

## EXPERIENCES WITH COMMERCIAL BAGGING OF "C" SUGARS IN LUABO-MOCAMBIQUE

By T. COVAS

Luabo is a sulphitation white factory, where in addition to mill white, or plantation white sugar for direct consumption in the Province of Moçambique, high polarising raw sugars are also manufactured for refineries in Portugal. The market requirements are about 70 per cent whites and 30 per cent raws.

Until recently the practice has been to bag all "A" sugars as mill whites, "B" sugars as raws and "C" sugars melted and returned to Syrup.

No double curing facilities for "C" sugars being available, this could not be used with confidence as seed for "A" and "B" massecuites. The "C" massecuites generally cured well, but an occasional uneven grained, badly curing strike upset the entire vacuum pan routine, causing difficulties in boiling an acceptable white sugar.

Therefore, melting of all "C" sugars was adopted as a standard procedure, although occasional experiments were carried out to dry and bag this sugar, without much success. The final product was either low in polarisation or dark in colour, or both, and in any case unacceptable for the Refineries.

Our "C" Battery comprises 8 Broadbent Centrifugals 42 in. by 24 in. at 1,800 r.p.m., with facilities for thermostatically controlled reheating of massecuites in a receiver above the machines.

During the past crop a change was made in the seeding methods of "C" massecuites. The previous icing sugar seeding was replaced by a slurry, which was made in a laboratory ball mill. 120 ccs. of slurry

(containing 50 grs. of sugar) was used for making 2 "C" strikes of 900 cu. ft. each.

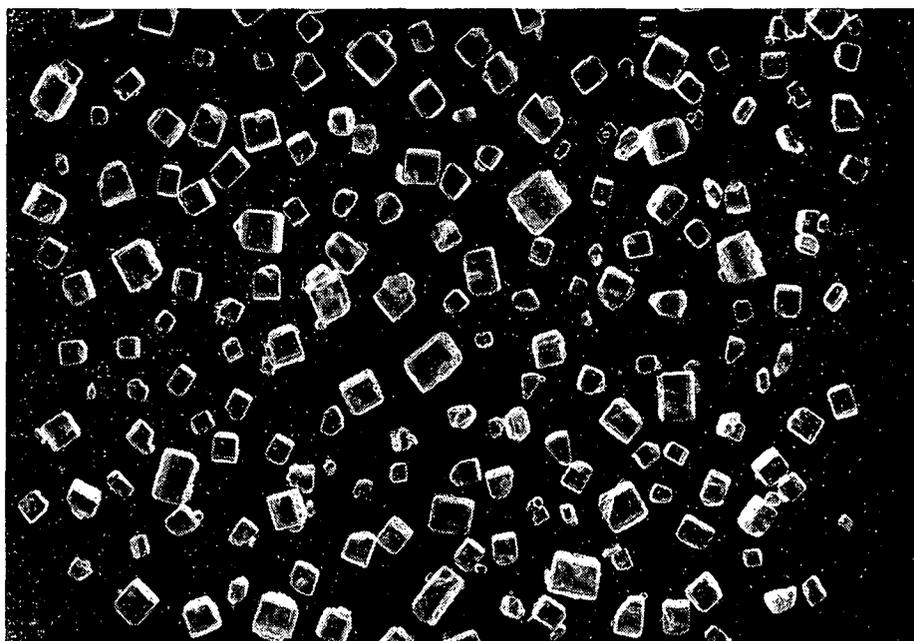
The introduction of slurry seeding of "C" massecuites had a most gratifying result. The grain size became even (maybe a shade on the large size, with an average specific grain size of 0.32 mm.) and the final molasses became much better exhausted.

Considering that the mixed juice was of high purity, over 86, the final molasses exhaustion with 39 clerget purity was considered acceptable. The brix of the final molasses rose from 91 to 94/95 and the quantity of molasses decreased correspondingly. For many weeks it was 2.3 per cent on cane and only towards the last weeks of the Crop rose above the 3 per cent.

The single cured "C" sugar was of light colour (the "C" massecuite had an average total colour of 800 at 560 m  $\mu$ ) dry, and polarised in the range of 92°/94°.

This sugar was considered to be too good to be melted. Economic considerations prompted us to find a more suitable method for its utilisation, as Luabo Factory has a considerable steam deficiency (through circumstances beyond our control) and every pound of steam which could be saved meant less additional fuel required.

Thus the single cured "C" sugar was mingled with "A" wash to form a magma of 90° Brix and pumped to a mixer, where it was mixed with single cured "B" sugar. When necessary, further "A" wash was added to bring this magma to 90° Brix.



This mixture was then double-cured and washed, with a minimum quantity of water, and steam dried in a rotary dryer.

The resulting sugar was of very light colour (having a total colour varying between 200/300 at 560 m  $\mu$  or total Lovibond colour of 12/15) and polarised at 98.6/99.0°. It had a specific grain size of 0.50/0.55 mm. which, although smaller than desired, did not perturb us as this sugar was earmarked for a Refinery where it was to be melted. Important consideration was the filtrability rate, which was between 35 and 40 per cent. Keeping quality of it was excellent, with 0.20 per cent moisture and a safety factor of 0.15.

The foregoing procedure appears to have achieved the following advantages:

1. By bagging all the "C" sugars, the recirculation of non-sucrose has been considerably reduced.
2. The quantity of remelt was reduced to a minimum and for all practical purposes eliminated. Accordingly, less "A" boilings were required, resulting in economy in consumption of steam and fuel.
3. Less "A" massecuites reduced the overall quantity of molasses, thus increasing the capacity of the Panfloor, Crystallisers and Centrifugals.
4. Due to less recirculation of molasogenic non-sucrose, the quantity of final molasses was reduced, thus reducing sucrose losses at this station (from 8.7 per cent in 1962 to 8.3 per cent in 1963).
5. The reduced sucrose losses in final molasses, resulted automatically in increased Boiling House Recovery and Overall Recovery from 89.2 and 83.5 per cent in 1962 to 90.2 and 85.0 per cent in 1963, respectively.

The following are the disadvantages of this process:

- (a) Very careful attention is required in boiling of "C" massecuites. If the grain is too small, or uneven, or false grain is present, the curing is unsatisfactory, resulting in low polarising, moist dark sugar. Such sugar is unsuitable for mixing with "B"s and invariably difficulties are experienced in double curing such mixture.
- (b) By eliminating the remelt, only a negligible quantity of high grade liquor is available for mixing with virgin syrup for "A" massecuites. It is suspected that this may adversely affect the colour and quality of mill white sugar, especially in cases where back-boiling of molasses is practiced.
- (c) Somewhat larger Dryer capacity is required, as with this sugar it is more difficult to achieve a satisfactory dryness.

**Conclusion:** Where market conditions permit the manufacture of an average quality of mill white sugar (colour index  $\pm 150$ ) and where a high quality raw sugar is required (minimum polarisation 98.5°), the bagging of "C" sugars, together with "B"s is economically a most rewarding procedure.

**Mr. Boyes:** In order to compare our method of making slurry with your method I would like to explain what we do. We use the method described by Beesley, that is, a ball mill and methyl alcohol. 1,800 cc. of slurry produces two strikes and yet you manage to achieve this with 120 cc. of slurry, and therefore your grinding and technique appear to be better than ours, in that you are not dissolving any grain — a true seeding method.

You say on page 2 that "by bagging all the 'C' sugars, the re-circulation of non-sucrose has been considerably reduced". But you appear to be melting part of your "C" sugars by means of wash, thereby removing the surrounding non-sucrose layer and are in effect re-circulating your non-sugars.

**Mr. Covas:** For our slurry we use Dettmars Slurry Mill. 600 cc. of ordinary mill white sugar is added to 1,200 cc. of methylated spirits. The mill runs for four hours and the final volume is 1,500 cc., of which we use 120 cc.

As regards reduction of circulation of non-sucrose. Previously we melted all our "C" sugar, therefore all the non-sucrose was returned to the syrup. Now we are double curing the "B" and "C" sugars and only a minimum quantity of wash is received. We determine the purity of the "B" wash and return it either to the "B" or "A" molasses.

**Dr. Douwes Dekker:** On page 2 Mr. Covas says "the quantity of final molasses was reduced". What does he actually mean by this and how does he explain it? The quantity of final molasses is the amount of non-sugars in clarified juice, plus the amount of sucrose retained in the molasses plus the amount of water in final molasses. A reduction can only be brought about by a drop in the rate of inversion compared with the previous year. Otherwise you will have the same amount of non-sugars.

**Mr. Covas:** We assume that as we are not returning our "C" sugar, still containing a certain amount of final molasses, to the "A", it must be going out in the form of more final molasses.

**Dr. Douwes Dekker:** The total amount of final molasses is the amount of final molasses discharged plus the amount retained in sugar.

The polarization of your "B" sugar is the same and contains the same amount of final molasses. If you are now producing less final molasses as such, and your sugar polarization stays the same, then you must have less non-sugars in the final molasses. Is this possible? Could you have had a higher purity of your mixed juice, or less inversion?

**Mr. Covas:** There definitely was less inversion.

**Dr. Douwes Dekker:** Had you had a lot of inversion?

**Mr. Covas:** Some — not a lot.

**Dr. Douwes Dekker:** According to the figures there was a reduction from 8.7 to 8.3 so you must have had a lot of inversion.

**Mr. Covas:** We used to when all the "C" sugars were being re-circulated. We are now using high speed centrifugals producing a first class "C" sugar which is completely dry. Before these were used the "C" sugar was moist and contained a lot of invert and molasses which went back to the "A" sugar.

**Dr. Douwes Dekker:** But it was not discharged in the "A" sugar. When you introduced this did the polarization of your raw sugar drop?

**Mr. Covas:** No.

**Dr. Douwes Dekker:** Was it about the same? Did the sugar contain the same amount of molasses?

**Mr. Covas:** Yes.

**Dr. Douwes Dekker:** Then the purity of your mixed juice must have been higher.

**Mr. Covas:** The mixed juice purity was about the same.

**Mr. du Toit:** Is it not possible that you are not expressing your molasses as brix, that possibly the brix matter increased?

**Mr. Covas:** It is a curious anomaly that the brix of our final molasses did increase. We had difficulty handling it at 94, 95 brix and had to heat it and even then were not always able to pump it. Our molasses is sold on condition it is not diluted and this increases our difficulties.

**Mr. Gunn** (in the chair): Is the acceleration rate of your 1,800 r.p.m. centrifugals slow, medium or fast?

**Mr. Covas:** I would describe it as medium. We achieve a high acceleration after four minutes.