

## Chemical Analysis of Fruit Juice of European Cranberrybush (*Viburnum opulus*) from Kayseri-Turkey

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The fruit juice of the European cranberrybush (*Viburnum opulus*) is a traditional drink in middle Anatolia region of Turkey, especially in Kayseri city. Chemical analyses of fruit juice of *Viburnum opulus* (local name is Gilaboru) collected from the various sites in Kayseri-Turkey were performed. The major ions in the fruit juice were determined by the classical analytical methods. Trace metal contents of the fruit juice samples were determined by atomic absorption spectrometry. While major components of the samples were at mg/L level, the levels of the trace metal ion were found at µg/L.

**Key words:** Fruit Juice, *Viburnum opulus*, gilaboru, chemical analysis, standard methods, atomic absorption spectrometry.

### INTRODUCTION

European cranberrybush (*Viburnum opulus*) is an important plant in the Middle Anatolia region of Turkey. European Cranberrybush produces white flowers in late spring. The red fruit is ornamental from late summer to early fall and persists into winter<sup>1-3</sup>. Some studies have been performed for the investigation of the properties of the European Cranberrybush<sup>4,5</sup>.

The local name of *Viburnum opulus* in Middle Anatolia (Turkey) is gilabau. The fruit juice of gilabou is a traditional drink for people living in Kayseri city and Middle Anatolia region<sup>6</sup>. It has a nice taste. People living in the Middle Anatolia region of Turkey drink it to prevent some stomach and kidney problems<sup>3,6</sup>.

The fruit of *Viburnum opulus* with its handles is collected at the end of autumn. The fruit is washed in tap water; then it is put on a cup with water for approximately three months. During this process, the fruit of *Viburnum opulus* is ripened. Then in order to obtain fruit juice the ripened fruits are pressed. Before drinking, the fruit juice is diluted approximately 1 : 4 with tap water and then some sugar is added to this solution.

In the present work, chemical analyses of the fruit juice of gilaboru (European cranberrybush) which was produced as home-made from the fruit of *Viburnum opulus* collected from five different sites at Kayseri-Turkey were performed.

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## EXPERIMENTAL

Samples were collected from various sites in Kayseri-Turkey at the end of September 1999. After washing with tap water, the samples were ripened by the process traditionally adopted in Kayseri region. After three months, the fruit samples were pressed. Then the fruit juice samples were analyzed.

All chemicals employed were of analytical grade and aqueous reagents were prepared in doubly distilled deionised water. Prior to analysis, all instruments were calibrated according to the manufacturer's recommendations.

### Method

pH was measured by using Orion Research Analyzer Model 399 pH meter. Conductivity was determined using Jenway PCM1 portable conductivity meter. The classical analytical methods were used in the determinations<sup>7-9</sup>. The analyses of tannic acid<sup>9</sup> were done by using Hitachi 150-20 spectrophotometer. Chloride was determined using Volhard Argentometric Method.

The concentration of ascorbic acid in the samples was determined using iodometric titration. Total dissolved solids (TDS) of the samples were determined gravimetrically and sodium and potassium with Jenway PFP7 model flame photometer. Trace metal contents of the fruit juice samples were determined directly with Perkin-Elmer Analyst 100 atomic absorption spectrometer.

## RESULTS AND DISCUSSION

The concentrations of the major components of the fruit juice of *Viburnum opulus* samples (gilaboru) collected from five different stations in Kayseri-Turkey were determined. The results are given in Tables 1 and 2. The pH of the samples was in the range of 2.8-3.1. The conductivities of the fruit juice samples from Gomec, Gesi, Kiziltepe, Kergah and Hisarcik regions were 2600, 2900, 3000 and 4200  $\mu$ siemens/cm, respectively. The level of tannic acid was in the range of 181.6-902.9 mg/L (lowest in Gesi region, highest in Hisarcik region). The highest concentration of ascorbic acid was in the fruit samples from Hisarcik region as 661 mg/L. The lowest level of ascorbic acid was in samples from Gesi region.

TABLE-1  
LEVELS OF pH, CONDUCTIVITY, TANNIC ACID AND ASCORBIC ACID  
IN THE FRUIT JUICE OF *VIBURNUM OPULUS*

Site	pH	Conductivity ( $\mu$ siemens/cm)	Tannic acid (mg/L)	Ascorbic acid (mg/L)
Gomec	3.0	2600	573.3	612
Gesi	2.8	2900	181.6	308
Kiziltepe	3.0	3000	768.9	559
Kergah	3.0	2600	824.6	581
Hisarcik	3.1	4200	902.9	661

The concentration of chloride was in the range of 425.4–638.1 mg/L (Table-2). While the highest level of chloride ions was in the sample from Hisarcik, the lowest level was in the samples from Kergah. The levels of sodium were highest in samples collected from Kergah and lowest in samples from Gomec. The potassium levels of the fruit juice samples was found approximately at the same level (range: 37.7–44.5 mg/L) (Table-2). The concentration of calcium in the samples from Gomec, Gesi, Kiziltepe, Kergah and Hisarcik were 3.95 mg/L, 4.30 mg/L, 3.65 mg/L, 3.73 mg/L and 3.79 mg/L, respectively. The levels of magnesium in the samples were in the range of 10.88–14.41 mg/L (highest in Hisarcik and lowest in Kiziltepe).

TABLE-2  
THE LEVELS OF MAJOR COMPONENTS OF THE FRUIT JUICE  
OF *VIBURNUM OPULUS* (mg/L)

Station	Chloride	Na	K	Ca	Mg
Gomec	428.4	216.6	39.4	3.95	12.25
Gesi	567.2	233.3	40.0	4.30	11.53
Kiziltepe	496.3	n.d.	37.7	3.65	10.88
Kergah	425.4	271.5	42.7	3.73	10.98
Hisarcik	638.1	239.5	44.5	3.79	14.41

n.d.= not determined.

The levels of some trace metals in the fruit juice of *Viburnum opulus* from different stations in Kayseri-Turkey were analyzed in triplicate by atomic absorption spectrophotometry. The results are given in Table-2. All the investigated metal ions in the fruit juice samples were at  $\mu\text{g/L}$  level. The lowest and highest levels of elements detected ranged between  $0.6 \mu\text{g/L}$  for Co and  $10.1 \mu\text{g/L}$  for Fe. The highest levels of total trace heavy metal ions were found in the sample from Gesi. The lowest level of total heavy metal contents in the fruit juice was found in the samples from Gomec station (Table-3).

The copper level in the samples was in the range of  $0.8$ – $2.5 \mu\text{g/L}$  (the minimum being in Gesi and the maximum in Kergah). The concentration of cadmium in all the samples was found below  $0.5 \mu\text{g/L}$ . As can be seen in Table-3, the iron levels in the samples were in the range of  $2.7$ – $10.8 \mu\text{g/L}$ . The lowest and highest values were in Gomec and Gesi, respectively. The levels of cobalt in the samples were in the range of  $0.6$ – $1.8 \mu\text{g/L}$ . The concentrations of lead in the fruit juice samples from Gomec, Gesi, Kiziltepe, Kergah and Gesi regions were 1.4, 1.6, 1.7, 1.6 and  $1.7 \mu\text{g/L}$ , respectively.

TABLE-3  
CONCENTRATION OF SOME TRACE METALS IN THE FRUIT JUICE  
OF *VIBURNUM OPULUS* ( $\mu\text{g/L}$ )

Station	Cu	Fe	Co	Pb
Gomec	1.4	2.7	0.6	1.4
Gesi	0.8	10.1	0.8	1.7
Kiziltepe	1.5	7.8	—	1.6
Kergah	2.5	8.3	0.6	1.7
Hisarcik	n.d.	6.4	1.8	1.6

n.d. = not determined

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