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EFFECT OF SOME CLARIFYING AGENTS ON THE QUALITY OF DATE SYRUP DURING STORAGE

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Date is the third major fruit crop of Pakistan. Good quality dates are consumed as such. On the other hand secondary quality dates find no place in the market and are virtually wasted. To minimize this economic loss, there is a possibility of utilizing inferior grade dates in preparation of syrup. For this purpose sugar was extracted by cooking the dates with water, treating with some clarifying agents and concentrated to 70°Brix using vacuum concentration. The date syrup was hot filled into glass bottles sealed with crown corks and stored at ambient temperature for 3 months. Sodium hydrogen carbonate lowered the acidity being an antacid. In general during storage a substantial increase in reducing sugars with corresponding decrease in non-reducing sugars in the date syrup was observed. Organoleptically the products were found to be acceptable after even extend period of storage with a light and better colour when treated with sodium hydrosulphite.

INTRODUCTION

The date fruit is obtained from date palm (Phoenix dactylifera L.). Pakistan occupies 5th position as regards the production of dates when compared to the world statistics. (Anon. 1986). A huge amount of this fruits however, goes waste every year

due to many reasons, the adverse storage conditions being the most important.

The main object of this project was to minimize the such economic loss by utilizing the secondary quality date fruit in preparation of date syrup and to see its stability during storage.

Some earlier investigations on the use of low quality fruits for preparation date syrup were made by Barrevld (1971), Benjamin et al., (1975) and Ehrenberg (1977).

While investigating date juice quality under storage conditions of 13-20°C and room temperature (25 ± 5°C), Godara and Pareek (1985) observed a slight rise in total sugars and total acids after five months period of storage. Sensory tests could not detect any deterioration in date juice upto 43 days at room temperature and 5 months at 13.5°C.

MATERIALS AND METHODS

Secondary quality dates were purchased directly from the plantation and washed with water. Sugar extraction was done after the addition of 3 volumes of water and cooking in double jacketed steam kettle for 15 minutes. The materials so obtained was passed through a pulper to remove stones and pith.

The date extract after treatment with 0.1 per cent sodium bicarbonate ($NaHCO_3$) and with 0.1 per cent sodium hydrosulphite ($NaHSO_3$) was concentrated to 70°Brix in vacuum concentrator. The syrup was hot filled in pre-sterilized bottles, capped by machine and stored for three months at the ambient temperature ranging from 17 to 40°C.

The analysis of syrup samples was carried out at 0, 30, 60 and 90 days of storage for acidity, reducing and non-reducing sugars according to standard methods of A.O.A.C. (1984). Samples of syrup were also tested for colour, taste and flavour using the scoring method of Krum (1955).

RESULTS AND DISCUSSION

Chemical evaluation

The data syrup was analysed for some of the important chemical constituents.

Acidity

As shown in Table 1, the initial acidity content was 0.31 per cent in control sample, 0.23 per cent in the samples treated with $NaHCO_3$ and 0.35 per cent for the samples treated with $NaHSO_3$. The storage seems to cause in general a substantial rise in acidity content.

After storage period of 90 days the acid contents were 0.61 per cent in the untreated date syrup, whereas 0.54 per cent in samples treated with $NaHCO_3$ and 0.66 per cent in syrup treated with $NaHSO_3$. The reduction in acid content in the date syrup when treated with sodium hydrogen carbonate was because of its antacid properties.

Preparation treatments with chemical agents as well as storage intervals showed highly significant (P 0.01) influence on the acidity (seed for details in Table 4).

These observations revealed that ageing of date syrup caused a release of H^+ in the medium which in turn increased the acidity of samples. The rise in total acidity during storage was also observed by Godara and Pareek (1985).

Sugar content

Initially the reducing sugars (Table 2) were 32.43 per cent in untreated samples, 45.30 per cent in syrup prepared with 0.1 per cent $NaHCO_3$, and 44.54 per cent when treated with 0.1 per cent $NaHSO_3$.

During storage a substantial increase in reducing sugar content was observed in date syrup. After a storage period of 90 days the increase in reducing sugars was found to be in the range of 30.86% to 33.4 per cent.

Table 1. *Effect of various treatments on percent acidity of date syrup during storage.*

Treatments during preparation	Storage in days			
	0	30	60	90
———	.31 ± .02	.45 ± 0.00	.52 ± .01	.61 ± .01
Na HCO_3	.23 ± .01	.37 ± .01	.44 ± .01	.54 ± .01
Na HSO_3	.35 ± .02	.47 ± .01	.58 ± .01	.66 ± .02

Results are expressed as mean ± SD of three observations.

Table 2. *Effect of various treatments on percent reducing sugars in date syrup during storage.*

Treatments during preparation	Storage in days			
	0	30	60	90
———	32.43 ± 1.95	36.82 ± 2.20	40.38 ± 0.64	42.38 ± 1.27
Na HCO_3	45.30 ± 1.71	50.74 ± 1.17	55.43 ± 2.09	59.99 ± 0.87
Na HSO_3	44.54 ± 2.14	50.82 ± 1.93	55.82 ± 1.58	59.42 ± 0.66

Results are expressed as mean ± SD of three observations.

Table 3. *Effect of various treatments on percent non-reducing sugars in date syrup during storage.*

Treatments during preparation	Storage in days			
	0	30	60	90
———	29.33 ± 1.31	26.27 ± 1.13	23.35 ± 0.60	21.91 ± 2.36
Na HCO_3	19.77 ± 1.83	14.92 ± 1.40	10.63 ± 2.36	6.37 ± 0.47
Na HSO_3	17.98 ± 1.25	11.85 ± 1.45	7.67 ± 1.77	5.27 ± 1.15

Results are expressed as mean ± SD of three observations.

Table 4. *Effect of various treatments on organoleptic characteristics of date syrup during storage*

Storage in days	Colour			Flavour			Taste		
	Treatments			Treatments			Treatments		
	1	2	3	1	2	3	1	2	3
	———	$NaHCO_3$	$NaHSO_3$	———	$NaHCO_3$	$NaHSO_3$	———	$NaHCO_3$	$NaHSO_3$
0	7.4±0.89	7.9±1.40	5.6±1.40	7.8±1.10	7.6±0.89	4.2±1.79	6.8±1.64	7.0±0.71	5.0±1.58
30	5.2±2.17	7.6±2.07	4.6±2.17	6.6±1.82	7.8±1.02	6.4±2.07	6.8±0.96	7.4±1.52	6.6±1.14
60	6.2±0.84	5.6±2.41	6.4±1.67	6.0±1.22	6.6±1.56	6.0±1.73	6.4±1.52	6.8±0.98	5.6±1.67
90	6.6±1.14	6.8±1.30	6.0±1.22	7.0±0.89	6.0±1.73	5.8±1.30	7.0±0.71	7.0±0.71	6.4±0.55

Results are expressed as mean ± SD of five observations out of 10 maximum numerical scores.

Table 5. *F-ratio values for various parameters as affected by treatments and storage intervals in date syrup*

Due to	Acidity	Reducing sugars	Non-reducing sugars	Colour	Flavour	Taste
Treatments	100^{**}	355.17^{**}	243.98^{**}	2.59^{NS}	4.72^{*}	8.47^{**}
Storage	375^{**}	109.64^{**}	70.67^{**}	1.01^{NS}	1.22^{NS}	0.78^{NS}

NS = Non-significant

* = Significant at 5% level

** = Significant at 1% level

Initially non-reducing sugar contents of date syrup were 29.33 per cent, 19.77 per cent and 17.98 per cent in untreated and treated with 0.1 per cent $NaHCO_3$ and 0.01 per cent $NaHSO_3$ as given in Table 3.

An inversely proportional decrease in non-sugar occurred with increase in reducing sugars during storage.

Highly significant influence (P 0.01) for treatments as well as for storage was observed for reducing and non-reducing sugars (Table 5).

The increase in reducing sugar content may be attributed to increase in acidity which in turn accelerated the process of hydrolysis of non-reducing sugars at elevated storage temperature during summer.

Organoleptic evaluation

Date syrup samples under each treatment were evaluated organoleptically for colour, flavour and taste. The over all picture of colour so obtained revealed no significant effect on date syrup. As far flavour is concerned the sample treated with $NaHCO_3$ observed to be the best one. There was a highly significant effect of treatments whereas storage showed insignificant effect on the taste attribute (see for details of results in Table 4and 5).

Organoleptic evaluation for colour, flavour and taste attributes, obtained in this research was found to be similar to that of Godara and Pareek (1985) who found no deterioration in date juice during storage.

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