

# A FIELD TRIAL OF SUGAR CANE VARIETIES—SERIES E.

By H. H. DODDS and P. FOWLIE.

The varieties selected for this experiment were twelve in number, including the Uba control, and had shown promise in preliminary trials at this experiment station. All are well known varieties that need no introduction, excepting La Mercy Red and La Mercy Yellow. These are local names given to two varieties growing a few years ago on the estate of D. de Chazal at La Mercy, Natal. They are believed to have come originally from Mauritius, but their names, and the circumstances of their introduction have long been lost. It has been suggested that the yellow one is a variety from Mauritius known as Iscambine, that was formerly grown to some extent in Natal.

The soil in which the experiment was planted is a clay loam of varying thickness overlying a very stiff impervious clay. In most parts of the field a shallow strata of gravel is to be found between the surface soil and the underlying clay. The soil has been greatly modified by material washed down from the adjacent hillside which is a doleritic intrusion, very characteristic of this part of the country. The surface soil is consequently somewhat variable in texture as well as in depth, in some parts having a considerable admixture of sand, but on the whole is most accurately described as a clay loam.

It was last analysed about eight years ago when it was shown to be well provided with nitrogen, 0.13%, and potash 0.17%  $K_2O$  (0.011% soluble in 1% citric acid) and organic matter (6.57% loss on ignition). The total phosphate was 0.04%  $P_2O_5$  of which 0.006% was soluble in one per cent. citric acid; the pH was at that time 5.5. A further analysis is in process but not yet completed.

Average dimensions were recorded for some of the varieties as cut and topped ready for milling and are as follow:—

Variety.	Tons of 2,000 lbs. of cane per acre.	Mean length of stick.	Mean thickness.	Mean weight of stick.	Mean length of internodes.	No. of canes per acre.
Co. 290 .. .. .	37.67	81 ins.	2.47 cm.	2.05 lbs.	2.50 ins.	36,750
P.O.J. 2725 .. ..	32.66	76 ins.	2.96 cm.	2.70 lbs.	2.30 ins.	24,190
P.O.J. 2727 .. ..	26.96	72 ins.	2.60 cm.	2.70 lbs.	2.30 ins.	19,970
P.O.J. 2878 .. ..	25.41	67 ins.	3.00 cm.	2.30 lbs.	2.70 ins.	22,100
P.O.J. 2714 .. ..	25.10	68 ins.	3.46 cm.	3.40 lbs.	2.25 ins.	14,760

The chemical analyses are of laboratory power mill samples, each plot being sampled and analysed separately to give the average results tabled.

The Co. 281 was sampled and analysed at the

The field appears to have been continuously under cane for very many years until 1929 when it was ploughed out of cane, and carried a crop of soya beans and velvet beans, manured with 400-lbs. per acre of Egyptian rock phosphate. It was again ploughed in August, 1930, harrowed and furrowed for planting, and planted with cane on September 9th and 10th, 1930.

The canes were all planted as a single continuous line in the furrows, 5 feet apart. The plots are of 1/20th acre each, consisting of 4 cane rows 109 feet long. There are five replications of each of the 12 varieties, arranged on a Latin square plan.

Germination was very good, very few blanks having to be filled in. The fertilizer applied consisted of 480-lbs. of superphosphate (17%  $P_2O_5$ ), 120-lbs. of ammonium sulphate, and 60-lbs. of potassium chloride per acre, all placed in the row at time of planting.

The weather at time of planting and for a few days afterwards was rainy, but then three months of deficient rainfall (total 7.26ins.) supervened, after which there were heavy rains at the end of December and throughout January.

The cane was harvested early in September, 1932, except for the Co. 281 which was allowed to stand over for some weeks longer for replanting. The total rainfall was 68.2ins. except for the Co. 281 which had a further 6.0ins. after the other varieties were harvested, but which would have relatively little effect on an already mature cane.

The harvesting results are shown in the table on page 2.

same time though not actually harvested until later as stated above; consequently the results cannot be considered as very comparable with the rest.

Bearing that important qualification in mind,

Co. 281 shows to most advantage, but taking the experimental error into account there is no significant difference between any of the four leading varieties, Co. 281, P. O. J. 2725, Co. 213 and Co. 290, and all are clearly superior to Uba under the conditions of the experiment. The P.O.J. 2725 is lower in cane yield than the rest, but as usual leads in sugar content.

CH. 64/21 and P.O.J. 2727 may be considered to be equal to Uba for practical purposes under the conditions of this experiment, while the rest appear to be definitely inferior to Uba under these conditions.

The Co. 213 gave rather unexpectedly good results, having regard to its much poorer record in Series C experiment harvested last year, which was in a somewhat similar soil, though rather more severe conditions. A grave disadvantage in Co. 213 for our conditions is its relative susceptibility to mosaic disease which would in any case postpone its release for some years.

The Co. 290 appeared to be somewhat over mature at time of harvesting and would probably have shown to better advantage if cut a little earlier; the same may be said to some extent of the CH. 64/21.

The moisture supply and soil conditions are too poor for such varieties as P.O.J. 2878 and 2714.

Hind's Special gives an unusually high sucrose return for this variety, but cane yields are disappointing compared with those of earlier tests under more favourable conditions.

The results from the two La Mercy varieties serve to confirm the impression that none of the variety canes imported into this country before the last eight years are sufficiently hardy for many of our conditions.

The field was carefully inspected at intervals for mosaic and streak diseases. No case of mosaic disease was recorded, except for one instance in La Mercy Yellow when the cane was 6 months old, and streak disease was confined to a few cases in the susceptible varieties Uba and CH. 64/21.

In soils better supplied with moisture and of better natural drainage than that of this experiment, the indications are that the superiority of the varieties Co. 290, P.O.J. 2725 and Co. 281 over Uba is considerably greater than in this case. Under such conditions, P.O.J. 2878 and P.O.J. 2727 also come into the picture, giving much greater yields of cane of higher sugar content and purity and lower fibre than Uba.

Thus a parallel series of the same twelve varieties (except for the substitution of Co. 210 for Hind's Special) but in a well drained swamp soil showed the three varieties Co. 290, P.O.J. 2725 and Co. 281

to be outstanding in the order named, yielding from 75 to 90 per cent. more sugar per acre than Uba. P.O.J. 2878 took fourth place with 40 per cent. and Co. 213 fifth with 35 per cent. more sugar per acre than Uba, which gave 26.25 tons of cane per acre of 14.47% pol or 3.80 tons pol per acre, or less than that from the far inferior soil of series E quoted above.

The area of swamp soil was very limited, so that it was possible to plant no more than duplicate blocks of 1/20th acre of each variety. Consequently the results have little statistical significance, and are not quoted in detail but are mentioned in support of the general impression that varieties such as those quoted above are capable of showing even better results in comparison with Uba in better soils.

This opinion is now being subjected to experimental trial in properly replicated series in good soils at Umfolozi, Umhlatuzi, and Umzinto.

### Summary and Conclusion.

A variety trial is described (Series E of this experiment station) in which 11 selected varieties are compared with Uba in a shallow clay loam overlying a stiff impervious clay.

Co. 281, P.O.J. 2725, Co. 213, and Co. 290 each yielded from 25 to 32 per cent. more sugar per acre than the Uba controls; CH. 64/21 and P.O.J. 2727 were approximately equal to Uba under the conditions of the experiment, while P.O.J. 2878, P.O.J. 2714 and Hind's Special were slightly, and La Mercy Red and La Mercy Yellow considerably, inferior to Uba.

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CHAIRMAN: These continuation papers on field trials from the Experiment Station are very interesting, and while not affording large ground for discussion must be of particular interest to Planters in comparing the various trials that have been carried out by the Experiment Station in various sections of the country.

Mr. O. J. ASKEW: I should like to thank Mr. Dodds for his very lucid paper. I think we should study the harvesting results at the back and then we shall know what to plant.

Mr. H. E. H. PALAIRET: It is generally the same with Mr. Dodds' papers. There is nothing further to discuss, it is all there! There is only one thing about the fibre of Co. 290, I think it is worth a bob extra! (Laughter).

Mr. BECHARD: But on the point of reducing sugar I think it is worth a bob less!

Mr. WATSON; I would like to say that Mr. Bechard just took the words out of my mouth. I had just drawn the President's attention to the reducing sugar ratio.

Mr. DODDS: The only thing that occurs to me to say on that at the moment, is that I seem to recollect in our discussion on the Clarification and Filtration Report yesterday that the Clarification Committee seemed to think that a high reducing sugar content was rather of benefit seeing that it led to a low purity of molasses (laughter). It is certainly difficult to account for these differences in secondary constituents such as reducing sugar ratio and phosphate content. But we are accumulating a lot of statistical data regarding these canes and we hope to be able to produce some conclu-

sions out of them eventually. For the present I am not prepared to say very much about the implications of the variations in such matters as the reducing sugar ratio and phosphate content.

CHAIRMAN: A very interesting point was raised about the reducing sugar ratio. This was pointed out yesterday; very high reducing sugar ratio was found in tropical countries between 8 and 9 as compared with 3 in Natal, leading to a low final molasses. These figures have very wide ranges. You will note that Uba has 3.15 which is perfectly normal, and P.O.J. 2725 has only 1.9. What the effect of these factors will be in the factory is at present a matter of conjecture.

If there is no further discussion we will accord the usual vote of thanks. (Applause).

## HARVESTING RESULTS.

VARIETIES	Co. 281.	P.O.J. 2725.	Co. 213.	Co. 290.	CH. 64/21.	Uba.	P.O.J. 2727.	P.O.J. 2878.	P.O.J. 2714.	Hind's Special.	La Mercy Red.	La Mercy Yellow.
Tons (2,000 lbs.) of cane per acre	35.70	32.66	39.08	37.67	30.82	30.12	26.96	25.41	25.10	28.48	26.21	24.68
Increase or decrease tons cane per acre	+ 5.80	+ 2.54	+ 8.96	+ 7.55	+ 0.70	—	— 3.16	— 4.71	— 5.02	— 1.64	— 3.91	— 5.44
Per cent. increase or decrease tons cane per acre..	+19.256	+ 8.433	+29.748	+25.066	+ 2.324	—	—10.491	—15.637	—16.667	— 5.445	—12.981	—18.061
Tons (2,000 lbs.) pol (sucrose) per acre	5.726	5.618	5.666	5.617	4.719	4.503	4.228	4.081	3.998	4.033	3.748	3.579
Tons sucrose bonus for high purity according to Fahey scale ..	0.218	0.182	0.133	0.052	0.061	Nil	0.064	0.091	0.096	Nil	0.113	0.106
Tons sucrose per acre, including bonus	5.944	5.800	5.799	5.669	4.780	4.503	4.292	4.172	4.094	4.033	3.861	3.685
Increase or decrease tons pol (sucrose) per acre ..	+ 1.441	+ 1.297	+ 1.296	+ 1.166	+ 0.277	—	— 0.211	— 0.331	— 0.409	— 0.470	— 0.642	— 0.818
Per cent. increase or decrease tons pol (sucrose) per acre	+32.00	+28.80	+28.78	+25.89	+ 6.15	—	— 4.69	— 7.35	— 9.08	—10.44	—14.26	—18.17
Standard deviation from mean	0.967	0.510	0.860	0.672	0.156	0.538	0.286	0.410	0.612	0.351	0.958	0.409
Standard experimental error ..	0.432	0.227	0.385	0.300	0.069	0.240	0.124	0.183	0.273	0.157	0.429	0.183
Value of increase or decrease at £4.441 per ton sucrose..	+£6/8/-	+£5/15/2	+£5/15/1	+£5/3/7	+£1/4/7	—	—£0/18/9	—£1/9/5	—£1/16/4	—£2/1/9	—£2/17/-	—£3/12/8
Sucrose per cent. cane (pol)	16.04	17.20	14.50	14.91	15.31	14.95	15.68	16.06	15.93	14.16	14.30	14.50
Bonus for purity	0.61	0.56	0.34	0.14	0.20	Nil	0.24	0.36	0.38	Nil	0.43	0.43
Corrected sucrose per cent. cane (pol), including bonus ..	16.65	17.76	14.84	15.05	15.51	14.95	15.92	16.42	16.31	14.16	14.73	14.93
Fibre per cent. cane	15.37	12.90	16.16	13.17	14.79	16.21	14.68	14.31	13.16	17.07	17.36	15.62
Juice—												
Brix	22.2	22.8	20.9	20.6	21.9	21.7	21.7	21.8	21.3	21.5	20.8	20.3
Sucrose (pol)	20.66	21.13	18.93	18.49	19.74	19.14	19.59	19.77	15.42	18.62	19.01	18.57
Purity	93.1	92.6	90.7	89.7	90.0	88.3	90.2	90.8	90.9	86.4	91.3	91.3
Reducing sugars per cent. juice	0.06	0.06	0.34	0.22	0.42	0.60	0.18	0.41	0.28	0.73	0.14	0.27
Reducing sugar ratio ..	0.31	0.19	1.80	1.29	2.14	3.15	0.93	2.06	1.50	4.01	0.55	1.43
Phosphate (P <sub>2</sub> O <sub>5</sub> ) content of juice per cent.	0.0224	0.0268	0.0148	—	0.0186	0.0141	0.0315	0.0290	0.0161	0.0147	0.0178	0.0189

**NOTES.**—The bonus mentioned above is that awarded under the Fahey scale now in effect in this country for payment for cane, under which the pol. of the cane is credited with an increase according to a scale for purities of juice above 89.0. There is a corresponding scale of penalties for purities of juice below 83.0. The value per ton assumed for sucrose £4.441 is the average for the past season, not including a small final adjustment that would increase it slightly.