

REPORT OF THE COMMITTEE ON DETERMINATION OF FIBRE IN CANE

The Congress resumed at 2:15 p.m.

The above paper was read by Mr. G. S. Moberly:

This Committee was first appointed in 1927 consequent upon the inclusion of the following paragraph in the Fahey Conference Agreement:—

“Owing to the lack of information on a rapid and reliable method of determining the fibre content of individual consignments of cane, we recommend that such adjustment should stand over until the Industry has had an opportunity of devising some suitable method of testing.”

The first report from the Committee proposed the use of a semi-indirect method based on presumed constants, such as Normal Juice Factor and Crusher Juice % Normal Juice. The only test proposed was Moisture % Bagasse.

Reporting again in 1929, the Committee decided that the above method was unsatisfactory owing to the uncertainty of the constants, and a variety of lixiviation methods was proposed for trial. In the same year a paper was read by Mr. R. M. Bechard, then a member of the Committee, giving the result of series of tests, which showed that the quantity of juice expressed from cane under given conditions was proportional to the fibre and that both were proportional to the Java Ratio. Similar conclusions had been reached earlier by Mr. G. C. Dymond, as a result of experiments carried out at Empangeni.

During the 1929/30 Crushing Season a number of tests were carried out by the S.A. Cane Growers' Association. These fell under two heads:—“A,” trials of lixiviation methods; “B,” experiments designed to verify the results of Messrs. Bechard and Dymond on the effects of fibre on extraction. Most of the lixiviation experiments were unsatisfactory, as it was found that constituents of bagasse other than sucrose were hydrolysed and dissolved. A fairly satisfactory method based on a short immersion in hot water was evolved, but an attempt to apply this on a factory scale was vitiated by the large sampling error. Tests of the extraction method did not give as satisfactory results as earlier experiments had led us to expect. This is considered to be due to the fact that the shredder employed acted differentially on different canes thereby affecting the subsequent extraction in the press.

In their 1930 report, which dealt with the above experiments, the Committee pointed out that the real importance of fibre testing lay in the possibility that it would present of assigning to each load of cane an appropriate Java or Natal Ratio

and thus assuring a fairer distribution of sucrose. In order to keep attention focussed on this primary aspect of the problem the Committee recommended that consideration be given to the idea of abandoning the provisional Fibre Bonus and Penalty Clauses of the F.C. Agreement which tend to obscure the real issue. This recommendation was endorsed by the Conference.

During the 1930/31 Season a number of tests were made of hand samples consisting of 10, 20 and 40 sticks, but the general result of these tests was to show that the sampling error is such as to render useless any individual fibre tests based on hand samples.

The result of four years' work shows that we are still a long way from evolving a satisfactory method of making individual fibre tests. The Committee feel strongly that the whole attitude of approaching the problem should be altered. The idea of fibre tests as such should be dropped. Experiments should be directed towards obtaining information on the varying “millability” of different canes and the establishment of methods for assuring a fairer distribution of sucrose between individual consignments. The title and terms of reference of this Committee should be altered and the whole problem should be tackled anew from this standpoint.

From the new angle of approach the Committee feels that the tests of extractability would repay further trials. In spite of certain discrepancies, it seems fairly well established that the quantity of juice extracted bears a direct relationship to the Java Ratio. At present this is more apparent in the average of groups of tests than in individual tests, but better standardized conditions of experiment would probably enable us to extend the method to individual tests. Arising from this, it seems probable that very useful results could be obtained were it possible to weigh or measure the first extracted juice separately. The difficulty of such a procedure is well appreciated, but the possibility should not be lost sight of. The Committee feels therefore that an effort should be made to weigh or measure primary and secondary juice separately, and if possible to determine a ratio based on the proportion of primary to total juice.

Another method seems to hold out a certain amount of promise. A series of experiments conducted by Mr. Dymond at Empangeni, and by Mr. Christianson at Gledhow, during the past season, show a certain concordance between the purity drop from First Expressed Juice to L.P.M. Juice and the Java Ratio. The results at present (due probably to experimental difficulties), are not very definite, but experiments in this direction should be continued

and possibly extended to the drop from First Expressed to Residual Juice, though the results in this case would be somewhat obscured by the return of low juice for compound imbibition.

Whatever lines of experiment may be pursued in future, it should be borne in mind that "millability" and sucrose distribution are to be considered as of greater importance than the determination of fibre % cane.

Members of Committee:

G. C. DYMOND.
O. A. FELTHAM.
W. O. CHRISTIANSON.
J. C. R. BIJOUX.
J. RAULT.
G. S. MOBERLY (Convenor).

Mr. DYMOND: The whole of this problem of fibre has been obscured by the use of the word "fibre." We thought that fibre was a constant, whereas it is not; it is a variable, and a very decided variable. Its physical characteristics vary in the different varieties from hard and brittle, to soft and spongy. While hot water dissolves fibre in varying degrees according to the physical characteristics of that fibre, the chemical consistency of fibre in cane is based on hypothetical formulae, which are to my mind entirely valueless. "Millability" is a word coined to express the milling qualities of cane as measured by the volume of juice expressed at a given pressure, and is of practical value, and must one day be the basis for the evaluation of cane. So far we have not got any practical method of measuring the amount of juice expressed from different varieties, except from a number of experiments carried out in hand mills, and I think this problem will eventually reduce itself not so much to the scientific or accurate determination of the amount of juice, but rather an arbitrary standard; that is, that every type of cane would be separated into fairly wide degrees whereby the amount of juice expressed would be correlated with an arbitrary Java ratio. As you know to-day in the distribution of sucrose in cane there are a lot of errors attached to it, and I think future progress in the more correct distribution of bagasse will be along the lines of the amount of juice—in other words, the millability of the different varieties of cane.

Mr. BECHARD: Considering that the sampling error has been the stumbling block for testing for fibre would not the sampling error also act in the same way so far as millability is concerned?

CHAIRMAN: We hope that whatever method is eventually produced for testing for millability it may be one not based on a hand sample. We cannot outline at the present time what it would be.

One suggestion put forward is a separate measuring of the first expressed juice, in which case the actual quantity extracted would be the measure of millability. Whatever we do we will have to bear in mind that hand sampling has little if any value.

Mr. DYMOND: The Committee went even further and considered that the volume of juice should be measured not from the first unit but from the first three units, that is including the first mill. Under such conditions we anticipate that the relationship between the volume of juice expressed and the Java ratio would be much more accurate.

Mr. BECHARD: A point is mentioned about a paper I read two years ago. My paper was not exactly on the point of extraction but from the point of feasibility of sampling the bagasse after the primary pressure had been exerted on it. This is more the line I took at that time and I still feel there is a certain amount of investigation to be done in that direction. Of course if the primary juices can be measured that will solve a great many difficulties. Another point is the question of field refuse or trash in the cane. Last year at the mill where I was we started a small war on the untrashed dirty cane, and the result was very obvious in a very short time. We had consignments of cane with as much as 17 per cent. of field refuse in it. This to my mind is the biggest unfairness of the whole Fahey Conference Agreement, the supply of cane with up to 17 per cent. trash should receive a percentage of sucrose based on the analysis of juice, when probably instead of there being 85 per cent. of juice these may be only 65 per cent. Mr. Dymond noted some figures last year saying that the Java ratio varied about 1.3 for every degree of fibre. I did not get quite the same figures, but my own figures worked out to vary about 0.9 for every degree of fibre. That is if the cane contained 75 per cent. of juice, instead of 85 per cent., the Java ratio should be reduced by approximately 9°, in other words, cane showing 14 sucrose should only contain about 11.5, and yet when you come to apply the Java ratio there is a planter receiving payment for trash, and this payment he is receiving is being taken from his fellow planters, planters supplying good fair marketable cane. The biggest problem of all to my mind is to keep down that trash. It is unfortunate we have not a standard here where cane is tested for trash. I believe they have one in Hawaii. In Portuguese Zambesi they are allowed 3 per cent. of trash, and if there is anything beyond that the field overseer knows all about it. Every day tests are made, and that is applied to all the consignments. I consider 3 per cent. a very good figure to work on, and cane should not be allowed in mills with more than 3 per cent. Consider the effect on the rollers, besides the fact that you are taking money out of the good planter's cane to pay for the inefficient planter. That is a matter that requires looking into.

Mr. DYMOND: I would like to point out that the valuation of cane on a millability basis would obviate the points that you have raised and that trash would naturally retain a certain amount of juice, which would automatically lower the Java ratio applying to individual planters. In the same way the question of wet cane could also be solved if we could have a basis of millability.

Mr. BOOTH: I thought the various riders added to the original Fahey Agreement provided that the Mill Manager had a certain amount of discretion with regard to rejection of cane with trash. I would like to ask Mr. Dymond if he seriously suggests it as a practical proposition to separate primary and secondary juice in the working of a factory. I do not call in question his "millability"; I have long recognised that, in fact I have put it in practical effect.

Mr. DYMOND: As a matter of fact I was rather surprised when I saw in this report the suggestion that both juices should be weighed. I don't think that is the idea I had in my mind. The idea was that the mixed juice would be weighed as is the practice to-day, but that in some way the volume of the primary juice should be measured. That to my mind is not an insuperable difficulty. It would mean a series of one or two thousand gallon tanks alternately filled and emptied. There are certain practical difficulties attached to it, but I do not think they are insuperable, bearing in mind the fact that the the idea was not to apply that volume to individual consignments but rather to take the average for a week.

Mr. BECHARD: I take it you suggest the cane would be separated on the cane carrier and in the milling plant right through until the last unit of the primary plant has completed its work. That is rather a difficult proposition, is it not?

Mr. DYMOND: I think you are rather confusing the issue. To-day we have a distribution of sucrose in which you will admit the errors are very large. You have brought up the point of the difficulty of separating individual consignments on the carrier. There is that difficulty, but the error involved taken over a period of a week would not be so great. The errors would not be so great as the errors incurred to-day in the distribution of sucrose.

Mr. BECHARD: I was not querying the question of errors. My point is the difficulty in the milling plant. By the time the cane has reached the third roller the first roller would be working dry practically. At certain mills where you have small consignments of four to five tons it would mean delay on the carrier every time a new consignment arrived.

Mr. DYMOND: I don't think it would be practicable under those conditions with small consignments.

CHAIRMAN: I think the Committee realised this was a difficult proposition and only put it in tentatively and said they realised it was difficult. It was thought that as most difficulties can be overcome with trial and experiment and patience that there was a possibility that the numerous difficulties in connection with this might be overcome in some way. At any rate we wanted to open up the avenue for investigation.