

FOURTH PROGRESS REPORT ON EXPERIMENTS AT UMFOLOZI BY THE EXPERIMENT STATION STAFF.

Before giving the usual tabulated results obtained from the harvesting of experiments at this centre, it seems desirable to give a few details of changes which have been made in the programme of experiments being conducted.

Experiment No. 1, a small trial of seven varieties with only four replications, was ploughed out after being harvested in 1936. A new experiment, No. 10, was planted on the same area to compare the yields from Co.281, Co.290 and Co.301. The plant cane crop from this new experiment was harvested at twelve months old, and the results are included in this paper.

Experiments Nos. 3 and 4 were reaped again in 1937 as third ratoons. These experiments were planted with various fertiliser treatments. The plant cane crop and three ratoons have given negative results, and for that reason figures are not given. They are planted with P.O.J.2725 and are still ratooning strongly, so the plots have been rearranged to form an experiment to test the effect of dressings of nitrogen as ammonium sulphate. It is felt that although no result was obtained from the dressings of fertilisers applied five years ago, it is possible that it might be profitable to top-dress the old ratoons. The treatments compared are:—

- No fertiliser.
- 400 lbs. ammonium sulphate per acre.
- 800 lbs. ammonium sulphate per acre.

There are 24 plots of each treatment.

Experiments Nos. 5 and 9 were definitely abandoned as being of no value and were not harvested as experiments in 1937.

Experiment No. 6, the line spacing experiment with P.O.J.2725 and P.O.J.2878, was harvested and weighed, but the results are not published because they are very unreliable. A very considerable part of the area under this experiment was badly damaged by flood water lying too long on it and patches of cane were completely killed out.

All that can be said about the results is that in general they again showed P.O.J.2725 to be better than P.O.J.2878. The effect of spacing the rows 4 feet, 5 feet, 6 feet and 7 feet apart is not definitely shown in this experiment. To investigate this matter further, and also to obtain more information about the new variety Co.301, a large new experiment, No. 11, has been laid down to test the same range of spacings with the four varieties of cane Co.281, Co.290, Co.301 and P.O.J.2725. The site of the new experiment adjoins experiments Nos. 7 and 4. There has been a good even stand of P.O.J.2725 cane on this land, and it is considered much more uniform than the site which has been abandoned.

The following tables show the results obtained from experiments harvested in 1937. Summaries of previous results from the same experiments are included to bring the results up to date.

UMFOLOZI EXPERIMENT No. 2.—VARIETY TRIAL. THIRD RATOON CROP.

Harvested at 12½ months' old, 2nd to 6th December, 1937.

	P.O.J. 2725.	Co. 290.	P.O.J. 2878.	P.O.J. 2727.	CH. 64/21.	UBA.	P.O.J. 2714.
Tons cane per acre	37.90	41.91	32.06	33.83	31.10	28.31	24.81
Increase tons cane per acre over Uba	9.59	13.60	3.75	5.52	2.79	—	-3.50
Percentage tons cane per acre compared with Uba	133.9	148.0	113.2	119.5	109.9	—	87.6
Tons pol (sucrose) per acre	6.34	5.65	4.92	5.08	3.90	3.81	3.72
Increase tons pol per acre over Uba	2.53	1.84	1.11	1.27	0.09	—	-0.09
Percentage tons pol per acre compared with Uba	166.4	148.3	129.1	133.3	102.4	—	97.6
Pol (sucrose) % cane... ..	16.74	13.48	15.35	15.02	12.53	13.47	14.99
Fibre % cane	97.3	11.54	9.58	10.75	13.75	13.84	13.26
Juice: Brix	21.5	19.4	20.2	20.8	18.5	19.9	21.1
Pol (sucrose) %	19.92	16.74	18.36	18.16	16.21	17.59	19.31
Purity... ..	92.8	86.1	89.7	89.1	87.8	88.3	91.4
Mgms. per 100 ml. Phosphate content	42.6	40.6	42.2	42.8	48.2	37.0	44.4
" " Potash content ...	232.4	234.1	159.4	240.7	188.4	141.9	156.9
" " Chlorides content .	110.1	191.7	103.0	163.3	106.5	138.5	67.4

Umfolozi Experiment No. 2—continued.	P.O.J. 2725.	Co. 290.	P.O.J. 2878.	P.O.J. 2727.	CH. 64/21.	UBA.	P.O.J. 2714.
Reducing sugar ratio... ..	2.02	3.14	2.69	2.65	3.52	2.88	2.25
Total value of sucrose per acre at £5.4303 per ton	£34 8 7	£30 13 8	£26 14 4	£27 11 8	£21 3 7	£20 13 10	£20 4 0
Soft cane bonus	11 6	6 4	9 9	10 4	—	—	7 6
	35 0 1	31 0 0	27 4 1	28 2 0	21 3 7	20 13 10	20 11 6
Value of gain or loss compared with Uba for this crop	14 6 3	10 6 2	6 10 3	7 8 2	0 9 9	—	—0 2 4
General mean = 4.775 tons sucrose per acre.							
Percentage of general mean... ..	132.8	118.3	103.0	106.4	81.7	79.8	77.9

Significant error of difference between varieties at 19 : 1 odds = 0.475 tons sucrose per acre.

Percentage significant error of difference between varieties at 19 : 1 odds = 10 %.

Value of significant difference between varieties per acre at 19 : 1 odds = £2 11s. 7d.

Gain or loss compared with Uba.

	P.O.J. 2725.	Co. 290.	P.O.J. 2878.	P.O.J. 2727.	CH. 64/21.	P.O.J. 2714.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Plant cane, harvested at 21 months' old, August, 1934	38 15 10	27 11 6	27 11 6	20 1 5	1 4 2	7 15 5
First ratoon	15 19 11	14 18 9	7 8 11	8 18 4	2 15 2	—1 14 0
Second ratoon	11 6 2	11 13 1	6 10 5	9 10 5	3 15 0	2 13 1
Third ratoon... ..	14 6 3	10 6 2	6 10 3	7 8 2	0 9 9	—0 2 4
Total gain or loss compared with Uba over four crops	£80 8 2	£64 9 6	£48 1 1	£45 18 4	£8 4 1	£8 12 2

In this crop P.O.J.2725 regained the lead over Co.290 which it had as plant cane but not as first or second ratoons. In this crop it was significantly better than all the other varieties at 99 to 1 odds. Co.290 was significantly better than all the others, except P.O.J.2725, at 19 to 1 odds.

UMFOLOZI EXPERIMENTS Nos. 7A and 7B.—VARIETY TRIALS. SECOND RATOON CROP.

Harvested at 13½ months' old, 7th to 11th December, 1937.

	P.O.J. 2725.	Co. 290.	Co. 281.	P.O.J. 2878.	UBA.
Tons cane per acre	44.19	48.83	49.07	38.04	36.30
Increase tons cane per acre over Uba	7.89	12.53	12.77	1.74	—
Percentage tons cane per acre compared with Uba ...	121.7	133.3	135.2	104.8	—
Tons pol (sucrose) per acre	6.96	6.79	6.47	5.74	4.72
Increase tons pol per acre over Uba	2.24	2.07	1.75	1.02	—
Percentage tons pol per acre compared with Uba ...	147.5	143.9	137.1	121.6	—
Pol (sucrose) % cane	15.76	13.90	13.18	15.08	13.00
Fibre % cane	11.21	12.91	14.73	11.76	13.48
Juice : Brix	21.0	19.5	18.9	20.3	18.3
Pol (sucrose) %	19.24	17.19	16.97	18.29	16.33
Purity	91.7	88.1	89.7	91.3	88.9
Mgms. per 100 ml. Phosphate content	75.4	36.6	62.2	59.2	54.5
„ „ Potash content	189.6	273.0	224.5	128.6	143.1
„ „ Chlorides content	79.9	205.9	146.4	92.4	131.4
Reducing sugar ratio	0.70	1.28	1.46	1.20	1.49

Umfolozi Experiments Nos. 7A and 7B—continued.	P.O.J. 2725.	Co. 290.	Co. 281.	P.O.J. 2878.	UBA.
Total value of sucrose per acre at £5.4303 per ton ...	£37 15 10	£36 17 5	£35 2 8	£31 3 5	£25 12 8
Soft cane bonus ...	0 13 5	0 7 4	0 5 0	0 11 7	—
	38 9 3	37 4 9	35 7 8	31 15 0	25 12 8
Value of gain or loss compared with Uba for this crop	12 16 7	11 12 1	9 15 0	6 2 4	—
General mean = 6.13567 tons sucrose per acre.					
Percentage of general mean ...	113.4	110.7	105.4	93.6	76.9

Significant error of difference between varieties at 19 : 1 odds = 0.43 tons sucrose per acre.

Percentage significant error of difference between varieties at 19 : 1 odds = 7 %.

Value of significant difference between varieties per acre at 19 : 1 odds = £2 6s. 8d.

Gain or loss compared with Uba.

	P.O.J. 2725.	Co. 290.	Co. 281.	P.O.J. 2878.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Plant cane, harvested at 19 months' old, July, 1935...	25 19 0	18 8 8	16 18 9	15 14 4
First ratoon, harvested at 15 months' old, 27th October, 1936	18 17 4	12 17 3	15 6 11	10 0 9
Second ratoon ...	12 16 7	11 12 1	9 15 0	6 2 4
Total gain or loss compared with Uba ...	<u>£57 12 11</u>	<u>£42 18 0</u>	<u>£42 0 8</u>	<u>£31 17 5</u>

The results of these two experiments are grouped together in this report because they are replications of each other. When they were planted it was hoped to irrigate one and leave the other unirrigated, but the irrigation scheme was not proceeded with after the plant cane crop, so there now seems no reason why these should not be grouped together. This gives twelve replicate plots of each variety, which adds to the reliability of the experiment.

In this crop the difference between P.O.J.2725 and Co.290 was not significant, nor was the difference between Co.290 and Co.281, but P.O.J.2725 was significantly better than Co.281 at 19 to 1 odds. These three varieties were all significantly better than P.O.J.2878 and P.O.J.2878 was significantly better than Uba.

UMFOLOZI EXPERIMENT No. 8.—VARIETY TRIAL. SECOND RATOON CROP.

Harvested at 13 months old, 17th November, 1937.

	Co. 290.	Co. 281.	P.O.J. 2725.	P.O.J. 2878.	UBA.
Tons cane per acre ...	42.69	38.29	30.25	29.66	27.58
Increase tons cane per acre over Uba...	15.11	10.71	2.67	2.08	—
Percentage tons cane per acre compared with Uba...	154.8	138.8	109.7	107.5	—
Tons pol (sucrose) per acre ...	6.16	5.47	5.16	4.75	3.79
Increase tons pol per acre over Uba ...	2.37	1.68	1.37	0.96	—
Percentage tons pol per acre compared with Uba ...	162.5	144.3	136.1	125.3	—
Pol (sucrose) % cane ...	14.43	14.28	17.06	16.03	13.75
Fibre % cane ...	13.84	15.46	12.49	12.44	15.68
Juice: Brix ...	20.7	21.1	22.9	21.5	20.2
Pol (sucrose) % ...	18.43	18.87	21.03	19.67	17.99
Purity ...	88.9	89.7	91.6	91.7	88.9

Umfolozzi Experiment No. 8—continued.					Co. 290.	Co. 281.	P.O.J. 2725.	P.O.J. 2878.	UBA.						
Mgms. per 100 ml. Phosphate content...	...	...	...	65.2	82.0	109.0	77.2	105.0							
„ „ Potash content ...	...	...	...	159.4	217.0	125.3	169.3	229.1							
„ „ Chlorides content ...	...	...	...	167.5	56.8	78.5	106.5	127.8							
Reducing sugar ratio ...	...	...	...	1.81	0.78	0.58	0.68	1.03							
Total value of sucrose per acre at £5.4303 per ton...	£33	9	0	£29	14	1	£28	0	5	£25	15	11	£20	11	7
Soft cane bonus ...	0	6	5	0	3	11	0	9	2	0	9	0	—	—	—
	33	15	5	29	18	0	28	9	7	26	4	11	20	11	7
Value of gain or loss compared with Uba for this crop	13	3	10	9	6	5	7	18	0	5	13	4	—	—	—
General mean = 5.0673 tons sucrose per acre.															
Percentage of general mean ...	...	...	...	121.6	108.0	101.8	93.7	74.8	...	...	...	...	...	...	...

Significant error of difference between varieties at 19 : 1 odds = 0.780 tons sucrose per acre.

Percentage significant error of difference between varieties at 19 : 1 odds = 15.4 %.

Value of significant difference between varieties per acre at 19 : 1 odds = £4 4s. 9d.

Gain or loss compared with Uba.

	Co. 290.			Co. 281.			P.O.J. 2725.			P.O.J. 2878.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Plant cane, 19 months old ...	16	10	1	22	5	3	19	6	3	7	7	2
First ratoon, 15 months old ...	12	0	0	10	13	6	6	18	6	1	13	6
Second ratoon, 13 months old ...	13	3	10	9	6	5	7	18	0	5	13	4
Total gain or loss compared with Uba over three crops ...	<u>£41</u>	<u>13</u>	<u>11</u>	<u>£42</u>	<u>5</u>	<u>2</u>	<u>£34</u>	<u>2</u>	<u>9</u>	<u>£14</u>	<u>14</u>	<u>0</u>

In this crop Co.290 was significantly better than all the others except Co.281. Co.281 was not significantly better than P.O.J.2725, but was significantly better than P.O.J.2878 and Uba. P.O.J.2725 was not significantly better than P.O.J.2878 but, with P.O.J.2878, was significantly better than Uba.

Experiment No. 8 is situated on a rather low-lying part of the Umfolozzi flats. There has not been a flood big enough to cover the whole of the experiment area since it was planted, but parts of it have been under water several times. Observation has shown that Co.290 has been more fortunate in avoiding these

wet places than Co.281 and P.O.J.2725. It seems probable, therefore, that the superiority shown by Co.290 in this experiment is chiefly due to its being fortunate in the placing of its plots on the area. Over three crops the difference between P.O.J.2725, Co.290 and Co.281 is not significant.

Average Yields from three Crops on Experiments Nos. 7A, 7B and 8.

The third crop (second ratoons) was harvested within four years from the time the experiment was planted.

	P.O.J. 2725.	Co. 281.	Co. 290.	P.O.J. 2878.	UBA.
Tons cane per acre ...	54.59	57.17	56.84	46.02	40.97
Tons sucrose per acre ...	8.13	7.69	7.74	6.62	4.99
Average sucrose % cane ...	14.89	13.45	13.61	14.39	12.19
Average fibre % cane ...	10.94	14.07	12.13	11.56	13.00
Average purity of juice ...	91.5	89.7	87.8	90.9	87.6

These figures are the averages from 54 samples of each variety.

It is very gratifying to find that the new varieties, and particularly P.O.J.2725, are giving such good results at Umfolozi. The superiority shown by P.O.J. 2725 in these experiments is in keeping with the results which have been obtained by private planters on a commercial scale. This variety is now the most widely planted on the Umfolozi flats, and other varieties are

rapidly disappearing to make room for it. It was estimated that the average yield from approximately twelve months old P.O.J.2725 was over 40 tons per acre for the season just closed. The high average sucrose yielded by this variety is of great importance at Umfolozi.

UMFOLOZI EXPERIMENT No. 10.—VARIETY TRIAL. PLANT CANE CROP.

Harvested at 12 months old, 24th November, 1937.

	Co. 301.	Co. 290.	Co. 281.
Tons cane per acre	36.91	34.45	33.31
Increase tons cane per acre over Co.281	3.60	1.14	—
Percentage tons cane per acre compared with Co.281	110.8	103.4	100.0
Tons pol (sucrose) per acre	4.70	3.42	4.22
Increase tons pol per acre over Co.281	0.48	0.10	—
Percentage tons pol per acre compared with Co.281	111.4	102.4	100.0
Pol (sucrose) % cane	12.73	12.55	12.68
Fibre % cane	13.23	12.34	12.76
Juice : Brix	18.1	17.8	17.9
Pol (sucrose) %	16.02	15.27	15.69
Purity	88.5	86.2	87.4
Mgms. per 100 ml. Phosphate content... ..	37.7	25.2	34.8
" " Potash content	195.9	26.5	164.3
" " Chlorides content	106.5	191.7	74.5
Reducing sugar ratio	3.69	2.99	2.89
Total value of sucrose per acre at £5.4303 per ton... ..	£25 10 5	£23 9 2	£22 18 4
Soft cane bonus	—	0 5 2	0 3 5
	25 10 5	23 14 4	23 1 9
Value of gain or loss compared with Co.281 for this crop	2 8 8	0 12 7	—
General mean = 4.414 tons sucrose per acre.			
Percentage of general mean	106.5	97.9	95.6

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

Percentage significant error of difference between varieties at 19 : 1 odds = 7.2 %.

Value of significant difference between varieties per acre at 19 : 1 odds = £1 14s. 6d.

Co.301 was significantly better than Co.290 and Co.281. There was no significant difference between the latter two varieties.

This small experiment was laid down to obtain a comparison of Co.301 with the other two Co. varieties. It would have been desirable to add P.O.J.2725 in the comparison, but that was found to be impossible at the time. As mentioned before a new experiment, No. 11, to test these four varieties has been planted recently.

It is desired to thank the Umfolozi Co-operative Sugar Planters, Ltd., for all the assistance rendered

by them, and Mr. E. Stanley Murphy for the care he has taken of the plots.

South African Sugar Association,
Experiment Station,
Mount Edgecombe,
March, 1938.

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Mr. ROSENSTRAUCH: Referring to the effects of irrigation on root development of plant and ratoon canes, asked if there was any difference bet-

ween the crop yield on the section previously irrigated when under plant cane to the section which was not irrigated.

Mr. COLEPEPER: Replied that nothing significant could be deduced from the irrigation of the plots, owing perhaps to the problem of water seeping through the very porous soil of the flats into adjacent plots.

Mr. DODDS: Called attention to the Table of Experiment 10 on page 5 where Co.301 had not been graded with the soft cane bonus. Co.301 ought to receive the same soft cane bonus as the other Co. varieties.

The PRESIDENT: In thanking Mr. Colepeper, thanked also the Experiment Station which in a quiet way did so much work one often did not hear about.