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Araştırma Makalesi

Chemical Composition of two *Lactarius* Species of Wild Growing in Kestel (Kadınhanı-Konya) District

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Abstract

In this study, the amount of water, dry matter, total oil and mineral material contents of *Lactarius salmonicolor* R. Heim & Leclair and *Lactarius sanguifluus* (Paulet) Fr. mushrooms collected in Kestel Konya district were defined. As a result of chemical analysis, the water content of *Lactarius sanguifluus* was determined as 91.57% and the amount of dry matter was determined as 8.43%. On the other hand, in *Lactarius salmonicolor*, the amount of water was 90.92% and the amount of dry matter was 9.08%. According to these results obtained, water percentage and total oil rate in *L.sangiufluus* were found higher than *L. salmonicolor*. They grow in pine forests and in places near pine forests where *Cistus* sp. grow.

Key Words: *Lactarius salmonicolor*, *Lactarius sanguifluus*, mineral, Kestel, Konya.

Kestel (Kadınhanı-Konya) Yöresinde Yabani Yetişen İki *Lactarius* Türünün Kimyasal Bileşimi

Özet

Bu çalışmada, Konya Kestel yöresinden toplanan *Lactarius salmonicolor* R. Heim & Leclair ve *L.sanguifluus* (Paulet) Fr. mantarlarının su, kuru madde, ham yağ miktarı ve mineral madde içerikleri belirlenmiştir. Kimyasal analizler sonucunda *L.sanguifluus* türünün su içeriği % 91.57, kuru madde miktarı % 8.43. Diğer taraftan, *L.salmonicolor*'da ise su miktarı % 90.92, kuru madde miktarı % 9.08 olarak tespit edilmiştir. Bu sonuçlara göre *L.sangiufluus*'daki ham yağ oranı ve su yüzdesi *L.salmonicolor*'dan daha yüksek olduğu tespit edildi. Yetişme yeri olarak çam ormanı ve orman kenarındaki *Cistus*'ların yetiştiği yerlerde yetişmektedir.

Anahtar Kelimeler: *Lactarius salmonicolor*, *Lactarius sanguifluus,* mineral, Kestel, Konya.

Introduction

People have known about wild mushrooms for a long time and have consumed them as a food. We encounter the data related to the usage and growing of mushrooms in sources written as early as the 79 AD years by Plinius. Today, many species of mushrooms are used in medicine due to its antibiotic, anticancer and antiviral features [4], and recently, they have been used especially in biotechnological studies [5]. The minerals that existed in the content of the mushrooms are sodium, potassium, phosphorous, iron, zinc, copper, manganese, nitrogen, chlorine and calcium.

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The amino acids in mushrooms are arginine, isoleuecine, iysine, valine, leucine, threonine, histidine, phenylalanine, methianine and tryptophan [7]. Besides these, B1, B2, B3, B4, B5, B7, C and K vitamins are found abundantly in mushrooms. For this reason mushrooms help the nervous system work smoothly and cause a relaxation in the body [2].

Turkey has a great potential for edible mushroom-growing and is in the position of being a natural mushroom exporter [11].

The aim of this study is to determine the chemical components and habitat characteristics of the *L.salmonicolor* and *L.sanguifluus* mushrooms collected from Kestel district.

Materials and Methods

The mushrooms in this study were collected at the altitude of 1200-1500 m especially during October-November (2006) from forests in Kestel district (Beykavağı) in Konya (Figure 1). The diagnosis was made by referencing Kränzlin's [8] works after the macroscopic and microscopic features had been defined (Figures 2-3).

While defining the amount of water in the mushrooms, the mushroom samples were cleaned, and weighed with sensitive scales showed a mass of 100 gr and they were dried in a drying oven till the weight became stable. Dry matter quantization was done at 105ºC. After chloroform/ methanol mixture were added to 30 gr of mushrooms, they were cut into small pieces in a mixer to determine total lipid. The mixture was filtered from Whatman No.4 filter paper and determined with the help of nitrogen gas using evaporation method. The amount of Na and K in the mushroom samples prepared with the moist digestion technique for mineral determination was determined by using propane-air mixture in the flame photometer [1]. Atomic Absorption Spectrophotometer (AAS) was used in the measurement of samples, whose Zn, Mn, Cu, Fe, P and Mg content were determined with the moist digestion technique. To determine Ca, on the other hand, flame photometry measurement was used. To determine pH level of the mushrooms, 10 gr of cleaned mushroom samples were crushed in 50 ml distilled water in the mixer. Then, they were placed into a measurement balloon and the liquid was filled to 100 ml. 12 hours later the pH level of the filtered mixture was measured. In the soil analysis of the area where mushrooms grow, the soil samples, taken from 20 cm deep of the earth surface, were weighed to be between 20 to 50 gr and put into beakers. To destroy the organic matter in the soil, some hydrogen peroxide was added and to prevent foaming a few drops nitrosamine alcohol was added with the help of a straw. Moist digestion technique was used for the determination of Zn, Mn, Cu, Fe, P and Mg. For the determination of the elements that exist in the earth where the mushrooms are grown, some earth was taken nearly 20 cm deep at the site after the mushroom was uprooted. These samples were dried in ovens and then earth elements were defined.

Results and Discussion

The biology of the *L.salmonicolor* and *L.sanguifluus* species, which are among *Lactarius* species and know in our country as kanlıca, espit, melki, çıntar, were researched and analysis results were evaluated. The results were given below (Table 1).

According to the results obtained, water percentage and total oil rate in *L.sangiufluus* were found higher than *L.salmonicolor*. In terms of mineral matter while Ca, Zn and Mg were higher in L.sanguifluus, it is found that the other mineral rates were lower than *L.salmonicolor*.

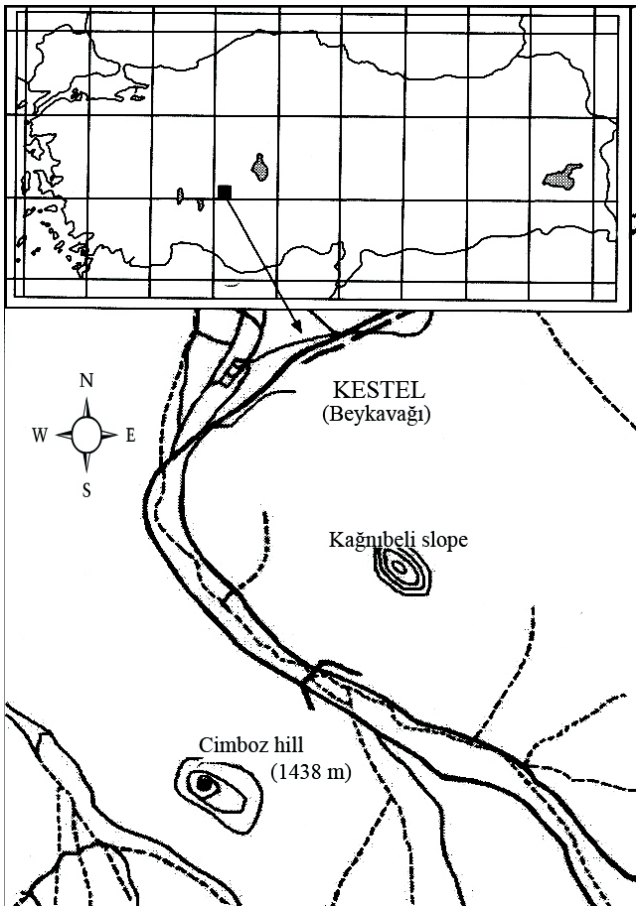

Figure 1. Map of the study area

Figure 2. Lactarius salmonicolor

Figure 3. Lactarius sanguifluus

Table 1 The data obtained as a result of the chemical analysis. *100gr.

Species of Fungi	Water %	Dry matter gr	Total oil gr	P%	K%	Mg%	Ca%	Fe ppm	Cu ppm	Zn ppm	Mn ppm
L.salmonicolor	90.92	9.08	0.91	0.27	1.12	0.34	1.30	1216.0	8.0	9.27	69.25
L.sanguifluus	91.57	8.43	0.99	0.25	1.09	1.32	2.37	829.33	5.16	11.85	48.33

In the collected mushrooms the amount of water was found to be 90.92 %in *L.salmonicolor* and 91.57 % in *L.sanguifluus*. It was determined that the results that many researchers have found *Agaricus bisporus* 91.2% [10], 91.3% [3] and *Clavaria* 91.1% [12] on the amount of water in macro fungus showed similarity with our study. Besides, the researchers have stated as 88.9% [12], 89.8% [11] the amount of water in *L.salmonicolor*.

The amount of dry matter was found as 9.08 gr for *L.salmonicolor* and 8.43 gr for *L.sanguifluus*. Siyamoğlu [9] had found as 9.1 gr the amount of dry matter in *L.deliciosus*. This result is very close to our study.

While the amount of oil in *L.salmonicolor* was found as 0.91 gr, the other researchers had found as 0.83 gr [12], 0.67 gr [11]. It is thought that the different amount of oil is related to the growing environment.

The amount of ash for *L.salmonicolor* was determined as 0.62 gr [12] and 0.65 gr [11]. The amount of ash for *L.deliciosus* was determined as 0.5 gr [9].

In a study by Dursun et al. [6], they had found as Cu 4.6 mg/kg^{-1}, Fe 1146.8 mg /kg^{-1}, K 15074.9 mg /kg^{-1}, Mg 1021.4 mg /kg^{-1}, Mn 15.9 mg kg^{-1}, Na 1344.5 mg kg^{-1}, Ca 769.5 mg kg^{-1} and Zn 34.8 mg kg^{-1} in *L.sanguifluus*. In the study for *L.sanguifluus* was defined as low the amount of mineral matters. For *L.semisanguifluus,* the content of Cu 40 mg kg^{-1}, Fe 586 mg kg^{-1}, Mn 14.5 mg kg^{-1} and Zn was found as 74.3 mg kg^{-1}.

The amount of mineral matters was found as Cu 8.6 mg kg^{-1}, Fe 4735.2 mg kg^{-1}, K 17605.1 mg kg^{-1}, Mg 2069.4 mg kg^{-1}, Mn 102.4 mg kg^{-1}, Na 4813.6 mg kg^{-1}, Ca 2715.4 mg kg^{-1}, Zn 59.9 mg kg^{-1} for *L.deliciosus* [4].

The distribution of elements at the different soil of two species was mostly iron, potassium and manganese. As for the distribution of elements in different soils where these two species grow, iron, potassium and manganese were the most abundantly found ones. It is seen that the oven dry sample of soils belonging to the *L.salmonicolor* species is closer to each other the amounts of nitrogen and phosphorous is equal. Table 2 shows that there is closely among some elements; while there is difference in the amounts among some others in the soil belonging to *L. sanguifluus* species. It is thought that these differences are caused soils taken from different regions. It shows that these lands are rich in terms of minerals for the mushrooms and other vegetation growing.

It has been observed that the soil where both species of mushrooms are grown is rich in terms of organic matter. Water saturation percentage of the soil is quite high. The amount of pH is around 6.5-7, which means it is acidic soil. The amount of salt is quite low and the amount of lime is also quite low.

In this study *L.salmonicolor* and *L.sanguifluus* species were investigated. The local people said that mushroom is a good source of food and provided a good source of income.

In addition to, it was resolved that mushrooms mostly grow near pine forests and under *Cistus* sp.

Table 2 Total element distribution in the soil

Locality	Number	%N at dry matter	Total element in the soil					
			Iron (Fe)	Copper (Cu)	Zink (Zn)	Manganese (Mn)	Phosphorous (P)	Potassium (K)
Cimboz Hill	1	3.8	330.50	4.91	23.86	168.44	16.20	382.10
	2	3.7	395.40	13.92	26.66	199.34	16.20	207.2
	A1	3.3	394.00	9.30	30.16	173.24	15.18	186.6
	A2	3.4	389.80	8.11	16.76	189.54	16.20	271.1
	A3	2.5	397.00	7.10	27.16	173.54	34.35	407.8

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References

Ağaoğlu Y.S., İlbay E., Güler M. (1991). Doğal ve Kültüre Alınabilir Mantar Türleri III. Shiitake (Lentinus edodes) Yetiştiriciliği Orman Genel Müdürlüğü, Ankara 465.

Bayraklı F. (1987). Toprak ve Bitki Analizleri, 19 Mayıs Üniversitesi, Ziraat Fakültesi Yayınları, Yayın no: 17, Samsun.

Bilgir B., Boztok K. (1983). Kültür Mantarının (*Agaricus bisporus* (Lange) Sing) Besin Değeri Üzerinde Araştırmalar. *Ege Üniversitesi Ziraat Fakültesi Dergisi* 20, 1, 9-17.

Carlile M.J., Watkinson, S.C. (1994). *The Fungi*.Academic Press London.

Dennis R.B. (1995). *Mushrooms: Poison and Panaceas, W.H. Freeman and Co*, New York.

Dursun N., Özcan M.M., Kaşık G., Öztürk C. (2006). Mineral Contents of 34 Species of Edible Mushrooms Growing Wild in Turkey. *Journal Science Food and Agriculture*, 86: 1087-1094.

Kannaiyan S., Ramasamy K. (1980). *A Handbook of Edible Mushrooms*. Today and Tomorrow's Printers and Publisher. New Delhi.

Kränzlin F. (2005). *Funfi of Switzerland, Volume 6*. Edition Mycologia Lucerne.

Siyamoğlu B. (1984). Çam Mantarının (*Lactarius deliciosus*) Besin Değeri Üzerinde Araştırmalar. *Ege Üniversitesi Ziraat Fakültesi Dergisi*, 21, 3, 105-113.

Souci S.W., Fachmann W., Kraut H. (1974a). *Die Zusammensetzung Der Lebensmittel and II Wissenchaftliche*, *Verlagsgeselschaft*, M.B.H., Stuttgart.

Souci, S.W. Fachmann W., Kraut H. (1974b). *Nahrwert Tabellen Wissenschaftliches Verlagsgeselschaft*, M.B.H., Stuttgart.

Törley D., Nedlkovites J. (1961). *Chemische Zusammensetzung Der Essbaren and Giftigen Pilze*, Stuttgart 7, 344-348.

Türkekul İ., Elmastaş M. (2004). Determination of Iron, Copper, Manganese, Zinc, Lead and Cadmium in Mushroom Samples From Tokat, Turkey, *Food Chemistry*, 84:389-392.