

NOTE

Sugar Contents of Juniper Plants

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The contents of free sugar has been confirmed inside the fresh foliage and berry samples gathered from the tree types which are naturally growing in different locations of the province Van and from the tall juniper which is one of the types of Turkish frost trees. It is determined that the average fructose content inside the fresh needle foliage is 44.0-70.2 mg/100 g, average sucrose is 10.0-25.0 mg/100 g, average glucose 22.0-26.0 mg/100 g and average di-glucose (maltoz) content is 5.0-17.0 mg/100 g. It has been found that the free sugar content of berry is higher than the sugar content of foliage, except di-glucose.

Key Words: Sugar contents, Juniper plants.

Spreading areas of the types of Juniper in Turkey is quite large^{1,2}. Various organs of the juniper plant which is found along with the oaks in the areas of the inner frost have wide area of use in medicine, cosmetics and food industry³. Berries of the different plant types are different than the general food from the angle of price and advantages. The spread of the junipers in Turkey starts from the extreme upper limits of the frost, arid climate and includes the regions having a steep character where barren land conditions are dominating. It is naturally able to continue its survival in many regions. Because of its ability to continue its survival in the growing environments possessing difficult conditions where the other types are not able to nestle and because of the reason that it is a stubborn group of plant that abandons the area at the last and obtains a potential importance⁴. Tall juniper also carries a potential importance in the protection and improvement studies of the poor growing environments⁵.

The grape like cones is 8-12 mm in diameter and formed of 4-6 knobs in the colour of blue like smoky black. These berries have the aroma and taste which is just specific to them. Most of the berries of the tree are consumed by the birds (from the family of thrush, gray thrush) and its foliage with needles is consumed by the goats and sheep as animal feed. The needles and the berries containing elongate tuber cycles which act as

reservoirs of volatile oils. There is plenty of vitamin C in its needles. In the food industry it is used in makings of drinks as a matter of aroma and as an aromatic plant and in dermatology it is used as a medicinal plant.

The purpose of this study is to evaluate the free sugars inside the berries and foliages of the tall juniper which naturally grows in the region of Van and under the conditions of intense grazing.

The first location is 1691 m above the sea level and northerly, the second location is 1760 m above and south bound, the third location is 1839 m above and on south and the fourth location is 1856 m above and northerly.

Determination of free sugar: The analysis of free sugar was done by modifying the methods reported by Torije *et al.*⁶ and Karkacier *et al.*⁷. 2 g of fresh fruit sample was grounded into powder in liquid nitrogen and 40 mL of methanol was added. After the mixture was incubated on a magnetic stirrer at 65 °C for 0.5 h, it was centrifuged at 4 °C, 1300 rpm for 40 min. The supernatant was transferred in clean tube and made up to 5 mL with methanol. After removal of methanol by rotary evaporator, the residue was dissolved in 25 mL double distilled water. The extract was passed through 25 mL double distilled water. The extract was passed through Sep-PakC18 cartridge and 2.5 mL filtrate was mixed with 7.5 mL acetonitrile. It was filtrated by 0.45 µm membrane filter and injected into HPLC. The column was calibrated by known standards of fructose, sucrose, glucose and maltose. Free sugars were expressed as mg/g in fresh fruit weight.

Statistical analysis: The means were separated by Duncan's multiple range test. Significant differences statistical package Costat was used for the analysis of variance were found at $p < 0.01$.

Primary ones for juniper as berry sugar are fructose which is a monosaccharide and sucrose which is a disaccharide. In the results of the free sugar analysis made in the berries and needles foliages which are fresh, the highest sugar was determined to be the fructose. This is followed by glucose, sucrose and di-glucose (maltose). Just as there are differences among the areas making up the locations where the samples were taken from, there are also differences in the berry and foliages of different locations and the difference of the contents of free sugar as a statistic at the level of 0.01 difference has been found (Table-1).

It is determined that the content of fructose taken from the berries and foliages of the tall juniper from the locations looking north are at a higher level than the samples taken from the slopes of the south. It has been seen that the levels of free sugar amount in the berries are higher than the levels of free sugar in the foliages and the importance between the locations, side and the height above the sea levels have also been witnessed and are important as statistically.

TABLE-1
LOCATIONS OF THE PLANT OF JUNIPER AND
FREE SUGAR CONTENTS (mg/100 g)

Location	Fructose	Glucose	Sucrose	Maltose	Leaf sugar
1 North	69.7 ± 0.43	35.0 ± 4.20	27.7 ± 2.12	13.5 ± 0.56	32.8 ± 9.16
2 South	52.5 ± 0.43	41.3 ± 6.93	29.2 ± 2.18	14.6 ± 1.09	29.6 ± 5.63
3 South	63.2 ± 7.41	41.7 ± 8.06	23.4 ± 2.66	10.5 ± 2.08	23.5 ± 6.35
4 North	69.7 ± 5.83	39.5 ± 7.86	21.2 ± 4.44	10.0 ± 0.68	25.3 ± 7.98

Maltose has been found to be at the lowest levels among the free sugars. Three to four months before ripening, juniper berries contain only 7.8 ± 1.7 % sugars and starches reported by Podder *et al.*⁸ and Akinci *et al.*⁹ found free sugar of 21.29 ± 1.47 g/100 g inside the berries of *Juniperus drupacea* (which is another type of juniper) and determined sucrose as 10.57 ± 0.61 g/100 g. Free sugar amount inside the *Juniperus excelsa* is higher than the level which Podder *et al.*⁸ reports. Akinci *et al.*⁹ determined that the levels of free sugar and sugar appointing in that direction are lower than the levels of sucrose. The free sugar content of the leaf in the first location had the highest amount.

REFERENCES

1. B. Pamay, *J. IU. Forestry Fac. A(1)*, **5**, 91 (1955).
2. G. Elicin, *J. IU. Forestry Fac.*, **232**, 109 (1977).
3. F. Yaltirik, *J. IU. Forestry Fac.*, **386**, 258 (1988).
4. A. Demirci and M.D. Avsar, *J. Sci. Engg.*, **3**, 85 (2000).
5. M.D. Avsar, *KSU. Science and Engineering J.*, **7**, 53 (2004).
6. E. Torije, C.M.C. Diez, M. Camara, E. Camacho and Mazario, *J. Sci. Food Agric.*, **76**, 315 (1998).
7. M. Karkacier, M. Erbas, M.K. Uslu and M. Aksu, *J. Chromatogr. Sci.*, **41**, 331 (2003).
8. S. Poddar and R. Lederer, *The American Midland Naturalist*, **108**, 34 (1982).
9. I. Akinci, F. Ozdemir, A. Topuz, O. Kabas and M. Canakci, *J. Food Engg.*, **65**, 325 (2004).

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