Proximate and sensory properties of fruit juice produced from varieties of watermelon (*Citrullus lanatus*).

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ABSTRACT

Watermelon (*Citrullus lanatus*) juice was produced from different varieties of watermelon (Dansuke, orangeglo and cream of Saskatchewan). Single strength orange juice was used as control. Proximate composition of sample products was analyzed. Results showed that single strength orange juice had more moisture and protein (93.41% and 0.74% respectively) than the water melon juices. The watermelon juice had more carbohydrates, fat and ash. Taste of single strength orange juice was comparable to that of Dansuke watermelon juice. Flavor attributes of all the samples were accepted.

INTRODUCTION

Botanically, fruits are those portions of plants which have seeds. These include mango, oranges, watermelon etc., and they are eaten as desserts (Okaka, 1997). Fruits are seasonal and are therefore sometimes scarce and expensive and the consumption level changes with seasons.

According to Okaka (1997), fruits may be eaten fresh but because of their perishability and seasonal nature, large quantities of fruits are traditionally and mechanically processed. Examples of products into which fruits have been processed include concentrated juice, canned fruits, dehydrated juice, frozen fruits, pickled fruits, wine and fruit juice.

Juices are the presses of fruits. They are obtained from fruits by mechanical processes(fermentable and unfermented) and they have the characteristic colour, odour and flavour typical of the fruit from which they come from (Alan and Sutherland, 1994). Juices of varying fruits are high in nutritional value. The nutritive content vary because of cultiva, local practice, difference in soil and processing methods (Okaka, 1997). According to Alan and Sutherland (1994), fruit juices have high levels of iron, calcium and sugar and they are excellent sources of vitamins A and C.

The most common juice is prepared from the citrus plants. Juices can also be made from other moisture fruits such as grapes, pineapple, sweetlime and watermelon.

Watermelon is a creeping annual which belongs to the gourd (*Cucubitaceae*) family . It was first cultivated in Egypt. Shortly after the discovery of the New World, it was brought to China around the 10^{th} century and then the western hemisphere. Although they are found in the markets variably throughout the year, the season for watermelon is the summer season or during dry periods. According to Wikipedia (2008), watermelon fruits are classified according to the different varieties which are yellow watermelon, orangeglo, the moon and stars variety, cream of Saskatchewan, melitopolski and dansuke watermelon. Watermelon gives more nutrients per calorie because of its higher water content and lower calorie against other fruits (Tindall,1983). Watermelon is ranked one of the best fruits for human consumption because of its nutritional and medical benefits. Hence the processing of watermelon into juice will make it to be available all the year round and this is the reason of this research.

MATERIALS AND METHODS

Materials

Varieties of watermelon (*Citurullus lanatus*) were obtained from Umuahia Central market in Abia State, Nigeria. Other materials used such as the chemicals and facilities were obtained from the biochemical laboratory of Mr Ikpeama in Ehimiri Umuahia, Nigeria.

Watermelon juice preparation

Watermelon varieties were examined for possible defects or disease (rots). Good ones were selected and washed in several portions of water. They were allowed to drain before use. The washed fruits were weighed before peeling with sharp kitchen knife and the rind and seeds removed to get the pulp (edible portion). After weighing, the pulp was cut into thin slices and crushed in a blender to obtain a homogenous mass which was transferred to a two fold muslin cloth. The sample in the cloth was pressed to release the juice which was collected in a clean plastic bucket. The pomace was washed with distilled water and the juice was filtered through the muslin cloth. Resulting juices from the watermelon varieties were packaged in a plastic packaging container and a single strength orange juice was used as control, in evaluating the properties of the juice samples.

Analysis of samples

Proximate composition

Crude protein, crude fibre, moisture content and dry matter of the watermelon juices were determined using the method described by James (1995). Fat was evaluated following the method described by Pearson (1976). Total Ash was determined using the method of AOAC (1990) and carbohydrate was calculated by difference.

Sensory evaluation

Sensory evaluation was carried out on the juice samples. A nine-point Hedonic scale and Analysis of variance (ANOVA) (Iwe, 2002) were utilized. Fifteen semi-trained panelists were recruited. They were served the juice samples in coded cups. The panelists assessed the taste, appearance, flavors and general acceptability of the samples using a nine-point Hedonic scale where 1 = like extremely and 9 = dislike extremely

RESULTS AND DISCUSSION

Proximate composition of fruit juices made from the watermelon varieties are presented in Table 1. There is a significant difference ($P<0.05$) in the moisture , dry matter, ash, crude fibre, ether extract, crude protein and carbohydrate contents of all the sample products and the control. The moisture content, ash, ether extract, crude protein (92.42%, 0.85%, 0.25%, 0.48%) for Dansuke watermelon, (91.81%, 0.78%, 0.35%,0.61%) orangeglo watermelon and (91.73%, 0.86%, 0.30%, 0.64%) cream of Saskatchewan was higher than the value represented in literature (http//www.dietaryfibrefood.com December, 2008). The differences may be attributed to climatic conditions like humidity and soil water retaining capacity (Tindall, 1983). Proximate composition such as dry matter, crude fibre and carbohydrate as reported in the literature (http//www.dietaryfibrefood.com December, 2008), (8.55%, 0.4% and 7.55%) were lower than the values represented in the result (7.58%, 0.29% and 5.43%) for Dansuke watermelon (8.15%, 0.24% and 6.20%) orangeglo watermelon and (8.26%, 0.33% and 6.13%) for cream of Saskatchewan.

Result from the analyses show that the carbohydrate, protein, fat, ash and moisture contents of the single strength juice were 5.39%, 0.74%, 0.18%, 0.23% and 93.41% compared to the value represented in literature, as 25.8g, 1.7g, 0.5g and 88.3g (Deutsch,1976).

Results from sensory analysis (Table 2), show that there are significant differences ($P<0.05$) in appearance, taste, texture and general accepability of the fruit juice samples. The difference is as a result of preference in appearance, taste, texture and flavour. The results of the taste of Dansuke and single strength

orange juice were significantly different (P<0.05) from the tastes of orangeglo and cream of Saskatchewan. According to Ensminger *et al.* (1995), flavor stimulates the sense of taste. The flavor of all the watermelon samples were significantly different (P<0.05) from single strength orange juice.

Furthermore the flavor of Dansuke watermelon is not significantly different (P>0.05) from that of the single strength orange juice. Results showed that the colour of Dansuke watermelon and cream of Saskatchewan are the same but significantly different from those of orangeglo and single strength juice. Kilgour (1987) and Ensminger *et al.* (1995) attributed the colour difference to vitamin A and carotene contents. Ensminger *et al.* (1995) described texture as mouthfeel which is attributed to the general acceptability of the product. The texture of single strength juice was mostly accepted, followed by those of Dansuke and cream of Saskatchewan respectively. This can be attributed to varieties and growing conditions (Tindall, 1983, Ensminger *et al.*, 1995)

CONCLUSION

The proximate composition of the juice produced from different varieties of watermelon was significant (P<0.05). The value of some of the proximate properties such as dry matter, ash, crude fibre, ether extract and carbohydrate, was higher than that of the single strength juice. This shows that watermelon juice has promising nutritional value and can compare favorably with juices produced from other fruits.

The single strength orange juice ensured better juice in terms of general acceptability, texture and appearance. The characteristics of Single strength orange juice can be favorably compared with that of Dansuke watermelon. The flavor of all the samples was accepted.

Table 1: Proximate composition of fruit juice produced from different varieties of watermelon**.**

	Sample means and deviations						
Analysis(%)	Dansuke	Ornageglo	Cream of saskatchewan	Single strength orange juice	Fcal	Ftab	LSD
Moisture content	$92.42^{a} \pm 0.014$	$91.81^{b} \pm 0.021$	$91.73^{c} \pm 0.021$	$93.41^{d} \pm 0.014$	3677.64	6.59	0.09
Dry matter	$7.5800^{a} \pm 0.014$	$8.185^{b} \pm 0.021$	$8.26^{c} \pm 0.42$	$6.59^{d} \pm 0.14$	3677.64		0.09
Ash	$0.85^{a} \pm 0.14$	$0.78^{b} \pm 0.00$	$0.86^{a} \pm 0.42$	$0.23^{c} \pm 0.14$	331.87		
Crude fibre	$0.29^{a} \pm 0.14$	$0.24^{b} \pm 0.14$	$0.33^{c} \pm 0.13$	$0.045^{d} \pm 0.007$	196.38		0.064
Ether extract	$0.25^{a} \pm 0.007$	$0.35^{b} \pm 0.14$	$0.30^{c} \pm 0.14$	$0.18^{d} \pm 0.00$	92.55		0.053
Crude protein	$0.48^{a} \pm 0.007$	$0.61^{b} \pm 0.007$	$0.64^{b} \pm 0.14$	$0.74^{c} \pm 0.021$	121.84		0.07
Carbohydrate	$5.43^{a} \pm 0.36$	$6.20^{b} \pm 0.14$	$6.13^{b} \pm 0.35$	$5.39^{a} \pm 0.014$	11.238		0.92

a-d = means with different superscripts are significantly different (P<0.05)

Table 2: Results of sensory evaluation of water melon juices

Parameters	Fruit juice samples						
	Dansuke (w_1)	Ornageglo (w_2)	Cream of saskatchewan (w_3)	Single strength orange juice (w_4)	Fcal	Ftab	LSD
Taste	$1.90^{a} \pm 0.056$	$3.30^{b} \pm 1.15$	$3.30^{b} \pm 0.82$	$1.50^{a} \pm 0.70$	12.37	2.84	1.30
Colour	$3.10^{a} \pm 1.19$	$2.10^{b} \pm 0.99$	$3.10^{a} \pm 0.87$	$1.60^{b} \pm 0.51$	6.51		1.43
Flavour	$2.50^{ab} \pm 0.84$	$3.30^{b} \pm 1.15$	$3.30^{b} \pm 1.16$	$2.10^{a} \pm 0.73$	2.72		1.77
Texture	$3.00^{a} \pm 1.33$	$3.90^{a} \pm 1.72$	$3.00^{a} \pm 1.33$	$1.10^{b} \pm 0.31$	8.36		1.98
General Acceptability	$2.80^{a} \pm 1.47$	$2.30^{a} \pm 1.05$	$3.20^{a} \pm 1.03$	$1.30^{b} \pm 0.48$	5.85		1.65

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