Journal of Food Biosciences and Technology,
Islamic Azad University, Science and Research Branch, Vol. 11, No. 1, 21-34, 2021

Formulation and Production of New Carbonated Malt and Jujube Drink and Evaluation of its Physicochemical, Microbial and Sensory Properties during Storage

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Received: 10 May 2020 Accepted: 13 September 2020

ABSTRACT: Malt and jujube are products with high nutritional value and wonderful medicinal properties. In order to benefit from the unique properties of both materials and to resolve problems related to malt soft drinks the production of a new beverage made of malt and jujube extracts was studied. In order to determine the optimal formulation, the central composite design (CCD) of response surface methodology (RSM) was applied. Malt extract, jujube extract and sugar were the independent variables of the design that 20 formulations were determined based on their limits. Optimization was conducted to achieve maximum phenolic content and general acceptance and the optimal formulation was determined as 2.97 ml of malt extract, 5.50 ml of jujube extract and 5.05 g of sugar per hundred ml of beverage. In order to improve optimal formulation of the drink, jujube essence was extracted and added to the drink. The physicochemical, microbial and sensory properties of the final carbonated drink of malt and jujube extracts were evaluated at production time and after three months of refrigeration. During this period, pH, acidity and Brix of the drinks did not change significantly, but the total phenol increase was significant. No microorganisms resistant to acids, yeast and mold was found in the beverage and the number of aerobic mesophilic bacteria was very low and within the standard range. Although the rate of sensory properties had decreased significantly at the end of the maintenance period, the scores were still high and within the acceptable range of judges.

Keywords: *Drink, Jujube Extract, Malt Extract, Response Surface Methodology*.

Introduction

Jujube with the scientific name “Zizyphus Jujube Mill.” is a plant from Rhamnaceae family that the fruit, seed, leaves, twigs, skin and roots of which have been used for the treatment of diseases since the past because of its excellent nutritional and medicinal properties (Mirheydar, 2010). Recent studies also show that jujube fruit has multiple biological activities such as anti-cancer, anti-inflammatory, anti-hepatitis, anti-stomach problems, antioxidant and anti-insomnia effects (Guo *et al.*, 2016). Numerous phenolic compounds in jujube such as chlorogenic acid, gallic acid, protocatechuic acid, caffeic acid (Jie *et al.*, 2003), catechin, epi-catechin and rutin (Hudina *et al.*, 2008) can be the main factors of the effectiveness of jujube fruit.

Barley with the scientific name “Hordeum Vulgare” like wheat is one of the important Gramineae plants. In addition to

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high nutritional value and many uses in traditional medicine, the good taste of products that are produced from barley, good maintenance capabilities, as well as special properties of barley in the milling process has increased the consumption of barley in the last century (Peighambardoust, 2009a). The major food – industrial use of barley is its application in malting and malt is mainly used in malt beverages (usually in the form of extracts) or brewery (Peighambardoust, 2009b). During malting barley grains are converted into products with useful nutritional properties, rich in enzyme with color and flavor properties (Moris & Bryce, 2000) and it is then possible to extract while the main purpose of extracting is to achieve the maximum simple carbohydrates (Ogushi *et al*., 2002) Science malt extract is a food with high nutritional value and its digestion is easier than malt, with its pleasant flavor and full of vitamins contents. Malt soft drinks are obtained by non-fermented malt extract that have been used as child food or to treat some patients in the past but today because of high nutritional value, awareness of the benefits of health products and clever marketing they are used by all classes and their production is increasing day by day (Obuzor & Ajaezi, 2010). One of the problems with non-alcoholic malt drinks is that they have poor taste compared to the alcoholic malt beverages and the main reason of which is the imbalanced flavor elements in the absence of alcohol. One of the methods used to solve this problem is to add flavors to the drink (Hosseini *et al.,* 2011). In this aspect no study is conducted throughout the world in the field of producing beverages containing malt and jujube extracts while the jujube herb can be used as food additive, flavor and to prepare a variety of foods (Yan & Gao, 2002; Pareek, 2013). Umelo (2012) used banana extract to produce soft malt flavored drinks. The researchers investigated different amounts of sugar, banana extract and malt extract produced banana flavored malt beverages. The results showed that under the fixed amounts of banana extract, changing the amounts of sugar and malt extract will not cause a significant difference in product's flavor but the color and overall acceptability scores in the samples with the highest amount of sugar and malt extract were significantly higher. Mc.Carthy *et al.* (2013) also produced phenolic extract from barley grains that had passed the fermentation stage and added it to grapes, blueberry, strawberry and pomegranate juices. No significant increase occurred in the phenolic compound of total juices.

Materials and Methods

- Materials

Ripe red - brown jujube fruit was prepared in almost identical in size with normal appearance (without damage or decay) under the supervision of experts from the Department of Natural Resources from different branches of trees in Isfahan province. Malt extract for food products was purchased from Behnoosh Setareh-Iran Co. and sugar from Naghshe Jahan- Isfahan-Iran Co. Gum Arabic, gallic acid and folin–ciocalteu reagent from Sigma-Aldrich Co. and other chemical materials, as well as microbial cultures were obtained from Merck Chemical Co.

- Preparing aqueous extract of jujube

The fruits were washed with water and after removing the surface water and pitting were left on perforated trays in an oven at 40 ° C for 48 hours (Guo *et al.*, 2015). Dried jujube was crushed into pieces with a diameter of approximately 3 to 5 mm with mortar and filtered for integration. 100 ml of distilled water was added to 20 grams of chopped jujube and the mixture was boiled for 10 minutes, the obtained aqueous extract was filtered with filter paper (with 25 microns pores) and poured into falcon tube until usage and kept in a refrigerator at 4°C (Nikbakht & Pourali, 2015).

- *Analyzing malt and jujube extracts qualitative properties*
- *Measuring extracts' pH, total soluble solids (TSS) and sugar*

Measuring malt and jujube extracts pH was caried out by pH meter (Mettler Toledo LPh 1A01, America), TSS were measured by digital refractometer ATAGO device (Japan) and the level of extracts' sugar was gauged by Lyne-Eynon method (Iranian National Standard No. 3897, 2014, Iranian National Standard No. 2685, 2007).

- *Measuring total phenol content of the extracts*

In order to measure total phenol content of the extracts first the extracts were dried with a freeze dryer (Malaysia), and stored at -20 ° C. Phenolic content was determined by Singleton and Rossi (1965) method with slight variations. The dried extracts were dissolved in methanol to a concentration of 2.5 mg/ml and after 0.25 ml folin–ciocalteu reagent was added to them and the container was shaken. 0.5 ml of saturated sodium carbonate solution and 4 ml of distilled water were added after three minutes, and kept for 30 min in a dark environment at the room temperature. The solution was centrifuged (Centurion Scientific K3, UK) at 20°C at 3200 rpm for six minutes. Finally, the absorbance of the upper part of the centrifuged sample was read with the spectrophotometer (JENWAY 6305, the State Kingdom) at a wavelength of 725 nm. The calibration curve was prepared based on the absorption of various concentrations of gallic acid per liter of distilled water. Total phenol content of the extracts was reported as milligrams of gallic acid per gram of extract (Boroski *et al.*, 2012).

- *Designing the formulations by response surface method*

In order to design the beverage formulas, the response surface methodology (RSM) in Minitab 16.1 software (USA) was applied (Table 1). The amounts of malt extract (X_1), jujube extract (X_2) and sugar (X_3) were the independent variables the levels of which were determined by preliminary studies and tests. The response surface method design was central composite design (CCD). The level of each of the independent variables was coded at five levels.

Table 1. Formulations presented from central composite design of response surface Methodology

RunOrder	StdOrder	Blocks	Malt extract (ml)	Jujube extract (ml)	Sugar (gr)
1	19	1	3.0	3.0	5.0
2	5	1	1.5	1.5	8.0
3	10	1	5.5	3.0	5.0
4	2	1	4.5	1.5	2.0
5	6	1	4.5	1.5	8.0
6	1	1	1.5	1.5	2.0
7	12	1	3.0	5.5	5.0
8	3	1	1.5	4.5	2.0
9	9	1	0.5	3.0	5.0
10	20	1	3.0	3.0	5.0
11	18	1	3.0	3.0	5.0
12	4	1	4.5	4.5	2.0
13	17	1	3.0	3.0	5.0
14	11	1	3.0	0.5	5.0
15	7	1	1.5	4.5	8.0
16	8	1	4.5	4.5	8.0
17	15	1	3.0	3.0	5.0
18	13	1	3.0	3.0	0.0
19	16	1	3.0	3.0	5.0
20	14	1	3.0	3.0	10.0

- *Preparing the samples based on the determined formulations*

In order to prepare each of the 20 formulations first the determined values of malt extract, jujube extract and sugar were mixed and then combined to reach 100 ml volume with RO water (purified water by reverse osmosis industrial method). Carbonated Samples' pasteurization was carried out in tunnel pasteurizators at 65°C for 30 minutes (Hosseini *et al.*, 2012).

- *Drink formulation optimization*

Quality indicators of this study included the measurement of soluble solids, phenolic content and general acceptability of 20 drink samples and the results were reported based on the judges' average mean scores for general acceptability and the mean data of three test replications. Soluble solids were measured by a digital refractometer device (Iranian National Standard No. 2280, 2007). The amount of total phenol of the samples was determined by folin–ciocalteu method, they were read by spectrophotometer at a wavelength of 765 nm. The calibration curve was prepared based on the absorption concentrations of 0, 50, 100, 150, 250 and 500 mg gallic acid per liter of distilled water. Total phenol content of the drinks was reported as mg gallic acid per 100 ml of drink (Majoni, 2006).

General acceptability measurement of the samples was carried out by 7 trained assessors by 9-point hedonic method (Luckow & Delahunty, 2004).

Formulation optimization was carried out to maximize total phenol content and general acceptability.

- *Preparation of final drink's formulation*

Followed by initial assessments to improve the flavor of the final drink, essential oil of jujube was extracted and its addition to the product was included as the complementary steps of production. Water distillation method was used for extraction by Clevenger apparatus within 4 hours and the final essence was dehumidified by anhydrous sodium sulfate. The prepared essences were stored in dark-colored containers in refrigerator (Boroski *et al.*, 2012). To prepare essence emulsion and mix the essence with the drink gum Arabic was used as emulsifier and based on the studies and flavor tests at different percentages 0.6% of emulsified essence was added to the drink and mixed with it.

- *Storage of final carbonated jujube and malt extracts drink product*

After adding the essence, the rest of process including filling, carbonation, heading and pasteurization was performed on the final product and the bottles were refrigerated at 5 ± 1°C. Physicochemical, microbiological and sensory tests were carried out on the final carbonated drink within zero (immediately after production), 30, 60 and 90 days of storage.

- *Statistical analysis*

In order to analyze the changes in physicochemical, microbiological and sensory characteristics from the production and up to three months after refrigeration the ANOVA was used in SPSS.19. Duncan test was done at the significance level of 0.05. The diagrams were plotted in Excel 2010.

Results and Discussion

- *Qualitative properties of extracts*

The results of the qualitative properties measurement of malt and jujube extracts are shown in Table 2. The results show that the obtained values of pH, total soluble solids and reducing sugar of malt extract were completely within the range of acceptable values specified by Iranian National Standard No. 3897 (2014). Jujube aqueous extract had adequate levels of brix and reducing sugars (Galindo *et al.*, 2015). The amount of sugar increases since the beginning of jujube fruit development until ripening (Wu *et al.*, 2012), pectin and natural sugars become soluble during ripening period (Wang *et al.*, 2012) and this would improve the qualitative properties of the fruit and its products.

Phenolic compounds are the main compounds that participate in grains' antioxidant activities. Among grains' wheat, barley, maize and their malts, the highest total phenolic compounds were observed in barley malt extract which also had the highest antioxidant activity (Fogarasi *et al.*, 2015). Releasing phenolic compounds' links by enzymes during malting or temperature effects of curing was among the reasons of increased phenolic content in malt extract (Qingming *et al.*, 2010).

Although phenol content of aqueous extracts of jujube was lower than that of the hydroalcoholic Chinese jujube extract (Zhao *et al.*, 2014), it was higher than the phenol content of ripe jujube extract extracted with methanol in the ultrasound by Wang *et al.* (2016). In fact, different extraction methods can also be among the factors that cause various amounts of phenolic compounds in the extracts of jujube (Zhao *et al.*, 2014; Guo *et al.*, 2015). During drying the jujube with non-enzymatic browning, the phenolic compounds were formed and the oven heat can break polyphenols' covalent bonds and release small polyphenol molecules both of which make more phenol moles to be available to the folin–ciocalteu reagent (Kim *et al.*, 2012). From another aspect the total phenol content in jujube skin extracts was more than its pulps' and it was more available in pulp extract than its core extracts' (Zhang *et al.*, 2010), with respect to this issue since in this study the skin and pulp of jujube were extracted, this could be a reason for the high phenolic content in our aqueous jujube extract.

- *Analysis of the effect of independent variables on the dependent variables*

Based on analysis of the responses in the application, the effects of the variables were plotted as 3-D diagrams (Figure 1, 2 & 3) and a model was defined based on the obtained regression results for each of the dependent variables (Table 3). As the adjusted coefficient of determination is closed to the efficient of determination, model capability will be higher (Montgomery, 2012).

In soluble solids' model the linear effect of malt extract and sugar factors was significant ($p \leq 0.05$). Increasing the jujube extract is insignificant in Brix increase while the malt extract has been able to cause a significant increase in soluble solids in the samples and malt extract confrontation with sugar maximized the Brix (Figure 1. A, B & C).

Both malt and jujube extracts have good amount of total phenols and so rich in phenolic compounds therefore they are capable of producing the phenolic-rich products. In any malt beverage there are a large number of phenolic compounds with antioxidant properties such as phenolic acids, ferulic acid, Maillard reaction products and sulfites and changing the amount of each one in drinks could be effective on the phenolic content and antioxidant activity (Pascoe *et al*., 2003). Increasing the phenol content by increase in malt extract is mostly due to the presence of heat resistant phenolic compounds in malt extract that are released during various stages of malting and processing (Hosseini *et al*., 2012). In case of jujube extract in addition to the nature of jujube that is rich in phenols, heating during the drying process and extraction can be effective in the release of phenolic compounds.

Sugar has low synergistic effect on increasing phenolic content of the samples against malt or jujube extracts. The presence of sugar in the environment can provide formation and increasing polyphenols

(Figure 2.A, B &C).

In the general acceptability model, the effect of all linear and quadratic expression was significant at 5% except the square effect of malt extract. Increasing jujube extract increased the general acceptance rates but in general the scores indicate that judges have preferred the samples containing both extracts (Figure 3.A). According to the judges in descriptions of the forms, although sugar has no significant effect on increasing the product odour, its effect in increasing flavor has been considerable. The increase in sugar and malt versus each other led to obtain higher scores by the judges (Figure 3.B) but according to the three-dimensional graphs, at high levels of sugar and jujube extract, there is a slight decreased and then increased rate of scores in the general acceptability of samples as the result of the interactive presence of these two variables (Figure 3.C). This reduction can be due to many reasons such as low color or excessive sweet flavor of the samples but by maximizing the use of extract the color and flavor are improved and the scores increase.

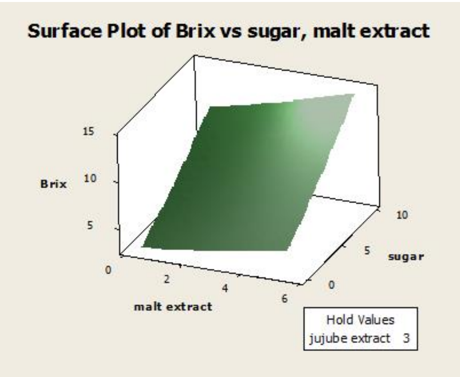
Table 2. Qualitative properties of malt and jujube extracts (mean ± standard deviation)

	pH	TSS(^{0}Brix)	Reducing sugar (%)	Total phenol (mgGAE/grEx)
jujube extract	4.9±.1	15±.4	28.57±.2	376±3
malt extract	3.7±.1	61.3±.2	42.22±2.1	323±6

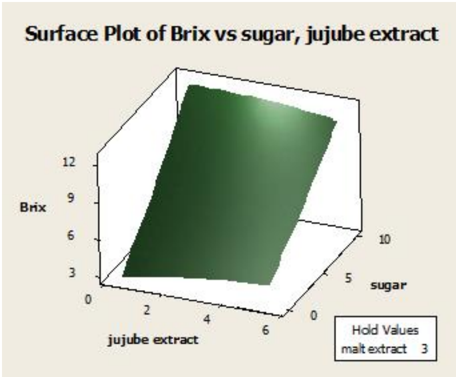
Table 3. The final model and coefficient of determination of the dependent variables (based on the code)

model	R^2	R^2adj
Brix = $7.718 + 0.908x_1 + 2.52x_3$	0.983	0.969
Total phenol = $30.901 + 5.897x_1 + 5.543x_2 + 2.388x_3 + 1.242x_1^2 - 0.61x_2^2 + 0.53x_1x_3 + 0.508x_2x_3$	0.996	0.993
General acceptability = $4.951 + 0.644x_1 + 0.389x_2 + 0.455x_3 + 0.474x_2^2 - 0.236x_3^2$	0.908	0.824

A



B



C

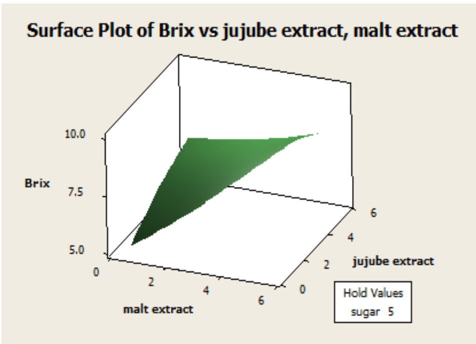
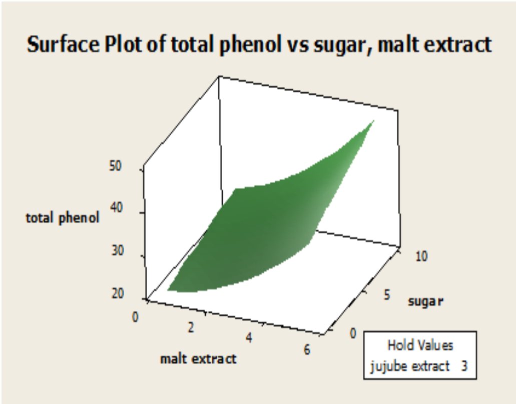


Fig.1. Surface plot of the effect of variables on brix

A



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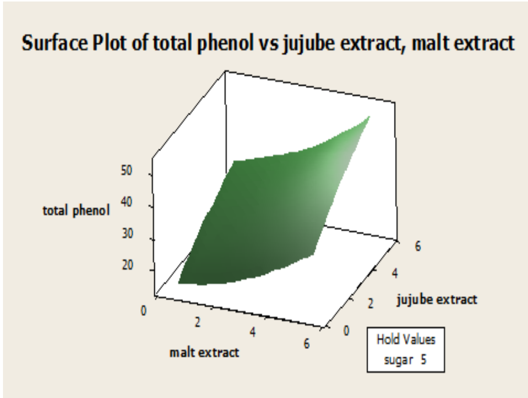


C

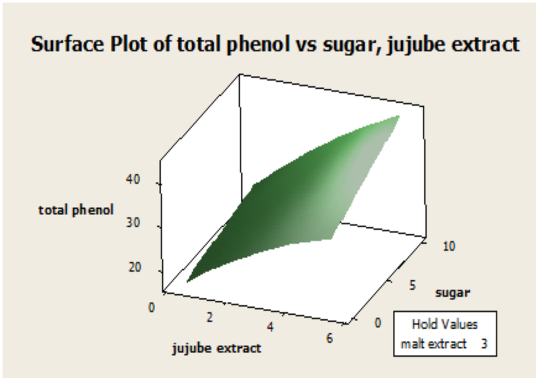
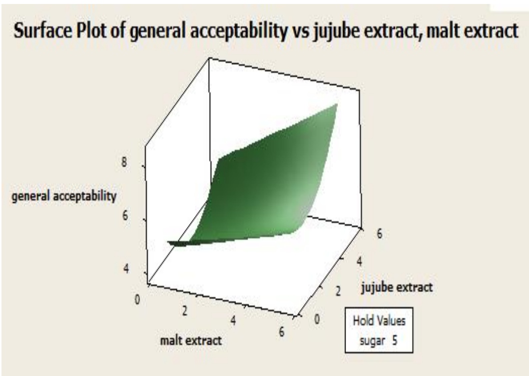
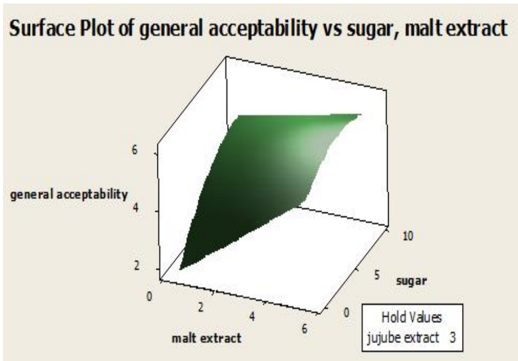


Fig. 2. Surface plot of variables on total phenol



A

B



C

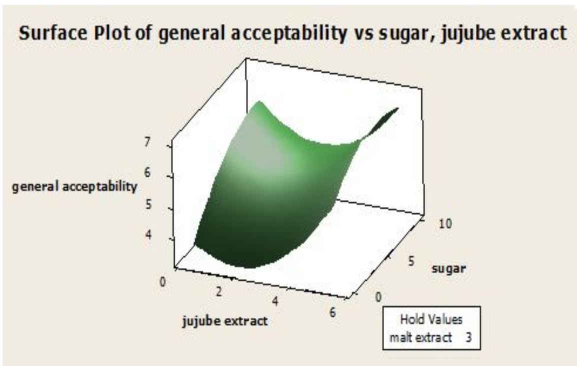


Fig. 3. Surface plot of variables on acceptability

In the table of the analysis of variance of the dependent variables (Table 4) in addition to the lack of fit, the significance of the linear and quadratic expression and the interactive effect was also mentioned where the non-significant expressions were removed from the models (Oehlert, 2010).

- Optimal and final formulations

Figure 4 presents the values determined by the software as the optimal formulation. The desirability of the process was also associated with the simultaneous optimization of the responses.

Optimal formulation contained 2.97 ml of malt extract, 5.50 ml jujube extract and 5.50 grams of sugar that according to these values it is possible to produce a drink that has the highest phenol content and general acceptability within standard Brix range (Table 5).

Table 4. Variance analysis of the dependent variables

Source	DF	Adj SS	Adj MS	P
TSS (^{0}Brix)				
Linear	3	97.74	32.58	0.00
Square	3	0.41	0.14	0.51
Interaction	3	1.34	0.45	0.10
Lack of Fit	5	1.62	0.32	0.10
Total phenol content				
Linear	3	97228.5	32409.5	0.00
Square	3	3024.5	1008.2	0.00
Interaction	3	574.7	191.6	0.02
Lack of Fit	5	181.3	36.3	0.51
General acceptability				
Linear	3	10.57	3.52	0.00
Square	3	4.40	1.47	0.00
Interaction	3	0.72	0.24	0.27
Lack of Fit	5	1.06	0.21	0.23

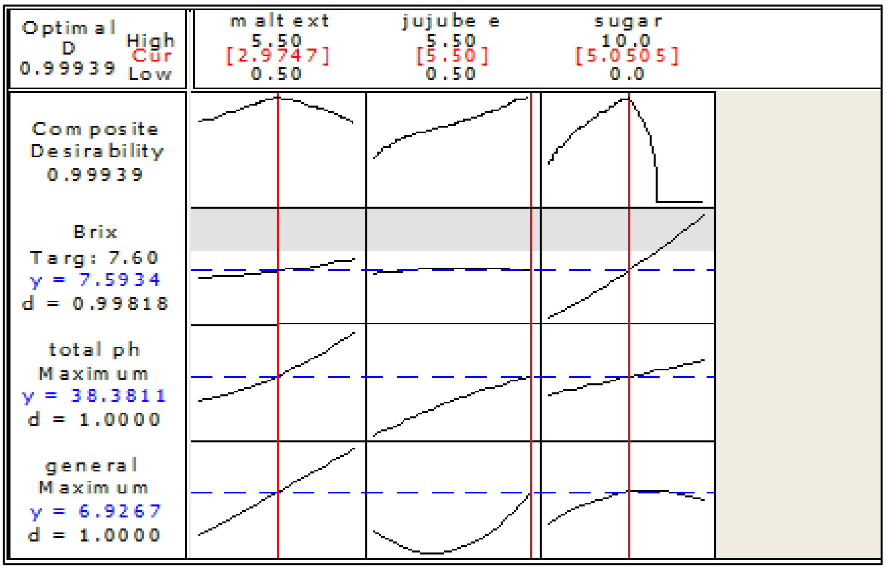


Fig. 4. Optimal formulation based on brix, total phenol and general acceptability

Table 5. Actual and predicted values for the quality properties of the optimal formulated drinks

	Predicted value	Actual value
TSS (^{0}Brix)	7.59	6.93
Total phenol content (mg GAE/100ml)	38.38	38.32
General acceptability	6.93	6.3

Okon and Akpanung (2005) reported that some people (healthy or diabetics) do not use conventional malt drinks to maintain their health because they are aware that these drinks contain high levels of sugar (more than 14%). In this context Umelo (2012) prepared flavored malt beverage with banana which contained 11.8% sugar and presented this drink as "low sugar" and healthy flavored malt drink. By this description the flavored malt beverage in the present study in addition to be natural, rich in nutrients and healthy (such as phenols), was also "low in sugar". The judge's scores for accepting drinks optimum formula was between 6 and 7. Followed by the initial studies to improve the sensory properties of the beverages and to achieve a formulation that is more accepted by the judges and other consumers, essential oil of jujube was extracted and added to the optimal drink formula. Based on the results of pre-tests in the final formulation of beverages, in addition to the optimal values of malt extract, jujube extract and sugar, 0.6% jujube essence was added to obtain the highest level of satisfaction.

- *Effect of storage period on the final drink*

Physicochemical properties of the final drink over three months are presented in Table 6. The reason for acidity in the drink was the natural acidity of the extracts, lactic acid in the applied malt extract and carbon dioxide in the water. The initial acidity of the drink and pH were both in the standard range (Iranian National Standard No. 2279, 2011). During the three months of storage the acidity and pH value changes were not significant. The reason that changes in acidity were higher than pH variation is associated with some buffer properties of the drink; in fact, some buffer properties and sulfur compounds can act as a tampon and prevent the pH variations despite changes in acidity (Sedaghat & Hosseini, 2010). Chemical, biochemical and biological reactions can cause pH and acidity changes (Varnam & Sutherland, 1994), for example during storage a sharp decline in total sugar, reducing sugar and sucrose or their degradation into non-sugar materials can increase acidity and reduce pH. The yeast can reduce pH by consuming the sugar and produce acid in the environment. Factors such as acidity, antimicrobial compounds, preservatives and increasing the pH through the production of ammonium by the molds, prevent yeasts' overgrowth (Islam *et al.*, 1990; Varnam & Sutherland, 1994). There is a more limited change in pH over 30 days of storage in pasteurized and refrigerated soft drinks compared to the either pasteurized or refrigerated samples (Osuntogun & Aboaba, 2004).

The product's changes due to consumption of sugars by bacteria, molds and yeasts (Varnam & Sutherland, 1994) but the soluble solids were fixed and had no significant change during storage. Insignificant changes in pH, acidity and brix during storage indicate that the outcome of parameters affecting the quality and shelf-life has been such that it has prevented the effective reaction in changing pH, acidity and Brix (Elhamirad & Mohammadi, 2006).

Oxidative stresses can disrupt the balance of antioxidants and materials created by oxidation and this leads to the diseases such as cancer, cardiovascular disease, cell injury or death and inflammatory disorders (Negi, 2013). Polyphenols are the main compounds with antioxidant properties. Measurement of drink's total phenol after production showed that adding essence to drink formulation increased phenol content. According to the studies eugenol is the main component of jujube essence (Al-Reza *et al.*, 2009; Al-Reza *et al.*, 2010). These phenolic compounds are capable of scavenging free radicals (Farhangfar *et al.*, 2011). Within three months of storage a significant increase was observed in total phenol content of the carbonated malt and jujube drinks (Figure 5). The highest increase occurred between the second and third months. This suggests that the stored drinks have more advantageous benefits. This increase may be due to the release of phenols as a result of hydrolysis of bonds between phenolic compounds and other compounds, especially proteins (Karami *et al.*, 2012). The formation of compounds capable of reacting with folin–ciocalteu reagent could also lead to over measurement of the phenolic compounds (Piljac-Zegarac *et al.*, 2009) that as discussed earlier, the sugar in malt beverages can play a role in the formation of these compounds.

According to microbiological tests of carbonated malt and jujube extracts drink, the colony of no acid's resistant microorganism, mold and yeast was observed in the plates after production and within three months (Table 7). It is proved that the processing and storage conditions affect the presence of pathogenic and corrupting microorganisms in food products; the use of high temperatures such as pasteurization destroys many mesophilic bacteria and controls proliferation of microorganisms at low storage temperatures (Osuntogun & Aboaba, 2004) so to apply both mentioned procedures at the same time could be more effective on the bacteria.

Sensory evaluation is used to study, measure, analyze and interpret the food properties understood by the five senses (Awobusuyi, 2015). After one month of storage of the final drink, the judges announced products' odour as unique. Jujube and malt extracts' odour has created a unique combined aroma of the product. Moreover, the interaction of sugars with acid to bind to the similar taste areas was such that it was accepted by the referees and this factor increased flavor and odour within 30 days of storage compared to the data of production (Figure 6). The flavor rate of the drink in the second and third months had a significant reduction compared to the first month that could be due to the low bacterial activity. The product odour showed a significant decrease in the third month ($p \leq 0.05$). The color of drink was not too dark or light and the score of the samples was fixed within the first 30 days.

The age and gender can affect the general acceptability of a product (Awobusuyi, 2015). Most people believe that cold drinks taste better than hot drinks (Osuntogun & Aboaba, 2004). Also, as the result of product durability, chemical and biochemical reactions and production of some combinations affect the flavor and odour that is not appealing to some consumers (Osuntogun & Aboaba, 2004). In case of the turbidity, polyphenols have two hydroxyl groups in their structure ring that enable them to react with many compounds and add turbidity over time (Varnam & Sutherland, 1994; Hosseini *et al.*, 2012).

Table 6. Physicochemical properties of the final drink during storage (mean ± standard deviation)

Time storage (day)	pH	Acidity (%)	TSS (^{0}Brix)
0	$3.75 \pm .01^A$	$0.295 \pm .051^A$	7 ± 0^A
30	3.75 ± 0^A	$0.312 \pm .024^A$	7 ± 0^A
60	$3.76 \pm .01^A$	$0.32 \pm .009^A$	$7.03 \pm .06^A$
90	$3.76 \pm .02^A$	$0.316 \pm .017^A$	7 ± 0^A

* Numbers have common letters in each column are not significantly different at the probability level of 5%

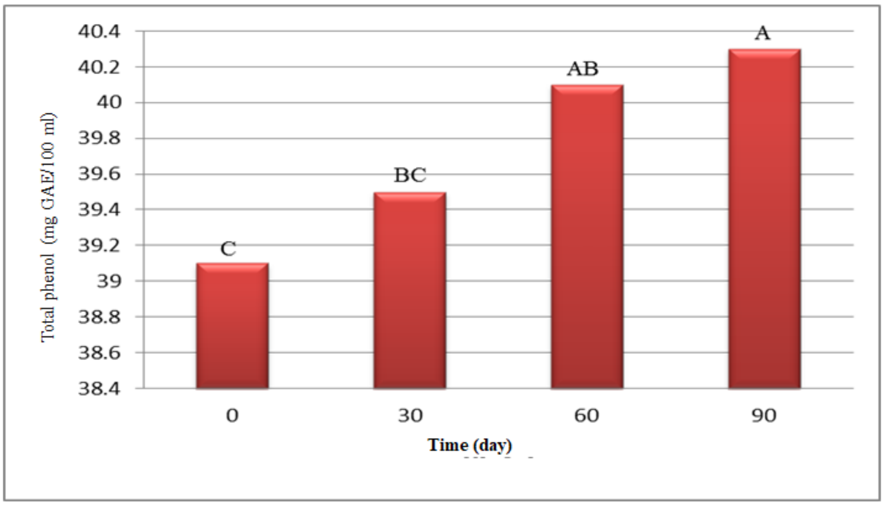


Fig. 5. Changes in the total phenol content of the final beverage during the storage period.

Table 7. Microbial properties of the final drink during storage (number of colonies on the three plates ± standard deviation)

Time storage (day)	aerobic mesophilic bacteria(cfu/ml)	acids resistant microorganisms	mold & yeast
0	$0.033\pm.58^{B}$	N*	N
30	1.67 ± 1.15^{AB}	N	N
60	3 ± 1^{A}	N	N
90	4 ± 1.73^{A}	N	N

* No microorganism found in the plates.

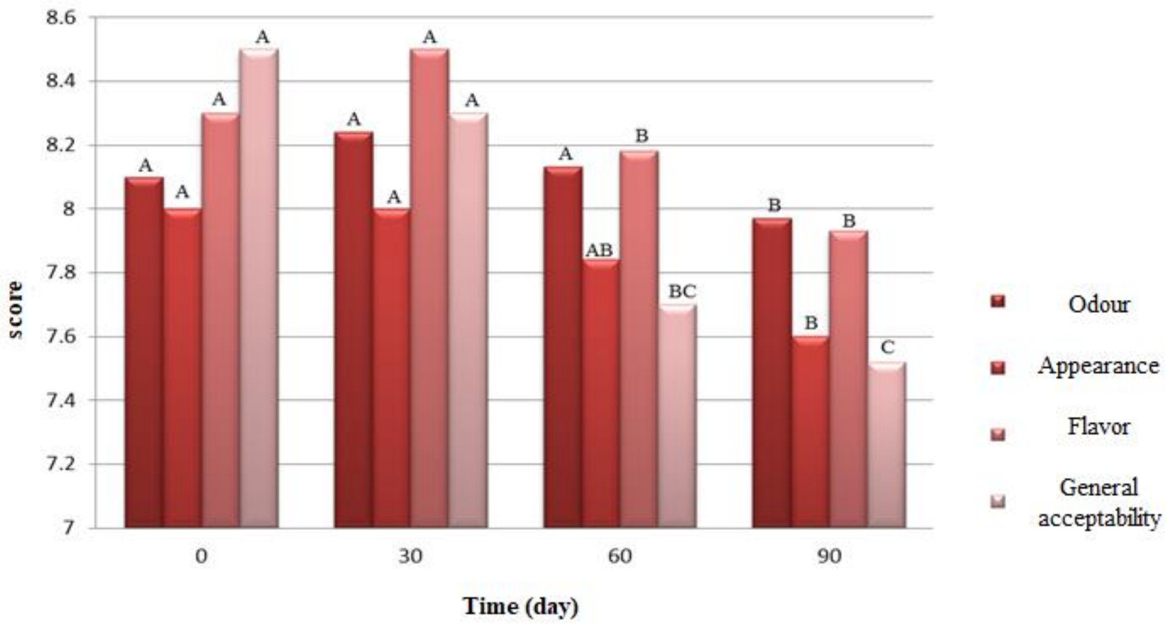


Fig. 6. Changes in the sensory properties of the final drink during the storage period.

Conclusion

Production of these drinks in addition to bring a valuable product containing positive properties for the society, it is considered as a strategy for the use of precious treasures of medicinal plants with jujube extract to progress their nation's economy because jujube is harvested in many parts of Asia and Iran without being used in the production of a variety of food products. Moreover, while having malt drinks' properties this product could also contain jujube extracts' properties and has a more favorable position in terms of nutritional value and medicinal properties compared with many drinks on the market and encourage consumers to take advantage of healthy drinks instead of harmful soda.

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