INTRODUCTION

1. Character and Distribution of the 3 Varieties

2. General Arrangement of the Plots

3. Values and Measurements on the following Characters:

4. Tillering

5. Length of Shoot and Number of Internodes

6. Percent. Diameter of Shoot

7. Density of the Cane

THE STUDY OF 3 VARIETIES OF SUGAR CANE

BY A SYSTEM OF MEASUREMENTS

by

J. B. G. Savory

Dissertation for the Associateship of the

Imperial College of Tropical Agriculture.

V. Showing Density of the Central Intermode in the 3 Varieties

VI. Showing Density of Cane and Percent.

age of Sucrose in the 3 Varieties

Department of Botany 1929-30.

VII. Showing Results of B.H. 10(12) and

Ba 11569 on Red and Black Soils in Barbados

VIII. Showing Results of the 3 Varieties on the College Farm

IX. Showing a Comparison of Estimated

and Actual Yields

X. Summary of Data
CONTENTS

1. Introduction 1
2. Characters and Distribution of the 3 Varieties 2
3. General Arrangement of the Plots 3
4. Counts and Measurements on the following characters:
   (1) Tillering 4
   (2) Length of Shoot and Number of Internodes 7
   (3) Average Diameter of Shoot 9
   (4) Density of the Cane 10
5. Results of Previous Trials with these Varieties 12
6. Comparison of Estimated and Actual Yields 14
7. Resume of Data 15
8. Conclusions 16
9. Index to Tables:
   Table I. Showing System of Randomisation 4
   II. Showing Tillering of the 3 Varieties 5
   III. Showing Results of B.H.10(12) and Ba 11569 on Red and Black Soils in Barbados 6
   IV. Showing Length of Shoot & Number of Internodes in the 3 Varieties 8
   V. Showing Diameter of the Central Internode in the 3 Varieties 10
   VI. Showing Density of Cane and Percentage of Sucrose in the 3 Varieties 10
   VII. Showing Results of B.H.10(12) and Ba 11569 on Red Soils in Barbados 12
   VIII. Showing Results of the 3 Varieties on the College Farm 12
   IX. Showing a Comparison of Estimated and Actual Yields 14
   X. Resume of Data 15
10. Bibliography 19
11. Rainfall Graph 20
I. INTRODUCTION.

Owing to the partial failure of the Soya Bean Experiments on which the writer was originally engaged, an additional problem had to be found to provide sufficient work during the nine months course.

Sugar cane was the crop chosen for this purpose, and from the vast collection of varieties growing on the St. Augustine Experimental Station, B.H.10(12), B 156, and Ba 11569 were selected for detailed study by a system of plant measurements and counts.

One frequently compares varieties of cane by a description of their botanical characters, such as position and shape of bud, width and colour of leaf, etc., and by this method recognition of different varieties in the field is greatly facilitated. However, apart from this fact, an accurate knowledge of the botanical characters of each variety is of little importance from a practical point of view, since it fails to indicate the approximate yield of cane or sugar, and without this valuable information an estimation of its true worth is hard to arrive at.

Cane farmers are invariably faced with the difficult task of choosing a variety suitable to their particular requirements. It is fairly obvious that a variety which will give them the maximum amount of sugar per acre, is the ideal to be aimed at, and consequently they look for a variety which combines to the greatest extent the factors associated with high yields.

The exact nature of these factors, it was hoped, might be made clear by a close investigation into the figures obtained from the counts and measurements of the current experiment.

In the light of present knowledge, the factors of tillering and diameter of shoots, together with others, all play a huge part in influencing the final yield and are therefore of the utmost importance in judging the value of a variety.

A discussion on the variation of these factors within each variety and between each variety for plant canes and first ratsoons constitutes the main body of this thesis, together with a note on the accuracy or otherwise of this method in estimating yields in the field.
2. CHARACTERS AND DISTRIBUTION OF THE THREE VARIETIES.

Certain fields on the St. Augustine Experimental Station are reserved each year for the cultivation of all the most popular varieties of cane grown in Trinidad with a view to estimating their relative merits as plant cane and as ratatoons. The three varieties (B.H.10(12), B.156, and Ba 11569) selected from the range, were chosen as being among the most important local varieties, and at the same time being present in plant cane and first ratatoon plots in the most convenient formation.

Field 10. B.H.10(12) enjoys immense popularity in this island at the moment, in fact it is planted out on larger acreages than any other variety. It has the reputation of germinating well, and adapting itself readily to fresh environments. It ratatoons strongly and yet ripens early enough for fall or spring planting. Moreover, it is highly resistant to Root Disease, but it is apt to contract Mosaic Disease readily. As a general purpose cane for West Indian conditions, it is still hard to improve upon this variety. More the planting of the setts, while the land is still fallow.

B 156 is not so widely distributed as the latter, but it is reported as being easy to establish, and capable of producing high yields of cane of moderate sucrose content.

Ba 11569 is the most recent of the three Barbados seedlings which are being dealt with in this work. In Porto Rico, it is said to germinate poorly and yield only a poor ratatoon crop. In Trinidad only a small area is devoted to it, but in Barbados, it is proving a serious rival to B.H.10(12) as a plant cane. In Guadeloupe, it has attained great success, being the favourite variety grown.
5. GENERAL ARRANGEMENT OF THE PLOTS.

(1) On Field 11 B.H.10(12) and B 156 were growing as plant canes, on plots nine rows wide with eleven stools in the row, thus giving 99 stools to the plot, and work was forthwith started on December. Bc 11569 did not appear on this field, so a plot of this variety on Field 19, which was remote from the other fields had to be studied instead. A simpler arrangement was possible in the case of first ratoons, as plots of all three varieties occurred as such on Field 13. These three plots were larger in size, having 40 rows of 11 stools each, giving a total of 440 stools.

It must be clearly understood that the plots were situated at the corner, at the side or in the middle of the field, as other varieties not included in this study, were being grown on adjacent plots in a semi-randomised system.

The general management on this estate includes the application of a 15 ton dressing of Pen Manure per acre. This takes place before the planting of the setts, while the land is still fallow. Being more sunlight and are less subject to competition, resulting in the setts are planted at distances of 5 ft each way, giving a total of 1742 stools per acre, normal average.

Apart from the fact that no artificial manures are applied, farm practice follows on normal lines. Of these 38 stools, each alternate one was observed, giving the required 25 stools.

Table 1. Showing system of Randomisation.
4. COUNTS AND MEASUREMENTS ON THE FOLLOWING CHARACTERS:-

(1) Tillering.

Tillering or shoot development of the stools was the first character to be studied, and work was forthwith started on December 21st.

It was necessary to devise a method of counting whereby just a sufficient number of stools were observed to give a valid result to the work and yet not so many as would entail unnecessary labour and accumulation of useless data. For the results to be of any value statistically, it was considered that at least 25 stools should be counted.

Having settled upon a minimum of 25 stools, it was next a question of what mode of randomising to adopt so as to obtain an even distribution of the stools and a representative sample of the whole plot.

In common with normal practice in yield and variety trials, the outside row or rows were discarded. It is generally recognised that in most crops the outside rows have a better chance of obtaining more sunlight and are less subject to competition, resulting in exceptionally fine plants, which, if included in the experiment would completely upset the general average.

Having discarded the outside rows (as shown in Table I.) there remained a square of 7 stools x 7 stools. Of these 49 stools, each alternate one was observed, giving the required 25 stools.

TABLE I. Showing system of Randomisation.
In the observed stools, only those tillers which were sugar bearers, and fit for the factory this year, were counted. It would have been more correct to have included the green immature shoots, but as the sucrose which they contain is usually in the form of reducing sugars, they are unpopular with the factory managers if present to any great extent, and therefore of little importance practically.

TABLE II. Showing Tilling of the 3 Varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Plant Canes</th>
<th>1st Ratoons</th>
<th>Plant Canes</th>
<th>1st Ratoons</th>
<th>Plant Canes</th>
<th>1st Ratoons</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.156</td>
<td>3.81</td>
<td>3.46</td>
<td>6.48</td>
<td>4.50</td>
<td>2.85</td>
<td>5.69</td>
</tr>
<tr>
<td>Ba.11569</td>
<td>9.20</td>
<td>5.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The arrows point to the significant differences of importance.

A glance at the above figures at once suggests that tilling is a varietal character, as the extent of tilling in plant canes and 1st ratoons for one variety is distinct from another.

No definite conclusions can be drawn from the differences between plant canes and 1st ratoons for tilling, but from practical experience it is usually found that an increase in tilling takes place in the first ratoon crop. Assuming that F.L. Engledow's statement in his "Census of an acre of corn" with reference to wheat can also be applied to Sugar cane, viz: "that tilling is an index to yield", it is clearly evident from the above figures that B.H.10(12) upholds its reputation of producing a consistently high yield year after year, since the tiller population is well maintained in the first ratoon crop - in fact a slight increase is registered.

B.156 appears to be a vigorous tiller, and almost keeps up its high standard in the 1st ratoon crop.

It would be interesting to note the behaviour of the varieties for tilling in the 2nd and subsequent ratoon crops. A general falling off in vigour is the general rule, with the possible exception of B.H.10(12), which is a notably strong ratooneer.

The very poor count in the case of Ba.11569 plant canes can be ascribed to one or more contributory factors. In the first place
the plot was situated on a field remote from the others, and adjacent to the Valsayn Coconut Estate. Certain parts of this estate were infested with corn grass, whose seeds blew over to this plot, germinated rapidly and got a thorough hold of the plot before the Sugar cane seedlings were strong enough to withstand the attack. Moreover, Ba 11569 possesses nodes of exceptional length, which are not conducive to rapid germination, hence the difficulty which this variety experiences in establishing itself properly during the first year. It is hardly surprising therefore, that this plot required more frequent supplying than any other.

A considerably higher tiller count in the 1st ratoon crop was only natural, since the count for plant canes was exceptionally low. This improvement merely marks a step towards complete establishment, rather than indicating any distinct varietal character.

In Barbados, this variety has proved a great success and judging by the following results germinating troubles were nonexistent, as it proved superior to the famous B.H.10(12) in both tillering and yield of cane and sugar on both classes of soil.

TABLE III. Showing Results of B.H.10(12) & Ba.11569 on Red and Black Soils in Barbados 1923-1926

<table>
<thead>
<tr>
<th>Canes per stool</th>
<th>Canes per acre in tons</th>
<th>lbs. per acre sucrrose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R.soil</td>
<td>B.soil</td>
</tr>
<tr>
<td>B.H.10(12)</td>
<td>11.49</td>
<td>13.20</td>
</tr>
<tr>
<td>Ba 11569</td>
<td>12.65</td>
<td>15.50</td>
</tr>
</tbody>
</table>

Referring back to the figures for the current experiment and treating them statistically, it is found that there are no grounds for believing that inter varietal differences in tillering exist in these varieties, although no one can deny that tillering is a highly variable character of most sugar cane varieties.

The standard deviations were used to calculate the significant differences between the plant canes of one variety and the plant canes of another, and similarly between the first ratoons of one variety and the first ratoons of another.

The plant canes of Ba 11569 were found to be significantly
weaker in their ability to produce tillers than the plant canes of either B.H.10(12) or B 156. However, it is probable that the significance of certain outside factors already mentioned can be held responsible for the poor performance of Ball569. It is unsafe therefore, to class this difference as varietal.

No other significant differences could be found, except between plant canes of one variety and first ratoons of another variety, but these results are valueless, as it is impossible to draw any definite conclusions where canes of different ages are compared, and another variable factor has to be considered in addition.

(2) Length of Shoot.

Having counted the tillers for each variety on 25 stools randomised over each plot, the tillers were next measured for length.

Certain details connected with the method of measurement and the number to be measured presented a great deal of difficulty. It is obvious that several equally satisfactory methods could be evolved for dealing with the situation, but the following was eventually chosen as being the most suitable: five randomised stools were picked out from the 49 stools in the centre of the plot, and all their shoots measured for length. For the purposes of this experiment, the length was considered to be the distance from the first green leaf sheath to the ground level at the bottom internode.

At the same time, the number of internodes per shoot was also counted. The present definition of length of shoot again determined the limits within which to count the internodes.

With a variety possessing an average of 10 tillers per stool, 50 readings would be obtained, which was considered sufficient to give the required degree of accuracy.
TABLE IV. Showing Length of Shoot and Number of Internodes in the 3 Varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Av. length of shoot</th>
<th>Av. No. of Internodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.H. 10(12)</td>
<td>5' 1&quot;</td>
<td>16.00</td>
</tr>
<tr>
<td>1st Plant Canes</td>
<td>4' 1&quot;</td>
<td>15.40</td>
</tr>
<tr>
<td>1st Ratoons</td>
<td>4' 7&quot;</td>
<td>14.00</td>
</tr>
<tr>
<td>Average</td>
<td>6' 0&quot;</td>
<td>17.70</td>
</tr>
<tr>
<td>B 156</td>
<td>4' 3&quot;</td>
<td>15.20</td>
</tr>
<tr>
<td>1st Plant Canes</td>
<td>4' 11&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>1st Ratoons</td>
<td>4' 7&quot;</td>
<td>15.40</td>
</tr>
<tr>
<td>Average</td>
<td>4' 7&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>Ba 1156</td>
<td>4' 7&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>1st Plant Canes</td>
<td>4' 7&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>1st Ratoons</td>
<td>4' 7&quot;</td>
<td>15.00</td>
</tr>
<tr>
<td>Average</td>
<td>4' 7&quot;</td>
<td>15.00</td>
</tr>
</tbody>
</table>

By carefully analysing these figures it is possible to pick out certain positive and negative correlations with the figures for tillers per clump, but no definite proof of the validity of these correlations is forthcoming.

However, it is interesting to note that the average length of shoot between plant canes and first ratoons is 4' 7" for each variety. According to the results of this experiment therefore, over a period of two years different varieties of cane under the same conditions produce about the same growth in length of shoot. When growth is abnormally vigorous, as in the case of B 156 plant canes, this is followed by a marked falling off in the first ratoon crop. Conversely, when growth is poor during the first year, an exceptionally strong ratoon crop in the second year results, bringing the average up to the required level. As one would expect, moderate growth in the plant canes appears to be followed by similar growth in the first ratoons. On the whole, the behaviour of the plant for length of shoot over a two year period conforms to fairly normal practice, being typical of crops as a whole. It is possible therefore to offer a reasonable theory as an explanation to account for the disappointing yields usually met with in ratoon crops of sugar cane.

Generally speaking, a bumper yield of any agricultural crop is followed by a very poor yield in the following year. This is invariably the case with ratoon crops of cane in Trinidad. In all probability growth of the vast system of fibrous roots belonging to the plant canes is not adequately checked at harvest, with the result that considerable interference is caused in the formation of new roots and the ratoon crop is partially choked.
Little importance is attached to the number of internodes per shoot, as there were no striking differences between plant canes and 1st Ratoons. Evidence at present seems to indicate that the number of internodes is governed by the variety, but that length of internodes is subject to wide variation due to environmental conditions of soil and climate. The average length of each internode could easily be obtained by dividing the number of internodes into the length of shoot, but this figure would fail to disclose the huge range which might occur in a particular variety. For example, in the case of Ba 11569 plant canes it was noticed that the bottom internodes of each shoot were of immense length, halfway up the stem there was a sudden transition to short thick set internodes as broad as they were long. Nothing of a similar nature was observed on the first rattoon plot of Ba 11569, which points to some cause other than variety being responsible for this peculiarity.

Flushes of growth, followed immediately by a check in growth are often caused by extremes in weather conditions, (e.g. drought and floods), or by the attack of some insect pest or fungus disease. For each variety an increase in length of shoot of 1st Ratoons over plant canes is quite naturally accompanied by a corresponding increase in the number of internodes, and vice versa.

### (2) Average Diameter of Shoot.

The measurement of this character was facilitated by the use of a pair of steel callipers. For each plot, the average diameter of the central internode on every sugar-bearing shoot of randomised clumps was measured. In this manner every plot was treated, so that depending on the tillering power of the particular variety, from 30-60 readings were obtained for each plot, which was considered sufficiently accurate for the purposes of this experiment.
the 1st Ratoon crop. In B.H.10(12), a variety which possesses exceptionally strong ratooning qualities this falling off amounted to 11%, but in B 156 the reduction was as much as 17%.

TABLE V. Showing Diameter of the Central Internode in the 3 Varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Plant Canes</th>
<th>1st Ratoon Canes</th>
<th>Plant Canes</th>
<th>1st Ratoon Canes</th>
<th>Plant Canes</th>
<th>1st Ratoon Canes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.H.10(12)</td>
<td>1.0”</td>
<td>0.89”</td>
<td>0.89”</td>
<td>0.77”</td>
<td>0.83”</td>
<td>0.77”</td>
</tr>
<tr>
<td>B 156</td>
<td>1.04”</td>
<td>0.92”</td>
<td>0.92”</td>
<td>0.77”</td>
<td>0.98”</td>
<td>0.83”</td>
</tr>
<tr>
<td>Ba 11569</td>
<td>1.05”</td>
<td>0.83”</td>
<td>0.83”</td>
<td>0.77”</td>
<td>1.055</td>
<td>0.77”</td>
</tr>
</tbody>
</table>

(4) Density of the Cane.

With the figures obtained, a rough estimate of the total volume of cane per acre can be worked out. To convert this to the weight of cane per acre it is necessary to know the density of the cane, so this was found for each variety. It was essential to adopt a method of sampling which would damage the cane field to a minimum and at the same time give a reasonably accurate result, representative of the whole field.

The problem was undertaken in the following way:-

One shoot from five randomised clumps was cut and the central internode in each case used to determine the density by the usual specific gravity method. Five readings were thus obtained, the average figures for which appear in the Table below, together with the figures for sucrose content in each variety. No laboratory analyses were made to calculate the Sucrose content, but figures for previous years were borrowed from the College factory to supply the necessary data for these three varieties.

TABLE VI. Showing Density of Cane & Percentage of Sucrose in the 3 Varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>B.H.10(12)</th>
<th>B 156</th>
<th>Ba 11569</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density of Cane</td>
<td>1.095</td>
<td>1.045</td>
<td>1.055</td>
</tr>
<tr>
<td>Percentage of Sucrose</td>
<td>10.98</td>
<td>9.71</td>
<td>10.94</td>
</tr>
</tbody>
</table>

The above table gives fairly conclusive proof that a high density of cane is usually associated with a high sucrose content in
Having found the density of the cane, the equivalent weight of water can be calculated, and knowing that 1 cubic foot of water weighs 62.4 lbs, the weight of cane per acre in tons can be worked out. Given the figures for sucrose content it becomes a simple matter to arrive at an estimate for yield of sugar per acre.

### Field Results of S.H.10(12) and Be 1169 in Red Cane in Batches:

<table>
<thead>
<tr>
<th>Batch</th>
<th>1st Plant</th>
<th>2nd Plant</th>
<th>1st Returns</th>
<th>2nd Returns</th>
<th>1st Total</th>
<th>2nd Total</th>
<th>1st Net</th>
<th>2nd Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be 1169</td>
<td>9.38</td>
<td>9.96</td>
<td>9.32</td>
<td>9.96</td>
<td>8.73</td>
<td>8.73</td>
<td>8.42</td>
<td>8.42</td>
</tr>
</tbody>
</table>

The figures for the results of these trials are very similar to those obtained in the experiment. S.H.10(12) gives ample proof of its strong promise of years, and well deserves its reputation of being the best variety. Be 1169 behaves very indifferently in the early stages, but shows great promise in the later stages of growth. However, in the second year, it performs better than S.H.10(12), but not as well as Be 1169. The figures are given together in the table below:

### Sweet Potato Variety on the College Farm:

<table>
<thead>
<tr>
<th>Variety</th>
<th>1st Net</th>
<th>2nd Net</th>
<th>3rd Net</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massage</td>
<td>2.75</td>
<td>2.66</td>
<td>2.62</td>
<td>12.09</td>
</tr>
<tr>
<td>M. Arthur</td>
<td>2.47</td>
<td>2.42</td>
<td>2.47</td>
<td>9.36</td>
</tr>
</tbody>
</table>

S.H.10(12) gives an appreciably higher yield than Be 1169 in the first year, but in the third year the yield drops off considerably.

Be 1169 (12) to take the lead by a narrow margin. Be 1169
5. RESULTS OF PREVIOUS TRIALS WITH THESE VARIETIES.

Since all these three seedling canes were raised in Barbados, reference to yield trials in the land of their birth might prove profitable as a suitable means of comparison with the current experiment.

The following results were extracted from the Barbados Annual Report.

TABLE VII. Showing Results of B.H.10(12) and Ba 11569 in Red Soils in Barbados.

<table>
<thead>
<tr>
<th></th>
<th>Yield of cane/acre (tons)</th>
<th>lbs. per acre of Sucrose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plant Canes</td>
<td>1st Ratoons</td>
</tr>
<tr>
<td>B.H.10(12)</td>
<td>38.56</td>
<td>29.38</td>
</tr>
<tr>
<td>B 11569</td>
<td>33.23</td>
<td>24.90</td>
</tr>
<tr>
<td>B.H.10(12)</td>
<td>41.85</td>
<td>20.28</td>
</tr>
<tr>
<td>B 11569</td>
<td>42.22</td>
<td>25.99</td>
</tr>
</tbody>
</table>

NOTE. B 156 does not appear in any trials, so is evidently an unimportant variety.

In some respects the results of these trials are very similar to those in the current experiment. B.H.10(12) gives ample proof of its strong ratooning qualities, and well deserves its reputation of being the best variety for ratoon purposes. Ba 11569 behaves very indifferently in the ratoon crops and can only seriously be considered as a rival to B.H.10(12) in so far as plant canes are concerned. However, on the College farm these varieties have been grown together in field trials and contrary results obtained, as is evident in the Table below:

TABLE VIII. Showing Results of the 3 Varieties on the College Farm.

<table>
<thead>
<tr>
<th></th>
<th>Plant Canes</th>
<th>1st Ratoons</th>
<th>2nd Ratoons</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ba 11569</td>
<td>4.55</td>
<td>7.75</td>
<td>3.68</td>
<td>15.98</td>
</tr>
<tr>
<td>B.H.10(12)</td>
<td>3.92</td>
<td>6.85</td>
<td>3.94</td>
<td>14.71</td>
</tr>
<tr>
<td>B 156</td>
<td>3.83</td>
<td>2.47</td>
<td>3.43</td>
<td>9.73</td>
</tr>
</tbody>
</table>

Ba 11569 gives an appreciably higher yield than B.H.10(12) in the first two years, but in the third year the yield drops off considerably, enabling B.H.10(12) to take the lead by a narrow margin. Ba 11569
over a period of 3 years puts up undoubtedly the best performance, but the growing of this variety under certain conditions is not recommended. Unless the soil is in good tilth germination will be impaired, as complete insertion of the long noded cuttings will be found difficult. Moreover, this variety is rather susceptible to the Mosaic Disease, which is capable of producing serious consequences in badly affected areas.
6. COMPARISON OF ESTIMATED AND ACTUAL YIELDS.

TABLE IX. Showing a Comparison of Estimated and Actual Yields.

<table>
<thead>
<tr>
<th></th>
<th>B.H.10(12)</th>
<th>B 156</th>
<th>Ba 11569</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plant Canes</td>
<td>1st Ratoons</td>
<td>Plant Canes</td>
</tr>
<tr>
<td>Estimated Yield</td>
<td>63.73</td>
<td>45.54</td>
<td>77.38</td>
</tr>
<tr>
<td>Actual Yield</td>
<td>50.60</td>
<td>29.15</td>
<td>25.85</td>
</tr>
<tr>
<td>Percentage Error</td>
<td>26%</td>
<td>56%</td>
<td>203%</td>
</tr>
</tbody>
</table>

The above figures are proof of the unreliability of this system of measurements for yield estimation of sugar cane. Apart from the fact that the yields have been grossly overestimated in every case, the differences are far from relative and the percentage error shows a wide range of variation.

It is hard to account for such huge discrepancies, unless the number of observations was too small or the method of randomisation unsatisfactory. One would naturally expect the estimated yield to be slightly higher than the actual yield, as it represents the theoretical yield, and fails to make allowances for loss by evaporation at harvest and loss in transport from field to factory, but the excess of estimated over actual yield is out of all proportion to the effect of these factors as sources of loss in yield, so some other factor must be held responsible.

Moreover, there appears to be an entire absence of uniformity in the percentage errors, - a figure which should remain constant, ceteris paribus, throughout the varieties.

Since the detailed study involved in collecting data for estimating these yields was rewarded with such indifferent results, the present methods can at once be considered as being of little practical value. With slight modifications, however, it should be quite possible to evolve a workable method giving greater accuracy and requiring less effort.
<table>
<thead>
<tr>
<th>Shoots per clump. Mean</th>
<th>B.H.10(12)</th>
<th>B 156</th>
<th>B 11569</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plant Canes</td>
<td>1st Ratoons</td>
<td>Plant Canes</td>
</tr>
<tr>
<td>σ - Standard Deviation</td>
<td>3.81</td>
<td>3.46</td>
<td>6.48</td>
</tr>
<tr>
<td>Average length of shoot</td>
<td>5' 1&quot;</td>
<td>4' 1&quot;</td>
<td>6' 0&quot;</td>
</tr>
<tr>
<td>Number of Internodes</td>
<td>14.80</td>
<td>13.40</td>
<td>17.70</td>
</tr>
<tr>
<td>Diameter of Central Internode</td>
<td>1&quot;</td>
<td>.89&quot;</td>
<td>.92&quot;</td>
</tr>
<tr>
<td>Area of Cross Section (2πr²)</td>
<td>3.14 sq. &quot;</td>
<td>2.77</td>
<td>2.39</td>
</tr>
<tr>
<td>Volume of Shoot (Area of C.S. x Length)</td>
<td>.111 c.&quot;</td>
<td>.078</td>
<td>.120</td>
</tr>
<tr>
<td>Volume of Cane per Stool</td>
<td>1.119 c.&quot;</td>
<td>.857</td>
<td>1.526</td>
</tr>
<tr>
<td>Volume of Cane per Acre</td>
<td>2089 c.&quot;</td>
<td>1493</td>
<td>2658</td>
</tr>
<tr>
<td>Estimated weight of Cane per acre in Tons</td>
<td>63.73</td>
<td>45.54</td>
<td>77.38</td>
</tr>
<tr>
<td>Actual do.</td>
<td>50.80</td>
<td>29.15</td>
<td>25.85</td>
</tr>
<tr>
<td>Estimated weight of Sugar per acre in Tons</td>
<td>7.00</td>
<td>4.99</td>
<td>7.51</td>
</tr>
</tbody>
</table>

**Remarks:**
- Immature non-sugar bearing shoots were excluded.
- Arrows indicate significant differences worth noting.
- Length = distance from ground level to first green leaf sheath.

Stools 5' square = 1742 stools per acre.
Densities (1)1.095 (2)1.045 (3)1.055
1 cu.ft. of water = 62.4 lbs.

Percentage of Sucrose (1) 10.98 (2) 9.71 (3) 10.94
B. H. 10(12)

This well known Barbados hybrid, familiar to all cane farmers in the West Indies, is still hard to improve upon as a general purpose cane under a wide range of conditions. It thrives equally well on red and black soils, but is perhaps not quite so successful on the poorer classes of soils and sandy loams. It germinates rapidly and adapts itself readily to changes of environment, as is evident by its popularity throughout the West Indies. Of the Northern Islands, St. Kitts, Nevis, and Antigua grow this variety almost exclusively, and obtain high yields of good quality cane. It has now spread as far North as Cuba, where it has proved one of the best canes so far tested.

The most phenomenal success which this variety has achieved occurred in Porto Rico, where its introduction resulted in a huge increase in yield over the same acreage of cane grown.

It is an old established variety in Trinidad, and its performance in the current experiment enhances its already high reputation.

A casual glance at this variety on passing through the plots gave one the impression that it was a cane of extreme robustness and vigour of growth, at the same time being remarkable for its freedom from disease and its general uniformity of growth.

Figures in the current experiment seem to bear out these facts, as in the case of B. H. 10(12) the total weight of sugar per acre of plant canes and 1st ratoons is infinitely superior to either of the other two varieties.

The comparatively small reduction of yield in the first ratoon crop marks it as a variety admirably suited to Trinidad conditions, where the practice of ratooning is so extensively adopted. Over long periods of growth it will retain its vitality in a unique fashion, and still continue to produce high yields when other varieties would have died out through exhaustion.

Another equally valuable asset which this variety possesses
is its high sucrose content. It is by no means uncommon for this variety to give juice 2% richer than other varieties grown on the same land and under the same conditions.

Therefore, of the three varieties under consideration the writer has no hesitation in recommending B.H.10(12) as being the most satisfactory variety of cane under a wide range of conditions.

B. 1566.

This variety enjoyed great popularity in the West Indies a few years ago, but it has now been largely supplanted by new and improved varieties.

For several reasons it can be classed as an undesirable cane. It was noticed that there was a distinct tendency to root at the nodes and to send up a large number of late formed tillers, which failed to bear sugar in time for harvest.

Moreover, this variety produces such an abundance of vegetative growth during the first year, that there is always a grave risk of lodging, and if this occurs before the crop is fully ripe the yield of sugar will be considerably reduced.

An inevitable reaction takes place in the second year's growth, as is obvious by the huge falling off in yield in the ratoon crop. It might be argued that this variety would be useful in places where ratooning is not practised, as in Java, but against this must be offset the huge increased cost of harvesting and transporting a bulky cane of low sucrose content. It is therefore not surprising that the distribution of this variety has been far less widespread than in the case of the other two varieties.

Ba 11569.

The reports from different sources on the behaviour of this variety are in all cases conflicting.

In Barbados, where 90% of the 1926 plantings were devoted to this variety, it appears to have found no difficulty in establishing itself during the first year, since it yields as high and often higher than the famous B.H.10(12). However, in the ratoon
crops it deteriorates so rapidly that it ceases to be a rival.

On the College farm Ba 11569 has attained great success by heading the list of varieties for tons of sugar per acre over a three year period by a comfortable margin.

The results of this variety in the current experiment are hardly so encouraging. The exceptionally low yield in the case of plant canes was due to poor germination, and as a result frequent supplying had to be resorted to. By reason of the long noded setts which are hard to insert completely, the capacity for germinating in this variety is extremely weak. Moreover, an additional drawback to the long nodes lies in the fact that the canes themselves are weaker, and the incidence of lodging is therefore greater, as was strikingly borne out in the first reticule plot of this variety in the current experiment. Under the circumstances therefore, it is advisable to reject this variety in favour of others, unless the condition of the seedbed at planting out is ideal for rapid germination.
BIBLIOGRAPHY.


6. Sugar Cane Varieties. F. S. Earle (Cuba)

RAINFALL GRAPH

Rainfall in Inches

Jan  Feb  Mar  Apr  May  June  July  Aug  Sep  Oct  Nov  Dec

1928

1929

1930

Narrating