre.				
Percentage of general mean	93.3	111.0	92.2	103.8

Significant difference between varieties at 19 : 1 odds = 0.28 tons per acre.

Significant difference between varieties at 99 : 1 odds = 0.38 tons per acre.

Percentage significant difference between varieties at 19 : 1 odds = 4.47 per cent. of general mean.

Percentage significant difference between varieties at 99 : 1 odds = 6.07 per cent. of general mean.

Value of significant difference between varieties at 19 : 1 odds = £1.12s. 0d. per acre.

Value of significant difference between varieties at 99 : 1 odds = £2 3s. 5d. per acre.

Co.301 >> Co.290 >> Co.281.
P.O.J.2725.

Co.301 is highly significantly better than Co.290, which is highly significantly better than P.O.J.2725 and Co.281 in this crop.

Summary of Yield of Three Crops in tons Sucrose per acre.

Crop.	Date of harvesting.	Age of crop in months.	P.O.J.			
			2725	Co.301	Co.281	Co.290
Plant cane	27 Nov./6 Dec. 1939	20	9.50	9.37	8.80	8.60
First ratoons	10/15 Dec. 1940	12	5.79	5.68	5.37	6.02
Second ratoons	21/26 Nov. 1941	11½	5.84	6.95	5.77	6.50
Total for three crops			21.13	22.00	19.94	21.12
Increase or decrease compared with P.O.J.2725 for three crops			—	+0.87	-1.19	-0.01
Per cent. tons sucrose per acre compared with P.O.J.2725 for three crops			100.0	104.1	94.4	99.9
Value of three crops at £5.71 per ton			£120 13 1	£125 12 5	£113 17 2	£120 11 11

No. 11 Spacing and Fertilizer Trials. Summary of Yields of Three Crops.

Crop.	Age of crop in months.	Spacing Trial.				Fertilizer Trial.	
		4 ft.	5 ft.	6 ft.	7 ft.	No fertilizer.	Plant (300 lbs. amm. sulphate). 1st ratoon (600 lbs. amm. sulphate). 2nd ratoon (none.)
Plant crop	20	9.07	9.04	9.16	8.98	9.06	9.07
First ratoons	12	5.98	5.76	5.68	5.43	5.70	5.73
Second ratoons	11½	6.34	6.26	6.19	6.27	6.19	6.34
Total for three crops		21.39	21.06	21.03	20.68	20.95	21.14

In this second ratoon crop there is no significant difference between the yields from different line spacings or between fertilized and unfertilized areas, so only a summary of the

results are given in the preceding table, along with those of the previous crops.

Conclusions indicated by a study of all the experiments of Farm 16 Umfolozi, to date.

The following table shows the sucrose per cent. cane for each experiment harvested in each season and the average of all these tests for each variety. Because some varieties have been

tested much oftener than others, these averages are not strictly comparable, but they are a useful indication of the quality of the varieties in this respect.

Season	No. of tests.	Date harvested.	Age of crop in months.	Sucrose per cent. Cane.						
				P.O.J. 2725	P.O.J. 2878	Co.290	Co.281	Co.301		
Season 1934.										
Experiment No. 1	4	August	18	13.21	12.93	11.64	—	—	—	
Experiment No. 2	5	August	21	13.06	13.18	11.51	—	—	—	
Experiment No. 4	36	August	21	12.29	—	—	—	—	—	
Experiment No. 5	25	August	—	—	—	13.47	—	—	—	
Experiment No. 6	20	August	18	14.43	14.46	—	—	—	—	
Season 1935.										
Experiment No. 1	4	October	14	14.58	14.44	13.71	—	—	—	
Experiment No. 2	5	October	14	15.46	14.96	14.76	—	—	—	
Experiment No. 4	36	October	14	15.02	—	—	—	—	—	
Experiment No. 5	25	October	14	—	—	14.40	—	—	—	
Experiment No. 7A	6	July	19	14.19	14.02	13.64	13.13	—	—	
Experiment No. 7B	6	July	19	14.29	14.04	13.35	13.39	—	—	
Experiment No. 8	6	July	19	15.08	14.19	13.88	13.92	—	—	
Season 1936.										
Experiment No. 1	4	November	13	13.74	12.87	11.81	—	—	—	
Experiment No. 2	5	November	13	15.04	14.10	12.89	—	—	—	
Experiment No. 7A	6	October	15	14.57	14.18	12.83	13.34	—	—	
Experiment No. 7B	6	October	15	13.90	13.46	12.77	13.04	—	—	
Experiment No. 8	6	October	15	15.45	14.73	14.11	13.78	—	—	
Experiment No. 4	36	November	12½	15.07	—	—	—	—	—	
Season 1937.										
Experiment No. 2	5	December	12½	16.74	15.35	13.48	—	—	—	
Experiment No. 4	36	November	13	16.05	—	—	—	—	—	
Experiments Nos. 7A and 7B...	12	December	13½	15.76	15.08	13.90	13.18	—	—	
Experiment No. 8	6	November	13	17.06	16.03	14.43	14.28	—	—	
Experiment No. 10	6	November	12	—	—	12.55	12.68	12.73	—	
Season 1938.										
Experiment No. 2	5	December	12	16.16	15.15	14.28	—	—	—	
Experiments Nos. 3 and 4	72	December	12	16.00	—	—	—	—	—	
Experiments Nos. 7A and 7B...	12	November	11	16.11	15.11	13.99	13.48	—	—	
Experiment No. 10	6	December	12	—	—	14.23	13.67	14.49	—	

Season	No. of tests.	Date harvested.	Age of crop in months.	Sucrose per cent. Cane.						
				P.O.J. 2725	P.O.J. 2878	Co.290	Co.281	Co.301		
Season 1939.										
Experiments Nos. 7A and 7B	12	December	12½	14.63	14.13	12.06	13.28	—		
Experiments No. 11	16	November	20	13.86	—	12.86	13.03	13.48		
Season 1940.										
Experiments Nos. 3 and 4	72	August	20	13.53	—	—	—	—		
Experiments Nos. 7A and 7B	12	December	12	14.53	13.98	13.04	12.60	—		
Experiment No. 10	6	August	20	—	—	12.82	12.54	11.93		
Experiment No. 11	16	December	12	15.28	—	13.81	13.08	13.29		
Season 1941.										
Experiments Nos. 3 and 4	72	November	15	17.00	—	—	—	—		
Experiments Nos. 7A and 7B	12	November	11½	15.90	15.90	14.21	14.09	—		
Experiment No. 10	6	November	15	—	—	15.49	15.33	15.56		
Experiment No. 11	16	November	11½	17.13	—	15.65	14.83	15.43		

P.O.J. 2725... average of 567 tests 15.13 sucrose per cent. cane
P.O.J. 2878... average of 159 tests 14.52 sucrose per cent. cane
Co.290 ... average of 261 tests 13.64 sucrose per cent. cane
Co.281 ... average of 174 tests 13.50 sucrose per cent. cane
Co.301 ... average of 72 tests 13.94 sucrose per cent. cane

For comparison the following figures obtained at the Umfolozi mill for the 1941-42 season crop are very interesting :—

	Percentage of crop.	Average sucrose per cent. cane for season.
P.O.J. (mostly 2725)	60.07	13.90
Co.281	27.88	13.85
Co.290	5.81	12.67
Co.301	4.05	13.39
Uba	2.19	12.95

The sucrose figures given at the mill do not agree with those obtained in the experiments recorded in this paper. At the mill the sucrose per cent. cane for Co.281 and Co.301 is much nearer to that for P.O.J.2725 than it is in the experiment results. It is suggested that this may be because much of the Co.281 and Co.301 sent to the mill was grown on dry hillside lands, whilst nearly all the P.O.J. 2725 was grown on the flats.

If all were grown on the flats the results obtained in the experiments are probably a more correct comparison of the sucrose per cent. cane than those given by the mill for season 1941-42.

The difference in yield of tons sucrose per acre from these five varieties has not been very great. Of the two P.O.J. varieties P.O.J.2725 has been better than P.O.J.2878 on the average for two reasons. It has given definitely higher yields as plant cane and first ratoons in all the experiments where they have been compared, although in old ratoons there has been little difference between them, and it has given a somewhat higher average sucrose per cent. cane.

There has been a very small difference between the three Co. varieties, but these experiments would place them in the following order: Co.301, Co.290 and Co.281. Co.301 has been grown for a much shorter time than the others, so the average for this variety covers fewer seasons and fewer trials than that for the others, which may possibly be to its advantage. All these varieties have shown themselves to be good growers and capable of ratooning well. Each has got individual characters, both good and bad, which have to be taken into account when deciding which variety to plant under the varying conditions found on the Umfolozi flats.

In the following notes an attempt is made to set out some of the advantages and disadvantages of each variety.

P.O.J.2725.

This variety quickly came into prominence at Umfolozi and has been more extensively grown there than any of the other new varieties. These experiments show that its sucrose per cent. cane is 0.6 per cent. higher than P.O.J.2878 and about 1.5 per cent. higher than the Co. varieties. P.O.J.2725 has given very good plant cane and first ratoon crops, easily beating all the others. In older ratoons it has given about the same yield as the others, on the average.

Its most objectionable character is its tendency to arrow profusely at an early age in some seasons. When this happens the crop can be considerably reduced, even if it is harvested at approximately 12 months old, and such a crop is quite unsuitable to keep over a second growing season.

During the past two or three years there has been a considerable amount of damage done by a cane borer; *Eldana saccharina*, on some farms, chiefly in P.O.J.2725 which has been allowed to stand over for more than one season. It appears that damage from this borer would not be very serious if the cane could be reaped annually.

P.O.J.2878.

This variety has been grown only to a very small extent at Umfolozi, chiefly because in the earlier years after their introduction it gave decidedly less promising results than P.O.J.2725. In experiments at Farm 16 the plant cane and first ratoons were decidedly lower than those of P.O.J.2725, but in older ratoons there was very little between the two varieties. It does not arrow like P.O.J.2725, has a more upright habit, and a tougher rind. These characters make it a more suitable cane for carrying over than P.O.J.2725, and it probably deserves to be more widely planted than it has been up to now.

Co.290.

With the exception of Co.301, which has not had very many trials so far, this cane has been second only to P.O.J.2725 in these experiments. It is a cane with many advantages and it has enjoyed a large run of popularity throughout the South African sugar industry, but it was never largely planted at Umfolozi because planters preferred P.O.J.2725 with its higher sucrose per cent. cane and larger size of sticks. It matures early, and this can be either a good or a bad point according to circumstances. It is useful for reaping early in the season, but it does not keep over well for two seasons at Umfolozi, or anywhere, if it has attained a fair size in the first year.

Co.281.

Although this cane has not shown up so well in these experiments as Co.290, it has attained a much greater degree of popularity at Umfolozi as well as elsewhere. This popularity is probably well deserved as Co.281 is a very hardy cane. It is well suited to stiff soils and can stand very wet conditions and also drought for a considerable time without serious injury. It is also one of the best canes to stand over for two seasons.

It has been found to be highly resistant to the cane borer, *Eldana saccharina*, at Umfolozi, and is now being planted on fields where damaged P.O.J.2725 has been ploughed out. As a measure to try to eradicate the borer this may be necessary, but it probably is not a good change over in every respect.

Its very upright growth of rather thin leaves makes it a cane which does not cover the ground quickly. In order to get reasonably quick cover close spacing of rows has been resorted to. This means additional expense in planting and also in hand weeding the lines in the plant cane crop.

Then taking the sucrose per cent. cane of this variety at 13.5 per cent. against 15 per cent. for P.O.J.2725, both the planters and the mill have to deal with 11 tons of Co.281 to get the same return as from 10 tons of P.O.J.2725, which of course reflects extra costs in handling Co.281.

These considerations appear to indicate that where P.O.J.2725 can be expected to do well it ought still to be planted in preference to Co.281.

Co.301.

It is not proposed to say much about this variety because, as already stated, the experiments with it are only in comparatively early stages. It is a very vigorous grower and carries a heavy foliage. This makes it very easily blown over, and we already know it ought to be reaped annually on the flats at Umfolozi. If that is kept in mind it is well worth a trial. It should also be said that it is not an early ripener and gives best results in the second half of the season.

ONE SEASON VERSUS TWO SEASON CROPS.

These experiments show that it is more profitable with any of the varieties to harvest them each year rather than to allow them to go to two seasons. This indicates that only when necessary should crops be held over for two seasons. The best varieties to hold over are Co.281 and P.O.J.2878.

FERTILIZER.

The fertilizer experiments at Farm 16 have shown no response to fertilizer of any kind on plant cane and first ratoon crops on what was practically new lands. On old ratoons, however, definitely profitable results have been obtained from the application of nitrogen as sulphate of ammonia.

A new experiment has been planted to compare Government guano with sulphate of ammonia alone and with a mixture of sulphate of ammonia and superphosphate. This experiment was planted in January, 1941, and will be reaped this year for the first time.

It may be that lands at Umfolozi which have carried cane for a considerable number of years may respond to fertilizer, although they did not do so when first planted up. The results from this experiment will be watched with interest.

VARIETY TRIALS AT U.L.O.A. ESTATE, UMFOLOZI.

As is generally known, frequent importations of canes from overseas are received at the Experiment Station. Some years ago a number of seedling canes were received from Puerto Rico. They are mainly crosses of P.O.J.2725 and SC.12/4, a well-known West Indian variety, and belong to the thick (noble) types of canes. It was felt that such canes could not be expected to give their best returns under conditions at the Experiment Station, so as soon as enough planting material had been grown there arrangements were made to try them out at Umfolozi in

comparison with P.O.J.2725, and the small experiment reported was laid down at the U.L.O.A. Estate. It did not make a very good start and many misses had to be supplied, which made the plant cane very uneven. When it was nearly a year old it was decided to cut it down and plant another larger experiment with the more promising varieties before it was fit to cut for the mill.

The second experiment, which ought to have been fit to harvest at the same time as the first ratoons of the first one reported on below, made a good start, but when it was only a few months old it was almost completely destroyed by flood water and only a few plots on the higher side of the field survived, so it had to be abandoned as an experiment.

Experiment No. 1 consists of four very small plots of each variety, so these results cannot be regarded as very reliable, but the plots have made pretty even growth over the area and may be taken as a reasonably good indication of the comparative value of the varieties. The outstanding feature of the results is the performance of M.P.R.28, which gave slightly better sucrose per cent. cane and sucrose per acre than P.O.J.2725. In this crop P.O.J.2725 did not flower very much, it may be said that it had as good a chance as it ever will have.

M.P.R.28 is in many respects very similar to P.O.J.2725. So far it has shown no sign of flowering in this country, and it has a reputation for not flowering readily in Puerto Rico. It seems a very promising variety for Umfolozi and further results are awaited with interest.

P.R.809 is another very nice looking cane. Its tonnage was very little behind the other two, but its sucrose per cent. cane was disappointing.

The principal index marks of the cane varieties bred in Puerto Rico are:—

M.P.R., P.R., and F.C.

M.P.R. designates canes originally raised at the Puerto Rico Agricultural Experiment Station at Mayaguez, at the western end of the island; this station is controlled by the U.S. Department of Agriculture.

P.R. canes are from the agricultural experiment station of the local government of the island (Puerto Rico, of course, being a territory of the U.S.A.). This station is located at Rio Piedras, in the north-central part of the island.

F.C. canes are raised at the experiment station of a commercial sugar manufacturing company operating Fajardo Central, a large factory on the east coast of Puerto Rico.

Climatic and soil conditions vary widely in different parts of Puerto Rico, although the island is only 100 miles long and 36 miles wide; hence the development of several independent experiment stations each with their own sphere of work.

U.L.O.A. EXPERIMENT No. 1.—TRIAL OF UNRELEASED NEW VARIETIES.

First Ratoon Crop, harvested at 18 months old, 24th June, 1941.

	P.O.J. 2725	M.P.R. 28	P.R. 809	M.P.R. 49	M.P.R. 151	P.R. 803	M.P.R. 3	M.P.R. 7	M.P.R. 61	M.P.R. 63	M.P.R. 42
Tons cane per acre	65.44	65.50	59.31	54.25	52.63	51.94	46.50	41.19	43.87	46.56	39.00
Increase or decrease tons cane per acre compared with P.O.J.2725	—	+0.06	-6.13	-11.19	-12.81	-13.50	-18.94	-24.25	-21.57	-18.88	-26.44
Per cent. increase or decrease tons cane per acre compared with P.O.J.2725	100.0	100.1	90.6	82.9	80.4	79.4	71.1	62.9	67.0	71.1	59.6
Tons sucrose per acre	10.25	10.52	9.20	7.53	7.04	7.42	6.76	6.28	6.61	6.81	5.20
Increase or decrease tons pol. per acre compared with P.O.J.2725	—	+0.27	-1.05	-2.72	-3.21	-2.83	-3.49	-3.97	-3.64	-3.44	-5.05
Per cent. increase or decrease tons pol. per acre compared with P.O.J.2725	100.0	102.6	89.8	73.5	68.7	72.4	66.0	61.3	64.5	66.4	50.7

	P.O.J. 2725	M.P.R. 28	P.R. 809	M.P.R. 49	M.P.R. 151	P.R. 803	M.P.R. 3	M.P.R. 7	M.P.R. 61	M.P.R. 63	M.P.R. 42
Pol. (sucrose) per cent. cane	15.67	16.06	15.51	13.88	13.37	14.28	14.54	15.25	15.07	14.63	13.33
Fibre per cent. cane	10.21	11.83	11.90	12.72	10.38	14.21	12.61	12.18	11.51	10.04	12.00
Juice: Brix	20.6	20.95	20.6	19.4	19.1	20.2	20.6	20.9	20.6	19.6	18.8
Pol. (sucrose) per cent.	18.88	19.52	19.36	17.48	16.83	18.49	18.65	19.10	18.78	17.65	16.86
Purity	91.7	93.2	93.9	90.5	88.3	91.9	90.2	91.1	91.3	90.2	89.5
Reducing sugar ratio	2.81	1.18	2.38	2.94	2.83	1.46	2.20	3.55	1.20	2.28	1.75
Total value of sucrose per acre at £5.71 per ton	£58/10/6	60/1/5	52/10/8	43/0/0	40/4/0	42/7/4	38/12/0	35/17/2	37/14/10	38/17/9	29/13/10
Value of increase or decrease com- pared with P.O.J.2725 for this crop	—	+1/10/11	-5/19/10	-15/10/6	-18/6/6	-16/3/2	-19/18/6	-22/13/4	-20/15/8	-19/12/9	-28/16/8
General mean yield, tons sucrose per acre = 7.60.											
Per cent. of general mean	134.9	138.4	121.1	99.1	92.6	97.6	88.9	82.6	87.0	89.6	68.4

Significant difference between varieties at 19:1 odds = 1.82 tons sucrose per acre.

Significant difference between varieties at 99:1 odds = 2.45 tons sucrose per acre.

Percentage significant difference between varieties at 19:1 odds = 23.94 per cent. of general mean.

Percentage significant difference between varieties at 99:1 odds = 32.23 per cent. of general mean.

Value of significant difference between varieties at 19:1 odds = £10 7s. 11d. per acre.

Value of significant difference between varieties at 99:1 odds = £13 19s. 9d. per acre.

M.P.R.28 and P.O.J.2725 are practically equal. P.R.809 makes a good third, and the others are all a long way behind in this crop.

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To Mr. E. Stanley Murphy and his manager, Mr. G. M. Higgins, also to the staff of the Umfolozi Co-operative Sugar Planters, Ltd., and to Mr. Kirkwood of the Experiment Station staff, who did the sucrose tests, the authors are deeply indebted. They wish to thank most heartily all who assisted in carrying on the work of the experiments.

They also wish to offer their sympathy with Mrs. Dick and her family in their great loss. The kindness, hospitality and help extended by the late Wm. Dick to all members of the Experiment Station staff were unflinching. They were very much appreciated and will be greatly missed.

Experiment Station
South African Sugar Association,
Mount Edgecombe
March, 1942.

Mr. FOWLIE explained, in reply to Mr. Pougnet, that at Umfolozi the usual spacing between-lines was from 5 to 6 feet for P.O.J.2725, but the tendency was to plant Co.281 much closer, often only 4 to 4½ feet. These experiments showed that there was very little difference between 4, 5 and 6 feet planting for all varieties and only a slight falling-off in yield at 7 feet, which was not significant under the conditions of these experiments.

That being so, he was not in favour of the closer spacings, even for Co.281. Closer spacing meant increased cost in planting and planting material and also hand weeding, as it meant more length of line per acre.

These experiments had only been carried out on a large scale at Umfolozi, but there were indications that the same comparative results would be obtained elsewhere, though the optimum planting distance would naturally be closer on hillsides than on Umfolozi flats. There was some indication that the wider spacings tended to increase sucrose per cent. cane.

Mr. DODDS said that irrigation experiments had been started at Umfolozi some time ago, but it was found impossible to continue them at the time. He thought such experiments would be very desirable. Umfolozi had generally a low rainfall. The soil was very fertile, however, and the water table high, with the result that cane seldom showed signs of drought. He thought, however, that irrigation might help a great deal to promote the earlier growth of the cane and help it through

until it could get at the water reserves below. He would welcome an opportunity to carry out irrigation experiments at Umfolozi.

Mr. RAULT said that he was struck once more by the discrepancy between sucrose figures obtained at a commercial mill and an experimental mill. He would also have expected a higher sucrose per cent. cane in P.O.J.2725.

Mr. FOWLIE pointed out that sucrose at Umfolozi was always very much lower than it was for the rest of the industry. The only point he wanted to make in the paper, however, was that figures obtained with the experimental mill were from canes on the flats, and as such their order was probably more correct than the mill figures, as the mill handled Co.281, which came mostly from the hills, whereas the P.O.J. were from the flats.

Mr. DYMOND said that the difference in analyses between cane from experimental plots and the normal mill supply was due to the fact that whereas experimental cane was clean and fresh, mill cane was often dirty and affected by factors such as length of time between cutting and milling, old brake-cane, etc.

Mr. DODDS said that the method of determining sucrose in experimental plots had been carefully scrutinized and no flaws had been found in them. In these tests both the expressed juice and the resulting bagasse were analysed, whereas the cane testing service depended solely on an arbitrary Java Ratio in determining sucrose content of consignments. If, therefore, the average quality of the cane entering the mill was lower than that of the plots, the sucrose returns from them would be too low. Mr. Dodds agreed with Mr. Pougnet that it was quite possible for sucrose in cane to increase for a day or two after cutting.

Mr. GARLAND, replying to Mr. Pougnet, said that Co.290 ratooned quite satisfactorily, provided it was cut every year and was grown on suitable soil. Co.290 was essentially a one-year-old cane. If it were cut as a year or fifteen months' old cane it ratooned very well, and in some cases had given as many as five and six satisfactory crops, as shown by experiments carried out by the Experiment Station. If it were left to a two-year-old crop, however, so-called "red rot" set in and the cane deteriorated very quickly, and this affected the subsequent ratooning.

Mr. FOWLIE, replying to a question by Mr. Pougnet, said that it was better to cut cane infected by borer every year, as the effect was not so great the first year as when the borer was allowed to multiply and continue its work of destruction in the second year.

Dr. DICK, referring to the same question, said that by cutting the cane every year a great number of borers were destroyed. The development of the borer depended on climatic conditions, but in hot weather it probably went through the complete cycle in a month.