

Use of Date Syrups in Breadmaking

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ABSTRACT

Cereal Chem. 60(1):56-58

The effect of various date syrups on experimental breads was studied with the straight dough procedure. Date syrups were found to cause a substantial increase in the weight and volume of loaves. They also improved the texture of the finished bread. When date syrups were substituted for sucrose in the bread formula, the crumb characteristics became inferior with increasing

concentrations of date syrups. These characteristics included color, aroma, taste, and mastication. Compared to the control treatment, however, which employed no sugar source in the formula, the date-syrup treatment showed improvement in all characteristics except crumb color, which was adversely affected by all types of date syrups.

The role of sugars in breadmaking is well established. Fermentable sugars in bread dough generally are essential for yeast as a source of energy, whereas residual sugars in the baked loaf play an important role in determining its eating characteristics. Both types of sugars, however, affect the flavor and shelf life of the finished bread.

Barham and Johnson (1951) investigated the effect of various sugars on dough and bread properties. They found that optimum grain and texture were obtained from 6-8% sugar concentration. When sugars were added to bread dough, loaf volume increased, crust color intensified, flavor and aroma were enhanced, texture improved, and shelf life of the baked product was extended (Pylar 1973). However, excessive amounts of sugar in the bread formula may result in decreased loaf volume, crust color that is too dark, and a reduced rate of gas production in the fermented dough. Tang et al (1972) studied the fate of various sugars during fermentation by employing five different bread-making systems. They demonstrated that the sugar composition of the finished bread reflected the type of fermentation in the dough.

Many types of sugars were used. Their manufacture, properties, and use in bread and other baked products were reviewed (Biscuit Bakers Institute 1970, Pylar 1973). Sucrose is the most important sugar in the baking industry. Sweeteners are rarely used in the Iraqi bread formulas. However, when sucrose is employed, it is added to the yeast suspension at levels below 1% (flour basis). The commercial large-scale production of bread in Iraq is increasing. Consequently, the trend toward adding sugars to bread doughs is also increasing.

The increasing demand for table sugar in Iraq calls for seeking a sugar substitute for certain uses in the food industry. Dates, from the date palm tree (*Phoenix dactylifera* L.), provide an excellent source of sugars. Chemical analysis of the commercial Iraqi date cultivars revealed that the date fruit is composed of large amounts of reducing sugars and limited amounts of nonreducing sugars (Yousif et al 1976). Total sugar content of dates varies among varieties. In most Iraqi dates, it ranges between 60 and 70% of the total weight (Bassat 1971). Iraq is a major date-producing country. For the period 1971-1976, its annual production was estimated to be 426,200 tons (Shubbar 1979).

The use of date products as a substitute for sugar in breadmaking is possible only if such products do not adversely affect the finished bread. The object of this study was to evaluate the effect of varying amounts of different date syrups on bread characteristics.

MATERIALS AND METHODS

Baking tests were performed according to the AACC method (1969). The Bread Score report, as used by the American Institute of Baking (Dalby and Hill 1960), was adopted in evaluating the experimental loaves. Date juice concentrates from fruits of the principal commercial date cultivar in Iraq, Zahdi, were used in this

study. Several preparations of date syrups were tested during this investigation, but only three were chosen (designated D₁, D₂, and D₃). The date syrup D₁ is a commercial product, locally called *dibis*. It was produced according to a procedure followed in the Kerbala State plant (Benjamin and Zubair 1973). Other date syrups, D₂ and D₃, were prepared by the Department of Food and Dairy Technology, University of Basrah, Iraq. The procedure used involved extraction of sugars by cooking pitted dates in water (1:3, w/w) at 70-75°C in an open pan for 40 min. The slurry was then filtered through a cloth filter and the filtrate collected as a stock material for further processing. To obtain the date syrup, D₂, the stock material (ie, raw juice) was refrigerated for 24 hr, filtered, and the filtrate concentrated at 70-75°C to 70% Brix as measured by a refractometer. In preparing the date syrup D₃, the stock material was treated for defecation with 1% CaO and 0.5% H₃PO₄ (w/w, based on weight of dates). These reactions were done for 30 min at 65°C and pH 6.5 with stirring. Nonsugar matters, together with other impurities, then separated and the clear juice concentrated to 70% Brix.

A straight-dough formula was followed. The formula consisted of (in percent, flour basis): flour, 100; dry yeast, 3; salt, 1; and water, 50. Table I lists the sugar sources and treatments that were investigated. Two controls were used: control 1, with no sugar-source added; and control 2, with 6% sucrose (flour basis) added to the dough. The other treatments involved a gradual substitution for sucrose with date syrups in the bread formula.

RESULTS AND DISCUSSION

The bread-scoring system used by the American Institute of Baking (Dalby and Hill 1960) was used in our investigation because it provided a thorough evaluation of the experimental loaves. Detailed information about the effect of date syrups on external as well as internal characteristics of the finished bread was desirable.

Effect on External Characteristics

Date syrups caused a substantial increase in the volume of the finished bread (Fig. 1). Volume increased sharply up to 8%

TABLE I
Proportions of Date Syrup and Sucrose in the Straight Dough Formula

Treatment ^a	Date Syrup (%)	Sucrose (%)
Control		
1	0	0
2	0	6
DI	2	4.6
DII	4	3.2
DIII	6	1.8
DIV	8	0.4
DV	10	0
DVI	12	0

^aD = date syrup.

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concentration, but decreased markedly above this level. Barham and Johnson (1951) reported that, with the sponge dough process, specific loaf volume increased up to 3% and decreased above 6% sugar concentrations. Their experiments revealed that higher sugar concentration reduced the rate and amount of gas production in fermenting dough.

In all the date syrup treatments, the character of crust (Fig. 2D) and the color of crust (Fig. 2E) showed a marked improvement over control 1, which employed no sugar source. However, the substitution for sucrose caused a pronounced decrease in scores of these properties, especially when date syrups were used in excess of 8% concentration. Pigments occur naturally in date fruits. Therefore, the extracted juices and, hence, the syrups prepared from them were all colored and imparted a color of varying intensity to the baked bread. On the other hand, the presence of pectic substances and proteins in the date syrup preparations (Bassat 1971, Benjamin and Zubair 1973) might be responsible for the adverse affect they imparted to the character of the crust.

While break and shred (Fig. 2C) was least affected by the date-syrup treatments, *dibis* (ie, D₁) caused a noticeable improvement in this property at all levels employed. This again might be attributed to the presence of proteins and pectic substances normally found in *dibis* in higher concentrations than in other date syrup preparations (Benjamin and Zubair 1973).

Evenness of bake (Fig. 2A) generally improved only at high levels of date syrup. However, this character was influenced more by the heat adjustment in the oven. Nearly all sugars in the date-syrup

preparations are invert sugars (Bassat 1971, Benjamin and Zubair 1973, Yousif et al 1976) and therefore were expected to play a major role in the browning process. In comparison with control 1, the symmetry of form (Fig. 2B) showed some improvement when date syrup was added at higher concentrations, but the substitution for sucrose did not show such an effect.

The use of date syrups in the bread formula caused a substantial increase in the weight of the loaves (Fig. 3). This might be attributed

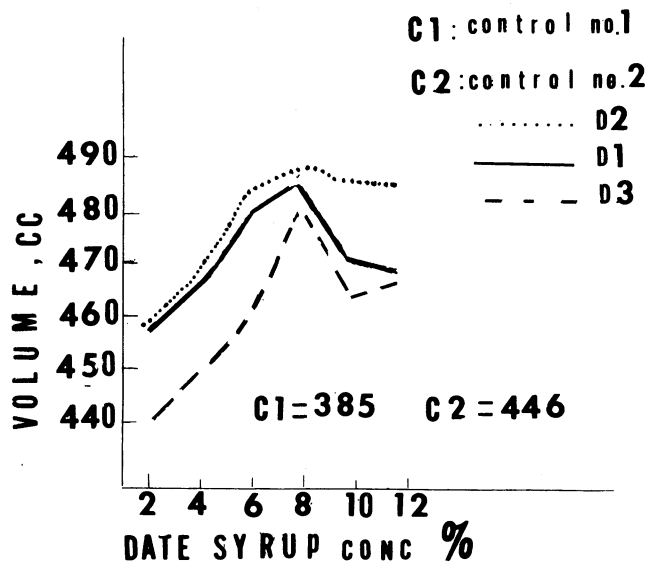


Fig. 1. The effect of different levels of date syrups on the volume of experimental loaves.

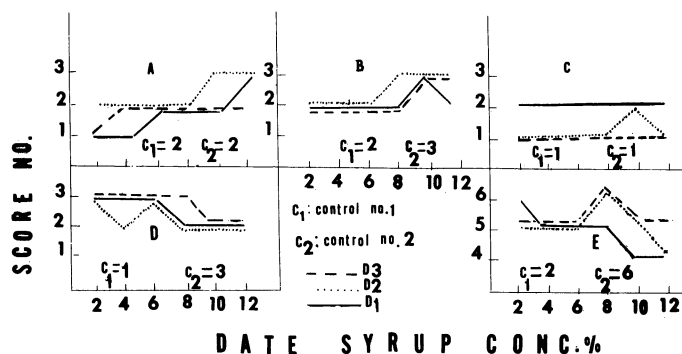


Fig. 2. The effect of different levels of date syrups on the external characteristics of experimental loaves. A, bake; B, symmetry; C, break and shred; D, crust character; E, crust color.

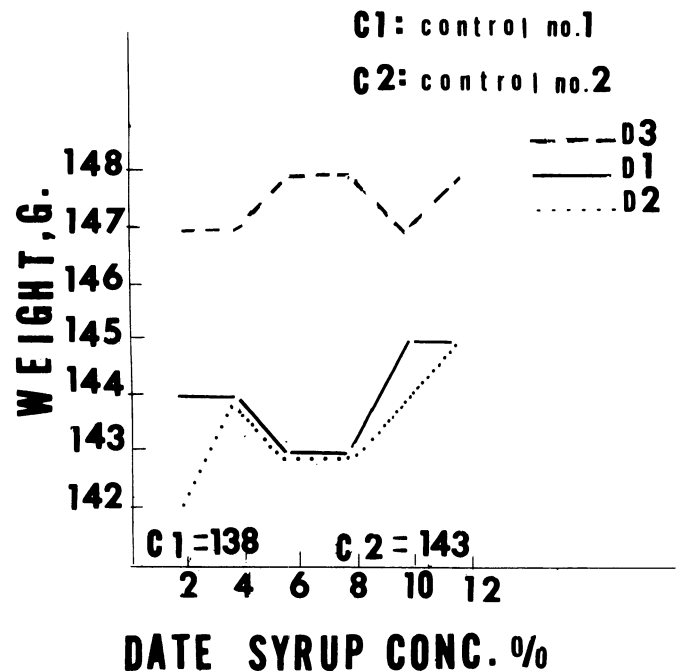


Fig. 3. The effect of different levels of date syrups on the weight of experimental loaves.

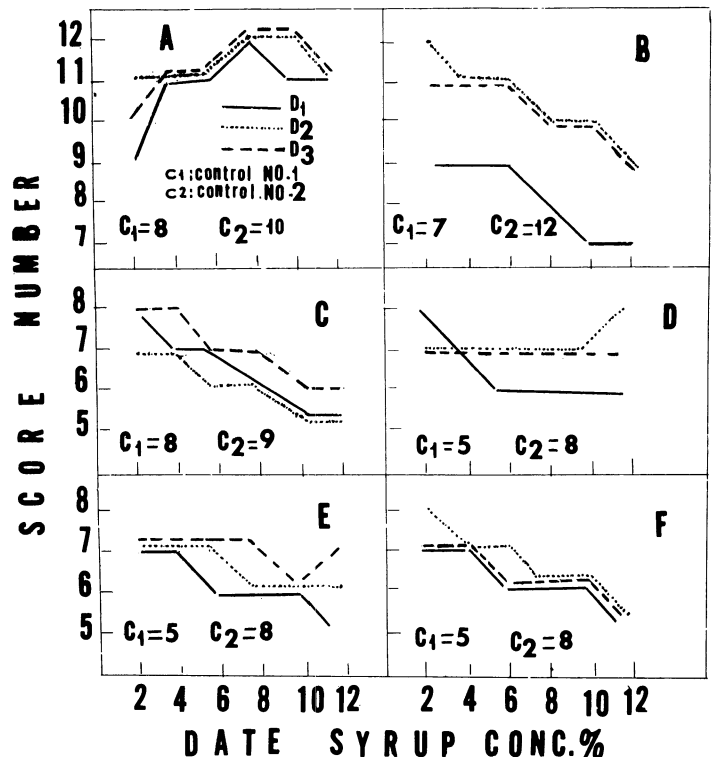


Fig. 4. The effect of different levels of date syrups on internal characteristics of experimental loaves. A, texture; B, taste; C, color of crumb; D, grain; E, mastication; F, aroma.

to the hygroscopic nature of invert sugars, proteins, and pectic substances, which are present in the date-syrup preparations.

Effect on Internal Characteristics

Except for texture (Fig. 4A), in which date syrups caused improvement over the control treatments, the crumb characteristics, including taste, color, grain, mastication, and aroma were adversely affected by the addition of date syrups (Fig. 4B-F). However, when date-syrup treatments were compared with control I, which employed no sugar source, all except crumb color (Fig. 4C) characteristics were improved by the addition of date syrup; crumb color was adversely influenced by all types of date syrups employed.

We believe that if date syrups were used that were of higher clarity than those encountered in the present investigation, most of the adverse effects discussed in this study would be overcome. Much more research needs to be done to obtain unpigmented date syrup preparations that are also free from nonsugar materials such as ash, proteins, and pectic substances.

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[Received July 22, 1981. Accepted July 19, 1982]