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PRODUCTION OF DATE NECTARS

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ABSTRACT

Date nectars were searched to establish suitable outlets for the surplus amounts of dates and to present more variations in consumption forms of dates. Several methods were used with the aim to extract the higher TSS and maintain nature flavor of the resultant date extracts. Gradient extraction method was evaluated to be the preferable method. Extracts obtained from cultivars Meghal, Bent-Aesha, Khadari, Amry, Zaghloul, Deweki, Koboshi and Hyani were adjusted at 14% TSS and organoleptically evaluated. Hyani nectar was evaluated the highest for overall acceptability. As an attempt to increase the acceptability of the obtained date nectar, extracts of Carob, Tamarind, Licorice and also Skim-milk were added. Adding Carob with 40%, Tamarind 20% and Skim-milk 20% significantly enhanced the acceptabilities of the resultant nectar blends.

Key Words: Date, Nectar, Extraction, Blend, Acceptability

INTRODUCTION

Dates have long been known in Arab countries which produce 77.5% of the total world production (**League of Arab States, 1984**). This increase in production is coupled with decrease in consumption and leaves the produced countries facing a great surplus (**El-Shaarawy, 1986a**). Search for new forms of date consumption is, therefore, important. The majority of the produced dates are consumed at the Rutab and Tamr stages, while small percentage is processed into date products. New products were recently searched to establish outlets for the surplus dates and to present more variation in consumption forms (**El-Sharrawy, 1986b**). Owing to the hot weather prevailing most of the year, beverages form an important food item in Egypt. Introduction of a date based beverage presents therefore a very interesting field, particularly that production of beverages from fruits other than dates is relatively not faced consumer demands. Few attempts were published in this area, including production of milk-date drinks (**Yousif *et al* 1982**) and date Juice (**Benjamin *et al* 1982**). Most of other investigations utilized date juice or

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syrup mainly as a sweetener (**Hamad *et al* 1986 and Yousif *et al* 1986**). Others were concerned largely with clarification of the date juice (**Benjamin and Abbas, 1982 and Al-Agidi *et al* 1986**).

The present study investigated various extraction methods to obtain the highest yield of date extracts. In several studies it was reported that, although dates are consumed in many forms, acceptability of date drink was not sufficiently high. Therefore, and within the aim of the work the possibility of producing acceptable nectars from eight different date cultivars produced in Egypt was tested. Further, the effect of adding Carob, Tamarind, Licorice and Skim-milk to the date nectar to arrive at a date nectar of high preference was also considered.

MATERIAL AND METHODS

Eight different date cultivars namely Khadari, Koboshi, Deweki, (from North Sinai governorate), Hyani, Bent Aesha, Zaghloul, Amry and Meghal (from Ismialia governorate) were used in this study. The dates were at full color stage (bisser stage) except Hyani was at rutab stage. Carob, Tamarind, Licorice and Skim milk were mixed with the prepared date nectar with gradient percentages as attempts for improving the acceptability of the produced date nectar. Most promising additives were somewhat comparable in their nature with dates to maintain on the character of the produced date nectar.

Preparation of Date Extract

Several extraction methods were used with the aim to obtain the highest yield of TSS and maintain on the nature flavor of the date in the resultant extract. Hyani date was used in the extraction experiments. The date was washed and the flesh was minced, blanched at 95°C for 3 min to inactivate the enzymes and subjected to the extraction methods as follows:

No.1- Soaking the minced flesh in the same weight of water at (25° C±1) for 12 hr, then pressing through cheese cloth to obtain the extract.

No.2- Heating the flesh in the same weight of water at 80 - 85°C, 1 hr, then pressing.

No.3- Heating the flesh in the same weight of water in autoclave at 15 1b/ square inch for 30 min, then pressing.

No.4- Soaking the flesh in the same weight of water with adding 0.1% commercial pectic enzymes (Pectinex, Novo), incubation for 30 min at 30°C, then pressing.

No.5- The procedure in method No.4 but with adding 0.1% commercial cellulases (Celluloclast, Novo) instead of pectic enzymes.

No.6- In this method the gradient extraction was proposed to maximize the extraction efficiency. Minced flesh was mixed with the same weight of water, and the mixture was left at 40°C for 2hr, then at 60°C for 1hr, then left over night in refrigerator. The mixture was drained to obtain the extract. The extraction was further continued by adding the same weight of fresh minced date to the obtained extract. The temperature of the mixture was raised to 65°C for 1 hr, then to 70°C for another 1hr, then the mixture was left in refrigerator

over night. The mixture was pressed through cheese cloth to obtain the final extract. The procedures were subjected on date flesh with and without peels.

The obtained extracts from Hyani date with different extraction methods were evaluated according to TSS and flavor to select the best method. Date flavor was evaluated by 10 staff members on the basis of nature date flavor.

Preparation of Date Nectars

Gradient extraction method was evaluated the best method and it was subjected in preparation of the extracts from different date cultivars. The TSS of the obtained date extracts ranged from 16.1 to 37.8% were diluted to 14%, then mixed with sugar solution 14% with a ratio of (1:1 v/v) to obtain the date nectar. The resultant date nectars were immediately evaluated organoleptically by 10 staff members for color 20, taste 30, odor 20 and appearance 15 scores.

The data were statistically analyzed for variance and LSD test (**Snedecor and Cochran, 1967**).

Chemical Analyses

The chemical analyses of the obtained extracts of the tested date cultivars were determined according to **AOAC (1984)**, as follows: moisture was determined by drying at 70°C in a vacuum oven to constant weight. Total soluble solids (TSS) were measured by an Abbe refractometer at 25°C. Acidity was assigned as citric acid, and pH value was measured by a pH meter. Total and reducing sugars were determined by Lane and Eynon method.

Preparation of Date Nectar Blends

Date nectar blends were prepared by mixing the date extracts with the extracts from Carob, Tamarind, Licorice and Skim milk. The selected date extracts Hyani (24%) and Meghal (28%) were diluted to 14% TSS. The extracts of Carob Tamarind and Licorice were also adjusted to 14% TSS. The Skim milk was prepared from dry Skim milk with concentration 14% TS. Carob, Tamarind and Licorice extracts were added with percentages 20 and 40%, while Skim milk was added with 10, 20 and 40% of the date extracts 14%. Sodium carbonate was added to raise the pH of date extracts to about 6.5 in case of mixing with Skim milk to prevent the precipitation of milk. The prepared blends were then mixed with sugar solution 14% with percentage (1:1 v/v) and evaluated organoleptically.

RESULTS AND DISCUSSION

Six extraction methods were used for preparation date extracts from Hyani date. The preference between the subjected methods was based on of the yield of TSS and maintenance on the nature date flavor (Table, 1). Among heating methods, extracts obtained by autoclaving or by heating at 80-85°C for 1hr showed high TSS, which reached 19% in each one, but possessed cooking flavor particularly in autoclaving method. **El-Shaarawy *et al* (1986a)** reported that TSS generally increased by increasing extraction temperatures from 50 to 100°C to the Saudi Khalas and Ruzeiz dates but with darker color. Cold soaking method showed clear date flavor, but the TSS was very low, being only 12%.

Enzyme extraction methods, either with pectic enzymes or cellulases achieved relatively high TSS, but saccharified and weak date flavors were recorded. As a result of these unsatisfactory attempts the extraction procedures were directed to the gradient extraction process. This method has not used severe temperature to avoid the cooked flavor. Moreover, the extraction was further continued by adding fresh minced date to the obtained extract, and that increased the TSS recovery without increasing water volume. Therefore, the gradient extraction methods without peeling showed the highest TSS (24.5%) and clear date flavor.

Flavor of Khalas and Ruzeiz date extracts recorded higher scores by extraction at 85°C for 15 min than for 60 min **(El-Shaarawy *et al* 1986a)**. Using peeled date in the gradient method was not beneficial where the gained TSS was lower than that without peeling. According to the obtained data, the gradient method without peeling was evaluated to be the preferable method, and it was selected to extract date juice from different date cultivars. **Khalil (1995)** prepared date beverage by mixing Siwi debs (25%) with milk (75%) to produce a complemented food product which contained total sugar 75%, protein 11.6%, fat 9.6% and ash 3.1% on dry basis. **Youssef and Ba-Abbad (1999)** prepared date juice by extraction date flesh by boiling in water, mixing the mixture in blender, drainage through two layers of cheese cloth, then adjustment the TSS to 15% by adding sugar.

Table (2) showed chemical analyses of date juices obtained from tested date cultivars. Zaghloul juice contained the highest moisture content (81.12%) and the lowest was recorded in Amry (57.73%). The moisture contents of the others were very comparable and ranged from 70.8 to 74.67%. Extracted juice from Amry showed greatly higher TSS (37.75%) followed by Khadari (25.25%) and the lowest TSS was in Meghal (16.11%). The determined acidity of date extracts showed that dates are relatively considered to be from the lower acidity fruits. The acidity of the studied date juices were ranged from 0.051 to 0.28% (as citric acid) where, the highest acidity value was in Hyani and the lowest value was in Deweki. The pH values were in accordance with acidity values where, the lowest pH was in Hyani (4.61) and Deweki showed the highest, which was approached from the neutral (6.21). On dry basis, total sugar contents were relatively high, and they were somewhat comparable in the obtained date juices. The highest content was in Amry extract (63.38%), Zaghloul contained the lowest (45.3%) and the other extract cultivars being a rang from 52.01 to 58.49%. Reducing sugars were the greatest fraction of total sugars where, their contents represented approximately from 68 to 95% from the total. **El-Shaarawy *et al* (1986a)** reported that soft date cultivars contain little or no sucrose. Amry juice showed the highest reducing sugar content (58.54%) and the lowest was in Hyani (33.36%).

Production of date drinks would be a break through towards national and probably international beverages, with all the economic, nutritional and social consequences. **El-Shaarawy *et al* (1986b)** utilized fresh extracts of Saudi Khalas and Ruzeiz and Iraqi Zhahedi dates in preparation of date drinks. Analysis of

Table 1. Effect of different extraction methods on TSS and date flavor of the extracts of Hyani date

Extraction methods	Cold soaking 12 hr	Heating 80-85°C, 1 hr	Autoclaving 15 lbs/inch^2 30 min	Pectic enzymes 12 hr, 30°C	Cellulases 12 hr, 37°C	Gradient without peeling	Gradient with peeling
TSS, %	12	19	19	20	19.5	24.5	22
Date flavor	Clear flavor	Cooked flavor	Strong cooked flavor	Saccharified & weak flavor	Saccharified & weak flavor	Clear Flavor	Clear flavor

Table 2. Chemical characteristics of date extracts from tested date cultivars

Tested parameters % \ Date Cultivars	Hyani	Khadari	Koboshi	Deweki	Bent Aesha	Zaghloul	Amry	Meghal
Moisture	73.77	71.50	73.20	74.67	71.90	81.12	57.73	70.85
TSS	24.30	25.30	24.30	22.30	25.80	16.80	37.80	16.10
Acidity	0.280	0.064	0.067	0.051	0.058	0.090	0.082	0.099
Total sugars	52.01	53.21	58.39	58.49	54.64	45.30	63.38	53.46
Reducing sugars	35.36	50.74	52.69	53.24	46.67	42.51	58.54	50.23
PH	04.61	05.38	05.34	06.21	05.67	04.98	05.21	04.93

date extract indicated that total soluble solids content of 14% was well accepted. Table (3) represents the organoleptic evaluation of date nectars of the various tested date cultivars. Comparing the acceptabilities of date nectars without any additives was the primary concern in this stage. The color of Bent Aesha nectar showed the higher score and it was significantly higher than those of Deweki, Khadari, Amry and Meghal but not significantly with Hyani, Koboshi and Zaghloul, respectively. Hyani nectar showed the highest significantly in overall acceptability than other nectars except Koboshi nectar. It scored the highest level in overall acceptability especially from the viewpoints of taste, aroma and appearance. Nectars of Amry, Deweki and Meghal realized the lowest level in overall acceptability, respectively. Within the following trends Amry nectar gained the lowest score in aroma, Deweki in color and appearance and Meghal in taste.

As an attempt to increase the acceptability of date nectars, extracts of Carob, Tamarind, Licorice and also Skim-milk were added. Hyani date extract was selected for this experiments because of its highest sensory properties. However, Meghal was selected to increase its low acceptability, where, the other objective of this work is to find outlets for the lower quality dates available in large quantities. **Mustafa *et al* (1986)** searched to find products that will utilize the date paste produced from the low quality dates. The basic information about the effect of date paste of the variety Ruzeiz on the quality of bread and cookies was their objective.

Table (4), showed the organoleptic evaluation of Hyani nectar blends, from which adding Carob extract to Hyani extract enhanced the resultant nectar than Hyani nectar alone (control). In such a case, color, taste, aroma, and appearance rated higher by adding Carob with 20% and 40% than the control. Consequently overall acceptabilities of the blends 20% and 40% ranked higher than control, but the blend 40% was higher significantly. By the same trend, adding Tamarind extract until 20% to the date extract improved palatability of the produced nectar. Overall acceptability of blend 20% Tamarind scored higher value than Hyani control, but blend 40% was lower. On contrary, blending Licorice extract with date extract decreased the acceptability of the resultant blend. Taste, aroma, and overall acceptability of the blends 20% and 40% Licorice being significantly lower than control. Adding Skim-milk until 20% enhanced the acceptability of the resultant nectar than control nectar, but increasing addition of milk to 40% reduced acceptability. From the above results, the best obtained blends were, 40% Carob, 20% Tamarind and 20% Skim milk, respectively. The blend 40% Carob was the only one which showed significant difference in overall acceptability than Hyani nectar (control).

Table (5), represents several nectar blends of Meghal date. Adding Carob, Tamarind and Skim-milk to Meghal date extracts showed a pronounced enhancement in the produced blends than Meghal alone (control). Both the blends 20% and 40% Carob given higher significantly in overall acceptability than control nectar. The same trend was noticed by adding Tamarind, but blend 20% showed higher scores than blend 40%. Adding Skim-milk until 20% improved the palatability

Table 3. Organoleptic evaluation of date nectars

Properties / Date Cultivars	Color 20	Taste 30	Aroma 20	Appearance 15	Over all acceptability 85
Meghal	14.2 b,c	15.4 b,c	13.4 c	11.4 a,b	54.4 d,e,f
Bent Aesha	17.2 a	21.4 a,b	13.8 b,c	09.0 b,c	61.4 c,d
Khadari	12.0 c,d	22.2 a,b	14.4 b.c	09.8 b,c	58.4 c,d,e
Amry	12.0 c,d	19.0 c	12.4 c	07.4 c	50.8 f
Zaghloul	15.4 a,b	22.6 a,b	15.0 b	11.4 a,b	64.4 b,c
Deweki	09.6 d	23.0 a,b	15.6 a,b	03.8 d	52.4 e,f
Koboshi	16.2 a,b	24.4 a	15.8 a,b	12.8 a	69.2 a,b
Hyani	16.8 a,b	25.4 a	17.8 a	13.8 a	72.6 a

Means have the same letters are not significantly different at p = 0.05

Table 4. Organoleptic evaluation of Hyani date nectar blends

Properties / Date Cultivars	Color 20	Taste 30	Aroma 20	Appearance 15	Over all acceptability 85
Hyani	15.6 a,b	25.4 a,b	17.8 a,b	13.8 a,b	72.6 b,c,d
Hyani + 20% Carob	17.2 a	27.2 a	18.4 a,b	13.6 a,b	76.4 a,b,c
Hyani + 40% Carob	17.0 a	28.2 a	19.2 a	14.0 a,b	78.4 a
Hyani + 20% Tamarind	16.4 a,b	28.6 a	18.8 a	14.0 a,b	77.8 a,b
Hyani + 40% Tamarind	17.6 a	21.4 b	16.4 b,c	14.4 a	69.8 d
Hyani + 20% Licorice	16.2 a	11.4 c	12.6 d	14.2 a,b	54.4 e
Hyani + 40% Licorice	13.6 b	07.6 c	09.4 c	13.0 b	43.6 f
Hyani + 10% Skim-milk	16.4 a,b	26.6 a	17.8 a,b	14.2 a,b	75.0 a,b,c,d
Hyani + 20% Skim-milk	17.0 a	28.8 a	17.2 a,b	14.6 a	77.6 a,b
Hyani + 40% Skim-milk	14.4 a,b	28.4 a	14.6 c,d	13.8 a,b	71.2 c,d

Means have the same letters are not significantly different at p = 0.05

Table 5. Organoleptic evaluation of Meghal date nectar blends

Properties / Date Cultivars	Color 20	Taste 30	Aroma 20	Appearance 15	Over all acceptability 85
Meghal	14.2 b,c	15.4 b,c	13.4 c,d	11.4 a,b,c	54.4 c
Meghal + 20% Carob	15.2 a,b	21.4 a,b	15.6 a,b,c	12.0 a,b,c	64.2 a,b
Meghal + 40% Carob	15.2 a,b	23.4 a,b	17.4 a	11.6 a,b,c	68.8 a
Meghal + 20% Tamarind	15.2 a,b	24.0 a	16.4 a,b	11.0 b,c	66.6 a,b
Meghal + 40% Tamarind	16.8 a	19.2 a,b	13.8 b,c,d	13.6 a	63.4 a,b
Meghal + 20% Licorice	17.0 a	10.2 c,d	08.8 e,f	11.2 b,c	47.2 d
Meghal + 40% Licorice	13.2 c	06.8 d	0.6.4 f	10.0 c	36.4 e
Meghal + 10% Skim milk	16.2 a	20.0 a,b	13.6 c,d	12.2 a,b,c	61.4 b
Meghal + 20% Skim milk	16.8 a	22.2 a,b	14.4 b,c	13.0 a,b	66.4 a,b
Meghal + 40% Skim milk	14.0 b,c	23.6 a,b	11.4 d,e	12.2 a,b,c	62.2 b

Means have the same letters are not significantly different at p = 0.05

of the produced date nectar, then it decreased in blend 40%. Meanwhile, all date milk nectars (10, 20 and 40%) were significantly higher acceptable than Meghal alone. On the other hand, adding Licorice to Meghal extract reduced the acceptability of the produced blends.

Conclusion

The study represents the possibilities of producing date nectars from some Egyptian date cultivars. Most of the produced date nectars were accepted organoleptically. Adding Carob, Tamarind and Skim milk to date nectar enhanced the acceptability of the blends. That is an opportunity to find outlets for lower quality dates such as Meghal.

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إنتـــاج مشروبـــات البلـــح

[٤٤]

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فى محاولة لإيجاد أساليب جديدة لتصنيع الفائض من إنتاج البلح وتنوعا اكثر فى صور الاستهلاك تم إنتاج مشروبات البلـح. هذا وقد استخدمت عدة طـرق استخلاص بهدف الحصول على أعلى نسبة مواد صلبة ذائبة مع المحافظة على نكهة البلح الطبيعية. وقد كانت طريقة الاستخلاص التدريجى افضل الطرق . للحصول على المستخلصات من الأصناف : مجهل، بنت عيشة، خدارى، عامرى ، زغلول ، دويكى ، كبوشى وحيانى للوصول إلى تركيز ١٤% مواد صلبة ذائبة وقيمت حسيا. وفى محاولة لزيادة القابلية لمشروب البلح تم إضافة مستخلصات خروب بنسبه (٤٠%) ، تمر هندى(٢٠%) وأيضا لبن فرز(٢٠%) وأدى ذلك إلى وجود تحسن جوهرى فى مدى قابلية مخاليط مشروب البلح الناتجة .

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