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Production Of Functional Drinks From Blood Orange And Strawberry

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Abstract

The present work was carried out to investigate producing functional drinks and natural syrups from strawberry and blood orange juice mixtures whereas color and functional properties of strawberry and blood orange juice are similar due to anthocyanin had been found in their juices and the nutritional value of each juices is high.

This research aims to utilization of blood orange juice manufacturing to increase the cultivated area and the production especially in new lands.

Treatments comprised four different blended drinks and syrups representing (100:0), (75:25), (50:50) and (25:75) (w:w) from strawberry and blood orange juices, respectively.

Results showed that the value of total solids, total soluble solids, total acidity, total sugars and carotenoids were higher in blood orange juice as compared to that in strawberry juice. Meanwhile, the anthocyanin and viscosity were higher in strawberry juice than that in blood orange juice.

Concerning the chemical and physical properties of functional drinks produced from blended strawberry and blood orange juices show that a slightincrease in total solids, total soluble solids, total sugars and carotenoids due to their high contents in fresh blood orange juice. Viscosity of drinks produced by adding sodium alginate (0.2%) recorded high viscosity than pectin. While drinks produced by without any stabilizers recorded lowest values. Results indicated that no considerable changes of total solids, total soluble solids, total sugars of syrup produced with strawberry juice only or with blended with blood orange juice. While the syrups prepared with strawberry juice and with 25%,50% and 75% blood orange juice recorded a slight decrease of ascorbic acid, anthocyanin and viscosity than that of 100% strawberry juice.

Organoleptic evaluation showed that functional drinks prepared from blended strawberry and blood orange juices at the ratio (75:25), (50:50), respectively and by adding pectin as stabilizer agent recorded high score than other treatments. Organoleptic evaluation of new strawberry and blood orange functional syrups indicated that syrups prepared from strawberry and blood orange juice at the ratio (50:50) recorded higher scored of all studied properties followed by the syrups prepared with (75:25) strawberry and blood orange juice, respectively.

Accordingly, it can be recommended that the new functional drinks could be successfully produced from blended strawberry and blood orange juice at the ratio (75:25), (50:50), respectively and by adding pectin (0.2%) as stabilizer. Also, new strawberry and blood orange functional syrups could be successfully produced using blended of strawberry and blood orange juice at the ratio of 50:50.

Keywords: Blood orange, Strawberry, Chemical properties, Anthocyanin, Organoleptic evaluation, Functional foods.

Introduction

The total world production of strawberry and orange were 7.739.622 and 71.445.353 metric tons, respectively during 2013 year. Egypt is considered the first country for orange production and the second country for strawberry production in Africa. It produced 35.61% orange and 39.65% strawberry of Africa production during 2013**(FAO, 2013).**

On the other side, Egypt produced 2.886.015 tons orange and 254.921 tons strawberry during 2013, **(Department of Statistics, Ministry of Agriculture, Giza, Egypt).** The production of blood orange is decreased because its color considered problem during manufacturing and commercial local consumption.

Red- colored blood orange (Citrus sinensis) is not common in the US market but small quantities of blood orange juice have been blended with lightly colored sweet orange juice to improve flavor and color. The red color of blood orange is primarily associated with anthocyanin pigment not usually found in citrus but common in berry fruits. The production of clarified and concentration has been studied, considering the effects on some physico-chemical properties **(Toker et al., 2014**). **(Ebru et al., 2016)** demonstrated that the blood orange varieties possess improved quality and sensory attributes and therefore they can be used in order to take advantages of its nutraceutical components.The effect of ascorbic acid retention on juice color and pigment stability in blood orange juice during refrigerated storage were studied by **(Choi et al., 2002)** and showed that ascorbic acid appeared to have influence on anthocyanin pigment loss and lowering the intensity of redness in juice. Consumption of blood orange juice has been shown to reduce oxidative stress in diabetic patients, protect DNA against oxidative damage and may reduce cardiovascular risk factors more generally, as demonstrated for other high-anthocyanin foods **(Paredes et al., 2010).**Traditionally, Sicilian blood oranges have been associated with cardiovascular and consumption has been shown to prevent obesity in mice fed a high-fat diet **(Butelli et al., 2012).**Effect of fresh orange juice intake on physiological characteristics in healthy volunteers and observed favorable changes in some of inflammatory markers after the consumption of orange juice in participants **(Asgary et al., 2014).**

Like all citrus fruits, blood oranges are high in vitamin C and also a good source of folate (Vitamin B9), it is essential to the early development of a fetus. Drinking orange juice could help to improve brain function in elderly people. Orange juice is a major source of a group of naturally occurring plant phytochemicals known as flavonoids. Blood orange juice is a bioavailable source of antioxidants, which might moderately improve the antioxidants, which might moderately improve the antioxidant defense system **(Riso et al., 2005).**

Strawberry (Fragariaananassa, L.) is considered one of the main vegetable crops either for local consumption for export. Strawberry juice is a suitable source of vitamins, sugars and minerals. Strawberry and its juice are considered to improve digestion and have a curative effect in cases of heart disorders, atherosclerosis, gall stones, gout and anemia. **Giampieri et**

al.,(2012)reported that strawberries contain many important dietary components including vitamins, minerals, folate and fiber and are rich source of phytochemical compounds.

The presence of bioactive compounds such as flavonoids and ellagic acid derivatives makes the consumption of strawberry suitable for potential health benefits. Dietary intake of flavonoids has been associated to lower risk of heart disease as well as cancer, probably related to the antioxidative activity of these compounds **(Meyers et al., 2003).** The berries were rich in phenols, flavonoids, vitamin C and anthocyanin's. The strawberry cultivar " Summertiara" berries were the most suitable for processing ingredient of strawberry derived products with superior health promoting functionalities such as antioxidant activity and antihypertensive activity **(Nagai et al., 2014).** The strawberry fruit is now considered a functional food offering multiple health benefits beyond basic nutrition as substantiated by the accumulatingevidence on its antioxidant, anti-inflammatory, antihyperlipedemia, antihypertensivesor antiproliferative effects. These mechanisms of action are directly linked to the modification of etiology of chronic diseases **(Jemal et al., 2010).** Strawberries can be termed as a "functional food" providing health benefits beyond basic nutrition. Strawberries contain significant amounts of phytochemicals and micronutrients. Thus, several lines of evidence and warrants **(Basu et al., 2014).** Strawberries are a rich source of a wide variety of nutritive compounds such as sugars, vitamins and minerals as well as non-nutritive compounds such as flavonoids, anthocyanins and phenolic acids. All of these compounds exert a synergistic and cumulative effect on human health promotion and in disease prevention**(Giampieri et al., 2015).**

The present work was carried out to investigate producing functional drinks and syrups from strawberry and blood orange juice mixtures. Whereas the color and functional properties of strawberry and blood orange are similar.

Materials And Methods

1- Materials:

Strawberry (Fragariaananassa, L.)Scotavariety (15 Kg.) were obtained from a special farm in Ismailia Governorate, Egypt in 2015. Fruits were picked at ripe stage of maturity, the green parts were removed then washed, pulped by warring blender, after then filtered to remove the seeds.

Blood orange (Citrus sinensis, L.)Osbekvariety (25 Kg.) used in this study which were obtained from the local market of Zagazig City, Egypt (in the ripe stage). The fruits were washed and juice was obtained after removing the seeds and filtered.

2- Processing methods:

2-1- Preparation of new drinks from strawberry and blood orange juices is shown in Table 1.The prepared drinks were bottled in white glass bottles, closed tightly and pasteurized at 70°C for 20 minutes, then cooled with tap water according to **Odalovic et al. (2010).**

2-2- Preparation of new syrups from strawberry and blood orange juices:

The four different syrups were prepared from strawberry and blood orange juice with different amounts. The concentration was adjusted to about 59.5°Brix with sugar by cold method according to **Burzanovic (2009).**

The constituents of new syrups from strawberry and blood orange juices is shown in Table 2.

3- Analytical methods:

Moisture content, total solids, total soluble solids, titratable acidity and ascorbic acid were determined according to methods described in the **A.O.A.C. (2012).** Total sugars content, reducing and non reducing sugars were assayed according to Lane and Eynon's method as described in the **A.O.A.C. (2012).** Carotenoids were determined as described by **Horwitz and Latimer (2007).**Anthocyanins were determined according to **Ranganna (1977).**

The viscosity of beverages and syrups were measured using Brookfield viscometer Model DV-III Rheometer. The organoleptic evaluation of beverages produced and the reconstituted syrups were carried out as described by **Notter et al.(1959).**

Table (1): Constituents of functional drinks from strawberry and bloody orange juices mixtures:

Treatments / Constituents	1	2	3	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Strawberry Juice	80 ml	80 ml	80 ml	80 ml	60 ml	60 ml	60 ml	60 ml	40 ml	40 ml	40 ml	40 ml	20 ml	20 ml	20 ml	20 ml
Bloody orange juice	-	-	-	-	20 ml	20 ml	20 ml	20 ml	40 ml	40 ml	40 ml	40 ml	60 ml	60 ml	60 ml	60 ml
Sugar solution (16 °*Brix*)	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml	120 ml
Citric acid	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm	4.0 gm
Pectin	-	0.4 gm	-	-	-	0.4 gm	-	-	-	0.4 gm	-	-	-	0.4 gm	-	-
Sodium Alginate	-	-	0.4 gm	*H	-	-	0.4 gm	*H	-	-	0.4 gm	*H	-	-	0.4 gm	*H
Sodium benzoate	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm	0.05 gm

*H : Homogenization

Table (2): Constituents of functional syrups from strawberry and bloody orange juices mixtures:

Treatments / Constituents	A	B	C	D
Strawberry Juice	100%	75%	50%	25%
Bloody orange juice	-	25%	50%	75%
Sugar	59.5 °Brix	59.5 °Brix	59.5 °Brix	59.5 °Brix
Citric acid	3 gm/100 gm sugar	3 gm/100 gm sugar	3 gm/100 gm sugar	3 gm/100 gm sugar
Sodium benzoate	0.2 gm	0.2 gm	0.2 gm	0.2 gm

A= Syrup prepared from 100% strawberry juice.
B= Syrup prepared from 75% strawberry juice + 25% bloody orange juice.
C=Syrup prepared from 50% strawberry juice + 50% bloody orange juice.
D=Syrup prepared from 25% strawberry juice + 75% bloody orange juice.

Statistical analysis:

Data were statistically analyzed according to **Snedecor and Cochran (1982).** Least significant difference (L.S.D.) was calculated at 0.05 level as significance.

Results And Discussion

1- Chemical and physical properties of strawberry and blood orange juices:

Table (3) shows the chemical and some physical properties of fresh strawberry and blood orange juices. It could be noticed that blood orange juice contained 12.35% total solids, 12.10% total soluble solids, 1.27% total acidity, 9.63% total sugars and 1.97 mg/100 gm carotenoids. These values were higher as compared to that in strawberry juice. Meanwhile, the anthocyanin were higher in strawberry juice 4.15 mg/100 gm and 10.96 centipoise, respectively. While no considerable difference between ascorbic acid content of strawberry and blood orange juices 59.73 and 58.69 mg/100 gm, respectively. These results are in agreement with those reported by **Giampieri et al., (2012); Toker et al., (2014) and Ebru et al., (2016).**

2- Chemical and physical properties of functional drinks produced from blended strawberry and blood orange juices:

Results in Table (4) show the chemical and physical properties of new drinks produced from blended strawberry and blood orange juices. From this Table, it could be noticed that drinks prepared with blended blood orange juice with strawberry juice caused a slight increase in total solids, total soluble solids, total sugars and carotenoids because these contents in fresh blood orange juice was higher than fresh strawberry juice. Data in the same Table show a slight decrease of anthocyanin in beverages prepared with strawberry and orange juice than that of strawberry juice only because percentage of anthocyanin was higher in strawberry than that found in bloody orange juice. These results are agreement with **Giampieri et al.,(2012).** The same Table showed that the viscosity of drinks produced by adding sodium alginate (0.2%) recorded high viscosity than pectin. While drinks produced without any stabilizers were recorded lowest values. These results could be explained by the opinion of **Soliman (1999)** who found that natural beverages prepared from citrus peels concentrates by adding sodium alginate as a stabilizer recorded high values of viscosity than carboxymethyl cellulose and pectin.

3- Chemical and physical properties of functional syrups produced from strawberry and blood orange juices:

Results in Table (5) show the chemical and physical properties of new syrups produced from strawberry and blood orange juices. Results indicated that no considerable changes of total solids, total soluble solids, total sugars of syrups produced with strawberry juice only or with blended with blood orange juice. While the syrups prepared with strawberry juice and with 25% 50% and 75% blood orange juice recorded a slight decrease of ascorbic acid, anthocyanin and viscosity by increasing blood orange juice. This was due to the ascorbic acid content, anthocyanin and viscosity were slightly decreased in blood orange juice than those obtained from strawberry juice. These results are in accordance with those obtained by **Giampieri et al., (2012); Giampieri et al., (2015)**and **Ebru et al., (2016).**

Table (3): Chemical and some physical properties of fresh strawberry and blood orange juices.

Properties	Strawberry juice	Blood orange juice
Moisture %	90.21 ± 0.87	87.65 ± 0.73
Total solids %	9.79 ± 0.29	12.35 ± 0.35
Total soluble solids %	9.20 ± 0.25	12.10 ± 0.30
Total acidity %	1.05 ± 0.04	1.27 ± 0.06
Total sugars %	6.31 ± 0.13	9.63 ± 0.21
Reducing sugars %	3.89 ± 0.08	5.18 ± 0.14
Non reducing sugars %	2.42 ± 0.05	4.45 ± 0.07
Ascorbic acid mg/100 gm	59.73 ± 0.62	58.69 ± 0.54
Carotenoids mg/100 gm	1.51 ± 0.08	1.97 ± 0.09
Anthocyanin mg/100 gm	4.15 ± 0.04	2.24 ± 0.02
Viscosity (centipoise)	10.96 ± 0.27	6.13 ± 0.18

Data are means± standard error.

Table (4): Ch emical and some physical properties of functional drinks from strawberry and bloody orange juices:

Properties	*Treatments															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Moisture %	84.91 ±0.61	85.07 ±0.63	84.85 ±0.58	84.61 ±0.45	84.94 ±0.64	84.72 ±0.59	84.52 ±0.53	84.07 ±0.60	84.63 ±0.48	84.77 ±0.56	84.20 ±0.42	84.01 ±0.38	84.96 ±0.62	84.89 ±0.48	84.56 ±0.51	84.30 ±0.54
Total solids %	15.09 ±0.38	14.93 ±0.23	15.15 ±0.26	15.39 ±0.28	15.06 ±0.23	15.28 ±0.18	15.48 ±0.25	15.93 ±0.34	15.37 ±0.29	15.23 ±0.31	15.80 ±0.28	15.99 ±0.36	15.04 ±0.17	15.11 ±0.21	15.44 ±0.35	15.70 ±0.31
Total soluble solids %	14.20 ±0.30	14.50 ±0.31	14.60 ±0.29	14.80 ±0.34	14.20 ±0.37	14.60 ±0.22	14.90 ±0.28	15.00 ±0.35	14.20 ±0.20	14.65 ±0.26	15.00 ±0.23	15.10 ±0.35	14.23 ±0.18	14.30 ±0.27	14.50 ±0.19	14.90 ±0.34
Total acidity %	0.62± 0.03	0.66± 0.05	0.60± 0.04	0.64± 0.04	0.54± 0.02	0.59± 0.03	0.68± 0.06	0.55± 0.04	0.61± 0.03	0.63± 0.05	0.65± 0.02	0.69± 0.01	0.75± 0.07	0.74± 0.05	0.71± 0.06	0.76± 0.04
Total sugars %	13.50 ±0.29	13.74 ±0.23	13.82 ±0.18	14.03 ±0.31	13.52 ±0.23	13.83 ±0.28	14.16 ±0.19	14.23 ±0.21	13.56 ±0.17	13.91 ±0.25	14.28 ±0.13	14.37 ±0.21	13.53 ±0.11	13.59 ±0.18	13.76 ±0.15	14.20 ±0.22
Reducing sugars %	1.60± 0.06	1.62± 0.04	1.65± 0.03	1.68± 0.04	1.73± 0.05	1.80± 0.06	1.83± 0.08	1.85± 0.08	1.79± 0.04	1.86± 0.06	1.90± 0.05	1.89± 0.07	1.91± 0.06	1.95± 0.08	1.97± 0.06	1.93± 0.09
Non reducing sugars %	11.90 ±0.23	12.12 ±0.20	12.17 ±0.15	12.35 ±0.27	11.79 ±0.18	12.03 ±0.22	12.33 ±0.11	12.38 ±0.13	11.77 ±0.13	12.05 ±0.19	12.38 ±0.08	12.48 ±0.14	11.62 ±0.05	11.64 ±0.10	11.79 ±0.08	12.27 ±0.13
Ascorbic acid mg/100 gm	24.03 ±1.05	24.10 ±1.09	23.90 ±1.02	22.49 ±0.93	23.41 ±0.95	23.67 ±0.98	23.80 ±0.87	21.06 ±0.76	23.50 ±0.91	22.98 ±0.94	22.87 ±0.79	20.07 ±0.62	23.10 ±0.80	22.96 ±0.85	22.83 ±0.81	20.01 ±0.78
Carotenoids mg/100 gm	0.60± 0.02	0.58± 0.01	0.64± 0.02	0.59± 0.03	0.62± 0.04	0.68± 0.06	0.64± 0.03	0.69± 0.02	0.71± 0.05	0.73± 0.02	0.78± 0.04	0.76± 0.05	0.74± 0.07	0.78± 0.05	0.80± 0.06	0.82± 0.06
Anthocyanin mg/100 gm	1.64± 0.07	1.58± 0.05	1.61± 0.06	1.53± 0.08	1.45± 0.07	1.41± 0.09	1.38± 0.04	1.36± 0.06	1.25± 0.03	1.23± 0.05	1.29± 0.06	1.27± 0.08	1.15± 0.05	1.21± 0.02	1.18± 0.04	1.24± 0.03
Viscosity (centipoise)	4.01± 0.09	6.93± 0.13	10.28 ±0.21	3.82± 0.05	3.94± 0.06	6.86± 0.08	9.96± 0.018	3.79± 0.06	3.85± 0.05	6.61± 0.11	9.72± 0.19	3.69± 0.04	3.74± 0.08	6.49± 0.13	9.17± 0.23	3.48± 0.07

* These treatments are shown in Table (1) Data are means ± standard error.

Table (5): Chemical and some physical properties of functional syrups produced from strawberry and bloody orange juices.

Properties	*Treatments			
	A	**B**	**C**	**D**
Moisture %	35.38 ± 0.31	34.29 ± 0.28	35.34 ± 0.34	35.11 ± 0.40
Total solids %	64.62 ± 0.58	65.71 ± 0.61	64.66 ± 0.53	64.89 ± 0.64
Total soluble solids %	59.50 ± 0.52	60.00 ± 0.55	59.50 ± 0.48	59.40 ± 0.51
Total acidity %	3.53 ± 0.28	4.34 ± 0.32	2.77 ± 0.17	2.94 ± 0.25
Total sugars %	54.89 ± 0.47	55.17 ± 0.49	55.09 ± 0.41	54.97 ± 0.39
Reducing sugars %	5.52 ± 0.09	5.61 ± 0.08	5.43 ± 0.06	5.38 ± 0.07
Non reducing sugars %	49.37 ± 0.36	49.56 ± 0.41	49.66 ± 0.35	49.59 ± 0.32
Ascorbic acid mg/100 gm	35.38 ± 0.68	32.21 ± 0.63	31.91 ± 0.54	28.93 ± 0.49
Carotenoids mg/100 gm	0.75 ± 0.02	0.81 ± 0.03	0.88 ± 0.04	0.92 ± 0.05
Anthocyanin mg/100 gm	2.07 ± 0.08	1.87 ± 0.0.6	1.60 ± 0.07	1.39 ± 0.05
Viscosity (centipoise)	72.50 ±1.08	72.10 ± 1.13	70.00 ± 1.03	66.40 ± 0.96

* These treatments are shown in Table (2) Data are means± standard error.

4- Organoleptic evaluation of strawberry and blood orange mixture drinks:

The organoleptic evaluation of strawberry and blood orange mixture drinks is presented in Table (6). The results showed that drinks prepared from strawberry and blood orange juices at the ratio (75:25), (50:50), respectively and by adding pectin as stabilizer flowed by sodium alginate recorded high score than other treatments. Otherwise, the drinks treated with homogenization recorded lower scores because there was no stabilizer added. These results are similar with those obtained by**Toker et al., (2014)** and **Ebru et al., (2016)** who demonstrated that the blood orange varieties possess improved quality and sensory attributes of some food products.

5- Organoleptic evaluation of new strawberry and blood orange functional syrups:

Data in Table (7) indicated that syrups prepared from strawberry and blood orange juice at the ratio (50:50) recorded a higher scored of all studied properties followed by the syrups prepared with (75:25) strawberry and blood orange juice, respectively. These results confirmed that these syrups can be used as a functional food because blood orange juice is a bioavailable source of antioxidant, which might moderately improve the antioxidant defense system **(Riso et al., 2005).**These health effect may be attributed also to the synergistic effects of nutrients and phytochemicals in strawberries **(Basu et al., 2014).**

In conclusion, it can be recommended that the new functional drinks could be successfully produced from blended strawberry and blood orange juice at the ratio (75:25), (50:50) respectively and by adding pectin (0.2%) as stabilizer. Also new strawberry and blood orange functional syrups could be successfully produced using blended of strawberry and blood orange juice at the ratio (50:50). These drinks and syrups can be used in order to take advantages of its nutraceutical components which might moderately improve the antioxidant defense system and cumulative effect on human health promotion and in disease prevention.

Table (6): Organoleptic evaluation offunctional strawberry and bloody orange mixture drinks:

Properties	Maximum scores	*Treatments															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Color	10	9.10 ± 0.58	8.93 ±0.41	6.00 ±0.29	5.66 ±0.27	9.16 ±0.49	9.33 ±0.65	9.00 ±0.56	6.33 ±0.37	9.33 ±0.61	8.83 ±0.57	8.50 ±0.54	7.50 ±0.60	9.00 ±0.35	9.00 ±0.51	6.00 ±0.43	5.66 ±0.28
Flavor	10	8.87 ± 0.31	8.83 ±0.50	9.43 ±0.71	8.50 ±0.52	8.93 ±0.57	9.06 ±0.60	9.03 ±0.61	8.45 ±0.48	8.50 ±0.39	9.10 ±0.65	8.83 ±0.62	8.53 ±0.46	8.83 ±0.51	9.06 ±0.55	9.03 ±0.63	7.50 ±0.44
Appearance	10	9.00 ±0.45	9.00 ±0.48	5.33 ±0.28	5.00 ±0.25	9.13 ±0.70	9.06 ±0.57	8.93 ±0.60	6.00 ±0.31	9.00 ±0.59	9.06 ±0.48	8.83 ±0.51	8.33 ±0.44	9.00 ±0.38	8.66 ±0.49	5.33 ±0.28	5.00 ±0.25
Overall acceptability	10	8.90 ±0.49	8.92 ±0.53	6.92 ±0.18	6.38 ±0.33	9.07 ±0.49	9.15 ±0.54	8.98 ±0.57	6.92 ±0.45	8.94 ±0.60	8.99 ±0.63	8.72 ±0.46	8.12 ±0.58	8.94 ±0.70	8.90 ±0.65	6.78 ±0.53	6.38 ±0.41
Total		35.87 ± 1.83	35.68 ±1.92	27.68 ±1.46	25.54 ±1.37	36.29 ±2.25	36.60 ±2.36	35.94 ±2.34	27.70 ±1.61	35.77 ±2.19	35.98 ±2.33	34.88 ±2.13	32.48 ±2.08	35.77 ±1.94	35.62 ±2.20	27.14 ±1.87	24.54 ±1.38
L.S.D at 0.05		0.27	0.12	0.53	0.27	0.21	0.14	0.15	.017	0.22	0.17	0.08	0.14	0.35	0.16	0.35	0.19

* These treatments are shown in Table (1) *L.S.D value = Least significant difference test./
Data are means± standard error.

Table (7): Organoleptic evaluation offunctional strawberry and bloody orange natural syrup.

Properties	Maximum scores	*Treatments				L.S.D* at 0.05
		A	B	C	D	
Color	10	9.00 ± 0.56	9.33 ± 0.61	9.53 ± 0.70	8.66 ± 0.54	0.21
Flavor	10	8.50 ± 0.47	9.16 ± 0.53	9.18 ± 0.38	8.50 ± 0.49	0.13
Appearance	10	9.00 ± 0.60	9.23 ± 0.48	9.46 ± 0.57	9.06 ± 0.53	0.32
Overall acceptability	10	9.00 ± 0.39	9.13 ± 0.50	9.33 ± 0.45	8.76 ± 0.47	0.07
Total	40	35.50 ± 2.02	36.85 ± 2.12	37.50 ± 2.10	34.98 ± 2.03	

* These treatments are shown in Table (2) *L.S.D value = Least significant difference testat $p \leq 0.05$. Data are means ± standard error.

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إنتاج مشروبات وظيفية من البرتقال بدمه والفراولة

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الملخص العربى

إستهدف هذا البحث دراسة إنتاج مشروبات وظيفية جديدة وشراب طبيعى من مخاليط عصائر الفراولة والبرتقال الأحمر أبو دمه وذلك للإستفادة من عصير البرتقال أبو دمه تكنولوجياً فى مجال التصنيع الغذائى حيث أنه لا يستغل حالياً فى إنتاج المشروبات والعصائر بسبب لونه الأحمر. وقد أمكن الإستفادة منه بعمل مخاليط مع عصير الفراولة نظراً لتشابه اللون وإرتفاع القيمة الغذائية لكل منهما. وقد أجريت ٤ معاملات للمقارنة بنسب خلط لكل من المشروبات والشراب (١٠٠: ٠) ، (٧٥ :٢٥) ، (٥٠ : ٥٠) و (٢٥ : ٧٥) (وزن/ وزن) من عصير الفراولة والبرتقال أبو دمه على الترتيب. وقد أوضحت النتائج إرتفاع قيم المواد الصلبة الكلية والمواد الصلبة الذائبة الكلية والحموضة الكلية والسكريات الكلية والكاروتينات فى عصير البرتقال أبو دمه عن عصير الفراولة. بينما تبين إرتفاع نسبة صبغة الأنثوسيانين واللزوجة فى عصير الفراولة عن عصير البرتقال أبو دمه. كما أوضحت نتائج تحليل الصفات الكيماوية والطبيعية للمشروبات المنتجة من مخاليط عصائر الفراولة والبرتقال أبو دمه إرتفاع ضئيل فى نسب المواد الصلبة الكلية والمواد الصلبة الذائبة الكلية والسكريات الكلية والكاروتينات بسبب إرتفاع نسبها فى عصير البرتقال أبو دمه عن عصير الفراولة. كما تبين أن قيم اللزوجة فى المشروبات المصنعة والمضاف لها ألجينات صوديوم بنسبة ٠.٢% أعلى من تلك المضاف لها بكتين بنفس النسبة بينما سجلت المشروبات غير المضاف لها مثبتات أقل قيم فى اللزوجة.

وأوضحت النتائج عدم وجود إختلاف واضح فى نسب المواد الصلبة الكلية والمواد الصلبة الذائبة الكلية والسكريات الكلية فى الشراب المركز المصنع من عصير فراولة فقط أو المضاف له عصير برتقال أبو دمه. ينما وجد إنخفاض بسيط فى نسب حامض الأسكوربيك والأنثوسيانين وقيم

اللزوجة فى الشراب المصنع من عصير الفراولة والمضـاف له عصير برتـقال بدمه بنسب خلط ٢٥، ٥٠، ٧٥% عن الشراب المصنع بإضافة ١٠٠% منعصير الفراولة.

وقد أظهرت نتائج التقييم الحسى أن المشروبات الطبيعية ذات الخواص الوظيفية المحضرة بإستعمال مخاليط من عصير الفراولة والبرتقال أبو دمه بنسب (٧٥ : ٢٥) و (٥٠ : ٥٠) على الترتيب مع إضافة البكتين كمادة مثبتة كانت هى الأفضل من حيث القابلية العامة عن المعاملات الأخرى. كما أوضحت نتائج التقييم الحسى للشراب الطبيعى المركز المصنع من مخاليط عصير الفراولة والبرتقال أبو دمه أن الشراب المصنع بإستخدام نسبة (٥٠ : ٥٠) من كلا العصيرين هو الأفضل من حيث القابلية العامة يليه المنتج بإستخدام نسبة (٧٥ : ٢٥) من عصير الفراولة والبرتقال أبو دمه على الترتيب.

بناءً عليه يوصى بإنتاج مشروبات وظيفية جديدة من مخاليط عصير الفراولة والبرتقال أبو دمه بنسبة (٧٥ : ٢٥) و (٥٠ : ٥٠) على الترتيب مع إضافة البكتين بنسبة ٠.٢% كمادة مثبتة. كما يمكن بنجاح إنتاج شراب وظيفى بإستخدام مخلوط عصير الفراولة والبرتقال أبو دمه بنسبة (٥٠ : ٥٠). وهذه المشروبات لها وظائف صحية متعددة من الناحية التغذوية.

الكلمات الكاشفة: البرتقال بدمه - الفراولة - الخواص الكيميائية – الأنثوسيانين - التقييم الحسى - الأغذية الوظيفية.