

NATAL SUGARCANE VARIETIES

SOME OBSERVATIONS AND STATISTICS

By EXLEY STEWARD

Since the time when sugarcane was first grown commercially in Natal, over a hundred years ago, perhaps the most important question that has had to be decided by growers is which varieties of cane to cultivate to give the best returns under local conditions. It may not be generally realised that many hundreds of varieties exist in the sugar world to-day. McMartin¹ states that from the early days up till 1940, 180 varieties had been introduced into Natal alone, although only a few of these ever established themselves as commercial varieties. The first of the early varieties were imported from Mauritius about 1850, and Uba, the one time saviour of the industry, was brought into the country in 1883. Uba proved to be immune to mosaic and smut disease which were attacking the other canes to such a degree that some varieties were almost completely destroyed. In an attempt to rid the industry of these and other diseases the cultivation of any variety other than Uba, after June 30th 1927, was made illegal by proclamation of the Government.

It is the object of this paper to review the variety position since that time and to give some indication of the behaviour and results obtained from the canes that have subsequently been made available to the industry. The observations and statistics which follow refer to the 21,000 acres of cane lands which are under control of the author who does not presume to speak for the entire sugar belt. It is probable that different results have been obtained in other areas but it is hoped that the facts given here will prove of some value and lead, at least, to beneficial discussion. The figures, given in the various tables below have been taken over four seasons, from 1956-57 to 1959-60, and represent the findings from the harvesting of 30,163 acres.

Since 1930, 16 varieties have been released by the South African Sugar Experiment Station, at Mount Edgecombe, for commercial planting. All of these will be briefly discussed. In the paragraphs below the varieties are numbered in order of release, the year of release and the parentage, in parenthesis, given.

No. 1. 1930 P.O.J.2725 (P.O.J.2364×EK.28)

No. 2. 1930 P.O.J.2878 (P.O.J.2364×EK.28)

These were successful to varying degrees but were subsequently replaced by more suitable varieties and little, if any, still remain in cultivation.

No. 3. 1931 P.O.J.2714 (P.O.J.2364×EK.28)

No. 4. 1931 P.O.J.2727 (P.O.J.2364×Batjan)

No. 5. 1931 Co.290 (Co.221×D.74)

The same remarks apply as for Nos. 1 and 2 except that Co.290 lasted longer than the P.O.J. although Co.290 proved susceptible to red rot, especially at the higher altitudes.

No. 6. 1933 Co.281 (P.O.J.213×Co.206)

The immediate performance was very good and planters became enthusiastic about this variety which gave the best results in heavy red soil. After about twelve years Co.281 declined very rapidly. The last planting was done in 1949 when only 1.4 per cent of the total area planted was put under this variety (see Table IV). Even selected seed, planted out in rich virgin soil, failed to produce a satisfactory crop after 1949. The reason for the dying out of this, and other varieties, is unknown.

No. 7. 1935 Co.301 (Co.213×P.O.J.1499)

The history of Co.301 is similar to that of Co.281. After producing good crops for fifteen years or so it also failed. Being very susceptible to smut disease was one of the major reasons for this failure. No plantings of any significance have been made since 1952.

The following is an example of the collapse of Co.301. In 1951 a 23-acre field of Co.331 was planted, in the middle of which a three-acre strip was, at the same time, put under Co.301. In 1959 the Co.331, as 29 month old 4th ratoon, gave 43.9 tons per acre while all that was left of the 301 were a few struggling leaves.

No. 8. 1941 Co.331 (Co.213×Co.214)

A most prolific grower which is producing as well today as ever it did. In very sandy soils it will give a satisfactory crop where other varieties fail. Unfortunately the sucrose content is low and the yield of sucrose per acre poor, as shown in Table I. Another disadvantage is that it is difficult to get good weights on trucks or lorries due to the sticks being light and springy and thus difficult to pack. Consequently the output per labourer is less than in other varieties with an increase in harvesting costs. Co.331 will rapidly dry out, and a lot of sticks will die, if it is allowed to go beyond the peak of growth, therefore it should not be left to stand over in times of surplus.

The following figures from a 50 acre field show that there is no decline in the yield of Co.331. Planted in 1948 the yields, in per tons acre, from subsequent crops were:

1950	Plant cane	20 months	41.1
1952	1st Ratoon	24 months	42.0
1954	2nd Ratoon	22 months	36.9
1955	3rd Ratoon	17 months	25.5
1957	4th Ratoon	19 months	43.9
1959	5th Ratoon	22 months	38.0

Naturally the different ages at which the crops were cut had a bearing on the result, furthermore fertilisation has been heavier in recent years; however, it is interesting to note that the 2nd ratoon, cut at 22 months, gave 36.9 tons per acre while the 5th ratoon, also cut at 22 months, gave 38.0. Nevertheless, mainly because of the low yield of sucrose per acre, Co.331 will not be planted as extensively in the future as it was in the past.

No. 9. 1945 N:Co.310 (Co.421 × Co.312)

The most successful variety ever released. The phenomenal increase in the production of the Natal Industry during the last decade is largely due to the cultivation of this variety which has also been favourably received in other parts of the world. In times of surplus it has been found that N:Co.310 can be left standing three years or more without deteriorating. Although it sometimes flowers profusely this does not appear to have any serious ill effects. This variety is very susceptible to gumming disease especially in the high altitude mist belt areas. It has been found, however, that infected stools throw off all visible effects of this disease when adequately fertilised in good growing conditions.

Some growers maintain that N:Co.310 is now showing signs of decline but in the author's experience this is not the case. Table I shows that in 1956-57 the yield of sucrose per acre was 4.59 tons while in 1959-60 the figure was 5.38 tons.

No. 10. 1949 N:Co.339 (Co.421 × Co.312)

This is giving satisfactory results under all soil conditions including light sands where it is second only to Co.331. It is an erratic germinator and for the best germination results the setts should be very lightly covered with soil, from 1" to 2", at time of planting. Although very susceptible to mosaic disease it is very tolerant. The danger exists, however, in the possible spread of mosaic to varieties that are intolerant. Withstands dry conditions well.

No. 11. 1951 N:Co.292 (Co.421 × Co.312)

The first variety to show a browning of the leaves in dry spells it quickly recovers after rain. A straight cane, it packs well and good truck weights are obtained.

No. 12. 1951 N:Co.293 (Co.421 × Co.312)

Of the same parentage and year as N:Co.292 it has proved the more popular especially at the high altitudes. It is a slow grower the first year.

No. 13. 1954 N:Co.376 (Co.421 × Co.312)

Reference to Table I will show that this variety has given the best results of all every year since it was first harvested in 1957-58. It is rapidly gaining great popularity throughout the industry and is the one cane that may shortly exceed N:Co.310 in the percentage under cultivation. It is the next variety after N:Co.292 to show drying of the leaves under drought conditions, but quickly recovers. An easy cane to handle, the sticks are straight and the crop does not lodge. A bright future is anticipated for this variety.

No. 14. 1957 N:Co.334 (Co.421 × Co.312)

No. 15. 1957 N:Co.382 (P.O.J.2725 × Co.301)

Not much is known as yet about these recent releases although both appear to be growing well. 334 does well in low lying swamp areas. Recently some 382 over two years old was used as seed, as there was no other seed available. This was planted with some trepidation but the subsequent germination was excellent.

No. 16. 1959 N.50/211 (P.O.J.2725 × Co.285)

No information can be given on this the latest release. According to the Experiment Station² the following are the characteristics:

1. Not superior in yielding ability to the best of the present commercial varieties.
2. Resistant to the major sugarcane diseases.
3. Not recommended for high altitudes or coastal sands.
4. Sheds trash freely and flowers profusely.
5. A medium to thin cane it grows to a good length, It is inclined to lodge late in the growth cycle.

TABLE I
VARIETY YIELDS IN TONS SUCROSE PER ACRE
1956-57 to 1959-60

1956-57			1957-58			1958-59			1959-60		
Order	Variety	Tons per acre	Order	Variety	Tons per acre	Order	Variety	Tons per acre	Order	Variety	Tons per acre
1	310	4.59	1	376	7.21	1	376	6.84	1	376	5.83
2	293	4.54	2	292	6.02	2	293	6.37	2	382	5.75
3	331	3.91	3	339	5.91	3	339	6.13	3	292	5.67
4	301	2.80	4	293	5.47	4	310	6.08	4	334	5.56
-	-	-	5	310	5.25	5	292	5.23	5	293	5.46
-	-	-	6	Uba	4.44	6	331	5.18	6	310	5.38
-	-	-	7	301	3.83	7	Uba	4.12	7	339	5.22
-	-	-	8	331	3.79	8	301	3.34	8	331	4.67
-	-	-	-	-	-	-	-	-	9	Uba	3.50
-	-	-	-	-	-	-	-	-	10	301	3.22
Average		4.02	-	-	4.67	-	-	5.56	-	-	5.12

The above figures represent the findings from a total of 30,163 acres of cane harvested for the four years under review.

Taking the present average price of sucrose at £14 4s. 0d. per ton the difference in yields of 0.1 ton of sucrose represents a difference in income of £1 8s. 5d. per acre.

TABLE II

Comparison of variety yields in tons cane per acre, tons sucrose per acre, sucrose per cent cane and area of variety reaped per cent total crop reaped, for four years 1956-57 to 1959-60.

YEAR	N:Co.310				Co.331			
	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total
	Cane	Sucrose			Cane	Sucrose		
1956-57	33.1	4.59	13.89	36.5	32.4	3.91	12.06	36.5
1957-58	38.9	5.25	13.50	50.4	34.2	3.79	11.08	35.0
1958-59	46.4	6.08	13.11	53.7	41.9	5.18	12.36	25.6
1959-60	38.6	5.38	13.93	54.7	36.4	4.67	12.83	23.4
Average	40.7	5.50	13.52	52.7	36.7	4.41	12.01	27.6

YEAR	N:Co.293				Co.301			
	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total
	Cane	Sucrose			Cane	Sucrose		
1956-57	35.0	4.54	12.95	4.1	23.5	2.80	12.14	22.9
1957-58	42.7	5.47	12.83	3.0	27.0	3.83	14.18	9.0
1958-59	48.9	6.37	13.03	5.8	27.6	3.34	12.14	10.5
1959-60	40.2	5.46	13.60	5.1	25.3	3.22	12.72	5.2
Average	43.4	5.70	13.15	4.9	25.9	3.27	12.62	9.0

YEAR	N:Co.376				N:Co.292			
	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total
	Cane	Sucrose			Cane	Sucrose		
1957-58	56.3	7.21	12.80	.5	42.6	6.02	14.12	.1
1958-59	53.1	6.84	12.90	1.90	42.6	5.23	12.28	.5
1959-60	44.1	5.83	13.23	4.91	43.8	5.67	12.95	.8
Average	46.8	6.14	13.12	2.2	43.2	5.65	13.08	.6

TABLE II—continued.

YEAR	N:Co.339				Uba			
	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total	Tons per Acre		Sucrose per cent Cane	Area cut per cent Total
	Cane	Sucrose			Cane	Sucrose		
1957-58	50.4	5.91	11.72	1.7	36.6	4.44	12.13	.3
1958-59	48.2	6.13	12.71	1.8	42.5	4.16	9.78	.2
1959-60	39.4	5.22	13.26	5.1	29.1	3.50	12.03	.5
Average	43.2	5.54	12.80	2.7	34.3	3.95	11.51	.3

TABLE III

Average performance of varieties over four years, 1956-57 to 1959-60, listed in order of yield of tons sucrose per acre. (Excluding N:Co.334 and N:Co.382).

Order	Variety	Tons per Acre		Sucrose per cent Cane
		Sucrose	Cane	
1	N:Co.376	6.14	46.8	13.12
2	N:Co.293	5.70	43.4	13.15
3	N:Co.292	5.65	43.2	13.08
4	N:Co.339	5.54	43.2	12.80
5	N:Co.310	5.50	40.7	13.58
6	Co.331	4.41	36.7	12.01
7	UBA	3.95	34.3	11.51
8	Co.301	3.27	25.9	12.62

TABLE IV

The following figures show the percentage of the total yearly planting planted to the various varieties for the eleven years 1948-49 to 1958-59 and indicates the trend of popularity.

Variety	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59
Co.301	44.3	19.9	19.3	7.8	5.5	—	.5	1.0	1.0	—	—
N:Co.310	29.8	37.6	48.6	40.2	46.1	71.4	69.8	76.7	59.5	33.5	35.0
Co.331	20.7	41.0	32.1	52.0	44.7	4.1	15.0	5.0	18.0	12.0	10.0
Co.281	5.2	1.4	—	—	—	—	—	—	—	—	—
N:Co.293	—	—	—	—	2.6	15.7	11.2	7.0	12.5	5.6	—
N:Co.339	—	—	—	—	.4	7.2	2.0	4.3	2.8	16.5	7.0
N:Co.292	—	—	—	—	—	—	.9	3.8	1.0	1.1	—
N:Co.376	—	—	—	—	—	—	.6	2.2	4.2	29.0	46.0
N:Co.382	—	—	—	—	—	—	—	—	—	1.3	2.0
N:Co.334	—	—	—	—	—	—	—	—	—	1.0	—
Uba	—	.1	—	—	.7	1.6	—	—	1.0	—	—

REFERENCES

¹McMartin, A. (1940). The Sugarcane Varieties of Natal. Proc. S.A. Sugar Technologists' Association.

²S.A.S.A. Experiment Station (1959). S.A. Sugar Journal, Volume 43, No. 7, page 597.

Mr. du Toit (in the Chair), said he was pleased to hear that N:Co.310 was the most successful variety to date and that it was still good today although later it would probably be superseded by other varieties. Mr. Steward had already corrected himself in stating that for many of these varieties, such as N:Co.376, the comparison was between plant cane or younger ratoons in the case of the newly released varieties and rather older ratoons in the case of the older released varieties. The comparison between these varieties and the old canes must always be very difficult because one has got such a predominance of plant cane in the newer releases. The only true comparison one could make was between yields of the same ratoon, but then of course the areas under cane were small and the comparison might also be unreliable.

Mr. Steward said that although he had said N:Co. 293 was a slow grower in the first year he agreed with Mr. du Toit that it was in fact a good grower the first year, but he had noticed that, in spite of formation of the cane stick during the first twelve months, the crop put on a lot of weight in the second year, more so than that of other varieties in their second year. Regarding the possible decline of N:Co.310 he said that the variety had served us well for 15 years and, as far as his figures showed, was still giving satisfactory results, whereas varieties Co.281 and Co.301 had completely disappeared after 12 years or so. As far as Uba was concerned he admitted that he could not say positively that it was immune from smut disease, but from his experience he had never observed smut in Uba even in the days when the whole industry was planted to that variety. The first smut he had ever seen was found in Co.301.

Mr. Roy Halse commented that he had found smut in Uba but it was never really very serious.

Dr. McMartin said that Uba was planted because of its immunity to mosaic. It was susceptible to smut but smut was not one of our problems when Uba was grown, being in a quiescent state. In other countries, as in Portuguese East Africa, Uba was riddled with smut, at the same time as it was still being fairly largely cropped in Natal. Concerning the statement that N:Co.293 was a slow grower there are two types of varieties—those which tiller early and produce the stool and then form cane, and others which form cane earlier instead of tillering profusely, and he was of the opinion that this variety was of the latter type. Mr. Steward said that some growers maintained that N:Co.310 was deteriorating, whereas in the author's experience this was not the case. Looking back over the years it seems to have been the experience that the decline of any variety has been preceded by a lot of argument as to whether it was declining or not, and the fact that the argument had already begun suggested that

N:Co.310 was not going to be a permanency any more than any other variety.

Mr. Steward said regarding the decline of N:Co.310, he had made a point of saying earlier on in the paper that he was only concerned with the areas over which he was in charge and also said it was likely that in other places different opinions would be found. There was no smoke without fire and, as Dr. McMartin said, the very fact that deterioration of N:Co.310 was being discussed up and down the Sugar Belt, pointed to there being something in it. He felt however, it should still have its champions as it was the one cane that did put us right on top. It may be superseded later on but it had lasted us well for 15 years and was still going strong.

Dr. Cleasby, commenting on N:Co.310, said he considered that it was going out and it was the Tongaat Sugar Co.'s policy to plant limited amounts only in very good areas. In the last few years, weekly factory sucrose figures for N:Co.310 had shewn decreasing superiority over other varieties and one of the first things that happened when a variety started to deteriorate was that the sucrose content fell off. With regard to N:Co.334, it did well in wet areas and under irrigation. From this cane over 70 tons per acre had been reaped in 16 months. He considered that under these moist conditions ratoon stunting disease should not be a major factor with this variety. A disturbing feature at the moment was the way in which N:Co.376 was becoming infected with mosaic disease. The new variety No.50/211 looked most promising wherever it had been planted at Tongaat.

Mr. Steward said he thought that people would benefit from the remarks and observations which had been passed.

Mr. Hyde Palmer noticed there was no reference to ratoon stunting in N:Co.310. In his experience he found this to be quite bad and felt that ratoon stunting disease was the primary cause of deterioration in various varieties. Cane that had been heat-treated showed a remarkable improvement.

Mr. Steward said he remembered some years ago Mr. N. C. King came out round the fields with him and they went from variety to variety. Mr. King examined dozens and dozens of sticks of all varieties and although he was careful not to commit himself definitely, he said as far as he could see every stick of every variety had ratoon stunting.

Mr. G. M. Thomson stated that with ratoon stunting disease and the running out of varieties he did consider that ratoon stunting disease was only one of the factors which caused running out of varieties. It was not the only factor to be considered but the running out of varieties could at least be delayed by heat-treatment. He considered that N:Co. was deteriorating, and he felt the

other varieties should be closely watched, especially N:Co.376. Dr. Cleasby rightly mentioned mosaic disease in N:Co.376 and he considered the dangerous cane in this connection was N:Co.339. Last season was a bad one for mosaic disease. N:Co.376 was fairly resistant but could be badly damaged by disease. It must be remembered too that different strains of the various diseases could make themselves apparent. With large amounts of N:Co.339 in the industry there was the chance of mosaic disease rapidly developing.

Mr. Wilson said that an attempt had been made by Dr. Brett to assess the relative merits of our current varieties in the environment to which they were best adapted and it would appear that a good deal too much has been expected of varieties like N:Co.310 which had been widely planted throughout this industry in areas to which they were not suited. Tongaat had now arrived at the correct siting of N:Co.310 on rich soils and varieties better suited to the poorer soils were now going to be planted in such areas. With regard to N:Co.339, he had been under pressure from certain quarters to recommend its withdrawal. The withdrawal of this variety would justifiably cause a certain section of the industry to claim that its whole economy would be upset. The answer would appear to be, from Dr. Brett's assessment anyhow, that we have a substitute for N:Co.339 now in the variety, N:Co.382, and although N:Co.382 is still in its infancy, and while it may not as yet meet with the general approval of a lot of people, there is every indication that it will find a place, certainly to the extent that N:Co.339 has occupied, and there might be some justification for seriously considering the withdrawal of N:Co.339, at least from certain areas. There was a tendency, as he had said, with a good variety to plant it everywhere and hope for the best. He did not think this was sound practice. It was essential to get the right varieties in the right place and anything we could get in the way of information to achieve this end was extremely valuable. He was extremely interested in the Chairman's and Dr. Cleasby's views on the recent release of N.50/211. Dr. Brett, he knew, issued this variety with some reluctance. He felt it had been insufficiently tested, a not uncommon difficulty at the Experiment Station, which is constantly under pressure to speed up the release of new varieties. N:Co.310 was one variety he believed, which was only tested for 8 years instead of the desirable 12 to 13 years. He hoped that N.50/211 was another one of those successful varieties and that it would become as useful as N:Co.310.

Dr. Dodds said that the point raised about Uba and smut was the fact that it was not infected much in this country. He had seen thousands of acres of Uba in P.E.A. totally destroyed by smut. He did

not know if this was the same species of fungus as that affecting the canes in Natal. Natal was fortunate in that at one time they had received a large number of untested seeds of the cross Co.421 and Co.312. It was one of the most promising crosses one could imagine. Neither parent was any good in this country but each had been outstanding in its own sphere in India, Co.421 in the tropical zone, and Co.312 in the sub-tropical zone. All our N:Co. varieties came from this source.

Mr. Grice said that The Natal Estates Limited had found the variety N:Co.376 to be most promising. The planting of Co.301 had been discontinued because it was extensively affected by smut disease, and it was feared that this disease might spread to other more valuable varieties. N:Co.293 had proved to be an excellent cane under irrigation, where it was possible to harvest two crops in three years. Unfortunately, it was now evident that this variety had lost its resistance to smut and as a result was no longer being planted. The question was asked as to whether anyone present had found that this valuable variety was no longer resistant to smut disease?

Mr. Udal said that at Sezela they found that N:Co.293 was very susceptible to smut.

Mr. Pearson said that referring back to the original issue of N:Co.293, when it was advocated for high altitudes, the Experiment Station was well aware that it was subject to smut. Where it was planted in a field that contained Co.301 they got endless smut. In the more recent variety releases the cane had been heat-treated. He wondered how much attention was given by the planter to heat-treated cane when he was cutting up setts, and if the knives used were properly sterilized before the setts were cut.

Mr. P. F. Boule asked how one could differentiate between coastal and non-coastal soils.

Mr. Wilson said that from Dr. Brett's table N:Co.293 came top only on better soils at high altitudes. N:Co.293 was highly sensitive to environment and unless planted in the right area it could be an unsatisfactory variety.

Dr. McMartin said that he recollected when N:Co.293 was dropped out of trials at the Experiment Station. It was a poor yielder in the lower coastal areas, including the Experiment Station, and it was only because of an outbreak of red rot at Eshowe that this variety, and others, were planted there to see how they would do under the conditions in which red rot was destroying the commercial varieties. Under these conditions N:Co.293 was found to be outstanding.

Mr. de Robillard referring to Table III said that in Natal Estates they had similar results. He agreed with Dr. Cleasby that the sign of N:Co.310 deteriorating was that there was a drop in sucrose. The figure for Co.331 did not quite agree with this table. He said that it used to only do well on coastal sands but was now doing well on inland soils. If one calculated the growth per acre per month it seemed that N:Co.293 was one of the best.

Dr. Cleasby supported Mr. de Robillard that Co.331 had responded very well indeed to irrigation. It

was a variety which undoubtedly should be kept going.

Dr. McMartin said, referring to smut disease, that mosaic had spread all over the world with the spread of noble canes, and the suggestion has been made that with the increased use of wild cane in breeding everywhere smut may be expected to have a wider range. He himself felt that this was a disease which could slip through present quarantine procedure.