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Cucurbita pepo L. Tohumlarının Yağ Asidi Kompozisyonunun Belirlenmesi Üzerine Bir Çalışma

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ÖZET

Bu çalışmada yağ asidi kompozisyonunun belirlenmesinde materyal olarak Çorum'da yetiştirilen Ürgüp Sivrisi ticari çeşidi kabak çekirdeği kullanılmıştır. Bilindiği gibi; Kabak çekirdeği bazı hastalıklara karşı koruyucu ve tedavi edici aktif bileşenlere sahiptir. Geçmişten günümüze geleneksel olarak prostat ve parazitler gibi bazı hastalıklar için kullanılmıştır. Kabak çekirdeği ortalama %42-54 yağ içerir ve yağ asidi bileşimi yer, iklim ve olgunluk gibi faktörlere bağlı olarak değiştiği bilinmektedir. Bu çalışmanın sonuçlarına göre stearik, palmitik asit ve linoleik asit sırasıyla %0,46,%0,52, %0,05 oranlarında bulunmuştur. Ayrıca kaprilik asit ve palmitik asit %0,37 ve %0,52 olarak belirlenmiştir. Bütirik asidin, bağırsak hastalıklarının inhibisyonu için önemli olduğu bilinmektedir. Birçok bağırsak hastalığının nedeni, kolondaki düşük bütirik asit konsantrasyonları olabileceği düşünülmektedir. Bütün bu özellikleri değerlendirildiğinde Kabak çekirdeğinin günlük besin alışkanlığında kullanılmasının önemli olduğu fikri ortaya çıkmıştır.

A Study on Determination of The Fatty Acid Composition of *Cucurbita pepo* L. Seeds

Research Article

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ABSTRACT

In this study seed variety of Ürgüp Sivrisi pumpkin seeds collected from Çorum was used as material for determination fatty acid composition. It is known that; The seed of the pumpkin has active ingredients that protect and cure diseases. From past the present, it has been traditionally used for some diseases such as prostate and parasites. The pumpkin seeds contain average of 42-54% fat, and fatty acid composition depends on factors such as location, climate and maturity. According to the results of this study stearic, pamitic acid and linoleic acid respectively were found 0,46%, 0,52%, 0,05% degrees. In addition caprylic acid and palmitic acid were determinated at 0,37% and 0,52%. Butyric acid is important for inhibition of intestinal diseases. Reason of the many intestinal diseases are low butyric acid concentrations, in the colon. It shows the importance of using the pumpkin seeds in daily food habit.

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1. Introduction

Seeds of some plants are using in human and animal feeding [1]. Seeds of Confectionery pumpkin are used as a snack or in human nutrition due to high-quality oil content [2]. Biodiversity and varieties vary widely in genetic variation and most of the species of pumpkin (*Cucurbita pepo* L.) belonging to the Cucurbitaceae family can be grown easily in Turkey. The production average value of 41,610 tons with 61,500 hectares of pumpkin in Turkey [3,4,5,6].

The oil obtained from the pumpkin can'nt be use in the food product beceuse of its color, foaming properties and sharp flavor. In addition in Romania, Austria and Slovenia it is a commonly used in salad. According to the some studies, pumpkin seeds contain average of 42-54% fat, and fatty acid composition depends on factors such as location, climate and maturity [7,8,9,10].

1.1. Some important ingredient of the pumpkin seed

The environmental conditions are important for the variety of amino acids, fatty acids, minerals and vitamins of pumpkin seeds. Essential amino acids which are found in the pumpkin seed protein are isoleucine, tryptophan, lysine, methionine, leucine, phenylalanine, threonine and valine.

It is stated that the number of fatty acids found in nature and whose structures have been illuminated to date is more than 200 [11,12]. Alpha-linolenic acid is omega-3 linoleic acid and arachidonic acid are omega-6 and oleic acid is omega-9 fatty acids. Stearic and oleic acids form fatty acids of 18 carbons.

2. Material and Method

In this study seed variety of Ürgüp Sivrisi pumpkin seeds collected from Çorum was used as material for determination fatty acid composition. The plant material was supplied from Çorum province. The fruit and the seed photos of the pumpkin (*Cucurbita pepo* L.) are given Figure 1 and Figure 2.

Figure 1. The pumpkin (*Cucurbita pepo* L.) of belonging to *Cucurbitaceae* family

It is known that; the seed of the pumpkin has active ingredients that protect and cure diseases. From past the present, it has been traditionally used for some diseases such as prostate and parasites.

Figure 2. The seeds of the pumpkin

2.1. Determination of Fatty Acid Content of Seed Samples

Two g of fully ground seed sample is placed in the extractor section of the soxhlet apparatus (Buchi B-811) and extracted with hexane for about 4 hours. After extraction, the hexane solution tare is evaporated from the initially recorded soxhlet solvent containers on a rotary evaporator. At the end of the process, the solvent containers are re-weighed and the fatty acid methyl esters of the seed fractions are prepared over the total amount of oil obtained and the fatty acid contents are calculated.

2.2. Preparation of Fatty Acid Methyl Esters

A 100 mg oil sample is weighed into a 20 mL flask and allowed to dissolve in 10 mL of hexane. 100 µL of 2N potassium hydroxide is added and vortexed for 30 s and centrifuged.

At the end of the centrifugation, 1 ml of supernatant is removed and transferred to the vial to perform fatty acid analysis in GC-MS. DB-23 60 m x 0,25 mm ID, 0,15 µm (J&W 122-2361) column and helium will be used as carrier gas. Oven temperature 50 °C 1 min, 175 °C in 25 °C increments, 5 min at 230 °C in 4 °C increments; injection temperature will be 230 °C. 1 µL injection will be performed and the split ratio will be set to 1/50 [13,14].

2.3. GC-MS Analysis

Methylated fatty acid samples will be analyzed using Agilent 6890 GC gas chromatography and

5973 MSD mass spectrometry. The properties and test conditions of the GC-MS device to be used are summarized below.

Chromatographic System:	**Agilent 6890 GC**
Inlet	Split
Detector	5973 MSD
Autosampler	Agilent 7683
Liner	Split liner (p/n 5183-4647)
Column	60 m x 0,25 mm ID, 0.15 μm DB-23 (J&W 122-2361)

Test Conditions GC MS	
Inlet temperature	250 °C
Injection volume	1 μL
Split ratio	1/50
Carrier gas	Helium
Pressure	Continuous pressure of 230 kPa (33 cm/s at 50 °C)
Oven temperature	50 °C, 1 min, 25 °C / min to 175 °C, 4 °C / min to 230 °C, 5 min.
Detector temperature	280 °C
Detector gases	Helium supplementary gas 30 mL / min.

3. Results and Discussion

In this study, fatty acid composition of seeds variety of Ürgüp Sivrisi pumpkin seeds collected from Çorum was used as material for determination fatty acid composition. The data obtained are shown in Table 1.

Table 1. The data of fatty acid composition

The name of fatty acids	The rate of fatty acids %	The name of fatty acids	The rate of fatty acids %
Butyric acid	5,79	Linoleic acid	0,05
Caprylic acid	0,37	Arachidic acid	0,09
Lauric acid	0,04	Behenic acid	0,19
Tridecanoic acid	1,45	Eicosatrienoic acid	0,18
Myristoic acid	4,18	Tricosanoic acid	84,84
Palmitic acid	0,52	Eicosapentaenoic acid	0,61
Palmiteloic acid	0,24	Lignoceric acid	0,08
Heptadecanoic acid	0,18	Nervonic acid	0,07
Heptadecanoic acid	0,11	Dokosahexaenoic acid	0,05
Stearic acid	0,46	Elaidic acid	0,05

According to the results of this study stearic, palmitic acid and linoleic acid respectively were found 0,46%, 0,52%, 0,05% degrees. In addition caprylic acid and palmitic acid were determinated at 0,37% and 0,52%. Butyric acid was found 5,79% degree. It is important for inhibition of intestinal diseases. Reason of the many intestinal diseases are low butyric acid concentrations, in the colon [15,16,17]. It shows the importance of using the pumpkin seeds in daily food habit.

Butyric acid value of the seeds which are used in this study are found lower than the other same study [18,19]. Stearic acid value was found 0,46% in this study. This result was the same in a study [18,19] and lower than the other one [20]. The reason of differences that in the studies could be by the taxonomic or eco-geographical differences [21]. Value of linoleic acid and arachidic acid were lower that some of studies about *Cucurbita pepo* L. [18]. In addition to the similarities between this study and others, there were also differences. The methods that used in study, the ecological conditions of the region where the plants are grown or some other reasons may cause these differences.

4. Conclusion

Variety of Ürgüp Sivrisi pumpkin seeds were used as material for determination fatty acid composition by using the GS-MS analysis. The seed material was supplied from Çorum province. Firstly the seeds were prepared for fatty acid methyl esters by using hexane. After this process the GC-MS analysis were conducted.

Important fatty acids were determined form the seeds. Especially stearic acid, palmitic acid and linoleic acid were found in the oil which obtained from Ürgüp Sivrisi pumpkin seeds variety of *Cucurbita pepo* L.

In addition, palmitic acid and linoleic acid content, which are used especially as skin care supplements, make pumpkin seed oil more valuable. This work is a preliminary work and can be expanded as far as possible. It is also thought that it may be the source of further studies on this subject. As a result, the fatty acids composition of pumpkin seeds, which has an important role in nutrition, is enlightened in this study.

References

[1].Krzebietke SJ., Sienkiewicz S. Effect of foliar application of anthracene and pyrene (PAH) on yields and chemical composition of butterhead lettuce (*Lactuca sativa L.*) grown under varied abundance of substrate in nutrients, J. Elem. 2010; 15(3): 531-538.

[2].Paris HS. History of the cultivar-groups of *Cucurbita pepo* (Janick J. Eds.), Horticultural Reviews 2001; 25, 71-170.

[3].TUİK. Turkish Statistical Institute. (https://biruni.tuik.gov.tr/bitkiselapp/bitkisel.zul), 2015. Accessed 15 November 2016.

[4].Düzeltir B. Description of pumpkin lines for seed (*Cucurbita pepo* L.) by morphological characteristics and selection studies, M.Sc. thesis (unpublished). Dept. of Horticulture, Ankara University, Ankara, Turkey, 2004.

[5].Keskin L. Çekirdek Kabak Yetiştiriciliği, Sorunları ve Çözüm Önerileri, MSc Seminary, Dept. of Horticulture, Selcuk University, Konya, Turkey (in Turkish), 2007.

[6].Yavuz D., Yavuz N., Seymen M., Türkmen Ö. Evapotranspiration, crop coefficient and seed yield of drip irrigated pumpkin under semi-arid conditions, Scientia Horticulturae 2015; 197, 33-40.

[7].Murkoviç M., Hillebrand A., Winkler J., Pfannhauser W. Variabilitiy of vitamin E content in pumpkin seeds (*Cucurbita pepo L.*). Z Lebensm Unters Forsch 1996; 202, 275-278.

[8].Murkoviç M., Hillebrand A., Draxl S., Winkler J., Pfannhauser W. Distribution of fatty acids and vitamin e content in pumpkin seeds (*Cucurbita pepo L.*) in breeding lines, Acta Hortic 1999; 492, 47-55.

[9].Türkmen Ö., Uslu N., Paksoy M., Seymen M., Fidan S., Özcan MM. Evaluation of fatty acid composition, oil yield and total phenol content of various pumpkin seed genotypes, La Rivista Italiana Delle Sostanze Grasse 2015; 92, 93-97.

[10].Seymen M., Uslu N., Türkmen Ö., Juahaimi FA., Özcan MM. Chemical compositions and mineral contents of some hull-less pumpkin seed and oils. J. Am. Oil Chem. Soc 2016; 93, 1095-1099.

[11].Kayahan M. Yağ Kimyası, ODTÜ Yayıncılık 2003, Ankara, 220 s.

[12].Bayraktar B. Bayburt'ta organik tarım ve hayvancılığın mevcut durumu, Türk Tarım-Gıda Bilim ve Teknoloji Dergisi 2017; 5(13): 1762-1768.

[13].IUPAC Standard method 2.301. Standards methods for the analysis of oils, fats and derivatives (7th ed.)International Union of Pure and Applied Chemistry, Blackwell, Oxford, England (1992) (1st supplement. to the 7th ed.)

[14].Regulation H. Commission Regulation (EEC) No. 2568/91 of 11 July 1991 on the characteristics of olive oil and olive-residue oil and on the relevant methods of analysis Official Journal L 248, 5 September 1991. Official Journal L, 248, 1-83.

[15].Kumar CM., Rachappaji KS., Nandini CD., Sambaiah K., Salimath PV. Modulatory effect of butyric acid-a product of dietary fiber fermentation in experimentally induced diabetic rats, The Journal of Nutritional Biochemistry 2002; 13(9): 522-527.

[16].Spina L., Cavallaro F., Fardowza NI., Lagoussis P., Bona D., Ciscato C., Rigante A., Vecchi M. Butyric acid: pharmacological aspects and routes of administration, Digestive and Liver Disease Supplements 2007; 1(1): 7-11.

[17].Çağlar A., Tomar O., Ekiz T. Bütirik asit: Yapısı, özellikleri ve sağlık üzerine etkileri, Kocatepe Veterinary Journal 2017; 10(3): 213-225.

[18].Zeybek U. www.bukas.com.tr/product.asp (izlenme tarihi 18.07.2011), 2006.

[19].Younis YMH., Ghirmay S., Al-Shihryc SS. African Cucurbita pepo L.: Properties of seed and variability in fatty acid composition of seed oil, Phytochemistry 2000; 54, 71-75.

[20]. Hernández-Santos B., Rodríguez-Miranda J., Herman-Lara E., Torruco-Uco JG., Carmona-García R., Juárez-Barrientos JM., Chávez-Zamudio R., Martínez-Sánchez CE. Effect of oil extraction assisted by ultrasound on the physicochemical properties and fatty acid profile of pumpkin seed oil (*Cucurbita pepo*), Ultrasonics Sonochemistry 2016; 31, 429-436.

[21].Doğan B., Çelik M., Ünal M., Sefalı A., Martin E., Kaya A. Study of phylogenetic relationship of Turkish species of Matthiola (*Brassicaceae*) based on ISSR amplification, Turk J Bot 2016; 40, 130-136.