

## CONSUMER EVALUATION OF DATE-BY-PRODUCTS FOR EXPORTS - A QUASI EXPERIMENTAL STUDY

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**Abstract:** *The academic research has been mainly focusing on dates quality improvement and postharvest technology, whereas studies about dates by-products' development and marketing practices are still lacking. This is alarming given the recommendations put forth by researchers in the past who have identified areas of date improvements that include by-product utilization, value addition of dates, improvement of processing facilities, enhancement of marketing efforts, exports of date products. Thus, regional competition and demand for branded dates and by-products calls for developing Omani date industry with focus on innovation. Date syrup (dibs) represents an attractive date by-product given its use in many traditional foods. However, date syrup is not currently embraced by local entrepreneurs in comparison to their regional competitive counterparts. This study aims to address the aspects of consumer evaluation of Omani date syrup as an important and valuable by-product for the purpose of product innovations and exporting. In particular, it evaluates consumers' preferences and opinion toward possible combinations of date syrup from local brands to ultimately determine some segmenting and marketing elements for date syrup. To this end, sensory test and choice experimentation are conducted for four combinations of date syrup among a sample of 84 non-Arab expatriates living in Oman. The results revealed the most preferred brand had the best taste, least thickness and medium sugar level. The subjects favoured using date syrup as an ice cream topping, followed by spread on toast, bagel, waffle or pancake and a cheese cake topping. Its use with yogurt or milk was least preferred. When subjects were asked about importance of purchase attributes, good taste turned out to be most important followed by reasonable price, no added sugar, packaging, smoothness and sweetness. However, we noticed some difference between Asians, Europeans and North Americans.*

**Keywords:** *New Product Development, Date syrup, Product Attributes, Purchase Preference*

### 1. INTRODUCTION

Date is an important part of fresh food and trade in many countries and is one of the most important commercial dried fruits in the global market (Anwar *et al.*, 2005), particularly in hot and desert areas. According to FAO (2013) statistics, the total production and trade of dates was growing positively to represent 7.51 million metric tons in 2011. As a major national, economic, historical, nutritious, heritage,

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high-value sweet fruit, and hospitality symbol crop in Oman, dates represent 85% of all fruit trees and 50% of all agricultural land in the country (Ali, 2010). Date palm is the most appropriate crop plant suitable for cultivation in Oman (Al Yahyai & Khan, 2015). Oman is one of the largest producers of dates in the world with 200 species of dates. According to FAO (2013), Oman's share of world date production was 3.57% (268.011 metric tons) in 2011. With the total production of dates at 261,000 metric ton in 2007, 51% was used for local consumption, 20% for animal feed, 3% was exported and 26% was surplus (AbdulRazak, 2010). Thus, due to lack of date product development, a substantial quantity of date is wasted. Therefore, developing dates by-products using excess production provides great opportunity to diversify exports of Omani dates and to contribute to economic activity (Al Marshudi, 2002; Al Yahyai & Khan, 2015).

Many attempts have been made to improve the date sector in Oman such as introduction of labor saving cultivation methods, modern irrigation systems, improved packaging, and development of date palm by-products (Al Marshudi, 2002). Modern technologies were initiated in the date industry that enable efficient and faster processing. The government of Oman has played its significant role to support and promote establishment of modern date factory to improve the packaging of Omani date using modern processing systems and facilities. However, development and marketing of date by-products has not become a priority in Oman. The emergence of successful regional date brands such as Bateel and Jomara has placed renewed focus on importance of marketing efforts to promote Omani dates by-products.

Dates constitute the major source of agricultural income for many farmers (Al Yahyai & Khan, 2015). Date fruit can be processed into many value-added products such as dry dates, paste, syrup, juice concentrate, jam, butter, bars, chutney, pickles, and relish (Siddiq & Greiby, 2013). The worldwide production of dates has almost doubled in last two decades and it has become an important fruit in terms of international trade (Siddiq & Greiby, 2013). The processing of date fruit into value-added by-products also generates higher revenues for suppliers. Therefore, efforts need to be exerted to promote development of dates by-products to materialize higher income among ambitious local entrepreneurs. It has also been stressed that the success of future agricultural businesses rests in development of strong brands and not just quality characteristics of the product (Asioliet *al.*, 2016). Meshan and Tamrah are successful examples of Omani local brands which have capitalized on this advantage. Additionally, consumer lifestyles are influencing their consumption habits and they are giving more attention to premium and yet healthy food variations. Syrup (dibs) represents one of the potential date by-products that can be leveraged to a great extent given the Omani culture of syrup consumption and modern lifestyle consumption of healthy foods in general. But even more importantly, date syrup provides a significant opportunity for exports as it is 100%

natural, offers significant health benefits and provides usages similar to honey, maple syrup and other sugar based liquids. People use different names such as silan, dibs, molasses or even honey for date syrup but it is considered a “little known powerhouse of sweet, fruity, tangy flavor that deserves a prominent spot on your pantry shelf”, Lee (2014). In fact, it is even believed that honey mentioned in Bible is not from bees but from dates (Gershenson, 2011).

The government of Oman has also been making efforts to diversify the economy to reduce its reliance on revenues from oil, particularly in light of oil price crash in recent years. The conversion of raw date fruit into date syrup for export provides an opportunity to local suppliers to contribute to national economy while earning good livelihood. However, the absence of marketing orientation among local entrepreneurs, with exception of few, is manifested by lack of innovating value added date by-products. This is supported by Gelhar *et al.* (2009)'s statement that small and medium sized firms need to adapt, develop new ideas, and improve existing products.

## **2. RESEARCH OBJECTIVE**

Despite large production of various qualities of dates in Oman, there is limited focus on development of by-products and lack of marketing efforts for exports. As stated by Al Yahyai & Khan (2015), around 70% of the total date production in Oman is harvested from 10 cultivars but only 2.6% of total production is exported. One of the reasons, besides poor harvest handling and traditional irrigation systems, can be attributed to inefficient marketing programs and insufficient development of Omani dates by-products for wider commercialization. Dates are not widely processed and commercialized into value-added products compared to other tropical fruits (Siddiq & Greiby, 2013). Therefore, there are promising prospects of developing innovative by-product using dates. This study aims to investigate the possibility of innovating and marketing Omani date syrup, a widely consumed date by-products in Oman, from the perspectives of primarily non-Arab expatriates living in Oman. Particularly, this research will examine the following questions:

1. What are the preferences of consumers towards various brands of Omani date syrup in terms of sensory attributes?
2. What are the major usages of date syrup?
3. What are the important attributes used by consumers for purchase of date syrup and how this importance varies by ethnicity and age?

The rest of the paper is structured as follows: A brief profile of Oman is provided and benefits of date syrup are listed. New product development in food industry and its relevance to current project is explained. The quasi-experimental method is narrated in methodology section and the results are presented. Finally, the paper ends with discussion, conclusion and implications.

### 3. COUNTRY PROFILE

Sultanate of Oman is an Arab country located on the eastern edge of the Arabian Peninsula. As the second largest Gulf Cooperation Council (GCC) country in terms of area, it has a population of more than 3 million (Central Intelligence Agency, 2016). The hot and dry summer in Oman makes it an attractive region for date cultivars. Oman is ranked 8<sup>th</sup> in terms of date production (FAO, 2013). Date represents an important subsistence crop in Oman. In fact, date is positioned as a major economic and cultural commodity in Oman's structure.

### 4. DATE SYRUP

Dates are a great source of energy, natural sugars, antioxidants, vitamins, fibers and minerals. Dates are considered to have medicinal benefits and have been used to treat anemia, diarrhea, constipation, heart problems and many other disorders (Goodrich, 2016). Date syrup is a thick, sweet liquid extracted from dates and is commonly consumed across the Middle East. The research presented at Society for General Microbiology's Annual Conference in 2015 found date syrup to be better than Manuka honey in preventing the growth of bacteria (Date Syrup, 2015). It is considered a substitute for other syrups like maple and honey (Nixon, 2012). Also, considered as a natural sweetener, date syrup is a substitute for refined sugar and can be used as a spread with toast, pancakes, porridge, and yogurt and mixed with smoothies, hot chocolate, and milk (Khan, 2015). Date syrup is a suitable ingredient to be used in the formulation of food products to improve the nutrient properties (Ardali *et al.*, 2014).

### 5. NEW PRODUCT DEVELOPMENT IN FOOD INDUSTRY

New food product innovation is essential for firm's survival in today's competitive global market (Stewart-Knox & Mitchell, 2003). Cooper (1993) calls New Product Development (NPD) as "one of the riskiest, yet most important, endeavors of the modern corporation." It is generally estimated that approximately 80 to 90 percent of new products introduced to the market fail every year (Rudolph, 1995). A number of new products might not even make it to the retail stores.

The product development process was introduced in 1960s but its effectiveness was realized much later (Earle, 1997). New product development process comprises many stages. It begins with an idea leading to identification of market opportunities, moving on to the concept development, concept evaluation, business and technical evaluation, development of prototype and final product, and finally commercialization or launch of product in the marketplace (Rudder *et al.*, 2001; Trott, 2008).

According to Bigliardi & Galati (2013), food industry has one of the lowest research and development to sales ratios among any industrial sector. However, it

is recently showing growth in the innovation. Thus, product development strategy is essential for the ongoing improvement and introduction of new products (Earle, 1997). It has been recommended that food industry should adopt a knowledge based, focused and quantitative process to introduce new products (Earle, 1997). Some of the key ingredients for success of new products in food industry include knowledge of the customer and market, retailer involvement, and knowledge of technological developments (Earle, 1997; Stewart-Knox & Mitchell, 2003). Van Kleef *et al.* (2005) advocate, that for a new product to succeed, it is critical to incorporate 'voice of the consumer' in the beginning of the new product development process. However, this step, they contend is either skipped or not implemented properly. Linnemann *et al.* (2006) echo the same sentiment and conclude that for a food product development to be successful, it "needs to be based on consumers' needs and wishes".

For food companies it is essential to develop new products to meet and sustain consumer demand (Imram, 1999). Sensory attributes, in particular texture and flavour, are known to influence consumer perception and acceptance of food products (Imram, 1999). However, it has been suggested that presentation of the food products is extremely important as "first taste is almost always with the eyes" (Imram, 1999).

In fact, there is another paradigm which proposes that new product development in food industry should be led by consumers rather than being limited to seeking customer inputs (Costa & Jongen, 2006; Linnemann *et al.*, 2006). Introduced in 1990s, consumer led product development has been endorsed by many marketing and food technology experts (Lord, 2000; Van Trijp & Steenkamp, 2005). The major crux of consumer led development is that "Consumer needs should be the starting point of NPD processes" (Costa & Jongen, 2006). Accordingly, this study capitalized on the idea of developing date syrup based on consumer preferences and needs.

## **6. METHODOLOGY**

This is an exploratory research that guides the authors in the building hypothesis for future research. This study takes the form of experimentation and subsequent short survey questions. To gain an understanding of consumer's attitudes and reactions with respect to local brands of date syrup, sensory test and choice experimentation are conducted for four combinations of date syrup. As suggested by Siddiq & Greiby (2013), "one of the evaluation bases for dates is sensory quality attributes besides the chemical quality attributes and physical quality attributes". The focus on quality sensory attributes of date syrups includes sweetness, appearance, taste, etc.

According to Alpizar *et al.* (2003), the choice experiment asks subjects' to choose their preferred alternative from several options in a choice. Each alternative (in

this study, date syrup brands A, B, C, and D) is described with a number of attributes (in this study, sensory attributes of sweetness, thickness, and taste), where the levels of the attributes varies for each alternative (in this study, on a scale of 1 to 7, where 1 is least desirable and 7 is most desirable). The subjects were presented with four brands of date syrup labelled as A, B, C, and D and were first asked to indicate preference for sweetness, thickness and taste on a scale of 1 to 7 in a controlled lab environment. They were also asked to rank the brands on 1 to 4 with 1 being the best and 4 being the worst. The sensory properties of date syrups under study determine consumer appeal of their preferred composition and hence product development potential. Thus, as put forth by Alpizar *et al.* (2003), when individuals make their choices or preferences, compromises are implicitly apparent among the levels of the attributes of alternatives presented in a choice set. Consequently, subjects were able to evaluate the four alternatives based on their sensory preference in a survey ranking question.

Once the subjects identified their most favorite syrup, they were asked to try that particular syrup with various products. In order to address the second objective of this study and find out how subjects would like to use this syrup, they were asked to indicate the best usage of date syrup. Thus, subjects gave their opinion of using date syrups in six conditions together with their evaluation of their preferences of these conditions in a survey ranking question.

In order to understand factors effecting consumer's adoption of date syrup, the subjects were asked to indicate the importance of various product attributes in their decision to purchase date syrup. Thus, subjects were asked to rate taste, sweetness, thickness, smoothness, no added sugar, brand name, good packaging, and reasonable price on a scale of 1 (least important) to 7 (extremely important). To further assist in innovating date syrups, subjects were asked to suggest a particular flavor that would make date syrup taste better in an open-ended question.

## 7. RESULTS

A total of 84 individuals participated in this quasi-experimental research project. The profile of subjects is given below in Table 1

To determine preferences in terms of sweetness, thickness, and taste on a scale of 1 to 7, the findings (mean scores) and overall rankings of brands are given below in Table 2:

Based on subjects' choice of the most favorite syrup and trying it with the six options of products as shown below, the findings for consumers ranking are given below in Table 3.

**Table 1**  
**Profile of Subjects**

<i>Origin</i>	<i>N</i>
Asia	34
Europe	21
Middle East	8
North America	14
Others	7
<i>Age Group</i>	<i>N</i>
10-17	31
18-29	30
30-44	11
45-59	12

**Table 2**  
**Product Attributes and Ranking**

<i>Brand</i>	<i>Sweetness</i>	<i>Thickness</i>	<i>Taste</i>	<i>Overall Ranking by Customer</i>
A	5.14	5.01	4.65	4
B	5.38	3.85	5.45	1
C	5.90	5.75	4.98	3
D	5.12	4.20	5.37	2

**Table 3**  
**Product Usage**

<i>USE</i>	<i>Rank</i>
Ice Cream topping	1
On Toast or Bagel	2
On Waffle or Pancake	3
Cheese Cake topping	4
Mix in Yogurt	5
Mix in Drink	6

To determine the importance of various product attribute in consumer' decision to purchase date syrup, the findings about product attributes (mean scores) are given below in Table 4:

Exploratory cross-tabs of purchase attributes were conducted with age to discern possible difference. The results are given below in Table 5.

**Table 4**  
**Preferred Product Attribute in Purchase of Date Syrup**

<i>Purchase Attribute</i>	<i>Mean Score</i>
Taste	6.45
Sweetness	4.72
Thickness	4.69
Smoothness	5.25
No Added Sugar	5.41
Brand Name	3.97
Good Packaging	5.35
Reasonable Price	5.82

**Table 5**  
**Preferred Purchase Attributes by Age Group**

<i>Purchase Attribute</i>	<i>10-14</i>	<i>15-17</i>	<i>18-29</i>	<i>30-44</i>	<i>45-59</i>
Taste	6.79	6.58	6.74	6.50	6.75
Sweetness	5.17	3.60	4.96	3.50	4.75
Thickness	4.44	3.64	5.22	5.25	4.67
Smoothness	5.68	5.80	5.04	4.75	4.33
No Added Sugar	5.72	6.10	5.78	5.50	3.42
Brand Name	4.26	4.10	3.74	3.25	3.92
Good Packaging	6.00	5.20	4.57	6.00	5.33
Reasonable Price	6.00	5.70	5.30	5.50	6.17

To assist decision makers in developing a better understanding of consumers, cross-tabs of purchase attributes were conducted with regions. The results are given below in Table 6.

**Table 6**  
**Preferred Purchase Attributes by Regions of the World**

<i>Purchase Attribute</i>	<i>Asia</i>	<i>Europe</i>	<i>Middle East</i>	<i>North America</i>
Taste	6.58	6.65	6.48	6.80
Sweetness	5.21	4.38	5.15	3.44
Thickness	4.79	4.71	5.13	4.17
Smoothness	5.31	4.95	4.94	5.38
No Added Sugar	4.87	6.04	5.35	6.67
Brand Name	4.60	3.68	3.57	2.49
Good Packaging	5.89	4.23	5.34	4.89
Reasonable Price	6.02	5.33	5.64	5.17

The subjects were asked to suggest what other flavors would make the date syrup taste better. It was found that cardamom, vanilla, cinnamon and fruity flavor (orange, lemon strawberry) were some of the popular recommendations.

## 8. DISCUSSION AND CONCLUSION

This is one of the first studies with a focus on new product development in date by-product. It provides useful information to manufactures in term of product attributes, consumer purchase preferences, and segmentation of consumers. The objective of this research was to discover ideal characteristics and usage of date syrup from the perspective of primarily non-Arab expatriates living in Oman. It is envisaged that date companies in Oman can target non-Arab countries for the export of date syrup.

From Table 1 it can be inferred that brand B is ranked the best by customers. It has the best taste, least thickness and moderate sweetness. Brand A received the lowest ranking and it has the worst taste with relatively high thickness and least sweetness. This information can be of interest to entrepreneurs who are planning to develop and brand Omani date syrup as an important date by-products.

Most of the subjects preferred using syrup as ice cream topping followed by using it as a spread on toast, bagel, waffle and pancake. Using syrup as a sweetener or sugar replacement in yogurt or drink (milk in this case) was least preferred. One of the reasons for low preference for using it in milk was lack of solubility in liquid. Nevertheless, this finding is surprising given Ardali *et al.* (2014)'s conclusion that date syrup provides unique functionality when used with milk and yogurt. Particularly, using date syrup in the formulation of orange drink made it an enriched drink (Ardali *et al.*, 2014). Nevertheless, people may not attribute the usage of date syrup to healthy food. Thus, awareness is needed to educate people that the date syrup contributes to functionality and enriching of yogurt and milk if it is added to them.

It can be seen from above Table 4 that subjects consider good taste to be the most important sensory attribute for the purchase of date syrup. Reasonable price and no sugar added are succeeding important attributes. Packaging, smoothness and sweetness fall almost in the middle of spectrum. This finding suggest although the packaging of date syrup, perhaps, is not a major factorto drive the purchase of syrup for international audience, but there are numerous opportunities for developing the packages of Omani date syrup to make them attractive for local and international market. This is perhaps in line with the statement of Al Marshudi (2002) that" Appearance, composition, and packaging of Omani dates have not always been up to standard and have negative effects on local consumer purchases and Omani dates competitiveness in foreign markets". Surprisingly brand is considered the least importantand was not a major concern. It could be due to the fact the date syrup firms are not using the tools of branding to market themselves. It could also be justified by Gelhar *et al.* (2009)'s conclusion that brand name alone is no longer sufficient for food manufacturers to remain competitive due to threat of low cost imitators. Nevertheless, further research is needed in this area to

determine the impact of package and brand name in the patronage of Omani date syrup for both local and international market.

The understanding of relative importance of attributes related to date syrup is valuable for market segmentation purposes, and therefore the results of this study are useful for entrepreneurs and firms in the marketing of date products in Oman. The product attributes were cross-tabbed with age and origin of subjects to discern if there were any differences in terms of consumer preferences. It was found that the youngest age group (10-17) was most concerned about taste, sweetness, packaging and brand name. Surprisingly, they also did not want any added sugar. The oldest age group (45-59) consider price to be the most important factor in their purchase followed by taste and packaging.

There were also significant differences by region. Asians wanted sweeter product, good packaging, reasonable price and well-known brands. Asians did not care as much about added sugar. North Americans wanted the best taste, no added sugar, least sweetness and good smoothness. North Americans were least concerned about price and brand name. Europeans fall in the middle of spectrum. They want reasonably known brands, reasonable price, some sweetness and good taste. These results present valuable information for segmenting the consumers of Omani date syrup based on their demography. In fact, Gehlhar *et al.* (2009) noted "small and medium sized firms have unique ability or specific resource that is strategic to producing differentiated products".

## 9. IMPLICATIONS

Mbaga (2012) asserted that the success of marketing dates depends on the way they are produced, harvested, sorted, graded, processed, packaged and transported. In this vein, there is an urgent need to encourage the export of Omani date to capitalize on the surplus of wasted local dates. Al Marshudi (2002) recommended areas of research for Omani dates such as improving the competitiveness and marketability of Omani dates and developing new innovative by-products. The relative importance of good taste as the main sensory attribute driving the purchase of date syrup provides useful information for marketing and segmentation purposes. Innovation can occur in all parts of the food chain including the new food ingredients and materials (Bigliardi & Galati, 2013). The addition of new flavours such as cardamom, vanilla, cinnamon, fruity (orange, lemon strawberry), suggested by subjects, provide a venues for developing new products. These findings are useful for entrepreneurs and firms in the marketing of date products in Oman and abroad.

Oman dates industry has an opportunity to develop in areas of grading and packaging of dates. It can learn from the experience of Tunisia since it had the highest value of date exports in 2010 as per FAO (2013) statistics. Thus, more

marketing efforts with respect to branding of Omani dates are needed. Particularly, we need to determine the factors that inhibit or limit the branding of Omani dates. At the same time, we need to learn about local success stories in the area of branding Omani dates such as Meshan and Tamra. In addition, investments in marketing these local date brands are paramount to stay competitive and increase consumers' share of wallets. Branding is one of the possible strategies for product innovation (Isioli *et al.*, 2016).

Omani dates carry a very nationalistic value for consumers powered by the vast efforts and campaigns by various local institutions to promote buying products with Omani origin. Considering the government initiatives and support for Omani dates industry, innovation of date by-products should be based on market demand to maximize the return for local entrepreneurs. Health, vitality, and convenience foods are becoming more important in global food markets (Gehlhar *et al.*, 2009). Utilizing the finding of this study, Omani manufactures can develop date by-product brands for local as well as export markets.

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