

On the Biochemical Study of the Ripening of the Kaki-fruit, VI.*

Isolation of Sucrose from the Kaki-fruit.

By

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It was reported¹ that sucrose was found with d-glucose and d-fructose in the fruit, by means of inversion with dilute acids, and also that² the quantity of sucrose in the fruit changing along with the fruit life, was in inverse proportion to that of the reducing sugars.

As to the season for attaining the maximum quantity of sucrose in the fruit, according to the authors' observation it seems to be just before the maturity of the fruit, no matter what variety and where it was grown; namely in Kyoto, it was the end of September with the sweet variety, and the beginning of October with the astringent one.

Consequently, care should be taken in choosing the season most suitable for the isolation of sucrose from the fruit.

The sample used in the present experiment was "Gosho-Kaki", the sweet variety grown in Tanaka, Kyoto, was secured through the courtesy of Mr. Uno.

It was picked on Oct. 4th, and was a light orange yellow in colour, with a slightly astringent taste.

* The expenses of this investigation were shared by the Department of Education.

¹ J. Biochem., 1, 193 (1922); 2, 308 (1923).

² Jbid.,

30 fruits weighed 2233 gm. (74 gm. per fruit), and the pulp was prepared as usual, weighing 2080 gm. and this was boiled with 4500 cc. water for one hour to extract the sugars. 4800 c.c. of the extract were treated with basic lead acetate to separate the pectin and shibuol from the solution, and filtered, passed in sulphurated hydrogen gas, and then filtered. The clear filtrate amounting to 4450 c.c., showed $[\alpha]_D = +0.45^\circ$ in dm. tube, and contained 71 gm. d-glucose, 56 gm. d-fructose and 53 gm. sucrose which calculated by means of the reducing power of the Fehling solution and angle of rotation, before and after inversion, and these amounts correspond to 6.2% reducing sugars 2.6% sucrose in pulp.

To isolate sucrose only, the filtrate was concentrated to 630 c.c. under reduced pressure, 100 c.c. of the solution (11 gm. d-glucose 9 gm. d-fructose and 8.5 gm. sucrose) were oxidized according to the method proposed by one of us and M. Tanimura, with 75 gm. mercuric oxide and 30 gm. calcium carbonate. whereby the reducing sugars were all oxidized into sugar acids, sucrose only remaining in the solution unaffected by the action of the oxidizing agent.

The reaction was completed in two hours, and the insoluble salts filtered off, and the filtrate showed no reducing action toward the Fehling solution, was concentrated into a small volume under reduced pressure, poured into 150 c.c. 94% alcohol to throw down the calcium salts of the sugar acids, and filtered. The filtrate was concentrated again and treated with alcohol, and the operation repeated three times. The final solution containing 2.2 gm. sucrose calculated by means of the reducing power of the Fehling solution after inversion, was concentrated to syrup under reduced pressure.

Pure sucrose was obtained in a crystalline state from the syrup as usual, using glacial acetic acid as solvent, and amounted to 1.4 gm. (70% of the theory). The purified sample from ethyl alcohol solution melts at $182-183^\circ$, and showed the optical rotatory power,

¹ E. O. von Lippmann; *Die Chem. d. Zuckerarten*, IIte. Auf. 1066 (1904).

$$\left[\alpha \right]_D = \frac{100 \times 1.070}{1.607} = +66.60 \text{ in 1 dm. tube.}$$

It showed no mutarotation, and was hydrolysed by acids and also by the invertase into the reducing sugars, and gave on analysis the following results :

C=41.8 ; H=6.6 ; theory requires C=42.1 ; H=6.4 for $C_{12}H_{22}O_{11}$

The second crop crystallized from the mother liquor separated from the first crop, was 0.6 gm. and melted at 178—179°.

It was, thus, confirmed that sucrose actually exists in the Kaki-fruit.

In conclusion, the authors wish to express their indebtedness to Mr. Uno, for the donation of the material for this research.

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