

## TECHNICAL NOTES

**EFFECT OF MILL WHITE SUGAR IN THE CANNING  
OF PINEAPPLES**

Since the cost of transporting refined sugar 1,000 miles from Brisbane to Cairns appreciably increased pineapple canning costs at Cairns experiments were conducted to determine whether mill white sugar could be substituted for refined sugar in the canning syrup. It was understood that Hawaiian pineapple canners had used washed raw sugar during the Second World War due to the shortage of refined sugar, but the practice was discontinued immediately supplies of refined sugar returned to normal, and that experiments conducted in Fiji had not given encouraging results.

Cruess (1948, 1958) pointed out that "centrifugal sugar" and "plantation clarified" (presumably similar to mill white sugar) was once used for the canning of dark fruits where the amber colour of the syrup would not be an objection.

As a result of examinations made over a number of years, the Queensland Bureau of Sugar Experiment Stations was able to advise that Queensland mill white sugar was likely to be contaminated with bacteria, particularly thermophilic types, to a much greater extent than refined sugar.

Hucker and Pederson (1942), in an extensive review of the microbiology of commercial sugar and related sweetening agents, indicated the importance of using sugar with a very low bacterial count in sugar syrups used for canning. Papers referred to in the review, including Cameron and Bigelow (1931) and Cameron and Yesair (1931), discussed the use of bacteria-contaminated sugar in non-acid canned packs but made no reference to acid foods such as pineapple, presumably because of the comparative ease with which acid foods are sterilized.

**Procedure**

In order to evaluate the effect of mill white sugar in the canning syrup 16 oz cans of choice-quality sliced pineapple were used at two stages of maturity, namely just ripe and very ripe. Syrups were heated for 0, 4, and 8 hr at 200-205°F to simulate the treatment that a tank of syrup might receive before being filled into cans. On some occasions syrup was kept near boiling point all day when factory intake was small. Three syrups were used, namely (a) 40° Brix mill white, (b) 40° Brix mill white and 40° Brix refined blended in equal proportions, and (c) 40° Brix refined.

Eight cans each of 18 treatments were processed by normal commercial procedures in an atmospheric rotary cooker. Two sets were examined five days later, two sets stored at 100°F for three months, two sets stored at 100°F for six months, and two sets stored at room temperature for two years.

All the fruit used in the experiments were selected from the same grower, given the same heat processing and stored in the same incubator.

### Observations and Discussion

Colour differences were quite obvious to the naked eye at the first examination five days after canning. Figure 1 shows a typical photograph of representative slices subjected to the various treatments.

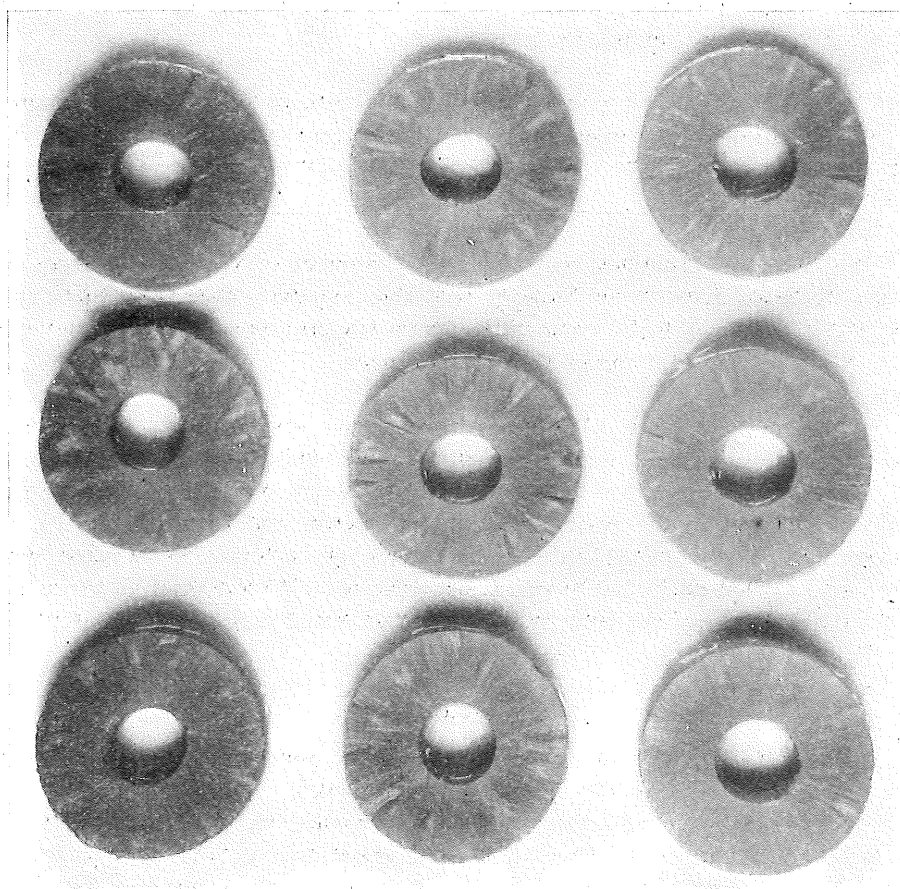


Fig. 1.—Effect of using mill white sugar. Syrups used (rows left to right): mill white; 50% mill white + 50% refined; refined. Heating time (rows top to bottom): 0 hr., 4 hr., 8 hr.

The presence of mill white sugar gave a dull, earthy appearance to the pineapple slices, particularly in the over-ripe fruit. These packs lacked the bright fresh appearance of the fruit in refined sugar syrup. The longer the heating time of the syrup the greater the variation in colour between the syrups.

The syrups containing mill white sugar were slightly dark in colour and slightly cloudy, due partly to fine particles of suspended matter, in particular bagasse. This type of syrup was not consistent with a high grade product and its appearance was sufficiently unsatisfactory to arouse the suspicion of the consumer as to the reliability of the product as a food.

The presence of mill white sugar also imparted to the product a raw sugar flavour which it was considered would be detrimental to acceptance by the buying public, who have become accustomed to a product made with refined sugar syrup. It was therefore felt that canned pineapple syruped with mill white sugar could be at a distinct marketing disadvantage.

It was observed that after storage at 100°F for three months, the dull earthy appearance had been accentuated, particularly as the heating time of the syrup was extended and as the concentration of mill white sugar was increased. In the mill white sugar packs abnormal flavours were also more accentuated and the fruit was less acceptable than that examined shortly after processing. Fruit packed in refined sugar syrups had lost a little flavour but its appearance was satisfactory.

The deterioration in appearance of packs containing mill white sugar was even greater after six months than at the examination at three months. All packs containing mill white sugar had developed most objectionable flavours, particularly where the syrups had been heated for 4 or 8 hr. Packs containing refined sugar syrups had deteriorated in appearance and those that had been heated for 4 or 8 hr had some objectionable flavours. There was no evidence of any activity by thermophilic organisms nor could their presence be detected.

After two years' storage at room temperature, all packs containing mill white sugar had a very unattractive appearance, were quite unpalatable, and many had developed hydrogen swells. The refined sugar syrup pack, which had not received excessive heat treatment, was quite normal for a pack stored for two years. Those containing heated syrups were of poor quality.

As the use of less than 50 per cent. mill white sugar would not be warranted economically, it is apparent that mill white sugar cannot be substituted satisfactorily for refined sugar.

## REFERENCES

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R. E. LEVERINGTON,  
Food Preservation Research Laboratory,  
Queensland Department of Agriculture and Stock.

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