SENSORY EVALUATION OF FRUIT PUNCH INCLUDING WATERMELON AND POMEGRANATE JUICES AT VARIOUS LEVELS

FARKLI ORANLARDA KARPUZ ve NAR SUYU İÇEREN KOKTEYL MEYVE SUYUNUN (PUNCH) DUYUSAL OLARAK DEĞERLENDİRİLMESİ

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ABSTRACT: In this study, the organoleptical acceptability of fruit punches including watermelon and pomegranate juices at various levels was determined as well as the optimum rates of mixture of these juices. In the study, the watermelon juice and pasteurized or concentrated pomegranate juices were used. According to the results obtained, the samples is which the B:A ratio was adjusted to 13:1, and the samples having 75% W/25% P and 75% P/25% W juice mixtures were most preferred by panelists.

Key Words: *Watermelon. Watermelon juice. Pomegranate. Pomegranate juice Fruit juice punc.*

ÖZET: Bu çalışmada farklı oranlarda karpuz ve nar suyu kullanılarak elde edilen meyve suyu karışımlarının laboratuar şartlarında test edilerek, tüketiciler tarafından kabul edilebilirlik düzeylerinin belirlenmesi amaçlanmıştır. Yapılan duyusal değerlendirmeler sonucunda Brix: Asit oranı 13:1'e ayarlanmış örnekler daha çok beğeni kazanmıştır. Tüm örnekler içerisinde en fazla tercih edilen %75 karpuz (K)+%25 nar (N) suyu ve %75 nar (N)+%25 karpuz (K) suyu içeren örnekler olmuştur. Elde Edilen bulgular ışığı altında karpuz ve nar suyunun tat ve genel izlenim bakımından iyi bir uyum sağladığı belirlenmiştir.

INTRODUCTION

Watermelon (Citrullus lanatus) as a refreshing and popular fruit has been known for centuries. Having an aromatic flavor, attractive texture and color make watermelon an attractive fruit for consumer during-especially-summer months (ACAR, 1990; HAYOĞLU and FENERCİOĞLU, 1990). In Turkey, the production of watermelon is about 3.9 million ton *per annum* and about 20% of this value is produced in Southeast of Turkey (ANONYMOUS, 1998).

When the production of watermelon is excessive and the export is limited, the sale price of watermelon decreases and, therefore, the producers generally leave the fruit on the field. This causes deficit in the national economy and also leads to some agricultural problems.

Watermelon juice is suitable for processing due to its color persistence and some other properties. Watermelon juice is used in the fruit juice mixtures in order to given them a nice color and flavor. In a study, the mixture of watermelon (80%), pineapple (10%) and orange juices (10%) recevied the highest organoleptical scores (HUOR et al., 1980a; SHIN et al., 1978).

FENERCIOĞLU (1993) found that the mixtures of watermelon (50%), sour cherry (25%) and apple juice (25%) was most acceptable to panelists.

According to KNATTAK et al (1965) watermelon juice contributes to the sweetness of fruit juice due to high fructose: glucose ratio in watermelon juice.

GUSSINA et al. (1971) recommended that watermelon juice should be mixed with some other sour fruit juices in order to have a sour flavor in the final mixture.

In Turkey, the production of pomegranate is sufficient. However, processed pomegranate juice has not attracted the consumer's preference yet. Therefore, the addition of pomegranate juice, which is quite sour, to fruit juices, which are less acidic, is recommended in order to increase the level of consumption of these fruit juices (CEMEROĞLU, 1977).

HUOR et al, (1980b) studied the effects of storage on the quality of concentrated watermelon juice. It was found that the color of watermelon juice concentrated by HTST technique to 65° Brix did not change after storage at-21°C for 18 months. It was also recorded that reconstituded watermelon juices had similar color to the freshones. Lycopen was found to be the prime color pigment in concentrated watermelon juice.

The major aroma compound of watermelon juice is non-z-6-enol and even at lower concentration than 1 ppb, this compound gives the characteristic aroma to watermelon (TERANISHI et al, 1971).

HAYOĞLU and FENERCİOĞLU (1990) found that the 11/0.8 sugar/acid ratio in watermelon juice was optimum. The same author also reported that the flavor of watermelon juice was affected from pasteurization temperature and time.

In the present study, mixtures of watermelon and pomegranate juices at various levels will be tested in order to determine the acceptability of these mixtures by consumers.

MATERIALS and METHODS

In the study, Şanlıurfa local watermelon and Suruc local pomegranate varieties were analyzed.

Watermelon juice (W) was obtained according to a method proposed by HAYOĞLU and FENERCIOĞLU (1990). Pomegranate juice (P) was divided into two batches and one batch was pasteurized, the other batch was concentrated to 70° Brix with a climbing film evaporator (VARDIN, 1999).

The sugar / acid ratio in watermelon juice, which had 6.5° Brix soluble dry matter and 0.06% acidity, was adjusted to below pH 4.0 by adding saccarose and citric acid.

Pasteurized pomegranate juice, which had 15° Brix soluble dry matter was diluted to 13° Brix with drink water. Concentrated pomegranate juice was processed in the same manner.

Three diffrent treatments were set in the study. In the first treatment (I) pasteurized pomegranate and watermelon juices were mixed; in the second experiment (II) concentrated pomegranate juice was mixed with watermelon juice; and in the third treatment, again watermelon juice and concentrated pomegranate juices were mixed but the Brix: acid **(B:A)** ratio was kept constant at 13:1. In the first two treatment, the sugar: acid ratio was adjusted to various levels. For all treatments, chosen W/P ratios were 50:50, 75:25, 25:75, 0/100 and 100/0, respectively (See Table 1). All samples were pasteurized at 80°C for 5 minutes in a water bath. Samples were stored at 2±1°C for 1 month. After storage, the samples were analyzed organoleptically by panelists (10 trained panelists) in terms of color (5 point), smell (5 point), flavor (10 point) and overall evaluation (10 points), according to GOULD (1977).

Table 1. The Experimental Desing of Watermelon and Pomegranate Juice Mixtures

Samples	Juice Rate (%) W : P	Treatment I B : A	Treatment II B : A	Treatment III B : A
A	50 : 50	13 : 1.0	13 : 1.0	13 : 1.0
B	75 : 25	13 : 1.0	13 : 1.0	13 : 1.0
C	25 : 75	13 : 1.2	13 : 1.5	13 : 1.0
D	0 : 100	13 : 1.6	13 : 2.0	13 : 1.0
E	100 : 0	13 : 1.0	13 : 1.0	13 : 1.0

Soluble solid content, pH, titratable acidity and ash were determined in watermelon and pomegranate juices according to IFFJ (1973).

The Results are the average of two separate experiments, and were analyzed for simple variance, and different groups were determined according to Least Significant Difference (LSD) test (STEEL and TORRIES, 1980).

RESULTS and DISCUSSION

While the yield of fruit juice was found 60% in processed watermelon juice, this was 42% pomegranate juice. Some properties of watermelon and pomegranate juices are illustrated in Table 2.

As seen in Table 2, the watermelon and pomegranate juices are not suitable enough for consumption as in their natural form with regard to Brix: acid ratio. This is in agreement with CEMEROĞLU (1977) and HUOR et al. (1980 b). Therefore, the fruit juices were prepared according to the experimental design shown in Table 1, and introduced to the preference of panelists. The mean values of organoleptical evaluation of punches are shown in Table 3.

Table 2. Some Properties of Natural Watermelon and Pomegranate Juices

Properties	Watermelon Juice	Pomegranate Juice
Soluble Solid (%)	6.50	14.20
PH	5.00	3.10
Titratable Acidity (%)	0.06	2.23
Ash (%)	0.30	0.46

Table 3. The Mean Values of Organoleptical Evaluation of Fruit Juice Punches

Treatments	Samples	Properties* Color	Smell	Flavor	Overall Evaluation
Treatment	A	$2.25^{a}\pm0.25$	$2.7^{a}\pm0.3$	$5.6^{ab}\pm0.2$	$6.05^{ab}\pm0.45$
	B	$2.9^{b}\pm0.1$	$3.3^{ab}\pm0.2$	$7.0^{c}\pm0.5$	$7.45^{c}\pm0.55$
	C	$1.95^{a}\pm0.05$	$3.5^{ab}\pm0.5$	$6.6^{bc}\pm0.4$	$6.35^{abc}\pm0.15$
	D	$4.4^{c}\pm0.1$	$2.65^{a}\pm0.15$	$6.25^{abc}\pm0.25$	$6.9^{bc}\pm0.1$
	E	$4.05^{c}\pm0.15$	$4.05^{b}\pm0.45$	$5.3^{a}\pm0.2$	$5.25^{a}\pm0.25$
Treatment II	A	$2.7^{a}\pm0.3$	$2.8^{a}\pm0.1$	$6.4^{c}\pm0.1$	$6.3^{a}\pm0.3$
	B	$2.65^{a}\pm0.35$	$3.3^{b}\pm0.1$	$7.55^{c}\pm0.05$	$8.0^{c}\pm0.0$
	C	$3.65^{a}\pm0.35$	$3.35^{b}\pm0.05$	$7.05^{d}\pm0.05$	$7.2^{b}\pm0.2$
	D	$4.8^{b}\pm0.2$	$4.0^{c}\pm0.0$	$6.0^{b}\pm0.0$	$7.05^{b}\pm0.05$
	E	$3.65^{a}\pm0.35$	$2.7^{a}\pm0.2$	$5.5^{a}\pm0.0$	$6.2^{a}\pm0.3$
Treatment III	A	$3.0^{a}\pm0.0$	$3.5^{a}\pm0.5$	$7.75^{b}\pm0.25$	$6.5^{b}\pm0.5$
	B	$3.75^{b}\pm0.25$	$4.0^{a}\pm0.0$	$9.6^{c}\pm0.5$	$9.5^{c}\pm0.5$
	C	$4.75^{c}\pm0.25$	$3.75^{a}\pm0.25$	$9.75^{c}\pm0.25$	$9.75^{c}\pm0.25$
	D	$5.0^{c}\pm0.0$	$4.5^{a}\pm0.5$	$7.75^{b}\pm0.25$	$7.5^{b}\pm0.5$
	E	$4.0^{b}\pm0.0$	$3.7^{a}\pm0.3$	$5.75^{a}\pm0.25$	$4.75^{a}\pm0.25$

** Same superscripts in the coulmns indicate different groups (p > 0.05)*

In the first experiment (I), pure watermelon (E) and pure pomegranate (D) juices received the highest color scores. No significant difference was found between these samples (P>0.05). While the watermelon juice was most preferred with its attractive red color, the pomegranate juice was preferred with its bright and clear appearance and color. Heat treatment affected the flavor of watermelon juice inversely and, therefore, the flavor scores of the samples decreased with the increase in the content of watermelon juice. Sample B received the highest flavor and overall evaluation scores, but the differences between samples B, C and D were found to be insignificant (P>0.05).

In the second experiment, while the sample D had the highest color and smell scores, sample B was evaluated as the best mixture in terms of flavor and overall organoleptical properties.

In the third experiment in which the Brix: acid ratios of all samples were adjusted to 13:1, sample D had the highest color and smell scores. The samples B and C were given the highest scores with regard to flavor and overall evaluation.

In the experiments I and II, whilst the sample B was evaluated as the best sample in terms of flavor and overall organoleptical properties; in the experiment III, due to the adjustment of Brix: acidratios the samples B and C received the highest scores.

The reason why the watermelon juice had low flavor score may be the use of citric acid for the adjustment of acidity as indicated by FENERCIOĞLU (1993) and HUOR et al. (1980a).

CONCLUSIONS

In the light of the organoleptical evaluations, the samples in which the Brix: acid ratios were adjusted to 13:1, attracted the panelists preference. Of all samples, the mixtures of watermelon juice (75%) + pomegranate juice (25%) and watermelon juices (25%)+ pomegranate juice (75) were most preferred. According to the results obtained, it can be concluded that the mixture of watermelon and pomegranate juices can be used in appropriate proportions for the manufacture of fruit juice punch.

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