

# FIRST PROGRESS REPORT ON EXPERIMENTS AT UMFOLOZI SUB-STATION.

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Early in 1932 an arrangement was entered into between the South African Sugar Association and the Umfolozi Co-Operative Sugar Planters, Ltd. to start an Experiment Sub-Station at Farm 16, Umfolozi, under the control of the Director of the South African Sugar Association's Experiment Station. Mr. E. Stanley Murphy, the occupier of Farm 16, agreed to take charge of the field work. There was much preliminary work to be done to prepare the ground for planting, but the first experiments were laid down in December, 1932, and others were planted during 1933.

The soil on the experimental area is typical alluvial, such as is found over a larger area of flat land alongside the Umfolozi River. This area is all subject to flooding, when the river rises, and the land has been built up by the deposition of silt and in places sand from the flood waters. The experiment area is mostly rather a heavy silt, but it varies considerably in colour from yellowish-grey to almost black. Though the general appearance of the surface is flat, the actual level varies several feet from the highest to the lowest parts of the area. Water naturally collects in the lower lying areas during wet weather, and owing to lack of fall can only be drained away slowly, but no part of the experiment area remains swampy, and the experiments do not appear to have suffered much from excessive water so far.

In studying the results of the first cutting of the experiments reaped in August, 1934, it will at once be noticed, that there are wide variations in yield between plots receiving the same treatment. This must be taken to indicate variations in the soil itself and this is confirmed by close examination, although sometimes the variation is not readily apparent.

## ANALYSIS OF SOILS FROM THIS AREA.

The following analysis of soils taken from different parts of the experiment area show the variable nature of this alluvial soil.

### Analysis of Soils from Farm 16, Umfolozi. November, 1933.

Sample.	Good soil.	Fair to medium.	Poor soil (water grass patch).
Insoluble residue .. ..	67.92	71.00	84.79
Soluble silica (SiO <sup>2</sup> ) .. ..	0.34	0.38	0.31
Loss on ignition .. ..	11.32	10.26	4.92
Potash (K <sup>2</sup> O) .. ..	0.61	0.54	0.30
Phosphoric acid (P <sup>2</sup> O <sup>5</sup> ) .. ..	0.12	0.13	0.07
Lime (CaO) .. ..	0.50	0.74	0.42
Magnesia (MgO) .. ..	0.18	0.30	0.17
Alumina (Al <sup>2</sup> O <sup>3</sup> ) .. ..	7.63	5.08	4.36
Oxide of Iron (Fe <sup>2</sup> O <sup>3</sup> ) .. ..	11.60	12.17	5.07
Not determined .. ..	—	—	—
Total .. ..	100.22	100.60	100.41

Sample.	Good soil.	Fair to medium.	Poor soil (water grass patch).
Total organic carbon ..	2.99	2.76	1.51
Total nitrogen .. ..	0.28	0.34	0.14
Carbon : Nitrogen ratio ..	10.70	8.20	10.80
Available potash (K <sup>2</sup> O) ..	0.030	0.023	0.013
Available phosphoric acid (P <sup>2</sup> O <sup>5</sup> ) .. ..	0.016	0.023	0.009
pH value .. ..	6.76	7.78	6.77
Lime requirement (tons CaCO <sup>3</sup> p.a.) .. ..	0.88	nil	0.55
Moisture of air-dry soil ..	6.18	5.33	2.22

### Mechanical Analysis.

Coarse sand .. ..	0.24	0.32	1.78
Fine sand .. ..	13.24	19.23	59.92
Silt .. ..	31.00	11.55	15.25
Clay .. ..	41.50	56.87	15.50
Moisture .. ..	6.18	5.33	2.22
Loss by solution (Fe <sup>2</sup> O <sup>3</sup> , etc.) .. ..	2.16	2.08	1.29
Difference (organic matter, etc.) .. ..	5.68	4.62	4.04
Total .. ..	100.00	100.00	100.00

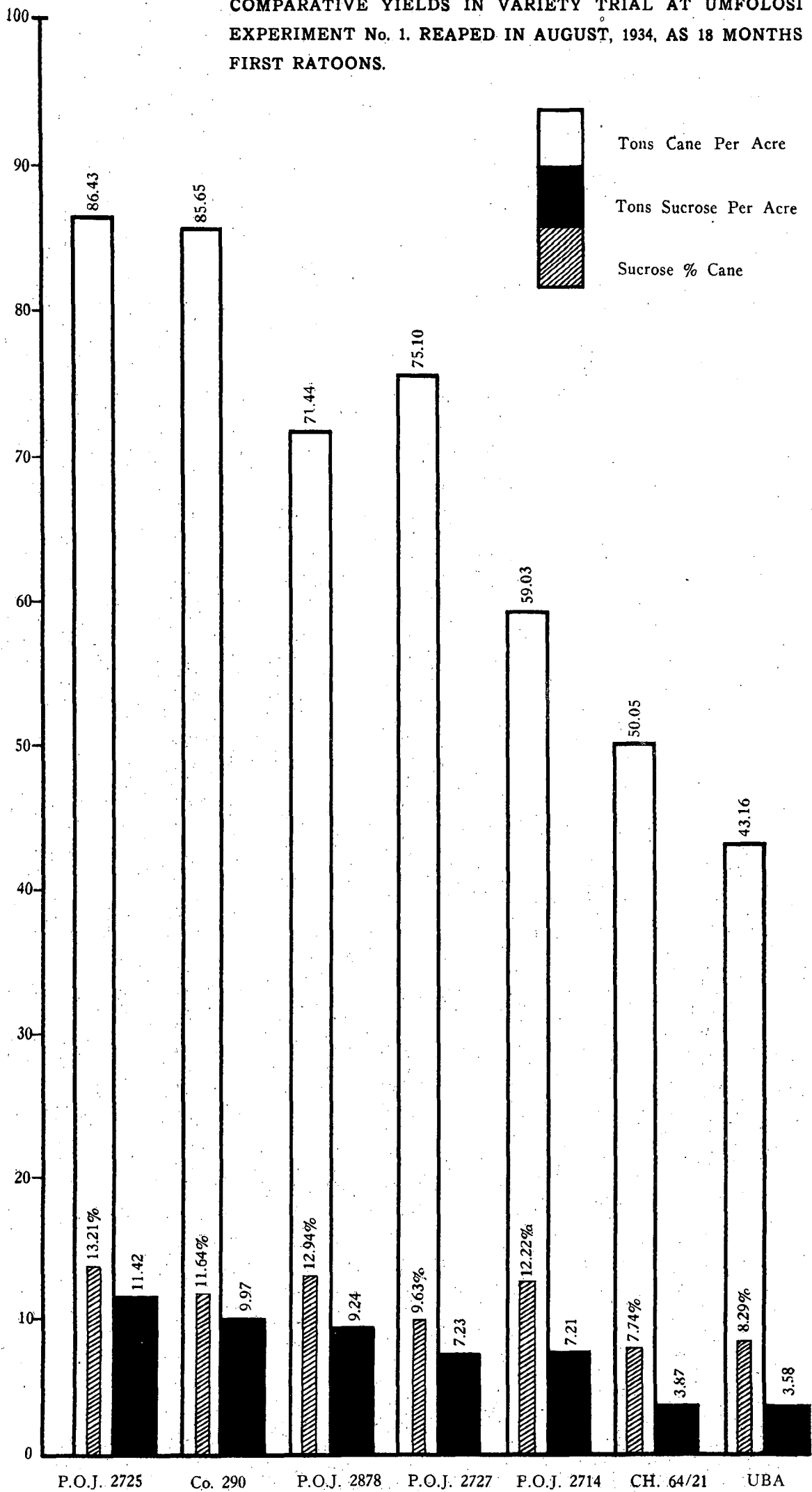
In 1933, Mr. Murphy had a pump erected on the bank of the river and during the dry season of 1933, Experiments Nos. 1, 2, 3, and 4 had several waterings, which probably helped to augment the yields. Since then no further pumping has been done, so that during the last growing season no irrigation was given. It is hoped that it may be possible to carry out some irrigation experiments later on.

## RESULTS OF EXPERIMENTS.

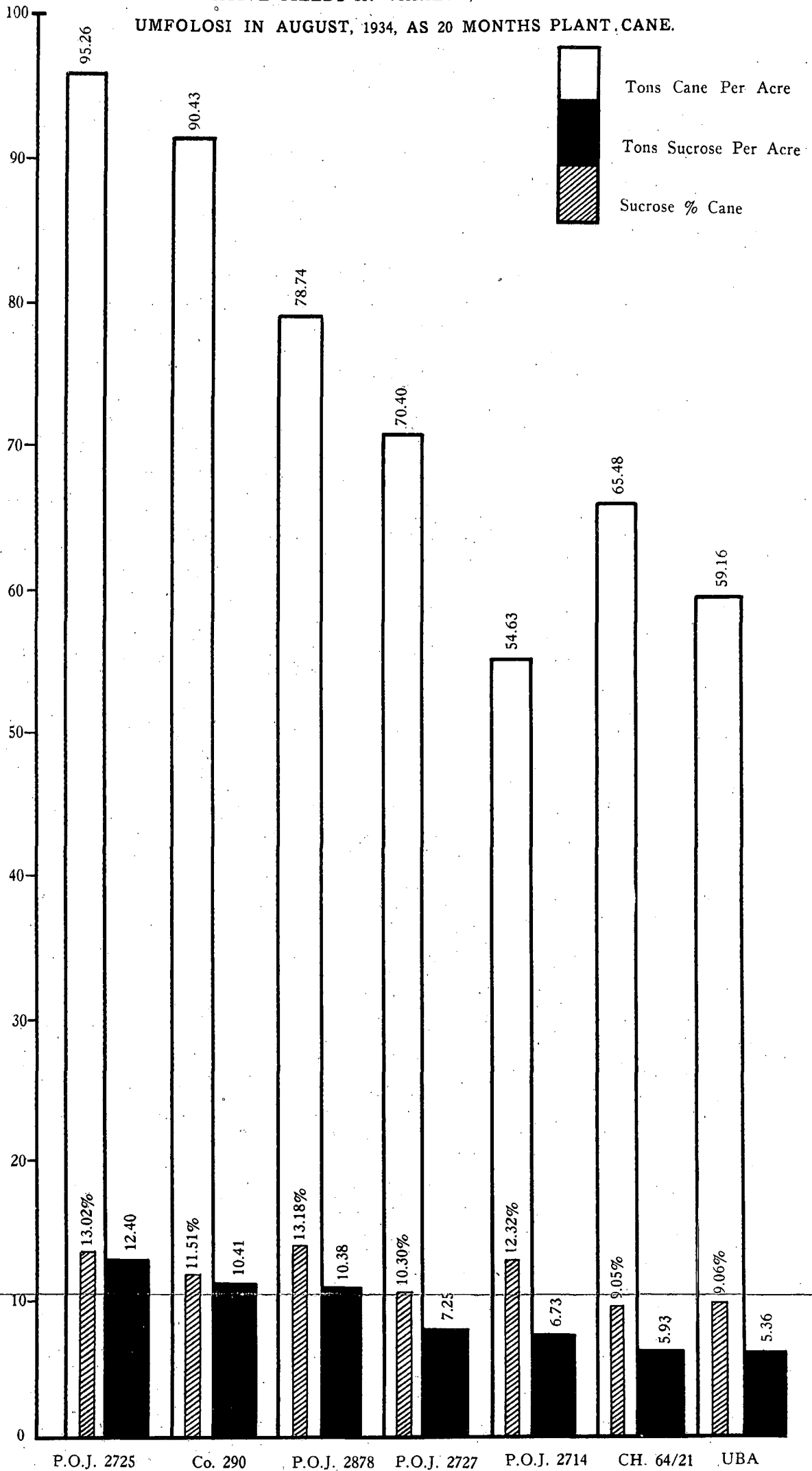
Experiments No. 1 and No. 2 are Variety Trials to test the yields, which can be obtained in this area from the varieties of cane, which have been released for commercial planting. These experiments include all the released varieties except Co.281, which had not been released at the time of planting. Further variety trials planted later include Co.281.

Experiment No. 1 was planted in April, 1932 on a plot of land, which was ready for planting soon after the agreement to start this Sub-Station was concluded. There are four plots of each variety each 1/20th acre in extent. No fertilizer has been applied to this experiment. In February, 1933, when the plant cane was 10 months old, it was cut for planting material, but was considered too immature to be tested, so no weights or tests were taken of this cutting. In August, 1934, when the first ratoon crop was 18 months old, the cane was cut for the mill and the following yields and tests were obtained:—

COMPARATIVE YIELDS IN VARIETY TRIAL AT UMFOLOSI  
 EXPERIMENT No. 1. REAPED IN AUGUST, 1934, AS 18 MONTHS  
 FIRST RATOONS.



COMPARATIVE YIELDS IN VARIETY, TRIAL No. 2. REAPED AT  
UMFOLOSI IN AUGUST, 1934, AS 20 MONTHS PLANT CANE.



**EXPERIMENT No. 1. VARIETY TRIAL—FIRST RATOONS, 18 MONTHS OLD.  
Harvested August, 1934.**

Plot No.	Variety.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Adjusted Purity Bonus.	Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of Uba standard	
4	P.O.J.2725	8,110	81.10	13.34	87.8	—	13.34	10.82	10.28	84.3		
8		8,915	89.15	13.58	87.3	—	13.58	12.11	—	83.6		
20		8,920	89.20	13.46	85.6	—	13.46	12.00	9.95	83.6		
24		8,625	86.25	12.45	84.9	—	12.45	10.74	10.39	84.2		
		<u>Average</u>	<u>86.43</u>	<u>13.21</u>	<u>86.4</u>	<u>—</u>	<u>13.21</u>	<u>11.42</u>	<u>10.21</u>	<u>83.9</u>	<u>319.0</u>	
		Standard deviation : 0.639.			Standard experimental error : 0.319.							
3	Co.290	9,040	90.40	11.56	88.5	—	11.56	10.45	—	81.9		
14		10,130	101.30	11.88	88.8	—	11.88	12.03	11.88	81.9		
17		8,395	83.95	12.01	88.6	—	12.01	10.08	—	81.9		
26		6,695	66.95	10.90	87.9	—	10.90	7.30	—	81.9		
		<u>Average</u>	<u>85.65</u>	<u>11.64</u>	<u>88.4</u>	<u>—</u>	<u>11.64</u>	<u>9.97</u>	<u>11.88</u>	<u>81.6</u>	<u>278.5</u>	
		Standard deviation : 1.705.			Standard experimental error : 0.852.							
22	P.O.J.2878	7,880	78.80	12.61	87.1	—	12.61	9.94	10.90	83.6		
18		6,310	63.10	13.28	89.1	0.02	13.30	8.39	—	83.2		
10		6,755	67.55	12.31	87.5	—	12.31	8.32	—	83.2		
6		7,630	76.30	13.56	88.1	—	13.56	10.34	10.67	82.7		
		<u>Average</u>	<u>71.44</u>	<u>12.93</u>	<u>88.0</u>	<u>—</u>	<u>12.94</u>	<u>9.24</u>	<u>10.78</u>	<u>83.2</u>	<u>258.4</u>	
		Standard deviation : 0.904.			Standard experimental error : 0.452.							
23	P.O.J.2727	7,710	77.10	9.04	79.5	—	9.04	6.97	—	83.6		
19		6,380	63.80	10.28	78.9	—	10.28	6.56	10.26	84.4		
11		7,860	78.60	9.43	81.7	—	9.43	7.41	11.09	81.4		
7		8,090	80.90	9.86	83.7	—	9.86	7.98	11.04	84.4		
		<u>Average</u>	<u>75.10</u>	<u>9.63</u>	<u>81.0</u>	<u>—</u>	<u>9.63</u>	<u>7.23</u>	<u>10.80</u>	<u>83.4</u>	<u>202.0</u>	
		Standard deviation : 0.527.			Standard experimental error : 0.264.							
25	P.O.J.2714	5,875	58.75	12.00	86.2	—	12.00	7.05	—	82.8		
21		5,755	57.55	12.32	86.9	—	12.32	7.09	11.44	83.0		
9		5,380	53.80	11.21	86.0	—	11.21	6.03	10.65	83.7		
5		6,600	66.00	13.15	89.0	—	13.15	8.68	10.00	83.1		
		<u>Average</u>	<u>59.03</u>	<u>12.22</u>	<u>87.0</u>	<u>—</u>	<u>12.22</u>	<u>7.21</u>	<u>10.70</u>	<u>83.2</u>	<u>201.0</u>	
		Standard deviation : 0.948.			Standard experimental error : 0.474.							
2	CH. 64/21	5,185	51.85	7.49	79.2	—	7.49	3.88	11.65	78.6		
13		4,884	48.85	8.40	78.3	—	8.40	4.10	—	80.4		
15		(half plot)	2,670	53.40	8.50	80.3	—	8.50	4.53	11.28	84.5	
27		4,610	46.10	6.46	75.8	—	6.46	2.98	11.74	78.0		
		<u>Average</u>	<u>50.05</u>	<u>7.71</u>	<u>78.4</u>	<u>—</u>	<u>7.74</u>	<u>3.87</u>	<u>11.39</u>	<u>80.4</u>	<u>108.1</u>	
		Standard deviation : 0.566.			Standard experimental error : 0.283.							
1	Uba	4,590	45.90	8.28	83.9	—	8.28	3.80	12.46	78.1		
12		3,915	39.15	9.22	84.9	—	8.22	3.61	13.66	77.5		
16		4,420	44.20	8.41	82.1	—	8.41	3.71	11.80	80.6		
28		4,340	43.40	7.34	78.9	—	7.34	3.19	13.21	79.3		
		<u>Average</u>	<u>43.16</u>	<u>8.31</u>	<u>82.4</u>	<u>—</u>	<u>8.29</u>	<u>3.58</u>	<u>12.78</u>	<u>78.9</u>	<u>100.0</u>	
		Standard deviation : 0.236.			Standard experimental error : 0.118.							

Experiment No. 2 was planted in December, 1932, on land closely adjoining and very similar in appearance to that on which Experiment No. 1 was growing. There are five plots of each variety each 1/10th acre in extent. The following fertilizers were applied in the furrows at the time of planting:

750 lbs. Superphosphate per acre.  
250 lbs. Ammonium sulphate per acre  
50 lbs. Potassium chloride per acre  
In August, 1934, when the plant cane crop was 20 months old, it was cut for the mill and the following yields and tests were obtained:—

### EXPERIMENT No. 2. VARIETY TRIAL—PLANT CANE, 21 MONTHS OLD.

Harvested August, 1934.

Plot No.	Variety.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of Uba standard	
28	P.O.J.2725	17,445	87.23	13.81	84.8	—	13.81	12.05	—	83.6		
21		19,135	95.68	13.48	88.0	—	13.48	12.89	—	83.6		
13		17,700	88.50	13.20	88.2	—	13.20	11.68	11.75	81.4		
9		20,305	101.53	12.56	88.9	—	12.56	12.75	—	83.6		
5		20,675	103.38	12.26	86.7	—	12.26	12.67	10.43	84.6		
	Average		95.26	13.06	87.3	—	13.02	12.40	11.09	84.2	231.34	
		Standard deviation : 0.146.			Standard experimental error : 0.065.							
2	Co.290	16,690	83.45	11.81	88.1	—	11.81	9.86	12.27	82.6		
6		17,275	86.38	12.35	88.3	—	12.35	10.67	11.94	81.6		
19		18,825	94.12	9.77	87.4	—	9.77	9.19	12.25	82.0		
29		19,040	95.20	11.81	89.4	0.08	11.89	11.32	11.98	81.7		
33		18,600	93.00	11.56	90.4	0.28	11.84	11.01	12.22	82.7		
	Average		90.43	11.51	88.7	—	11.51	10.41	12.13	82.1	194.21	
		Standard deviation : 0.781.			Standard experimental error : 0.349.							
34	P.O.J.2878	12,965	64.83	12.35	88.5	—	12.35	8.01	10.73	83.1		
24		15,075	75.38	12.75	86.1	—	12.75	9.61	10.57	84.5		
18		15,900	79.50	14.00	87.2	—	14.00	11.13	11.34	82.7		
20		17,625	88.13	12.63	88.0	—	12.63	11.13	11.39	83.4		
1		17,170	85.85	13.85	89.8	0.16	14.01	12.03	10.85	82.3		
	Average		78.74	13.18	87.9	—	13.18	10.38	10.98	83.2	193.65	
		Standard deviation : 1.420.			Standard experimental error : 0.634.							
8	P.O.J.2727	14,015	70.08	11.19	83.6	—	11.19	7.84	—	83.6		
27		13,335	66.68	9.61	79.9	—	9.61	6.41	—	83.6		
30		14,900	74.95	10.38	83.1	—	10.38	7.78	—	84.7		
15		14,250	71.25	10.54	83.8	—	10.54	7.51	—	83.6		
22		13,805	69.03	9.71	81.1	—	9.71	6.70	—	83.6		
	Average		70.40	10.30	82.3	—	10.30	7.25	—	83.8	135.26	
		Standard deviation : 0.584.			Standard experimental error : 0.261.							
10	P.O.J.2714	13,110	65.55	11.71	88.3	—	11.71	7.68	—	82.8		
32		14,075	70.38	12.89	87.5	—	12.89	9.07	11.94	81.1		
23		9,010	45.05	12.86	82.7	—	12.86	5.79	11.10	82.9		
17		12,975	64.88	11.84	84.5	—	12.84	7.68	10.77	83.1		
7		5,460	27.30	12.59	85.9	—	12.59	3.44	—	82.8		
	Average		54.63	12.32	85.8	—	12.32	6.73	11.27	82.5	125.56	
		Standard deviation : 1.949.			Standard experimental error : 0.870.							

## Experiment No. 2—Continued.

Plot No.	Variety.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of Uba standard
31	CH. 64/21	13,125	65.63	9.78	82.3	—	9.78	6.42	11.86	80.6	
26		12,855	64.28	10.33	82.9	—	10.33	6.64	—	80.4	
16		13,002	65.01	8.21	76.0	—	8.21	5.34	—	80.4	
11		13,615	68.08	.781	79.5	—	7.81	5.32	—	81.9	
4		12,880	64.40	9.18	83.3	—	9.18	5.91	12.27	81.9	
Average			65.48	9.05	80.8	—	9.05	5.93	12.07	81.0	110.63

Standard deviation : 0.542.

Standard experimental error : 0.242.

25	Uba	11,920	59.60	10.03	84.7	—	10.03	5.98	13.16	81.1	
35		10,370	51.85	8.61	81.1	—	8.61	4.46	13.36	78.6	
14		10,585	52.93	9.50	84.8	—	9.50	5.03	13.56	77.8	
12		14,468	72.34	8.14	79.9	—	8.14	5.89	12.29	81.4	
3		11,815	59.07	9.21	82.8	—	9.21	5.44	11.98	78.7	
Average			59.16	9.06	82.6	—	9.06	5.36	12.27	79.5	100.00

Standard deviation : 0.564.

Standard experimental error : 0.252.

Experiment No. 3 was planted in December, 1932, with P.O.J.2714 cane. It occupies an area between Experiment No. 2 and Experiment No. 4. The soil appears very much alike over the whole area, but the yields obtained were best on the side nearest to the river.

This experiment compares the effect of various applications of superphosphate along with a uni-

form dressing of ammonium sulphate and potassium chloride, with no fertilizer, and with ammonium sulphate and potassium chloride without any superphosphate. There are six plots of each treatment each 1/10th acre in extent. All fertilizers were applied in the furrows at time of planting. In August, 1934, when the plant cane crop was 20 months old it was cut for the mill and the following yields and tests were obtained:—

## EXPERIMENT No. 3. PHOSPHATE TRIAL WITH P.O.J.2714.

Harvested August, 1934.

Plot No.	Treatment.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of Controls.
27/2	150lbs. Amm. Sulph.	12,240	61.20	12.00	86.2	—	12.00	7.34	12.08	82.8	
33/2	75lbs. KCl.	15,740	78.70	11.29	86.4	—	11.29	8.89	10.48	82.0	
17/2		11,845	59.22	13.11	88.6	—	13.11	7.76	11.04	81.3	
24/2		14,760	73.80	12.33	88.5	—	12.33	9.10	11.31	82.8	
6/2		11,195	55.98	12.46	85.9	—	12.46	6.98	10.40	83.7	
9/2		14,145	70.72	11.63	84.5	—	11.63	8.22	9.70	84.3	
Average			66.60	—	86.6	—	12.08	8.05	10.83	82.8	116.33

Standard deviation : 0.77.

Standard experimental error : 0.314.

29/4	600lbs. Super.	14,110	70.55	12.32	87.4	—	12.43	8.77	11.06	82.7	
35/4	150lbs. Amm. Sulph.	13,815	69.08	12.35	89.3	0.06	12.41	8.57	—	82.2	
19/4	75lbs. KCl.	12,080	60.40	11.78	86.3	—	11.78	7.12	—	82.2	
22/4		15,315	76.58	11.57	83.7	—	11.57	8.86	—	82.2	
2/4		7,805	39.03	12.52	88.4	—	12.52	4.89	10.87	81.8	
12/4		15,130	75.65	11.22	88.2	—	11.22	8.49	—	82.4	
Average			65.21	—	87.2	—	11.93	7.78	10.96	82.3	112.43

Standard deviation : 1.418.

Standard experimental error : 0.579.

## Experiment No. 3—Continued.

Plot No.	Treatment.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of controls
30/5	900lbs. Super . . . .	13,575	67.88	12.29	85.7	—	12.29	8.34	11.81	82.9	
32/5	150lbs. Amm. Sulph.	14,130	70.65	12.44	87.3	—	12.44	8.79	10.67	83.7	
13/5	75lbs. KCl.	4,715	23.58	11.80	84.5	—	11.80	2.78	12.26	82.6	
23/5		15,185	75.92	11.54	86.2	—	11.54	8.76	10.78	83.4	
5/5		12,145	60.72	13.09	87.8	—	13.09	7.95	—	82.2	
8/5		12,950	64.75	11.42	86.6	—	11.42	7.39	—	82.4	
	Average	60.58	—	86.4	—	—	12.11	7.34	11.38	82.9	106.07

Standard deviation : 2.093.

Standard experimental error : 0.855.

25/3	300lbs. Super. . . . .	10,845	54.22	12.59	86.8	—	12.59	6.83	—	82.8	
15/3	150lbs. Amm. Sulph.	7,910	39.55	13.00	87.7	—	13.00	5.14	11.75	81.9	
21/3	75lbs. KCl.	15,180	75.90	11.85	87.7	—	11.85	8.99	—	82.2	
4/3		10,775	53.86	12.00	84.3	—	12.00	6.46	—	82.2	
11/3		14,171	70.85	11.00	85.8	—	11.00	7.79	10.42	82.5	
31/3		12,660	63.80	12.44	88.1	—	12.44	7.94	11.01	83.4	
	Average	59.70	—	86.7	—	—	12.05	7.19	11.06	82.5	103.90

Standard deviation : 1.225.

Standard experimental error : 0.500.

26/6	1200lbs. Super. . . . .	12,220	61.10	11.38	84.1	—	11.38	6.95	—	82.8	
34/6	150lbs. Amm. Sulph.	15,815	79.08	10.97	83.9	—	10.97	8.68	—	82.2	
16/6	75lbs. KCl.	8,620	43.10	12.42	86.2	—	12.42	5.35	—	82.2	
20/6		13,910	69.55	12.19	85.0	—	12.19	8.48	—	82.2	
1/6		8,313	41.56	12.94	88.3	—	12.94	5.38	10.77	82.6	
7/6		11,890	59.45	11.67	86.9	—	11.67	6.94	11.12	80.4	
	Average	58.97	—	85.7	—	—	11.81	6.96	10.94	82.1	100.59

Standard deviation : 1.314.

Standard experimental error : 0.537.

8/1	Controls — no fer-	13,130	66.65	12.96	85.8	—	12.96	8.51	—	82.4	
36/1	tiliser	15,150	75.75	11.69	86.7	—	11.69	8.86	—	82.2	
14/1		7,275	36.38	12.12	87.5	—	12.12	4.41	12.23	80.5	
18/1		13,135	65.68	12.33	88.9	—	12.33	8.10	—	82.2	
3/1		9,140	45.70	11.49	88.5	—	11.49	8.25	10.91	81.8	
10/1		11,380	56.90	11.26	85.2	—	11.26	6.41	10.79	82.4	
	Average	57.68	—	87.1	—	—	12.00	6.92	11.31	81.9	100.00

Standard deviation : 1.685.

Standard experimental error : 0.668.

Experiment No. 4 was planted in December, 1932, with P.O.J.2725 cane. This experiment compares the effect of various applications of nitrogenous fertilizer along with a uniform dressing of superphosphate and potassium chloride with the same dressing of super and potassium chloride without any nitrogenous fertilizer, with super alone and with no fertilizer.

There are six plots of each treatment, each 1/10th acre in extent. All fertilizers were applied in the furrows at the time of planting except the nitrate of soda which was applied as a top dressing after the cane was about a foot high. In August, 1934, when the plant cane crop was 20 months old it was cut for the mill and the following yields and tests were obtained:—

**EXPERIMENT No. 4. NITROGEN TRIAL WITH P.O.J.2725.**  
**Harvested August, 1934.**

Plot No.	Treatment.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of Controls
66/2	600lbs. Super ..	16,130	80.65	11.50	87.3	—	11.50	9.27	—	85.4	
72/2		21,800	109.00	11.70	88.9	—	11.70	12.75	—	79.3	
53/2		18,875	94.38	12.60	89.7	0.14	12.74	12.02	11.90	83.1	
58/2		23,655	118.28	12.70	88.2	—	12.70	15.02	11.30	81.8	
38/2		17,875	89.38	13.40	90.3	0.26	13.66	12.21	12.07	83.1	
43/2		21,060	105.30	12.76	93.6	0.66	13.42	14.13	11.37	83.9	
	Average	99.50	—	89.7	—	—	12.63	12.57	11.78	82.8	103.37

Standard deviation : 1.82.

Standard experimental error : 0.743.

62/4	600lbs. Super ..	18,145	90.73	11.30	85.4	—	11.30	10.25	—	85.4	
49/4	150lbs. Amm. Sulph.	17,555	87.78	12.10	86.5	—	12.10	10.62	—	83.3	
55/4	75lbs. KCl.	19,090	95.45	12.00	88.5	—	12.00	11.45	10.98	84.2	
60/4		23,500	117.50	12.30	86.0	—	12.30	14.45	—	81.6	
40/4		19,960	99.80	12.80	90.4	0.28	13.08	13.05	—	83.0	
44/4		21,745	108.73	13.80	87.2	—	13.80	15.00	—	85.6	
	Average	100.00	—	87.3	—	—	12.47	12.47	10.98	83.8	102.55

Standard deviation : 1.85.

Standard experimental error : 0.755.

63/1	Controls ..	17,870	89.35	12.50	88.7	—	12.50	11.17	9.85	85.4	
67/1		20,740	103.70	11.96	85.4	—	11.96	12.40	—	85.4	
71/1		21,475	107.38	11.10	87.5	—	11.10	11.91	—	79.3	
52/1		18,185	90.93	12.60	87.8	—	12.60	11.46	—	83.3	
42/1		20,315	101.58	11.56	86.5	—	11.56	11.74	—	83.0	
45/1		21,855	109.28	12.68	91.0	0.40	13.08	14.29	10.97	83.9	
	Average	100.37	—	87.8	—	—	12.12	12.16	10.41	83.4	100.00

Standard deviation : 1.025.

Standard experimental error : 0.419.

64/3	600lbs. Super ..	16,925	84.63	12.30	86.8	—	12.30	10.41	—	85.4	
70/3	75lbs. KCl. ..	21,815	109.08	11.90	90.2	0.24	12.14	13.23	—	79.3	
51/3		18,495	92.48	12.80	88.7	—	12.80	11.84	—	83.3	
54/3		19,770	98.85	11.10	85.4	—	11.10	10.97	11.90	83.8	
46/3		23,510	117.55	11.98	88.1	—	11.98	14.08	—	83.4	
47/3		22,480	112.40	11.11	81.9	—	11.11	12.49	—	82.7	
	Average	102.50	—	86.8	—	—	11.87	12.16	11.90	83.0	100.00

Standard deviation : 1.260.

Standard experimental error : 0.514.

65/6	600lbs. Super ..	18,785	93.93	12.70	89.0	—	12.70	11.93	—	85.0	
68/6	75lbs. KCl. ..	18,500	92.50	10.00	85.1	—	10.00	9.25	—	79.3	
57/6	120lbs. Amm. Sulph.	19,880	99.40	12.80	88.1	—	12.80	12.72	—	81.6	
59/6		22,330	111.65	12.00	87.5	—	12.00	13.40	11.20	82.6	
37/6		16,125	80.63	12.80	87.9	—	12.80	10.32	11.90	80.4	
48/6		22,890	114.45	12.04	85.5	—	12.04	13.78	9.02	83.9	
	Average	98.76	—	87.2	—	—	12.05	11.90	11.06	82.2	97.94

Standard deviation : 1.632.

Standard experimental error : 0.666.



**Experiment No. 4—Continued.**

Plot No.	Treatment.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio	Per cent. of Controls
61/5	600lbs. Super ..	16,335	81.68	12.30	88.8	—	12.30	10.05	—	85.4	
69/5	75lbs. KCl. ..	18,585	92.93	12.10	89.5	0.10	12.20	11.34	—	79.3	
50/5	300lbs. Amm. Sulph.	17,205	86.02	12.80	88.0	—	12.80	11.01	—	83.3	
56/5		20,290	101.45	12.50	94.6	0.76	13.26	13.45	10.70	84.2	
39/5		19,800	99.00	12.90	89.0	—	12.90	12.77	11.98	83.1	
41/5		20,045	100.23	12.20	87.5	—	12.20	12.23	—	83.0	
Average		93.55	—	89.6	—	—	12.62	11.81	11.34	83.1	97.12

Standard deviation : 1.136.

Standard experimental error : 0.463.

Experiment No. 5 was planted in February, 1933, with Co.290 cane. It occupies an area over 300 yards distant from Experiments 1-4, where the ground level is somewhat lower and where the soil has changed to a very dark grey colour.

This experiment compares the new concentrated fertilizers applied in the furrows at time of planting with a mixture of super, ammonium sulphate and potassium chloride containing an equal amount of phosphorus, potash and nitrogen applied, (a) all in the furrows, (b) super and potassium chloride in the furrows and ammonium sulphate as a top dressing, (c) super in the furrows and ammonium

sulphate and potassium chloride as a top dressing, and with no fertilizer. There are six plots of each treatment each 1/16th acre in extent.

In August, 1934, when the plant cane crop was 18 months old it was cut for the mill and the following yields and tests were obtained. It will be noticed that only five plots of each treatment are included. The cane from this experiment proved difficult to secure firmly on the trucks and some of the returns from the mill were obviously short weight and could not be included. The yields given are probably lower than they ought to be because of cane being lost on the way to the mill.

**EXPERIMENT No. 5. FERTILISER EXPERIMENT WITH Co.290 CANE.**

Harvested August, 1934.

Plot No.	Treatment.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of standard
41	520lbs. Super ..	6,300	50.40	12.99	87.22	—	12.99	6.55	—	85.2	
30	80lbs. KCl. ..	6,080	48.64	12.53	87.72	—	12.53	6.09	—	—	
27	120lbs. Amm. Sulph...	4,005	32.04	13.40	87.58	—	13.40	4.29	—	—	
36		6,185	49.48	13.47	87.82	—	13.47	6.66	—	—	
15		5,270	42.16	13.41	89.16	0.04	13.45	5.67	—	—	
22		—	—	—	—	—	—	—	—	—	
Average		44.54	—	87.88	—	—	13.14	5.85	—	85.2	102.45
Standard deviation : 0.857.											
Standard experimental error : 0.383.											
32	Controls ..	5,195	41.56	12.73	87.23	—	12.73	5.29	—	85.2	
39		—	—	—	—	—	—	—	—	—	
24		6,590	52.72	13.17	88.73	—	13.17	6.94	—	—	
33		6,620	52.96	13.55	88.08	—	13.55	7.18	—	—	
16		5,020	40.16	13.41	89.03	—	13.41	5.38	—	—	
18		3,450	27.60	13.55	88.27	—	13.55	3.74	—	—	
Average		43.00	—	88.87	—	—	13.27	5.71	—	85.2	100.00
Standard deviation : 1.252.											
Standard experimental error : 0.5599.											
31	520lbs. Super ..	—	—	—	—	—	—	—	—	85.2	
38	80lbs. KCl. ..	3,935	31.48	14.01	88.44	—	14.01	4.41	—	—	
23	120lbs. Amm. Sulph...	6,270	50.16	12.93	88.14	—	12.93	6.49	—	—	
35		6,240	49.92	13.65	87.96	—	13.65	6.81	—	—	
17		4,460	35.68	14.03	88.84	—	14.03	5.01	—	—	
20		5,090	40.72	13.31	90.00	0.20	13.51	5.50	—	—	
Average		41.59	—	88.67	—	—	13.57	5.64	—	85.2	98.77
Standard deviation : 0.895.											
Standard experimental error : 0.400.											

## Experiment No. 5—Continued.

Plot No.	Treatment.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Per cent. of standard
42	520lbs. Super	—	—	—	—	—	—	—	—	—	—
29	80lbs. KCl.	4,345	34.76	13.15	89.45	0.10	13.25	4.61	—	Av.85.2	—
25	120lbs. Amm. Sulph.	5,445	43.56	13.05	88.35	—	13.05	5.68	—	—	—
34		6,520	52.16	13.64	89.19	0.04	13.68	7.14	—	—	—
14		4,585	36.68	13.31	88.71	—	13.31	4.88	—	Av.85.8	—
19		3,805	30.44	14.08	88.85	—	14.08	4.29	—	—	—
Average		39.52	—	—	88.91	—	13.46	5.32	—	85.5	93.17

Standard deviation : 1.02.

Standard experimental error : 0.456.

40	400lbs. C.C.F.7	5,475	43.80	13.88	87.60	—	13.88	6.08	10.39	Av.85.2	—
37		4,155	32.24	13.69	89.08	0.02	13.71	4.56	—	—	—
26		4,545	35.36	13.05	87.62	—	13.05	4.61	—	—	—
28		3,455	27.64	13.11	86.40	—	13.11	3.62	—	—	—
13		4,900	39.20	13.29	87.86	—	13.29	5.21	10.96	85.8	—
21		—	—	—	—	—	—	—	—	—	—
Average		35.85	—	—	87.71	—	13.43	4.82	10.68	85.4	84.41

Standard deviation : 0.811.

Standard experimental error : 0.3627.

Experiment No. 6 was planted in February, 1933. It adjoins Experiment No. 5 and is also on very dark-coloured soil in a rather low-lying situation.

This experiment compares planting in lines 4ft., 5ft., 6ft., and 7ft. apart with P.O.J.2878 and P.O.J.2725 canes.

The plots are six lines 9ft. long so that each spacing of the lines gives a different plot area.

In Table 6 the yields are given per acre. One comparison of each spacing of P.O.J.2878 was badly damaged by wild pigs and the results could not be included. Another plot of the 7ft. spacing met with an accident and also had to be omitted. This cane was also cut in August, 1934, when it was 18 months old.

## EXPERIMENT No. 6. SPACING OF LINES—P.O.J.2878 and P.O.J. 2725.

Harvested August, 1934.

## P.O.J.2878.

Plot No.	Spacing.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Standard Dev.	Standard Exp. Error.
9/4	4 feet	5,865	56.85	14.33	87.8	—	14.33	8.40	9.20	86.40	—	—
8/4		5,960	59.60	13.46	86.6	—	13.46	8.02	—	—	—	—
11/4		5,790	67.90	15.63	90.5	0.30	15.93	9.22	—	86.40	—	—
6/4		5,740	57.40	13.66	86.0	—	13.66	7.84	—	—	—	—
3/4		5,555	55.55	12.98	86.3	—	12.98	7.21	10.10	85.60	—	—
Average		57.82	—	—	87.4	—	14.07	8.14	9.65	86.13	0.644	0.297
9/5	5 feet	—	—	—	—	—	—	—	—	—	—	—
8/5		6,725	53.80	14.69	89.7	0.14	14.83	7.98	—	—	—	—
11/5		6,685	53.48	13.47	87.3	—	13.47	7.20	—	86.40	—	—
6/5		6,370	50.96	15.19	89.7	0.14	15.33	7.81	—	—	—	—
3/5		5,845	46.76	13.24	85.6	—	13.24	6.19	—	—	—	—
Average		50.90	—	—	87.6	—	14.33	7.29	—	86.40	0.701	0.350
9/6	6 feet	8,320	55.46	14.92	90.7	0.34	15.26	8.46	—	—	—	—
8/6		8,035	53.57	12.67	86.0	—	12.67	6.78	—	—	—	—
11/6		8,400	56.00	13.10	87.1	—	13.10	7.34	—	86.40	—	—
6/6		6,600	44.00	15.95	91.6	0.46	16.41	7.22	—	—	—	—
3/6		6,150	41.00	14.51	88.7	—	14.51	5.95	—	—	—	—
Average		50.01	—	—	88.8	—	14.30	7.15	—	86.40	0.817	0.365

## Experiment No. 6—Continued.

Plot No.	Spacing.	Lbs. per plot.	Tons Cane per acre.	Sucrose per cent. Cane.	Purity.	Purity Bonus.	Adjusted Sucrose per cent. Cane.	Tons Sucrose per acre.	Fibre.	Java ratio.	Standard Dev.	Standard Exp. Error.
9/7	7 feet	8,785	50.20	15.01	90.1	0.22	15.23	7.65	—	—		
8/7		8,555	48.89	15.16	89.1	0.02	15.18	7.42	—	86.40		
11/7		9,655	55.17	14.51	89.7	0.14	14.65	8.08	—	—		
3/7		7,095	40.54	15.28	90.6	0.32	15.60	6.32	—	—		
Average			48.70	—	89.9	—	15.13	7.37	—	86.40	0.6496	0.325
<b>P.O.J.2725.</b>												
4/4	4 feet	6,350	63.50	14.35	90.1	0.22	14.57	9.25	8.65	85.30		
7/4		6,525	65.25	12.81	86.3	—	12.81	8.36	—	84.79		
2/4		5,900	59.00	12.63	86.7	—	12.63	7.45	—	—		
12/4		6,130	61.30	14.02	88.7	—	14.02	8.59	—	—		
10/4		5,175	51.75	14.67	90.8	0.36	15.03	7.78	—	—		
5/4		6,625	66.25	14.35	90.1	0.22	14.57	9.65	9.20	82.18		
Average			61.18	—	88.8	—	13.92	8.52	8.90	84.06	0.841	0.343
4/5	5 feet	8,155	65.24	14.07	89.0	—	14.07	9.18	—	84.79		
7/5		8,240	65.92	14.45	90.1	0.22	14.67	9.67	—	84.79		
5/5		7,570	60.56	14.57	90.0	0.20	14.77	8.94	—	—		
2/5		7,350	58.80	13.24	87.3	—	13.24	7.79	8.62	86.89		
12/5		7,320	58.56	14.63	90.5	0.30	14.93	8.74	—	84.79		
10/5		7,060	56.48	15.00	91.7	0.44	15.44	8.72	—	—		
Average			60.93	—	89.9	—	14.51	8.84	8.62	85.32	0.569	0.232
4/6	6 feet	9,885	65.90	14.07	89.6	0.12	14.19	9.35	—	84.79		
7/6		10,240	68.26	12.74	86.3	—	12.74	8.70	—	—		
5/6		8,755	58.36	13.77	87.4	—	13.77	8.04	—	—		
2/6		6,835	45.57	14.07	88.7	—	14.07	6.41	—	—		
12/6		8,640	57.60	14.63	90.0	0.20	14.83	8.54	—	—		
10/6		7,185	47.90	15.52	91.5	0.45	15.97	7.65	—	—		
Average			57.27	—	88.9	—	14.17	8.11	—	84.79	0.929	0.379
4/7	7 feet	10,305	58.89	14.90	89.9	0.18	15.08	8.88	—	84.79		
7/7		10,470	59.83	14.47	90.3	0.26	15.73	9.41	—	—		
5/7		9,660	55.20	15.02	90.0	0.20	15.22	8.40	—	—		
2/7		6,945	39.69	14.21	88.4	—	14.21	5.64	—	—		
12/7		8,850	50.57	15.40	90.0	0.20	15.60	7.89	—	—		
10/7		7,385	42.20	14.20	90.9	0.38	14.58	6.15	—	—		
Average			51.06	—	89.9	—	15.13	7.73	—	84.79	1.383	0.565

In August, 1934, when these canes were harvested, the cane was still rather immature owing to the late rains in the autumn of 1934. Had it been possible to delay reaping the sucrose per cent cane would undoubtedly have been higher all round. In this connection it should be noted that the cane from some of the plots of CH.64/21 and Uba was below the rejection point fixed by the Fahey Scale for mill cane, whilst all the other varieties were well above it. This means that the P.O.J. varieties and Co.290 can be counted upon to provide cane fit for milling earlier in the season than Uba, which

is very useful in a district such as Umfolozi, where the late maturing of Uba cane has frequently delayed the starting of the mill, when it was otherwise desirable to start crushing.

When reaping these experiments the cane was loaded on trucks and sent to the mill to be weighed there. This entailed a haul of over eight miles on the tramline during which certain losses must have taken place. As it is quite impossible to estimate these losses no allowance has been made for them, but undoubtedly they affected adversely the yields shown in the above tables to some extent.

## CONCLUSIONS.

1.—The variety trials show the superiority of P.O.J.2725, Co.290 and P.O.J.2878 in that order over the other released varieties. In the spacing experiment No. 6, the superiority of P.O.J.2725 over P.O.J.2878 is again shown. It is unfortunate that it was not possible to include Co.281 in these experiments, but experiments in which this variety is included with the others are due to be reaped during the coming season.

2.—The fertilizer trials do not show any significant return from any form of fertilizer over that obtained from the unfertilized plots either in the weight of cane reaped or in sucrose per cent cane. The experimental error due to variations in yield between different plots treated identically, however, is so great that any small response to fertilizer treatment might not be apparent.

3.—The spacing experiment seems to indicate that so far as the plant cane crop is concerned the closer the lines are spaced the heavier the yield of cane is. On the other hand the wider spacings gave a somewhat higher sucrose per cent cane though not enough to make up for the lower cane yields.

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