

Report of Committee on Cane Burning

The practice of cane-burning in Natal, was started some 25 to 30 years ago by the late Colonel Addison. The reasons were entirely economic—there was a shortage of labour, and burning away the trash, considerably reduced the cost of harvesting. That the trashing of Uba cane is a particularly difficult operation may be gauged from the evidence given by Mr. C. N. O'Brien, Government Sugar Technologist, Queensland, recorded in the Board of Trade Report, 1926. He stated that if other canes than Uba could be successfully grown in South Africa, the necessity for burning would cease to exist. Mr. O'Brien added, that no cane of which he has any knowledge, holds its trash with anything like the tenacity of Uba.

The practice of cane-burning gradually spread northward, and when Zululand was opened up, it was universally adopted there. The Industry is divided roughly into two sections, to the north of Tugela the universal practice is to burn, and trashing is almost equally universal south of Tugela.

Millers have consistently deprecated the practice of burning, many contracts containing a provision prohibiting it, and the Zululand millers have from time to time endeavoured to bring the practice to an end.

The question arose as far back as 1912, and was discussed at some length in the Beaumont Arbitration. In that award, Sir William Beaumont decided that Millers were not entitled to refuse burnt cane merely for the fact that it had been burnt.

The Sugar Enquiry Commission of May, 1922, better known as the Baxter Commission reported as follows:—

"The practice of burning cane prior to cutting, is universal in Zululand, and it also prevails to a greater or less degree on the majority of estates and farms in Natal. The reason for this would appear to be that Uba cane is very difficult and expensive to trash." i.e., "to remove leaves from the cane, and it is the cheapest and easiest way to trash by fire. Labour difficulties have also encouraged this practice. From an agricultural point of view, burning the trash is exceedingly harmful and destroys what should be returned to the soil as valuable manure. The consequent loss to the ensuing crop from lack of humus is great, besides which, trash left on the field and ploughed in, naturally helps to retain moisture and check the growth of weeds. In our opinion the decline in the yield per acre in Zululand has much to do with the practice of burning cane and the non-return to the soil of plant food.

The burning of cane seems to be detrimental also from the miller's point of view. In terms of the Beaumont Award, 1912, they have to accept burnt cane and pay for it at the same rate as unburnt cane, it having been held that, if the cane is milled within a reasonable time after being cut, the sucrose content does not suffer. It appears to be true, however, that it is difficult to regulate with any exactness, the quantity cut, and that

frequently more cane is burnt than can be conveyed to the mill in a reasonable time. We are told that the chemical changes in burnt cane are very rapid, inversion soon takes place, and the resulting juice is difficult to treat."

The question again arose in the Sugar Conference, held in November, 1922, under the presidency of Sir Howard Gorges. The following is an extract of the report in connection with the subject:—

Prinsen Geerligs, Noel Deerr, Dr. Tempany and Dr. Maxwell, who may be considered experts of International repute, having experience in different parts of the world, condemn the practice of burning cane, and it is admitted that the mere fact of putting fire to the cane has a tendency of killing the cells and accelerating the process of inversion.

Acting on the recommendation of the Commission it is necessary that the burning of cane should be discouraged. With this, the millers are faced with a big practical difficulty. It is generally stated that burnt cane will last 2 days, 3 days or 4, or in some cases 5 days, but it must be acknowledged that climatic conditions govern the rate of inversion in burnt cane, and the experience of Sir J. L. Hulett and Sons, Ltd's mills in Zululand also goes to show that ordinary chemical analysis of the cane frequently fail to reflect the impurities that are encountered in burnt cane of 4 or 5 days, in the mill.

As an example, burnt cane, which is 5 days old, may be delivered at the mill, and the analysis of same shows that its sucrose content is high, its purity fairly good, and glucose ratio only slightly above normal, but with the juice from this class of cane, great difficulties are encountered in the manufacture.

Leaving alone entirely, the agricultural point of view, and dealing with the question entirely from a miller's point of view, it is evident that analysis alone does not fully reflect the contents of the cane.

It is impossible to lay down any hard and fast rule, but it should be accepted as a principle that the burning of cane is detrimental, and its practice should be put an end to.

It is not suggested that every Planter in Zululand should cease burning his cane, but we do suggest after discussion, that a time or period should be given (say 3 years) at the expiry of which, the burning of cane should be illegal.

The Commission recommends that a penalty should be placed on burnt cane, and a higher payment made for hand trashed cane. The benefits to a mill getting a quarter or half of its supply of cane trashed is very doubtful, as whatever benefit may accrue to the mill, can be easily dissipated by an ingress of burnt cane at different times."

In the Report of the Board of Trade and Industries (No. 66, 1926) on the Sugar Industry, the following statement is made:—

"In short, as trash burning is generally admitted to be

injurious to the interests of the burner himself, as well as seriously detrimental to the welfare of the entire industry, the Board has no hesitation in associating itself with the view that a higher price should be paid for hand trashed cane than for burnt cane. The Board is further of opinion that after the suggested price differentiation has been given effect to for a period of five years, legislation should be passed totally prohibiting the trashing of cane by fire."

The Fahey Conference Agreement of 1926, contains a clause to the effect that "Cane may be hand trashed or burnt at planters' option, but all parties agree that the burning of cane before cutting should be discouraged."

All the above statements are based upon general experience only, and apparently are not substantiated by any scientific data.

The analysis of millers' conclusions at the present day, show that 50% of the millers that were good enough to reply to the questionnaire prefer burnt cane, 30% trashed and 20% have no preference.

So far as the present day opinion in the industry is concerned, it is impossible to say that opinion has crystallised on the planters' side. The older estates in Natal, continue trashing and advance evidence in support of the practice. They claim that burning is particularly suicidal on many of our sandy coast lands which are so deficient in humus.

On the other hand, the more recently established planters on the North Coast and Zululand point to savings in labour costs, and assert that as far as present day experience has gone, there has been no reduction in their crops in consequence of this practice, although it is stated in the Duncan Baxter Report, that the reduction in tonnage per acre is due to this cause. Comparatively few farmers have had any long experience of both practices. Experiments in this respect have only just commenced, and it is therefore exceedingly difficult to make any proper comparison.

In connection with the work of the Natal Sugar Experiment Station, experiments are being conducted at Tinley Manor and Empangeni, to study the effects of the two practices on the quality and yield of cane. The most recent results were published in the Experiment Station Report for December, 1926, after the harvesting of the first ratoon crops in each series. At Tinley Manor, there was a decided difference in yield of cane, while the results at Empangeni were not so definite. The results of the later ratoon crops should add to our knowledge.

The following results were obtained in Mauritius:—

	Yield per acre in tons		
	Plant	1st Ratoon	2nd Ratoon
No. 1.			
Trash buried	35.76	31.50	21.48
Trash left in field	35.54	35.72	25.52
Trash removed from field...	34.76	28.72	21.44
No. 2.			
Trash buried	27.62	32.25	25.56
Trash left in field	26.15	32.86	23.56
Trash removed from field...	22.62	28.86	19.24
No. 3.			
Trash buried	33.06	34.37	26.39
Trash left in field	33.52	33.02	25.43
Trash removed from field...	31.07	31.72	22.48

ARGUMENTS IN FAVOUR OF BURNING AND TRASHING FROM AN AGRICULTURAL STANDPOINT CONTRASTED.

(a) *Cost of Cutting*.—There is no doubt that as far as cutting costs are concerned, the cane burning system has a great advantage, and was probably the sole reason for its adoption. It is generally assumed that the cutting costs are roughly halved by burning, but this only applies to the alluvial flats where the tram line can be brought up close behind the cutters. On hillsides, and at any point where a heavy carry is involved, the economy through burning is possibly reduced.

(b) *Cultivation of Ratoons*.—There is insufficient evidence available to show which system is the most economical in connection with the cultivation of ratoons.

A field can be thoroughly cultivated after burning by pony ploughs and scarifiers, and fertilising can be easily carried out.

Pony-ploughing and scarifying appears to be more or less a standard practice in connection with burning, but amongst planters who trash, there is considerable variation in practice. Some leave their trash undisturbed for some months after cutting, thus avoiding any necessity for cultivation caused in that period, the trash being subsequently pulled into the middle of the lines. Others remove the trash into alternate lines, pony-ploughing and scarifying those left free, while others follow minor variations of these practices. It will probably be found that planters on steep hillsides, avoid disturbance of the soil between crops to prevent erosion.

(c) *Destruction of Humus*.—As far as Natal conditions are concerned, no conclusive evidence is available to show the effect of burning on the humus content of the soil; but it has to be remembered that the practice of cane-burning has been carried out almost exclusively on the newer sugar areas. Experience elsewhere with other varieties goes to support the trashing system. But if there is no evidence to show that the destruction of humus affects subsequent crops of cane, there is very definite evidence to show that the addition of organic matter in the form of a green manure crop (both leguminous and non-leguminous) has a very favourable effect on subsequent crops (see Experiment Station Reports).

(d) *Soil Moisture*.—The layer of trash left on the surface of the land after trashing, should play an important part in the conservation of soil moisture, a vital factor in view of the low rainfall in Natal.

(e) *Pest Control*.—It is stated by certain planters that the burning of trash destroys injurious insect pests. Some authorities state that this advantage is not as great as it would seem, for burning is likely to destroy the parasites of insect pests as well.

(f) *Vitality of Cane*.—It is a well known fact that the ratoon crop comes away better when the trash of the previous crop has been burned before harvesting the cane. This, however, is only a temporary advantage, the trashed cane soon catching it up.

It is thus impossible, with the present data on the subject to draw any definite conclusions regarding the superiority of either practice from an agricultural standpoint.

ARGUMENTS IN FAVOUR OF BURNING AND TRASHING FROM THE MILLERS' STANDPOINT CONTRASTED.

To obtain an expression of the opinion of the millers in this country, a questionnaire was recently issued. The questionnaire was sent out to 22 mills, and 13 sent in replies. Of these, however, only 11 included answers to the questionnaire. Of these, 2 mills crush trashed cane only, 2 crush burnt cane only, and 7 crush both burnt and trashed cane. 6 of the mills prefer burnt cane, 2 specifying that it should be freshly burnt.

Trashed cane invariably has a certain amount of trash still adhering to the cane. One mill reports that during wet weather, as much as 18% trash had been found on cane delivered at the mill. In view of this fact, it is customary at mills receiving trashed cane on small trucks, to burn away as much of the trash as possible in the mill yard before crushing.

Three mills prefer trashed cane, and two have no particular preference, provided the cane is clean and fresh and perfectly trashed.

The main reason for the preference of the two schools of practice is as follows:—Burnt cane is favoured by the one, because, as stated above, the trashed cane is almost invariably accompanied by an excessive amount of trash. This produces errors in the weight of cane, and has a tendency to reduce the extraction of the mills by increasing slipping and chokes, by augmenting the weight of bagasse. The other favour trashing, because with burnt cane considerable areas are sometimes burnt previous to cutting, and as a result, several days elapse between burning and milling. With trashed cane, there is a better guarantee of its freshness.

Other reasons advanced are that the wear and tear on machinery is increased by burnt cane, due to the amount of sand and grit which adheres. Another mill claims that the wear and tear is greater with trashed cane, because of the slipping of the mill rollers. It is also stated that juices from trashed cane are much cleaner than those from burnt.

Fifty per cent of the mills find no difference between the juices from burnt and trashed cane with respect to clarification. The preference among the remainder is equally divided. It is claimed that the juice from burnt cane contains more impurities, especially potassium salts, and that in the manufacture of white sugar, the minute particles of burnt trash spoil the colour of the sugar. As stated above, cane which has been burnt for some time previous to cutting and milling, presents certain serious difficulties in clarification. It is also claimed that there is a quicker settlement in the juice from burnt cane.

Unfortunately, no mills were able to give comparable returns dealing with burnt and unburnt cane in respect to recovery and purity of juice. One mill, however, made the following comment:—

“It has been apparent to us that burnt cane as a rule, gives a higher crusher juice purity than trashed when the cane is in good condition, but if for any reason, fermentation once sets in, burnt cane deteriorates more rapidly with a very noticeable drop in purity, and even when good burnt cane is subject to a shower of rain, a decided drop in purity is apparent in the crusher juice, while trashed cane remains practically unaffected. We have no records to substantiate this.”

The Committee is of the opinion that in the absence of scientific data, it is impossible to make any definite recommendation at the present time. They strongly urge that the industry should place sufficient funds at the disposal of the Experiment Station which will enable it to organise experiments over a series of years in all parts of the sugar belt by which the comparative merits of the two systems may be adequately tested.

The committee would like to take this opportunity of expressing their appreciation to those mills who replied to the questionnaire and to those planters who expressed their opinions on the relative merits of the two practices.

Chairman: I think you will agree this is a very valuable summary of the information to date on a very important and vexed question. The subject matter of the next paper is intimately bound up with this report, and I would suggest that it may be read and the two papers discussed together.

Committee on Cane Burning.

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