

## “A Field Trial of Certain Sugar Cane Varieties.”

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By H. H. Dodds.

Mr. H. H. Dodds read the following paper on the above subject:—

Singularly little has been published hitherto on the comparative field trials with sugar cane varieties in Natal.

The only outstanding change in our standard varieties took place in the eighties and early nineties when Uba supplanted several other kinds; probably Uba was well able to establish its superiority over existing varieties without the assistance of published records of systematic quantitative experiments.

At all events, records of such experiments, if any, do not appear to have been preserved.

In Cedara Memoirs, Vol. III., published in 1912, there are descriptive notes of several varieties other than Uba, compiled from information gained at the old Government Experimental Farm at Winkle Spruit, and various isolated qualitative notes and analytical data of miscellaneous varieties have been occasionally reported in the local sugar press.

It is believed, however, that the experiments to be described represent the first published quantitative field trials, adequately replicated on a uniform basis, anywhere in Natal.

These experiments, the first of a series at the recently established Experiment Station of the South African Sugar Association at Mount Edgecombe, Natal, were planted in 1926, and comprise five varieties of sugar cane, including Uba, namely, Badila, 1900 Seeding, D. 1135 and Argentine Selection (P.O.J. 213).

These do not represent any of the varieties imported under the new quarantine system of the Sugar Association, none of which were yet available in sufficient quantity at the time of planting this experiment. Badila, 1900 Seedling and D. 1135 were selected from a range of varieties imported from Queensland a few years earlier by Natal Estates, Ltd., and were considered to be the most

promising of their series for experiments without irrigation.

The remaining variety, Argentine Selection, or P.O.J. 213, was derived from a series of varieties imported from the Argentine several years ago. All of these Argentine canes, as they were called (although they were not produced originally in that country), became infected with mosaic disease with the exception of one healthy stool which Dr. H. H. Storey discovered in an otherwise totally infected field. This was transferred to an isolated quarantine station on the property of African Explosives & Industries, Ltd., at Umbogintwini, and stocks were built up from it, all of which with only one or two exceptions, remained free from mosaic disease, although exposed to severe field infection.

The variety was afterwards identified with P.O.J. 213, a cross between Chunni and Black Cheribon, one of the earlier of the new varieties developed at the Experiment Station of the Javan sugar industry and which has proved very successful in other extra-tropical countries, notably Argentina and Louisiana.

While fairly resistant to mosaic disease, it is by no means immune, and is of the so-called tolerant type, that is, it will survive for long after infection without serious deterioration from the sugar producing standpoint, and is thus particularly objectionable to have on commercial plantations during the present campaign for the elimination of mosaic.

Badila, or N.G. 15, is a very stout dark purple cane originally from New Guinea, where the recent expedition went to find other new varieties. It is of a characteristic pale green and broad leaf and is a variety which gives excellent yields combined with very high sucrose and purity when grown under favourable circumstances in a rich soil with plentiful supply of moisture. It does remarkably well in many parts of Queensland.

Natal Estates, Ltd., of Mount Edgecombe, have obtained yields up to 36 tons per acre without irrigation, but these results can only be obtained in a rich moist soil.

The 1900 Seedling is a variety of somewhat similar character, but of more upright growth.

D. 1135 was originally from British Guiana (Demerara), but never became established commercially in that country; it has, however, done very well in Hawaii and Queensland and also at Natal Estates, Mount Edgecombe, even without irrigation, in a moist fertile soil. This variety is also rather susceptible to mosaic disease, the symptoms often remaining latent for a considerable time after infection.

The soil selected for the experiment was a rather poor stiff clay loam very deficient in organic matter and phosphorus, as the following analysis shows:—

Classification—Greyish brown clay loam.

Reaction to litmus—Very slightly acid.

Hydrogen ion concentration—5.5 (pH).

	per cent.
Hygroscopic moisture . . . . .	1.66
(a) Loss on ignition . . . . .	1.48
(b) Total lime (as CaO) . . . . .	0.26
(c) Total potash (as K <sub>2</sub> O) . . . . .	0.17
(d) Total phosphate (as P <sub>2</sub> O <sub>5</sub> ) . . . . .	0.02
Above includes:	
(a) Nitrogen . . . . .	0.07
(b) Carbonate of lime . . . . .	0.040
(c) Available potash . . . . .	0.009
(d) Available phosphate . . . . .	0.002
Acidity (requirement of calcium carbonate)	0.001
Water capacity . . . . .	32.5
Capillarity (rise in 24 hours) . . . . .	426 mm.

The land has been more or less continuously under sugar cane for over fifty years, the last crop obtained before it became part of the experiment station being 15.0 tons per acre as third ratoons.

Before replanting with cane the field was treated with 900lbs. of Egyptian raw rock phosphate and 60lbs. of potassium sulphate per acre after thorough ploughing and harrowing. It was then fallowed under buckwheat as a green manure crop for one season and planted again with cane in November, 1926.

The field was divided into 21 equal and similar sections, each of 1/10th acre, comprising 10 cane rows, 5ft. apart and 87ft. long.

Four plots of each variety were planted excepting the Uba control plots, of which there were five.

All received a dressing of superphosphate, 250lbs. per acre, applied in the furrows at the time of planting.

The total rainfall during the crop was 58.5 inches, of which 19 inches, or nearly one-third, fell during the month of March, 1927. For the greater part of the rest of the two years the cane was suffering more or less from drought.

The non-Uba variety plots were harvested somewhat prematurely in July, 1928, since they were showing signs of suffering severely from drought.

The Uba would have been cut at the same time, but was found to be very immature and low in sucrose and purity, and therefore was left to take its chance for six weeks longer, although it was also showing signs of distress during the record drought that prevailed about this time.

The yields and analyses of the cane of each variety were as follows:—

Variety	1900 Seedling	Badila	P.O.J.213	D.1135	Uba
No. of plots	4	4	4	4	5
Yield Tons cane per acre	17.20	15.33	25.44	22.99	22.32
Tons sucrose per acre	2.75	2.70	4.02	3.26	3.37
Standard deviation from mean	0.29	0.24	0.29	0.08	0.22
Standard experimental error	0.14	0.12	0.14	0.04	0.10
Sucrose per cent. cane	16.0	17.6	15.8	14.2	15.1
Fibre per cent. cane	11.3	12.0	14.0	14.2	13.8
Juice extracted per cent. cane	48.4	51.2	43.5	49.2	51.8
Mill extraction	59.6	65.0	55.5	61.4	65.2
Java ratio (calculated)	81.3	78.9	78.1	79.9	79.5
Juice: Brix	21.8	23.6	22.0	20.4	21.8
Sucrose	19.68	22.32	20.23	17.77	18.99
Purity	90.3	94.6	92.0	87.2	87.1
Reducing substances per cent. juice	0.62	0.13	0.27	0.72	0.60
Reducing substance ratio	3.2	0.6	1.33	4.1	3.2
Hydrogen ion concentration (pH)	5.32	5.28	5.11	5.17	5.31
Phosphate (P <sub>2</sub> O) per cent.	0.026	0.041	0.028	0.032	0.041
Potash (K <sub>2</sub> O) per cent.	0.081	0.053	0.093	0.107	0.128

Cane juice expressed by a small laboratory hand mill.

The outstanding variety is the P.O.J. 213, which surpassed all others in yield of cane and was considerably higher in sucrose content and purity than its two nearest competitors in tonnage, D. 1135 and Uba.

It is evident that this variety is of great promise in severe drought conditions and in poor, impoverished soils of the clay type.

However, it is reported that in a light sandy soil at Umbogintwini it proved inferior to Uba.

The Uba cane well exhibits in these experiments its general hardiness in conditions of drought and poor soil.

D. 1135 has stood up very well to these conditions for a cane of the soft type; but is inferior to both P.O.J. 213 and Uba in yield of sucrose per acre.

Badila and 1900 Seedling, though exhibiting their characteristic high sucrose and purities, are evidently not adapted to these severe conditions, the yields per acre being very low in comparison with the thinner types of cane.

The phosphate and potash content of the juices are not perhaps of much significance except to show how these can vary with different varieties when grown in the same soil and similar conditions.

These results are only that of the plant cane crop and naturally much depends on the behaviour of the ratoons. Up to the present, however, as far as one can judge by inspection, the ratoon crops of these varieties maintain the same relative position as those taken by the plant cane, the P.O.J. 213, Uba and D. 1135 having stood freely and vigorously, while the Badila and 1900 Seedling remain rather poor.

Experiment Station,  
South African Sugar Association  
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Mr. Moberly: I think we have to thank Mr. Dodds and the Experiment Station for a paper giving what is very often considered the key problems of the Industry here—the matter of bringing in new varieties to replace or supplement our trusty Uba, a cane which has served us very well indeed so far, but we don't know what it will do in the future. One fact strikes me and that is the fibre figures, which are rather surprising in those two varieties P.O.J. 213 and D. 1135. Of course I don't know how those fibres would be under mill conditions. Perhaps Mr. Dodds can tell us whether the values given are normal with these varieties.

Chairman: P.O.J. 213 I believe is usually considered to be a cane of rather high fibre; it is of the thin cane type, consequently it has a larger relative quantity of fibre. D. 1135 I have not had much experience of and was rather surprised to find such large fibre, and attributed it to the extraordinarily dry conditions under which the experi-

As more material of new varieties of cane become available further series of quantitative experiments are being laid down, and in a few more years much more information will be available over a comparatively wide range of varieties.

Some of these experiments already include those of our later importations of varieties, such as P.O.J. 2725 and 2878 and several of the Coimbatore series, which preliminary qualitative trials indicate as of much promise for certain of our soil and climatic conditions.

Thanks are due to Messrs. Natal Estates, Ltd., Mount Edgecombe, and to Messrs. African Explosives & Industries, Ltd., Umbogintwini, for supplies of planting material of canes used in the experiments described.

### SUMMARY.

A field trial is described of five different varieties of cane in competition, Uba, P.O.J. 213, D. 1135, Badila, and 1900 Seedling. Of these P.O.J. 213 gives considerably the best results with the plant cane crop under the conditions of the experiment, being followed in order of merit by Uba, D. 1135, Badila and 1900 Seedling.

ment was conducted. Of course there is also the question of experimental error. I don't remember what the variation was between the four replications of each test but I don't think that they showed so much difference that the experimental error could account for the high fibre.

Mr. Moberly: We can all feel sure that if the Experiment Station continues like this we shall eventually obtain our goal of good substitutes for Uba cane.

Chairman: It is already after five o'clock and there is still another paper on further experiments in harvesting of burned cane. This is largely a repetition of experiments which were done last year, which experiments have been repeated with very similar results. Under the circumstances I don't think there is any need to go through the whole paper, but I will just read the general conclusions arrived at.