

SIXTH PROGRESS REPORT ON EXPERIMENTS AT UMFOLOZI

BY THE EXPERIMENT STATION STAFF

Since the first of these reports was written five years ago, a striking change has come over the sugar industry at Umfolozi. At that time Uba was practically the only cane being milled, and only comparatively small areas of the new canes had been planted. After that very large plantings of new canes were made. On the flats the chief cane planted was P.O.J. 2725 with much smaller areas of Co.290, Co.281 and P.O.J.2878. On the hill farms the most largely planted variety was Co.281.

The following figures, giving the percentages of the various varieties milled at Umfolozi during the past three seasons, show the rapidity with which the change-over has been made. These figures group all P.O.J. canes together, but P.O.J. 2725 comprises the greater portion. The figures for 1939-40 are only approximate as the season had not closed when this was being written.

	Season 1935-36	Season 1936-37	Season 1937-38	Season 1938-39	Season 1939-40
P.O.J.		34.97	58.98	56.51	66
Co.281	17.4	1.30	8.43	10.17	22
Co.290		7.06	9.86	19.42	7
Co.301		—	0.01	0.22	1
Uba . . .		82.6	56.67	22.72	13.88
	100.0	100.00	100.00	100.00	100

P.O.J.2725 has proved a very good cane on the flats chiefly because the average sucrose content is higher for it than for any other variety. It has also given excellent weights of cane per acre in many cases but is prone to form tassels when it is one year old or even less. If it is possible to harvest the cane within a few months of flowering this probably causes little loss but if it has to stand over another growing season after flowering the yield of sucrose per acre per annum is liable to suffer seriously.

It would appear that there might be a possibility of improving on P.O.J.2725 if a cane of similar type could be found capable of giving good growth and high sucrose content without the tendency to early and excessive flowering. There are now at the Experiment Station a number of canes, which have been imported from Puerto Rico, of the thick or noble type of cane. Most of these have been bred from P.O.J.2725.

In September, 1938, small plots of ten of these seedling canes were planted at Umfolozi, on the estate of the U.L.O.A., in comparison with P.O.J.

2725. These plots made a poor start due to a spell of very dry weather after planting, and many misses had to be filled in, but eventually they made good growth. During the winter season of 1939 P.O.J. 2725 was the only one which flowered. In January, 1940, the best five of these varieties were picked for replanting on a larger scale as a variety trial.

When taking the cane from the original plots for replanting it was not found possible to weigh it, but it was estimated that three of these varieties were heavier than P.O.J.2725. These were M.P.R. 28, M.P.R.49 and P.R.809. It is interesting to note that they are all seedlings of the same parentage P.O.J.2725 x S.C.124.

Samples of the canes replanted were brought back to the Experiment Station for analysis with the following results:—

	Sucrose % Cane	Purity	Fibre % Cane
P.O.J.2725 . . .	13.99	89.7	10.44
M.P.R.* 3 . . .	16.52	95.0	13.82
M.P.R.* 28 . . .	15.69	92.9	11.08
M.P.R.* 49 . . .	14.70	82.2	12.39
M.P.R.* 151 . .	12.78	87.0	10.86
P.R.809	12.75	82.3	9.54

* Formerly referred to as My.

Single small handmill samples as these were can only be regarded as giving an indication of the quality of the varieties tested, but the results taken in conjunction with the growth put on by the various canes point to M.P.R.28 and M.P.R.49 as the most promising of these varieties under Umfolozi conditions.

Perhaps it ought to be mentioned that from results obtained at the Experiment Station none of these canes show great promise under dry land conditions.

During the year under review only two experiments were harvested at Farm 16 Umfolozi. Some of the others which have been harvested annually for a number of years were left over to become more or less two years old in order to obtain information about the behaviour of the various canes when left over to grow for two seasons.

Experiments 7a and 7b, which are now treated as one variety trial, gave the results shown in the table below. It will be noted that this is the Fourth Ratoon crop from this experiment. It was reaped as 19 months' old plant cane in July, 1935, and has been taken off every year since.

TABLE I.
EXPERIMENTS 7A AND 7B.—FARM 16, UMFOLOZI (AVERAGED).
Twelve months old Fourth Ratoons, Harvested 7th to 13th December, 1939.

	P.O.J.2725.	Co.290.	Co.281.	P.O.J.2878.	Uba.
Tons cane per acre	34.04	35.24	41.06	38.55	38.23
Increase tons cane per acre over Uba	-4.19	-2.99	+2.83	+0.32	—
Percentage tons cane per acre compared with Uba	89.0	92.2	107.4	100.8	100.0
Tons pol (sucrose) per acre	4.98	5.45	5.45	5.45	4.46
Increase tons pol per acre over Uba	0.52	0.99	0.99	0.99	—
Percentage tons pol per acre compared with Uba	111.7	122.2	122.2	122.2	100.0
Pol (sucrose) % cane	14.63	12.06	13.28	14.13	11.67
Fibre % cane	11.34	12.38	13.89	11.54	14.68
Juice—Purity	90.6	86.6	90.6	91.1	87.4
Reducing sugar ratio	1.31	2.12	1.44	1.62	1.82
Total value of sucrose per acre at £5.561 per ton	£27 13 11	£30 6 2	£30 6 2	£30 6 2	£24 16 0
Value of gain or loss compared with Uba for this crop	+2 17 11	+5 10 2	+5 10 2	+5 10 2	—
General mean = 5.15866 tons sucrose per acre.					
Percentage of general mean	96.5	105.6	105.6	105.6	86.4

Significant error of difference between varieties at 19 : 1 odds = 0.267 tons sucrose per acre.

Percentage significant error of difference between varieties at 19 : 1 odds = 5.2% of general mean.

Value of significant difference between varieties per acre at 19 : 1 odds = £1 9s. 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	25	19 0	18	8 8	16	18 9	15	14 4
First ratoon	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
Third ratoon	7	19 4	7	7 5	3	16 11	4	7 10
Fourth ratoon	2	17 11	5	10 2	5	10 2	5	10 2
Total gain or loss compared with Uba	£68	10 2	£55	15 7	£51	7 9	£41	15 5

It will be noted that P.O.J.2725 has lost the place at the top which it had occupied for the first four crops. In Experiment No. 2, which was reported last year, the same thing happened in 4th ratoons. This would seem to indicate that P.O.J.2725 does not ratoon quite so well as some of the other varieties. Both of these experiments are being carried on further, so it is hoped to give the results from 5th ratoons in due course.

The above table shows that Co.290, Co.281 and P.O.J.2878 come out equal to each other in the 4th

ratoon crop. They are all significantly better than P.O.J.2725 in this crop. P.O.J.2725 is still significantly better than Uba.

Experiment No. 11.

As described in last year's report, this experiment has been designed to investigate three different phases of cane growing.

The results of the first of these, a comparison of four varieties of cane, are given in the following table.

TABLE II.
EXPERIMENT No. 11.—FARM 16, UMFOLOZI.
 Twenty months old Plant Cane, Reaped 26th November to 6th December, 1939.

	P.O.J.2725.	Co.301.	Co.281.	Co.290.
Tons cane per acre	68.58	69.51	67.52	66.84
Tons pol (sucrose) per acre	9.50	9.37	8.80	8.74
Decrease tons pol per acre compared with P.O.J.2725 ...	—	-0.13	-0.70	-0.76
Percentage tons pol per acre compared with P.O.J.2725...	100.0	98.6	92.6	92.0
Pol (sucrose) % cane	13.86	13.48	13.03	12.86
Fibre % cane	9.75	13.72	14.32	12.61
Juice—Purity	90.4	90.7	89.9	87.4
Reducing sugar ratio	1.61	1.40	1.26	2.20
Total value of sucrose per acre at £5.561 per ton... ..	£52 16 7	£52 2 1	£48 18 9	£48 12 1
Value of loss compared with P.O.J. 2725 for this crop ...	—	-£0 14 6	-£3 17 10	-£4 4 6
General mean = 9.066875 tons sucrose per acre.				
Percentage of general mean	104.8	103.3	97.1	96.4

Significant error of difference between varieties at 19:1 odds = 0.600 tons sucrose per acre.

Percentage significant error of difference between varieties at 19:1 odds = 6.6% of general mean.

Value of significant difference between varieties per acre at 19:1 odds = £3 6s. 9d.

	Co.301.	Co.281.	Co.290.
Gain or loss compared with P.O.J.2725 in Plant Cane	£0 14 6 loss	£3 17 10 loss	£4 4 6 loss

These results show that P.O.J.2725 was significantly better than Co.281 and Co.290, but not significantly better than Co.301.

The second comparison was between the results obtained from planting each of these varieties at 4ft., 5ft., 6ft. and 7ft. spacing between the rows.

The results were as follows in tons sucrose per acre:—

Variety	4ft.	5ft.	6ft.	7ft.
P.O.J.2725	9.75	9.25	9.80	9.20
Co.301	9.54	9.22	9.50	9.21
Co 281	9.17	8.82	8.69	8.49
Co.290	7.81	8.89	8.65	9.04
Average	9.07	9.04	9.16	8.98

Taken on the average these figures show that there is no significant difference between the yields from the various spacings.

Only with Co.281 is there a progressive increase in yield as the space between the lines is diminished. This confirms the general opinion that this variety ought to be planted closer than the others.

The third point investigated by this experiment was whether a profitable increase could be obtained by applying 300 lbs. per acre of Sulphate of Ammonia. The fertiliser was applied to half the plots of each variety for each spacing. There were thus 32 plots with fertiliser and 32 plots without.

The results were:—

Average of 32 plots:

With fertiliser 9.07 tons sucrose.

Without fertiliser 9.06 tons sucrose.

There was thus no return from the application of fertiliser to this crop. This may be because this was the plant cane crop as an increase due to the application of sulphate of amonia was reported last year from the old ratoon Experiments Nos. 3 and 4 which adjoin No. 11.

We are very much indebted to the staff of the Umfolozi Co-operative Sugar Planters, Ltd., and to Mr. E. Stanley Murphy for their assistance in carrying on these experiments and desire to thank them heartily.

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The CHAIRMAN, after referring to the interest which we have annually in these reports, threw the paper open for discussion.

Mr. DODDS reminded the Conference that he had referred yesterday (page 47, this proceedings) to certain of the commercial results due to growing P.O.J.2725 in place of Uba at Umfolozi, and said that the table on page 52 (first column) showed how rapidly the P.O.J. canes and Co.281 were replacing all other varieties at this factory. Associated with this change-over was the fact that in 1935 the output of the Umfolozi factory was 12,000 tons of sugar, but that in the season just closed the output had touched 30,500 tons, a threefold increase in four years. The fibre in 1935 had been 16.2 per cent., which was considerably above the average then when Uba was principally grown, but in the season just concluded the fibre was just over 14 per cent., the lowest in any factory in the industry.

The effort to replace P.O.J.2725 by varieties equally good, but without the disadvantage of early flowering, was being energetically pursued at the Experiment Station. Not only were the M.P.R. varieties being examined but also hybrids of 2725. There arrived at the Station 21 such hybrids crossed with various other varieties from different parts of the world. In addition, there are 189 seedlings, crosses with P.O.J.2725, raised at the Experiment Station from seed produced at Coimbatore to the specification set out by the Station.

Mr. MOBERLY remarked on the interest to be attached to this report which has been presented year by year. It would be of interest to see how the M.P.R. canes would do under irrigation in other parts of the sugar belt.