PROCEEDINGS BOOK

INTERNATIONAL PEPPER AND SPICES CONFERENCE

April 26, 2022/Tobasco, Mexico

Dra. Lily Lara ROMERO

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INTERNATIONAL

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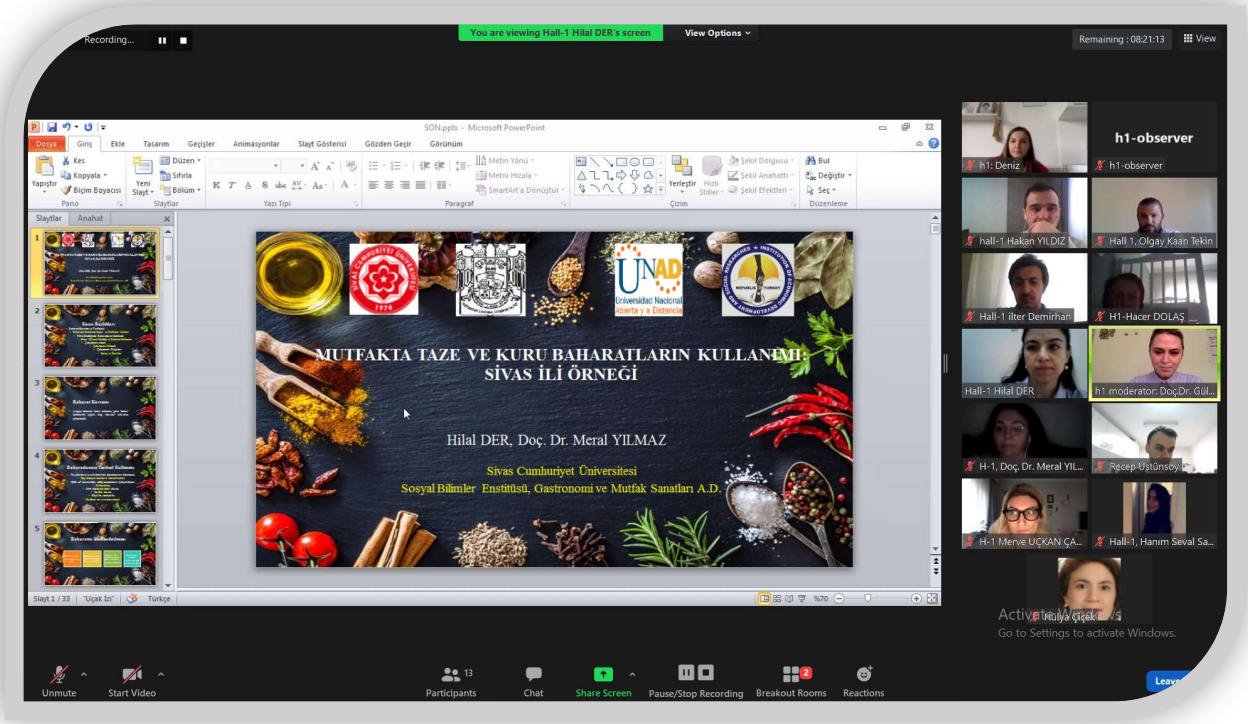

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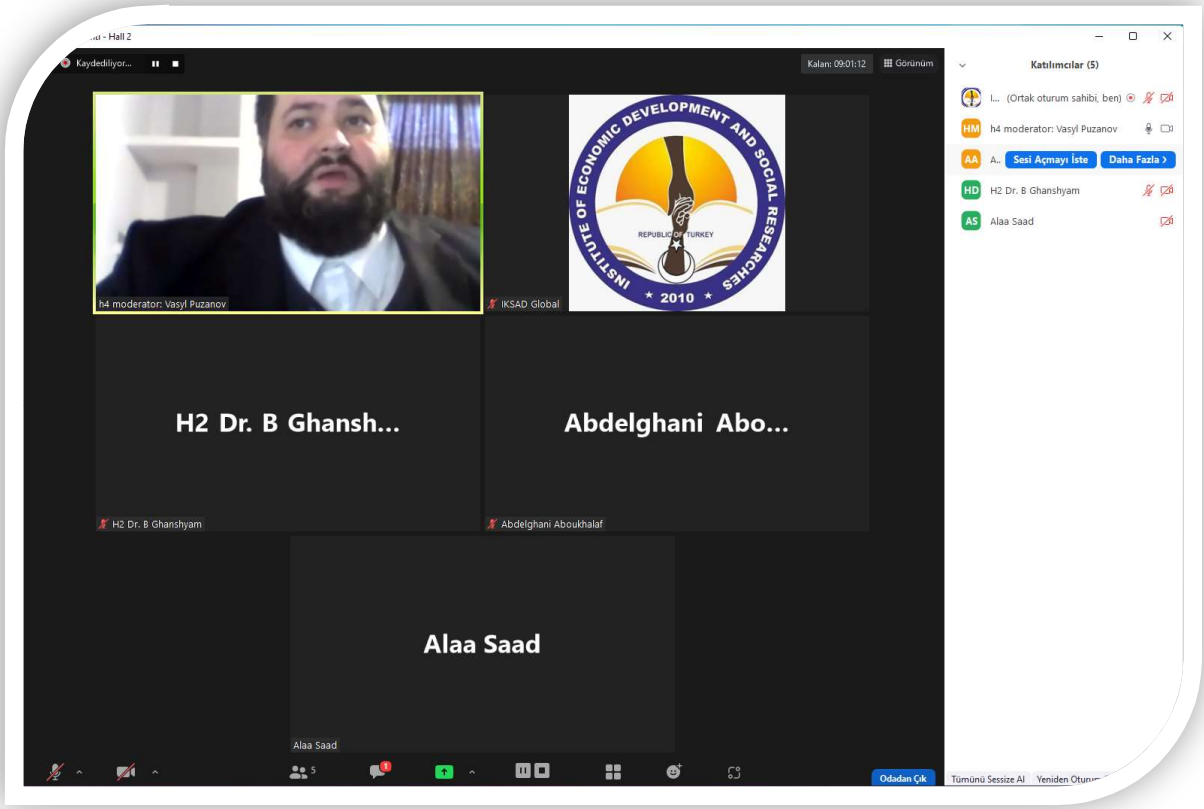

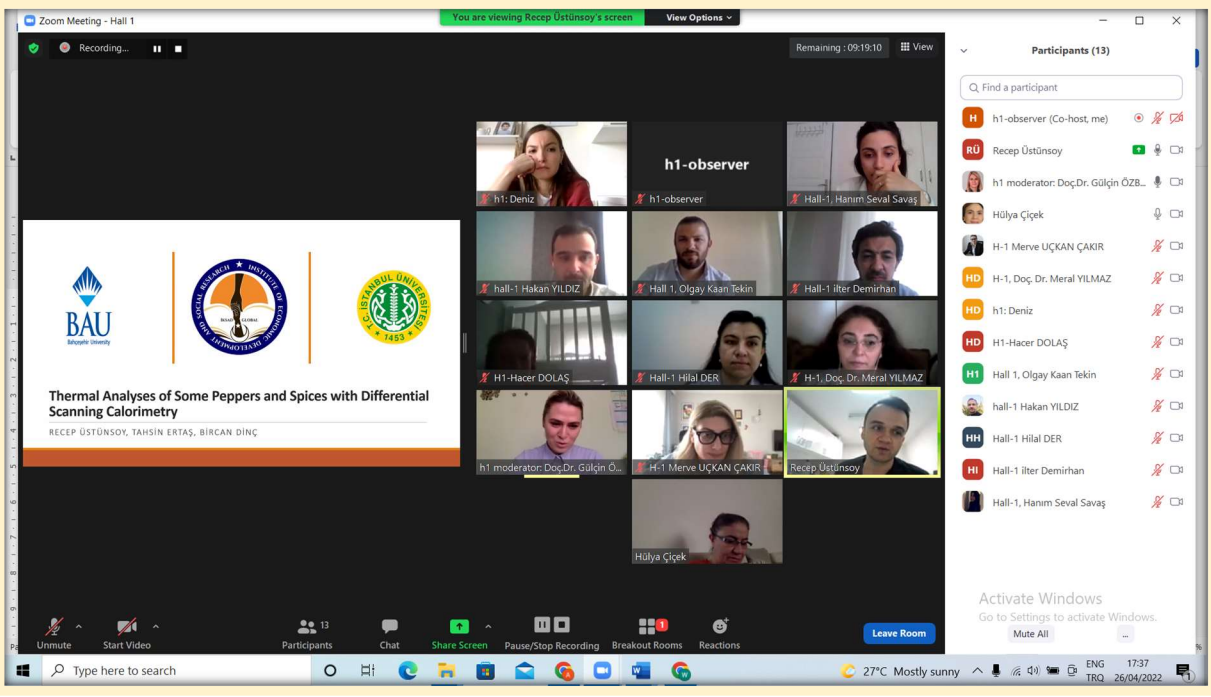

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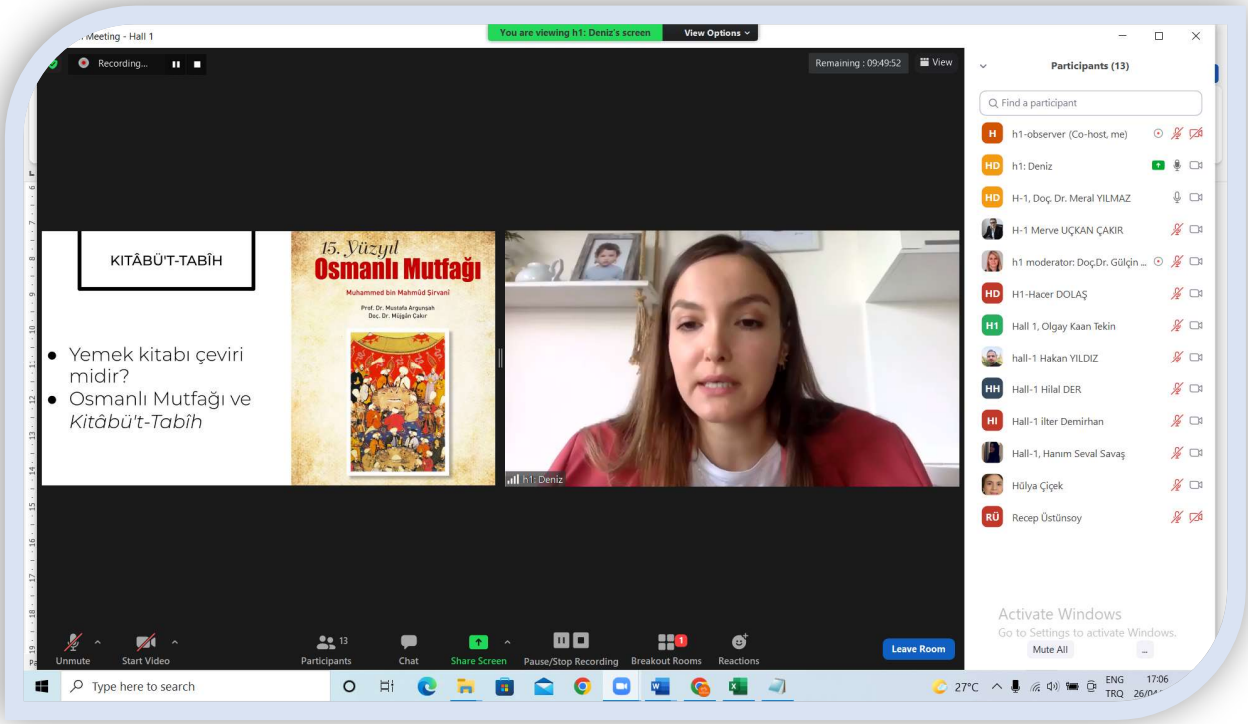

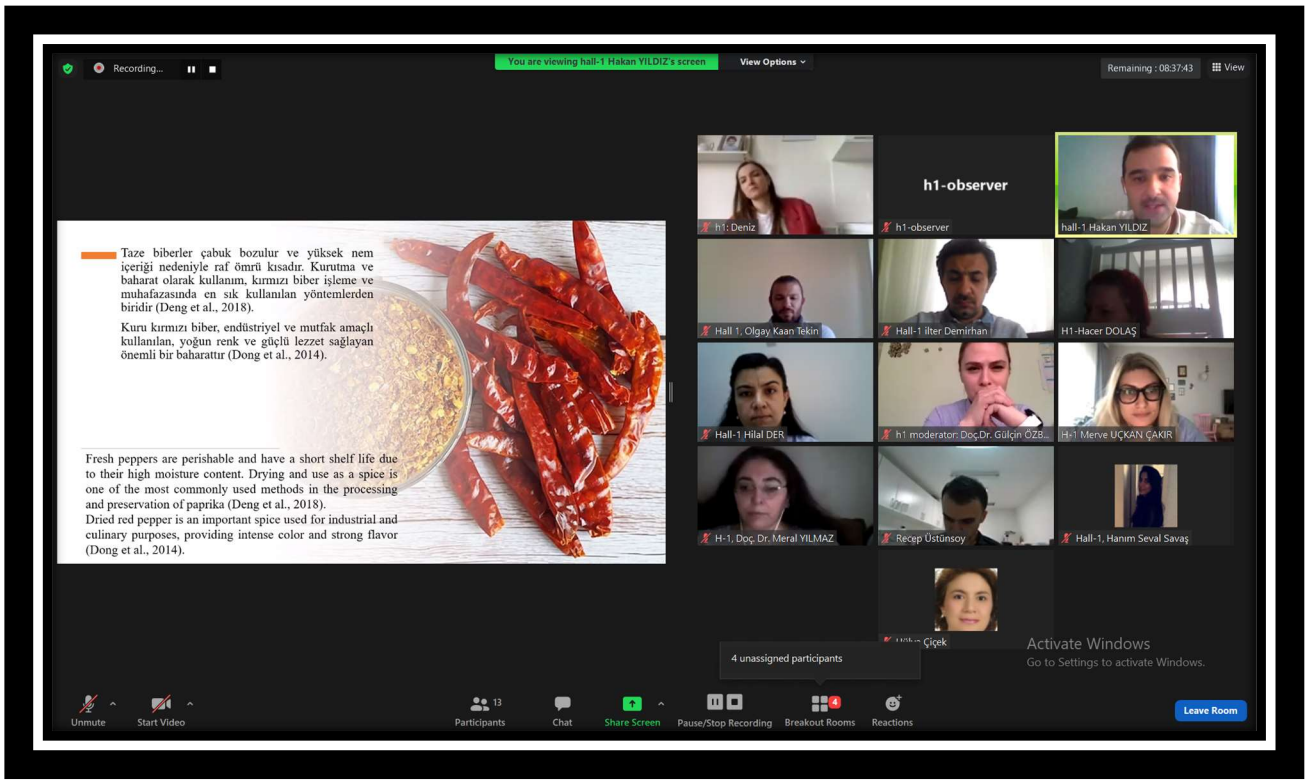

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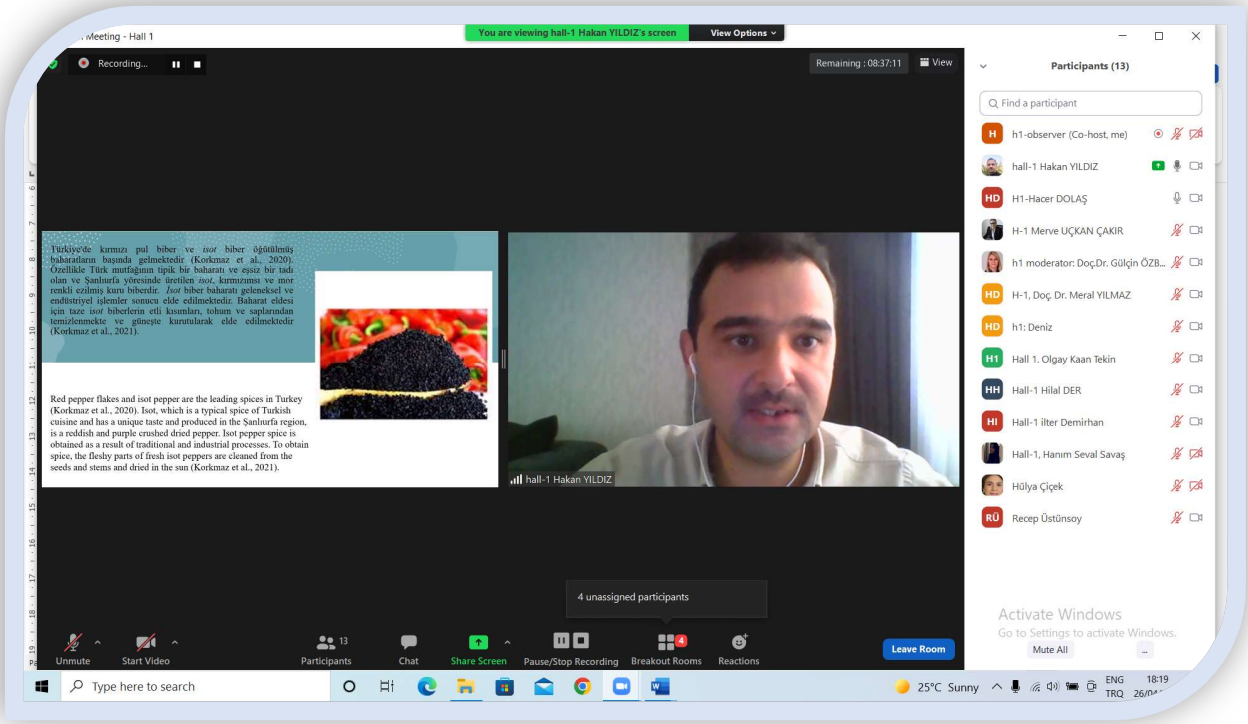

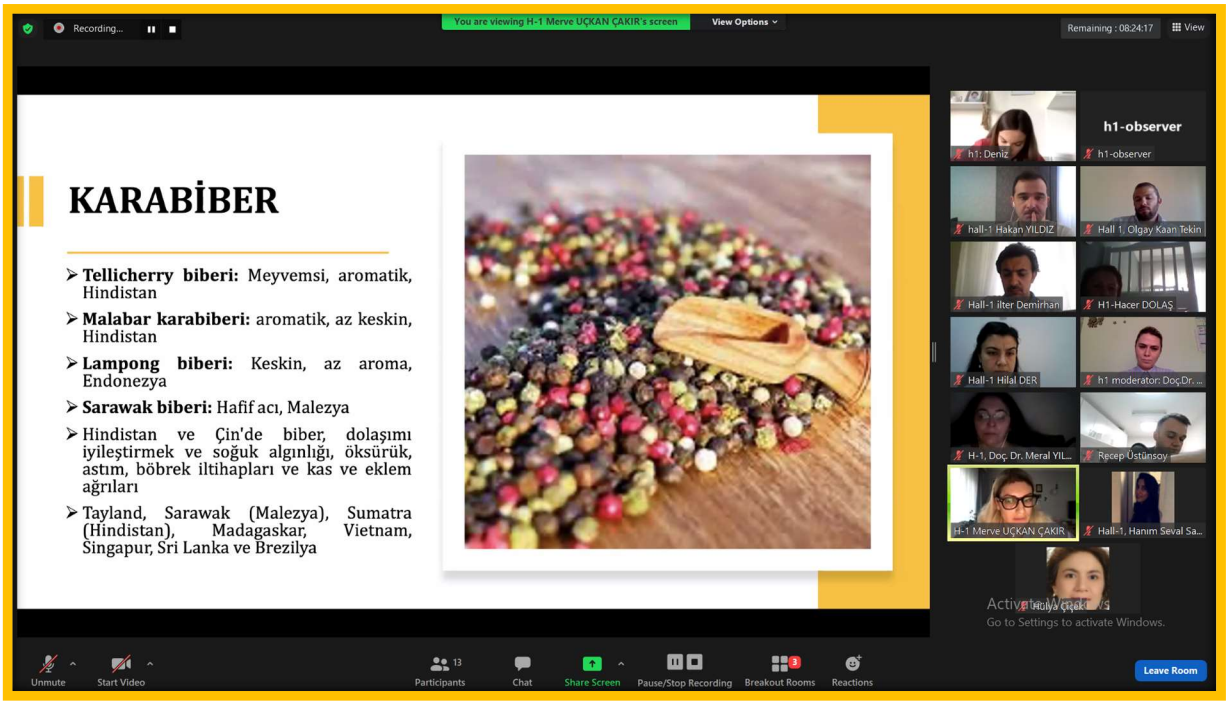

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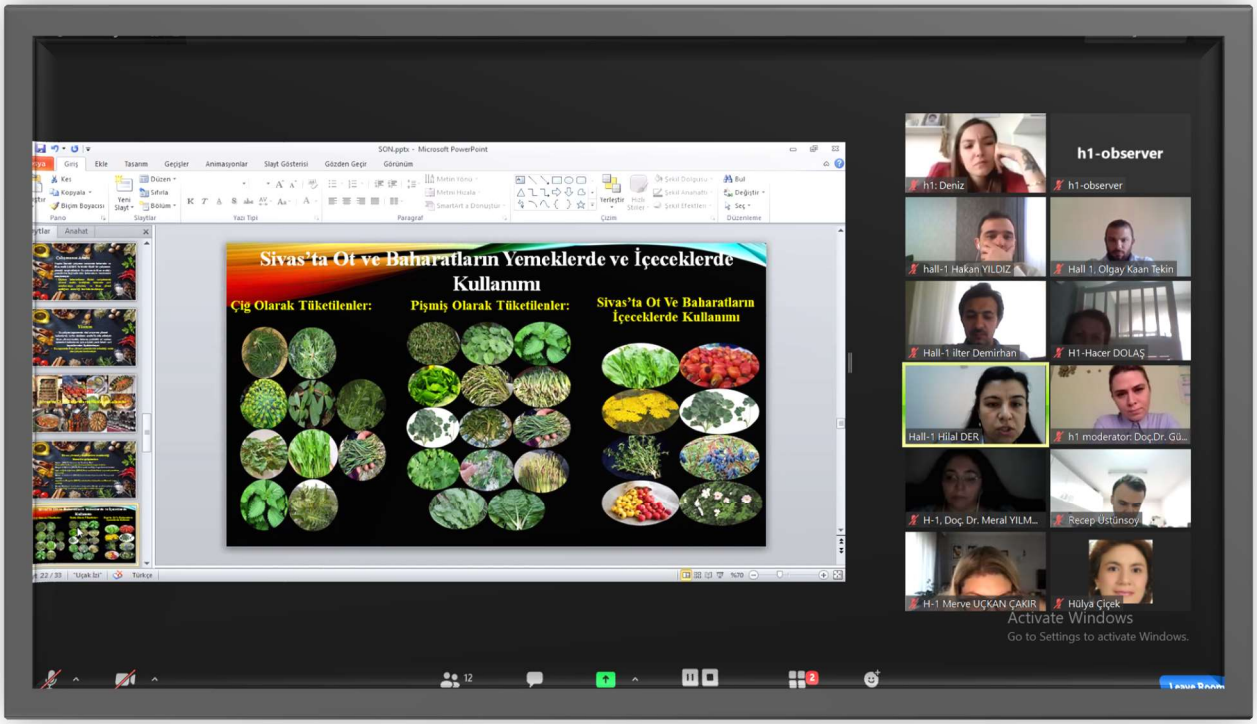

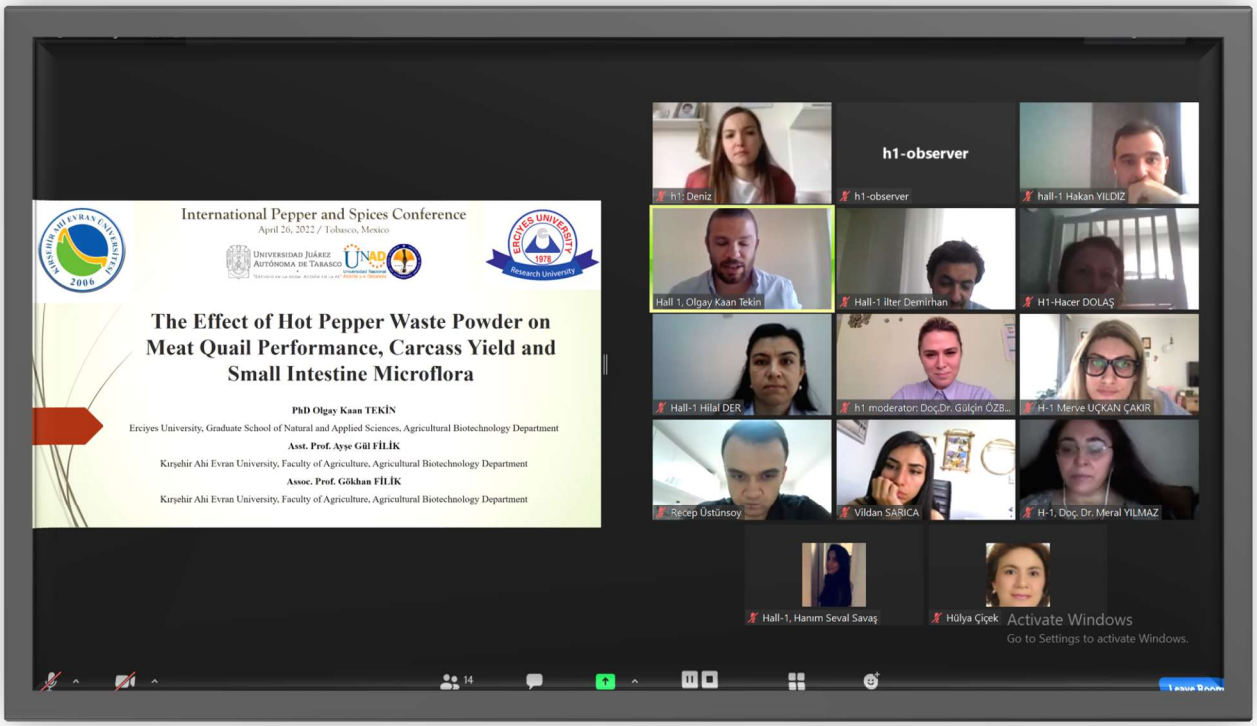

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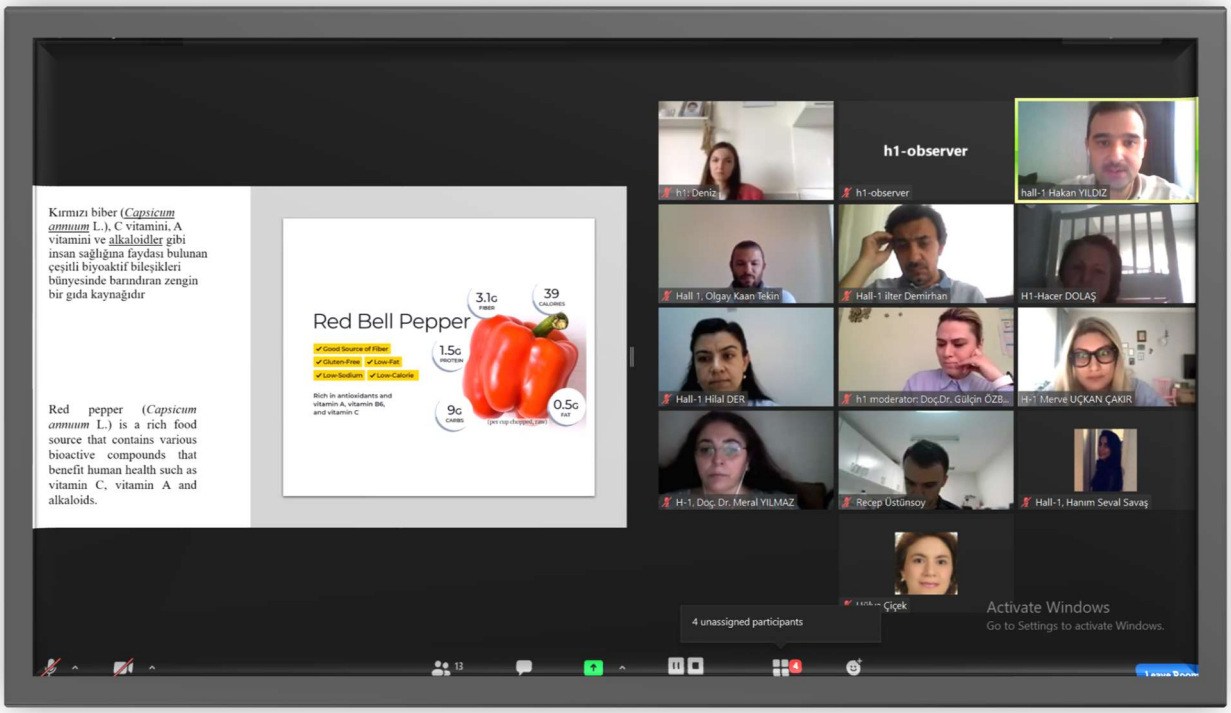

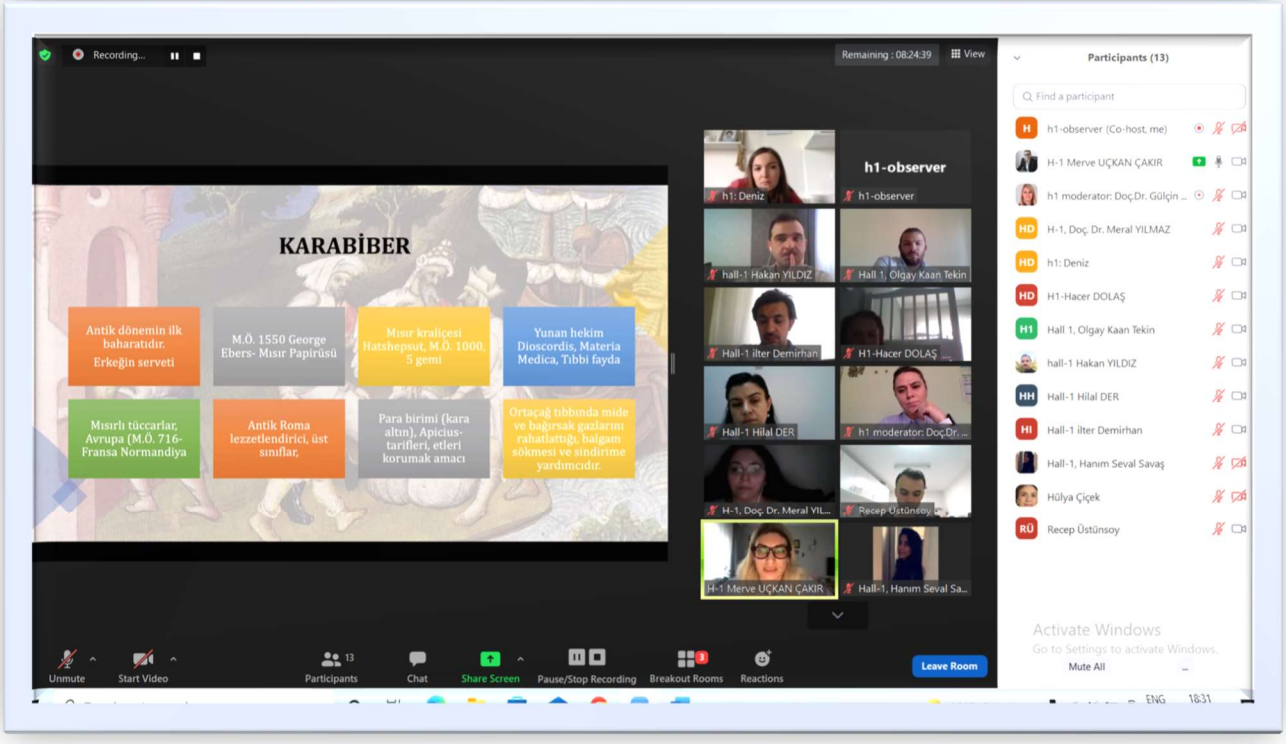

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ONLINE PRESENTATIONS

26.04.2022	HALL-1
MEXICO LOCAL TIME	ANKARA LOCAL TIME
09 00 : 11 30	17 00 : 19 30

HEAD OF SESSION: Assoc. Prof. Dr. Gülçin ÖZBAY

AUTHORS	AFFILIATION	TOPIC TITLE
Deniz Yılmaz	Özyegin University	SPICE CONSUMPTION IN THE 15TH CENTURY OTTOMAN ELITE CUISINE
Prof. Dr. Hülya ÇİÇEK Hanım Seval Savaş	Gaziantep University	THE EFFECTS OF HOT PEPPER CONSUMED IN THE SOUTHEASTERN ANATOLIA REGION OF TURKEY ON HUMAN HEALTH
Recep USTUNSOY Tahsin ERTAS Asst. Prof. Dr. Bircan DİNC	Istanbul University Bahçeşehir University	THERMAL ANALYSES OF SOME PEPPERS AND SPICES WITH DIFFERENTIAL SCANNING CALORIMETRY
İlter Demirhan Erkan Öner	Harran University Mersin University	INVESTIGATION OF ANTIOXIDANT ACTIVITY IN HOT RED PEPPER SPECIES GROWED IN KAHRAMANMARAS AND SANLIURFA PROVINCES
Olgay Kaan TEKİN Asst. Prof. Dr. Ayşe Gül FİLİK Assoc. Prof. Dr. Gökhan FİLİK	Erciyes University Kırşehir Ahi Evran University	THE EFFECT OF HOT PEPPER WASTE POWDER ON MEAT QUAIL PERFORMANCE, CARCASS YIELD AND SMALL INTESTINE MICROFLORA
Hacer DOLAS Hakan YİLDİZ Omer SAHİN	Harran University Istanbul Technical University	THE EFFECT OF MICROWAVE METHOD ON SURFACE AREA AND PORE STRUCTURE OF ACTIVATED CARBON OBTAINED FROM WASTE BIOMASS (HOT RED PEPPER STALKS)
Hacer DOLAS Hakan YİLDİZ Omer SAHİN	Harran University Istanbul Technical University	OBTAINING HIGH VALUE-ADDED PRODUCT FROM "İSOT" PEPPER WASTE STALKS: THE PRODUCTION AND CHARACTERIZATION OF ACTIVATED CARBON
Assoc. Prof. Dr. Gülçin ÖZBAY Res. Asst. Merve UÇKAN ÇAKIR	Sakarya Applied Science University Van Yuzuncu Yıl University	A SHORT HISTORY OF SPICES: AN OVERVIEW ON PEPPER HISTORY
Hilal DER Assoc. Prof. Dr. Meral YILMAZ	Sivas Cumhuriyet University	USE OF FRESH AND DRY SPICES IN THE KITCHEN: THE CASE OF SİVAS

ONLINE PRESENTATIONS

26.04.2022	HALL-2
MEXICO LOCAL TIME	ANKARA LOCAL TIME
09 00 : 11 30	17 00 : 19 30

HEAD OF SESSION: Assoc. Prof. Dr. Sergiy Lavrenko

AUTHORS	AFFILIATION	TOPIC TITLE
Maria Rizak Assoc. Prof. Dr. Sergiy Lavrenko	Kherson State Agrarian and Economic University, Ukraine	FEATURES OF CHILI PEPPER
Assoc. Prof. Dr. Sergiy Lavrenko Assoc. Prof. Dr. Nataliia Lavrenko Yelyzaveta Plaskalna	Kherson State Agrarian and Economic University, Ukraine	BASIL CULTIVATION IN HYDROPONIC SYSTEM
Assoc. Prof. Dr. Sergiy Lavrenko Maria Rizak	Kherson State Agrarian and Economic University, Ukraine	RESEARCH ON THE USE OF PAPRIKA AS A NATURAL FOOD DYE
Assoc. Prof. Dr. Sergiy Lavrenko Assoc. Prof. Dr. Nataliia Lavrenko Yaroslav Yakovenko	Kherson State Agrarian and Economic University, Ukraine	A NEW SPICE FOR UKRAINE IS SAFFRON
Dr. Ghanshyam Barman	C G P I T, Uka Tarsadia University, India	PEPPER AND SPICES PRODUCTION IN THE WORLD
Subhashish Dey	Gudlavalleru Engineering College, Andhra Pradesh, India	MECHANISMS AND ASPECTS OF FOOD PRESERVATION AND PROCESSING
Favour C. Uroko	University of Nigeria, Nsukka	PEPPER CULTIVATION AND WOMEN EMPOWERMENT IN NIGERIA: REVISITING RUTH AND BOAZ NARRATIVE
Abdelghani Aboukhalaf Sara Moujabbir Belkassem El Amraoui João Miguel Rocha Rekia Belahsen	Chouaib Doukkali University, Morocco. Ibn Zohr University, Morocco. University of Porto, Portugal.	ETHNOBOTANICAL SURVEY ON TRADITIONAL KNOWLEDGE AND USE OF WILD FOOD PLANTS IN SIDI BENNOUR REGION (CENTRAL MOROCCO)

ONLINE PRESENTATIONS

26.04.2022	HALL-3
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HEAD OF SESSION: Major Gheorghe Giurgiu

AUTHORS	AFFILIATION	TOPIC TITLE
Major Gheorghe Giurgiu Prof. Dr. Med Manole Cojocaru	Deniplant-Aide Sante Medical Center, Romania Titu Maiorescu University, Romania	GUT MICROBIOTA MEDIATES THE IMMUNOMODULATOR EFFECT OF DIETARY CAPSAICIN
Ananda Majumdar	The University of Alberta	ADVANTAGES OF SPICES AND HERBS FOR HUMAN HEALTH NUTRITION AND RECOVERIES
Dr. Muhammad Faisal	Sindh Madressatul Islam University	A WELLBEING REVIEW FOR THE BENEFITS AND WEAKNESSES OF PEPPERS AND CHILIES
Moses Adeolu AGOI Oluwadamilola Peace AGOI	Lagos State University of Education, Lagos Nigeria Federal University of Agriculture Abeokuta, Ogun Nigeria	RELEVANCE OF BIOTECHNOLOGY ON NUTRITION: IMPLICATION FOR HUMAN'S HEALTH
Najoua SOULO Badiaa LYOUSSI Zineb BENZIANE OUARITINI	Sidi Mohamed Ben Abdellah University (USMBA) -Fez, Morocco	SPICES ARE THE BEST AT GROCERIES FOR FINE DISHES AND STRONG BODIES
Marcelo GASPAR	School of Technology and Management, Polytechnic Institute of Leiria, Portugal	IMPROVING MEAL EXPERIENCE AND HEALTH WITH HERBS AND SPICES: INTEGRATING DEDICATED SPICE DISPENSERS WITH TABLEWARE TO EAT AWAY FROM HOME
Assoc. Prof. Dr. Rabia Shabir Ahmad Huda Ateeq	Govt College University, Faisalabad, Pakistan	CURCUMIN: GOLDEN SPICE WITH THERAPEUTIC PROPERTIES
Johnson Oshiobugie Momoh Oluremilekun Olabisi Sokefun Adenike Omosalewa Babalola Taiwo Toyin Oshin Babajide David Kayode	Lagos State University of Science and Technology (LASUSTECH), Ikorodu, Lagos State, Nigeria. Eko University of Medicine and Health Sciences.	HEPATOPROTECTIVE EFFECT OF METHANOLIC ROOT EXTRACT OF CURCUMA LONGA (TURMERIC) AGAINST ACETAMINOPHEN-INDUCED HEPATOTOXICITY IN WISTAR ALBINO RATS

ONLINE PRESENTATIONS

26.04.2022	HALL-4
MEXICO LOCAL TIME	ANKARA LOCAL TIME
09 00 : 11 30	17 00 : 19 30

HEAD OF SESSION: Vasyl Puzanov

AUTHORS	AFFILIATION	TOPIC TITLE
Marcquin Chibuzo Iheagwara	Federal University of Technology, Owerri, Imo State, Nigeria	INFLUENCE OF GINGER EXTRACT ON STABILITY AND SENSORIAL QUALITY OF SMOKED MACKEREL (Scomber scombrus) FISH
S.Noshin H.Kanwal	Department of Civil Engineering Technology, The University of Lahore, Pakistan	INFLUENCE OF RICE HUSK ASH ON COMPRESSIVE STRENGTH OF CONCRETE BY THE REPLACEMENT OF FINE AGGREGATES WITH QUARRY DUST
Aleksandra Stanojković-Sebić Zoran Dinić Jelena Maksimović Radmila Pivić	Institute of Soil Science, Teodora Drajzera 7, 11000 Belgrade, Serbia	INORGANIC, ORGANIC AND BACTERIAL FERTILIZATION EFFECT ON MAIN CHEMICAL COMPOSITION AND YIELD OF PARSLEY
Alaa Saad Obaid Abdalsattar Kareem Hashim Ali Abid Abojassim	Department of Physics, College of Science, Kerbala University, Kerbala, Iraq	238U, 232Th, 40K IN SPICES SAMPLES OF IRAQ
Vasyl Puzanov	La Universidad Nacional de Zaporizhzhia, Ucrania	PECULIARITIES OF SPICES RETAIL PACKAGING IN POST-SOVIET STATES
Cornelia Nichita	University of Bucharest, Romania.	STUDY ON PHENOLIC COMPOUNDS AND ANTIOXIDATIVE PROPERTIES OF SOME ORIGANUM VULGARE L. EXTRACTS
Cornelia Nichita	University of Bucharest, Romania.	ANTIOXIDANT ACTIVITY OF CAPSICUM ANNUUM L. EXTRACTS OBTAINED BY SUPERCRITICAL FLUID EXTRACTION
Cristina DAMIAN Nicolae CARPIUC	Stefan cel Mare University of Suceava, ROMANIA. Colegiul Alexandru cel Bun Gura Humorului, Suceava, ROMANIA.	EFFECT OF HEAT TREATMENT OF SOME SPICES FROM THE ROMANIAN MARKET ON TOTAL PHENOLIC AND ANTIOXIDANT ACTIVITY OF THEIR EXTRACTS

CONTENT

April 26, 2022/Tobasco, Mexico

SPICE CONSUMPTION IN THE 15TH CENTURY OTTOMAN ELITE CUISINE

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ABSTRACT

Spices represent a lot more than merely delicious nutrients that satisfy our human needs. With intricate tastes and scents, spices coming in rich varieties and countless combinations, act as one of the most significant players in penetrating cultural subtleties. On the other hand, while spices maintain their significance as condiments, their therapeutic effects are also re-emphasized with the increasing popularity of healthy and natural nutrition trends. I say "re-emphasized", because the use of spices within the foods due to medical concerns is not something new. The physiological benefits of food had been emphasized by Ancient Greek-Roman medicine and its pursuer, Islamic medicine, and spices in particular had been long valued due to their much more powerful therapeutic effects according to these medical understandings. In addition, spices, which were really expensive due to the fact that they were supplied from the Far East to Europe and Middle East, had been considered as luxury products and obtained many symbolic roles throughout history. Based on all of these, I am aiming to give insight into the spice consumption in Ottoman elite cuisine in the 15th century by analyzing *Kitâbü't-Tabîh* which is one of the most influential sources that shed light on Ottoman elite cuisine of the period.

Kitâbü't-Tabîh is an Arabic cookery book translated to Turkish by Muhammed bin Mahmûd-ı Şirvânî who was an Ottoman physician of the period. During the translation, Şirvânî also added the common Turkish names of Arabic recipes and 80-odd recipes to the book himself. As the last pages of the book are missing, it would not be wrong to assume that the number of recipes added by Şirvânî could be much higher. On balance, one must not consider Kitâbü't-Tabîh as a just translation. Its content gives important information about the Ottoman elite cuisine of the period.

Some of the recipes in the book were found to be actually cooked in the palace by the researchers. The recipes will be examined one by one and the spices used in the recipes will be determined. The data obtained from this review will be categorized according to the food categories. In order to support the data obtained from this analysis, any sources available such as medical manuscripts, travelogs (seyahatnâmeler), Matbah-ı Amire records, narh registers of Ottoman Istanbul in which the prices of demanded foods in bazaars and markets that were fixed by the state recorded, surnames (records of banquet) will be used. To determine the flavor profile created by the use of spices together is the main purpose of this study.

Keywords: Ottoman Elite Cuisine, spices, *Kitâbü't-Tabîh*, Muhammed bin Mahmûd-ı Şirvânî

April 26, 2022/Tobasco, Mexico

THE EFFECTS OF HOT PEPPER CONSUMED IN THE SOUTHEASTERN ANATOLIA REGION OF TURKEY ON HUMAN HEALTH

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ABSTRACT

Some spices that we use to enhance taste of food in daily life are very effective on human health. Recently, many beneficial effects of spices have been detected in users. *Capsicum annuum*, called pepper, is a plant from the Solanaceae family used as a vegetable and spice. Although the pepper originated in South America, it has spread almost all over the world.

In Turkey, especially in the Southeastern Anatolia Region, pepper consumption is too much. Besides being consumed fresh, it is used in many ways as roasted, pickled, dried or concentrated as paste. The active ingredient called capsaicin gives the pepper its bitter taste and enables it to show its effect. The nutritional value and health effects of different pepper species and various usage patterns are variable. Capsaicin (8-methyl-N-vanilyl-6-nonenamide) is a homovalinic acid derivative and a fat-soluble phenol. Capsaicin-like compounds have been shown to be present in significant amounts in sweet peppers as well as in hot peppers. Both have a branched fatty acid attached to a vanilyl core in their molecular structure. The most distinct difference between these plants is due to the way the acyl and vanilyl groups are attached to the basic structure. There is an amide bond (capsaicin) in hot pepper and an ester bond (capsinoid) in sweet pepper. Carotenoids such as capsanthine, carotene, capsorubin, cryptoxanthin, capsaicinoid, zeaxanthin, lutein gives its color to red pepper. Bitter-tasting capsaicinoid compounds are capsaicin (46-77%), dihydrocapsaicin (21-40%), nardihydrocapsaicin (2-12%) and others (less than 5% homohydrocapsaicin, homocapsaicin, nanilic acid vanililamide and decylic acid vanililamide). There are 318 kcal energy, 8.1 g water, 12.0 g protein, 71.3 fat, 56.6 g carbohydrates, 24.9 g fiber, 6.0 g ash, 148.0 mg Ca, 8.0 mg Fe, 293.0 mg P, 2014.0 mg K, 152.0 mg Mg, 30.0 mg Na, 2.0 mg Zn, 76.0 mg vitamin C and 41610 IU vitamin A in 100 grams of hot red pepper.

Due to the increasing tendency of scientists to natural products that create medicinal effects, studies on the effects of hot pepper on human health have increased recently. Hot pepper contains high levels of bioactive compounds such as vitamin C, carotenoids, flavonoids and phenolic acids with proven antioxidant and anti-inflammatory activities. When we look at the previous studies, they determined the cough suppressant, immune system protective, anti-obesity, diuretic, pain reliever, antioxidant, antitumoral, anti-inflammatory, antilipidemic, cardioprotective effects of hot pepper. It also stimulates digestive secretions and facilitates digestion. Fresh pepper contains plenty of provitamin A, vitamins C, B1, B2 and E.

Pepper growing and its use by processing in various ways in the Southeastern Anatolia Region of our country date back to ancient times. However, its use as a medicinal plant is not yet widespread enough. Although many scientific studies have been conducted on the medicinal use of pepper and its effects on human health, the issues related to pharmacological safety, effectiveness, risks that may occur during processing such as aflatoxin contamination and threats to health should be investigated in detail. Despite the fact that pepper consumption is so much in our country, the number of studies on this subject is inadequate. Therefore, more studies are needed on the effects of pepper consumption on healthy nutrition and diseases.

Keywords: Pepper, Capsaicin, Carotenoids, Spice

ÖZET

Günlük hayatta ana yemeklerimizi tatlandırmak amacıyla kullandığımız bazı baharatlar insan sağlığı üzerinde oldukça etkilidir son zamanlarda birçok baharatın kullanıcılarda birçok yararlı etkisi tespit edilmiştir. Biber olarak adlandırılan *Capsicum annuum*, Solanaceae familyasından sebze ve baharat olarak kullanılan bir bitkidir. Biber Güney Amerika kökenli olup; hemen hemen dünyanın her tarafına yayılmıştır.

Türkiye'de özellikle Güneydoğu Anadolu Bölgesi'nde biber tüketimi oldukça fazladır taze olarak tüketilmesi yanında, közlenmiş, turşu haline getirilmiş, kurutulmuş ya da konsantre edilmiş şekilde salça olarak birçok şekilde kullanılmaktadır. Biber etkisini içindeki etken madde olan ve acı tadını veren kapsaisin ile gösterir, farklı biber türlerinin ve çeşitli kullanım şekillerinin besleyici değeri, sağlık üzerine etkileri değişkendir. Kapsaisin (8-metil-N-vanilil-6-nonenamide) bir homovalinik asit derivesi ve yağda eriyen bir fenoldür. Tatlı biberde de acı biberde olduğu gibi kapsaisin benzeri bileşiklerin kayda değer miktarlarda bulunduğu gösterilmiştir. Her ikisinin de molekül yapısında bir vanilil çekirdeğine bağlı dallı bir yağ asiti bulunmaktadır. Bu bitkilerin arasındaki en belirgin fark temel yapıya bağlanan açil ve vanilil gruplarının bağlanma şeklinden kaynaklanmaktadır. Acı biberde amid bağı (kapsaisin), tatlı biberde ester bağı (kapsinoid) bulunmaktadır.

Kırmızıbibere rengini kapsantin, karoten, kapsorubin, kriptoksantin, kapsaisinoid, zeaksantin, lutein gibi karotenoid verir. Acı tadı veren kapsaisinoid bileşiklerinden kapsaisin (%46-77), dihidrokapsaisin (%21-40), nardihidrokapsaisin (%2-12) ve diğerleridir (homohidrokapsaisin, homokapsaisin, vanilik asit vanililamid ve desilik asit vanililamid % 5'den azdır). 100 gram acı kırmızıbiberde 318 kcal enerji, 8.1 g su, 12.0 g protein, 71.3 yağ, 56.6 g karbonhidrat, 24.9 g lif, 6.0 g kül, 148.0 mg Ca, 8.0 mg Fe, 293.0 mg P, 2014.0 mg K, 152.0 mg Mg, 30.0 mg Na, 2.0 mg Zn, 76.0 mg C vitamini, 41610 IU A vitamini bulunmaktadır.

Bilim insanlarının tıbbi etkiler yaratan doğal ürünlere olan eğiliminin artması nedeniyle, son zamanlarda özellikle acı biberin sağlık insan sağlığı üzerinde gösterebileceği etkilerle ilgili çalışmalar artmıştır. Acı biber antioksidan ve antiinflamatuar aktiviteleri kanıtlanmış C vitamini, karotenoidler, flavonoidler ve fenolik asitler gibi biyoaktif bileşikleri yüksek oranda içermektedir. Daha önceki çalışmalara bakıldığında acı biberin, öksürük giderici, bağışıklık sistemini koruyucu, obezite önleyici, diüretik, ağrı kesici, antioksidan, antitümoral, antienflamatuar, antilipidemik, kardiyoprotektif etkilerini belirlemişlerdir. Ayrıca sindirim salgılarını uyarır ve sindirimi kolaylaştırır, tat duyularını uyararak endorfin salınımına yol açarak, iştah artırıcı etki göstermektedir. Taze biber bol miktarda A provitamini, C, B1, B2 ve E vitaminleri içerir.

Ülkemizin Güneydoğu Anadolu Bölgesi'nde biber üretimi ve çeşitli yollarla işlenerek kullanımı oldukça eskiye dayanmaktadır. Bununla birlikte, tıbbi bitki olarak kullanımı henüz yeterli şekilde yaygın değildir. Biberin tıbbi kullanımı ve insan sağlığı üzerine etkileri konusunda çok sayıda bilimsel çalışma yapılmış olmasına rağmen, farmakolojik olarak güvenilirliği, etkinliği, işlenmesi sırasında aflatoksin kontaminasyonu gibi oluşabilecek ve sağlığı tehdit edebilecek riskler ile ilgili konular ayrıntılı olarak araştırılmalıdır. Ülkemizde biber tüketiminin bu kadar çok olmasına rağmen bu konuda yapılmış araştırma sayısı oldukça azdır. Bu nedenle biber tüketiminin sağlıklı beslenme ve hastalıklar üzerindeki etkileri konusunda daha fazla çalışmaya ihtiyaç vardır.

Anahtar Kelimeler: Biber, Kapsaisin, Karotenoidler, Baharat

GİRİŞ

Bir baharat olarak biber, medeniyetin başlangıcından beri bilinmektedir ve tarihsel olarak Yeni Dünya'nın keşfi ile ilişkilendirilmiştir (1). Meksika, Afrika, Hint ve Güneydoğu Asya mutfaklarında renk, aroma ve keskinlik veren sebze ve baharat olarak kullanılmaktadır (2).

Biber yaygın olarak "kırmızı şili", "acı biber", "acı kırmızıbiber", "tabasco", "paprika", "cayenne" vb. adlarıyla bilinen Capsicum cinsi, Solanaceae familyasına aittir (3). Genel olarak, dünya çapında yaklaşık 20 Capsicum türünün olduğu düşünülmektedir. Esas olarak C. annuum ve daha az ölçüde C. frutescens L. cinsinin ekili türlerinin meyvesi olduğu bilinse de (4). yetiştirilen beş ana Capsicum türü vardır: Capsicum annuum, Capsicum frutescens, Capsicum chinense, Capsicum pendulum ve Capsicum pubescens (3). Capsicum (Fam.

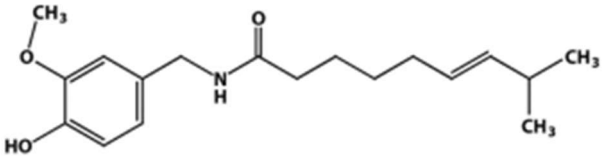
Solanaceae) acı biberden renkli kırmızıbibere ve olağanüstü aromasıyla dolmalık bibere kadar bu cins, kimyası, duyusal özellikleri ve fizyolojik etkisi nedeniyle büyük ilgi görmektedir. kırmızıbiber, baharatlar arasında hem hacim hem de değer olarak ticarette sadece karabiberden sonra ikinci sıradadır (5).

Ülkemizde ise özellikle Doğu ve Güneydoğu Anadolu'da başlıca gıda ürünlerinden biri olan biber ihracat potansiyeli açısından oldukça güçlü bir besindir (6). Biber taze olarak, kurutularak, kahvaltılık olarak, salça ve toz biber şeklinde tüketilmektedir (7).

KAPSAİSİN

P.A Bucholtz ilk olarak 1816'da kapsaisin molekülünün izolasyonunu ve saflaştırılmasını bildirmiştir. Bu raporda, organik çözücüler ile yumuşatılmış kapsüllerden biberlerin keskin içeriğinin çıkarılabileceğini belirtmiştir. L. T. Thresh, 1846'da kapsaisin adını verdiği bu maddenin kristal halde uzaklaştırılabileceğini bildirdi. 1878'de Endre Hogyes, kapsaisinin mukoza zarlarına dokunduğunda yanma hissi ve yutulduğunda mide salgılarında artış da dahil olmak üzere çeşitli biyolojik özelliklerini bildirdi. 1930 yılında E. Spath ve F.S. Darling, kapsaisin molekülünü sentezleyen ilk bilim adamları oldu (8).

Kapsaisinin yapısı, kimyasal özelliklerinde önemli bir faktördür. Molekül, uzun bir hidrokarbon kısmı içeren bir kuyruğa sahip, bağlı karbon atomlarının altıgen bir halkasından oluşur. Bu altıgen halka ve eşlik eden fonksiyonel grubu, bir bazik vanilil grubu oluşturur (8).



Şekil 1. Kapsaisin kimyasal yapısı (8)

Bilinen en acı maddelerden olan kapsaisin (trans -8-metil- N -vanilil-6-nonenamid) biberin ana bileşenidir. Biberin acılığı genetik yapısından kaynaklanır, ancak, yan ürünleri meydana getirmek için yapılan işlemlerden de etkilenir. Baharat ve lezzet verici amaçla kullanılmasının yanı sıra fizyolojik ve farmakolojik ve özelliklerinden dolayı tıbbi uygulamalarda ve bununla birlikte bilhassa organik tarımda bazı zararlıları uzaklaştırmak amacı ile ya da bunlarda hastalığa neden olan mantar ve bakterileri ortadan kaldırmak için kullanılmaktadır (9, 10). Kırmızıbiberin tipik aroması özellikle çok sayıdaki özgün ester ile pirazin, tiazol ve alkol bileşiklerinden kaynaklanır (11). Kırmızıbiberlerde kapsaisinoid miktarı, önemli bir kalite kriteridir. Kapsaisin tüm kapsaisinoidler arasında en acı olanıdır, kapsaisinden sonra sırasıyla dihidrokapsaisin, nordihidrokapsaisin, homokapsaisin ve homodihidrokapsaisin acılık özelliği taşımaktadır. Kırmızıbibere kendine özgü rengi karotenoidlerin taşıdığı pigmentler vermektedir, bazı karotenoidlerin ise A vitamini etkisi vardır. Kırmızıbibere bu rengi veren başlıca karotenoidler, kapsantin, karoten, kapsorubin, kriptoksantin, kapsaisinoid, zeaksantin ve luteindir. Acı tadın kaynağı olan kapsaisinoidlerden en fazla kapsaisin (%46-77), daha az miktarlarda dihidrokapsaisin (%21-40), nardihidrokapsaisin (%2-12) ve homohidrokapsaisin, homokapsaisin, vanilik asit vanililamid ve desilik asit vanililamid (% 5'den azdır) bulunur (12, 13). Kapsaisin kimyasal olarak alkaloid yapıdadır, soğuk ve sıcaktan etkilenmez; sebze pişirildiğinde ya da dondurulduğunda aktivitesini korur (9). Tablo 1'de100 gram acı kırmızıbiberin besin değerleri verilmiştir (11).

Tablo 1: 100 gram acı biberin besin içeriği

Besin Değeri	Miktarı	Besin Değeri	Miktarı
Enerji	318kcal	Fosfor	293 mg
Su	8.1 gr	Potasyum	2014 mg
Kül	6 gr	Sodyum	30 mg
Protein	12 gr	Magnezyum	152 mg
Yağ	17.3 gr	Çinko	2 mg
Karbonhidrat	56.6 gr	C vitamini	76 mg
Lif	24.9 gr	Riboflavin	1 mg
Kalsiyum	148 mg	Niasin	9 mg
Demir	8 mg	A vitamini	41610 IU

Kapsaisinin Kullanımı

Günlük diyette sebzeler, gastrointestinal sağlığın iyileştirilmesi, iyi görme ve kalp hastalığı, felç, diyabet gibi kronik hastalıklar ve bazı kanser türlerinin riskinin azalmasıyla güçlü bir şekilde ilişkilendirilmiştir. Sebzelerin bazı fitokimyasalları güçlü antioksidanlardır ve serbest radikal hasarına karşı koruyarak, metabolik aktivasyonu ve kanserojenlerin detoksifikasyonunu değiştirerek ve hatta tümör hücrelerinin seyrini değiştiren süreçleri etkileyerek kronik hastalık riskini azalttığı düşünülmektedir (14).

Kapsaisin metabolizmayı hızlandırarak yağ katabolizmasını artırır, doğal bir ağrı kesici ve mutluluk verici bir hormon olan endorfinin salgılanmasını sağlar (10).

İlaç endüstrisinde, gıda ve pestisit olarak da kullanılmaktadır (15). Keskin aroması ve tadı nedeniyle kapsaisin, gıda katkı maddesi olarak yaygın olarak tercih edilmektedir.

Kullanım sonrası hapşırma, öksürme, ağrı, ağız ve boğazda yanma hissi, yüz ve boyunda kızarma ve ayrıca alında terleme ile karakterize bir tabloya yol açabilir. Bütün bunlardan dolayı, acı biberle ilk karşılaşma genellikle tatsız olur, ancak sık kullanımla birlikte vücudun bu tepkilerine tolerans gelişir (16).

Kapsaisin, gastrointestinal sistemde görülebilen bağırsak gazı, diyare, mide ağrısı ve bağırsak krampları gibi çeşitli sorunların çözümünde kullanılmaktadır. Ayrıca kan dolaşımını artırıcı, koagülasyonu engelleyici, kolesterol düşürücü, anti-diyabetik, vücudun çeşitli bölgelerindeki ağrıları giderilmesi, deniz tutmasını engelleyici etkilerinden dolayı tercih edilebilir, alkolizm ve sıtma içinde kullanıldığı bildirilmektedir. Bazı toplumlar osteoatrit, romatoid artrit ve fibromiyalji sonucu oluşan ağrıyı gidermek amacıyla hastanın cildine kırmızıbiber uygulamaktadır. (17).

TIPTA KAPSAİSİN

Kapsaisin'in vücutla etkileşimi, çeşitli tıbbi uygulamalara yol açmıştır:

Ağrı Yönetimi

Kapsaisin şu anda topikal merhemlerde, herpes simplex veya zoster'ın yeniden aktivasyonunu takiben oluşan ağrıyı hafifletmek için kullanılmaktadır. Aynı zamanda, kas ve eklemlerdeki hafif ağrıların ve ağrıların geçici olarak giderilmesi için bir kremin içine dahil edilmiştir. Kapsaisin ayrıca ameliyatla ilişkili postoperatif ağrının kontrolü için test edilmiştir. Kapsaisin, ameliyat sırasında bir enjeksiyondan sonra uzun süreli ağrı kaybına neden olur (8).

Diyabet Kontrolü

Kapsaisin diyabet için topikal olarak kullanılır.

Topikal olarak uygulanan kapsaisin, diyabetik nöropati ağrılarının tedavisinde orta ila zayıf etkinliğe sahiptir (18). Taylandlı kadınlara verilen 5 gram taze acı biberin glikoz içeceği sonrası glikoz tepkisi ve metabolizma hızını değerlendirmek amacıyla yapılan bir çalışmada, 5 g capsicum frutescens tüketiminin Taylandlı

kadınlarda emilim döneminde plazma glokoz seviyesini önemli ölçüde azalttığını göstermiştir. Ayrıca, alımdan hemen sonra metabolizma hızını arttırdı ve 30 dakikaya kadar sürdürdüğü görülmüştür (19).

Kanser tedavisi

Capsicum cinsinin çeşitli kırmızıbiberlerinde önemli bir arındırıcı bir bileşen olan kapsaisin, bir vanilloid türüdür. Birçok kanser hücre hattında kanser ve mutasyon önleyici ve ayrıca kimyasallara karşı koruyucu biyolojik aktiviteler gösterdiği belirlenmiştir. Kapsaisinin, MCF-7 hücrelerinde kaspazdan bağımsız bir yolla hücresel apoptozu indüklediği ve reaktif oksijen türlerinin ve hücre içi kalsiyum iyonlarındaki dalgalanmanın bu süreçte minimal bir rolünün olduğu gösterilmiştir (20).

Biber tüketimi ile kanserden korunma arasında epidemiyolojik bir ilişki olduğuna dair raporlar bulunmaktadır. Taylandlılar, oldukça baharatlı yiyecekleri tercih etmeleriyle tanınırlar ve Tayland'ın Asya'nın geri kalanına kıyasla daha düşük bir mide-bağırsak kanseri insidansına sahip olduğu uzun zamandır bilinmektedir. Bağırsak, mide ve kolon kanseri oranları da Amerika Birleşik Devletleri ile karşılaştırıldığında Meksika ve Güney Amerika'nın çoğunda çok düşüktür. Birkaç Japon ve Çin araştırması, doğal kapsaisinin lösemi hücrelerinin büyümesini doğrudan engellediğini göstermiştir. Bu çalışmalarda laboratuvar ortamında izole edilmiş hastalıklı hücrelere doğrudan enjekte edilen saf kapsaisin kullanılmasına rağmen, yazarlar günlük acı biber tüketiminin belirli kanser türlerini önleyebileceği sonucuna varmışlardır (8).

Yapılan bir çalışmada, yeşil ve kırmızıbiberin bir bileşeni olan kapsaisin, iyi anlaşılmayan bir mekanizma yoluyla tümör oluşumunun baskılanmasıyla ilişkilendirilmiştir. Transkripsiyon faktörü sinyal dönüştürücüsü ve transkripsiyon 3'ün (STAT3) aktivatörü, tümör oluşumu ile yakından bağlantılı olduğundan, bu vanilloidin insan multipl miyelom hücrelerinde STAT3 yolu üzerindeki etkisi araştırılmıştır. Araştırmanın sonuçları kapsaisinin, multipl miyelom ve diğer kanserlerin önlenmesi ve tedavisinde potansiyel bir rolü olan, STAT3 aktivasyon yolunun yeni bir engelleyicisi olduğunu göstermektedir (21).

Diğer bir çalışmada ise hem mide kanseri hem de normal epitel hücreleri kapsaisin ile muamele edilmiştir. Kanser hücrelerinin daha duyarlı olmasına rağmen, kapsaisinin her iki hücrede de apoptozu indüklediği gösterilmiştir. Bu duyarlılık, kalsiyum seçici bir kanal proteini olan TRPV6'nın mevcudiyetine bağlıdır, çünkü normal hücrelerde TRPV6'nın aşırı ekspresyonunun, kapsaisin kaynaklı apoptozu artırdığı ve kanser hücrelerinde TRPV6'nın yıkılmasının bu eylemi bastırdığı gözlemlenmektedir (22).

Kemik Metabolizması

Kapsaisinin kemik metabolizmasına etkisini ortaya koymak için yapılan bir çalışmada yüksek doz kapsaisin en yüksek kemik kitlesine ulaşmayı engellediğini ve fazla miktarda kapsaisin kullanımı osteoporoz açısından riskli olduğunun göstermektedir (23).

Obezite Kontrolü

Kapsaisin, enerji harcamasını artırarak kilo kaybına karşı vücudun geliştirdiği metabolik hız azalmasına negatif yönde etki ederek zayıflamaya yardımcı olmaktadır (24). Epidemiyolojik veriler, kapsaisin içeren gıdaların tüketiminin daha düşük obezite prevalansı ile ilişkili olduğunu ortaya koymuştur (25) .

Biber, tat ve beslenmeyi arttırmak için kullanılan yaygın ve önemli bir baharattır. Yıllar boyunca, raporlar obezite önleyici bir ajan olarak potansiyelini göstermiştir (26). Ancak kapsaisin, çeşitli reçetesiz kilo kaybı takviyelerinde aktif bir bileşen olmasına rağmen, bu, kilo kontrolünde veya kilo vermede gerçek bir rolü olduğu anlamına gelmez. Daha önce de belirtildiği gibi, kapsaisin tüketimi metabolizmayı düzenler. Ayrıca kapsaisin, lipid oksidasyonunu arttırır ve onları tüketen deneklerin iştahını azaltır (8). Yapılan bir çalışmada, obez bireylerden alınan yağ dokusunda TRVP1 (geçici reseptör potansiyeli vanilloid tip-1) ekspresyonunun azaldığı gözlemlenmiştir. Azalmış TRVP1 ekspresyonuna kapsaisin kaynaklı kalsiyum akışının azalması eşlik etmiştir. Bunun üstüne oral kapsaisin uygulaması, obeziteyi önlemiştir. TRVP1 kanallarının kapsaisin tarafından aktivasyonunun adipogenezi ve obeziteyi önlediği sonucuna varılmıştır (27).

Anti-inflamatuar Ajan ve Analjezik Etki

Araştırmacılar, kapsaisinin güçlü bir anti-inflamatuar ajan olduğunu bildirdi. Laboratuarda ve sıçan sepsis modelinde deneyler kullanan araştırmacılar, kapsaisinin enflamatuar bileşiklerin üretimini inhibe edebileceğini veya sınırlayabileceğini veya tümör nekroz faktörü, interlökin 6 ve 10 gibi enflamatuar yanıtı kontrol eden hücresel bileşiklerle ilgili olabileceğini gösterdi. Kapsaisin ayrıca serbest oksijen radikallerinin temizlenmesinde veya etkisizleştirilmesinde rol oynayabilir (8).

Kapsaisin, çeşitli ağrı durumlarını tedavi etmek için topikal bir analjezik olarak kullanılmıştır (28). *Kapsaisin* nöropatik ağrı tedavisinde 2. basamak ilacıdır. Akupunktur noktasına kırmızıbiber alçısının (PAS) postoperatif opioid analjezik gereksinimi, yan etkileri ve iyileşme profili üzerindeki etkinliğini değerlendirmek için yapılan bir çalışmada, akupunktur noktalarındaki PAS, abdominal histerektomi geçiren hastaların postoperatif opioid gereksinimini ve opioidle ilişkili yan etkileri azalttığı görülmüştür (29).

Antioksidan Etki

Acı biber, flavonoidler, karotenoidler, fenolik asitler, A vitamini, C vitamini ve tokoferoller gibi yaygın bileşiklerin yanı sıra keskin kapsaisinoidler (kapsaisin, dihidrokapsaisin ve ilgili analoglar) gibi spesifik bileşenleri de kapsayan iyi bir diyet antioksidan kaynağıdır. Kapsaisinin bu iyi huylu analogları, basit in vitro sistemlerde linoleik asidi serbest radikal saldırısına karşı koruyabilir, hem otooksidasyonunu hem de demir veya EDTA aracılı oksidasyonunu inhibe edebilir (30). Kapsaisinin in vivo olarak kan akışı ve oksidatif stresi üzerindeki etkisiyle ilgili yapılan çalışmada, kapsaisinin güçlü bir antioksidan olabileceği ve kısa bir süre için tüketildiğinde bile LDL'yi düşürmeye yardımcı olabileceği varsayılmıştır. Kırmızıbiberde bulunan keskin bir bileşen olan kapsaisin (8-metil-n-vanilil-6-nonenamid), muhtemelen kan akışını artırabilir ve oksidatif stresi önleyebilir (31). Kapsaisin, iyi bilinen antioksidan α-tokoferolden daha etkili olarak lipid peroksidasyonunu önemli ölçüde inhibe ettiği ayrıca hem solüsyonda hem de membranlarda, özellikle ikincisinde 1,1'-difenil-2-pikrilhidrazil (DPPH) radikallerini temizlediği bulunmuştur (32).

Savunma amaçlı kullanımı

Kapsaisin ayrıca güvenlik tedbirleri sırasında, bireysel savunmada, zarar verebilecek hayvanlara karşı korunmada kullanılan biber gazının (Oleoresin Capsicum) aktif maddesidir. Bu sprey, gözlere veya mukoza zarlarına temas ettiğinde çok acı vericidir (8).

SONUÇ

Sonuç olarak derlemede ele aldığımız kapsaisin ve biberin içeriğinde bulunan diğer maddelerin mucizevi gücünün en önemli değerleri arasında moleküler yapıları ve bunların birlikte bulunarak sinerji yarattıkları kimyasal özellikleri yer almaktadır. Biber günümüzde insanlar tarafından sadece bir baharat olarak bilinse de insan sağlığı ve tıbbi alanda kullanımıyla ilgili bilimsel çalışmalar sunulmuştur. Ancak gözden geçirilen çalışmaların çoğu hücre kültürü ve hayvanlar üzerinde yapılmıştır ve bu mekanizmaların çoğunun yeterince açıklanamamış olmasından dolayı, daha fazla insan araştırmalarına ihtiyaç vardır.

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THERMAL ANALYSES OF SOME PEPPERS AND SPICES WITH DIFFERENTIAL SCANNING CALORIMETRY

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ABSTRACT

Herbal products obtained by grinding the roots, leaves, fruits, seeds, buds, flowers, and bark of plants that give smell and taste and have an appetizing feature are called spices. The use and trade of spices date to the first centuries. Even in the oldest known civilizations, it is included in historical tablets where spices are used in food, to prevent the deterioration of some foods, and to make medicines and ointments. Spices have many beneficial effects on health such as positive effects on lipid metabolism, anti-diabetic, antioxidant, anti-inflammatory, and digestive properties. However, it has gained a great place in our kitchens to give a good appearance, taste, flavor, and aroma to the food. Today, many kinds of spices are easily accessible, and their mixtures are prepared and used. An increase in the number of microorganisms and the formation of pathogens occur in spice products that are grown, harvested, and stored under inappropriate conditions. These conditions and some characteristics of spices can be investigated by using Differential Scanning Calorimetry (DSC). Glassy transition temperature (T_g) is one of these characteristics and it houses much information about the thermodynamical, physical, mechanical, and electrical properties of a matter [1]. Additionally, it gives us information regarding the sample's storage temperatures [2]. In this research, T_g values of 27 different spices which is collected from Spice Bazaar-Istanbul were determined by DSC (The data of only 5 of them has been added to the summary here). To perform analyses, 10 mg of each species are weighted and measured with 10 ºC/min heating rate under a nitrogen atmosphere with a flow rate of 30 ml/min (Shimadzu, DSC 60Plus). All the spices were stored at room temperature during the research. According to DSC thermograms (Figure 1), black pepper in powder form has the lowest T_g value which is 47.20 ºC among other spices. It is followed by cinnamon with T_g value of 49.36 ºC, Curry with T_g value of 49.64 ºC, and Thyme with T_g value of 65.67 ºC. Chili pepper has the highest T_g value which is 66.51 ºC. Storage temperatures must be lower than T_g values of the sample to preserve the chemical bonds between the molecules. Additionally, T_g values have the information about composition density of the samples [3]. After all the conditions considered, it can be concluded that Chili pepper has denser and more stable composition than black pepper, thyme, cinnamon, and curry.

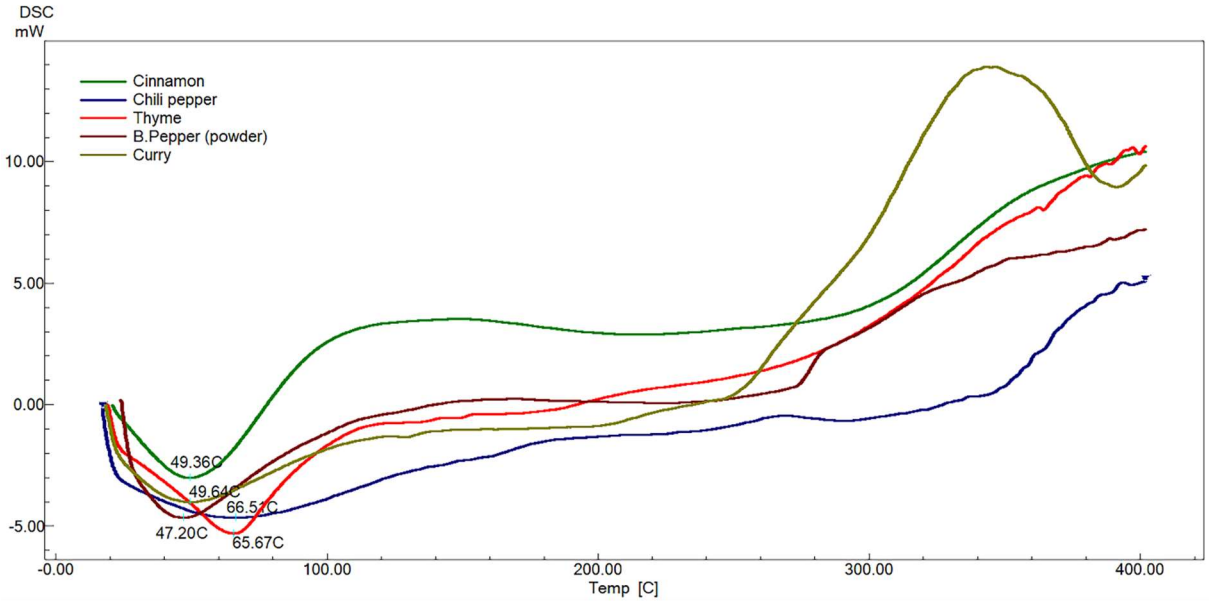

Figure 1: DSC thermograms of Cinnamon, Chili pepper, Thyme, Black pepper, and Curry.

Keywords: Pepper, Thyme, Cinnamon, Curry, DSC, Glassy Transition Temparature

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KAHRAMANMARAŞ VE ŞANLIURFA İLLERİNDE YETİŞTİRİLEN ACI KIRMIZI BİBER TÜRLERİNDE ANTİOKSİDAN AKTİVİTENİN ARAŞTIRILMASI

INVESTIGATION OF ANTIOXIDANT ACTIVITY IN HOT RED PEPPER SPECIES GROWED IN KAHRAMANMARAS AND SANLIURFA PROVINCES

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ABSTRACT

Hot red pepper originated in South America and widely produced in our Southeastern and Eastern Anatolia regions today and served as a spice consumed by local people. In this study, antioxidant activities of different extracts of red hot peppers grown in Sanlıurfa and Kahramanmaras provinces were measured and compared. Both plant samples brought to the laboratory were extracted with ethanol solution. In the solutions obtained from each extraction, ethanol was removed with the help of an evaporator at 42-47ºC under reduced pressure. The remaining water in the extracts was freeze-dried in a lyophilizer. Antioxidant capacity was defined using DPPH and ABTS methods. It was observed that both spice groups had high antioxidant activity. Sanlıurfa red pepper was found to have a higher antioxidant level than Kahramanmaraş pepper. The results obtained; suggests that consuming red pepper spice in terms of its high antioxidant content will be beneficial for human health.

Keywords: Antioxidant, Spice, Oxidative stres

ÖZET

Acı kırmızı biber Güney Amerika kökenli olup günümüzde Güneydoğu ve Doğu Anadolu bölgelerimizde yaygın olarak üretilmekte ve yerel halk tarafından sevilerek tüketilen bir baharat olarak sunulmaktadır. Bu araştırma ile Şanlıurfa ve Kahramanmaraş illerinde yetiştirilen kırmızı acı biberlere ait farklı ekstrelerinin antioksidan aktiviteleri ölçülerek karşılaştırma yapılmıştır. Laboratuvara getirilen her iki bitki örneği etanol solüsyonu ile ekstrakte edildi. Her bir ekstraksiyondan elde edilen çözeltilerde düşük basınç altında 42-47ºC'de evaporatör yardımıyla etanol uzaklaştırıldı. Ekstraktların yapısında kalan su, liyofilizatörde dondurularak kurutulmuştur.

Antioksidan kapasite DPPH ve ABTS yöntemleri kullanılarak tanımlanmıştır. Her iki baharat grubunun yüksek antioksidan aktiviteye sahip olduğu görüldü. Şanlıurfa kırmızı biberinin Kahramanmaraş biberine göre daha yüksek düzeyde antioksidan olduğu görüldü.

Elde edilen sonuçlar; kırmızı biber baharatının yüksek antioksidan içeriği bakımından tüketilmesinin insan sağlığı açısından yararlı olacağını düşündürmektedir.

Anahtar kelimeler: Antioksidan, baharat, Oksidatif stres

GİRİŞ

Serbest radikaller insan vücudunda zararlı etkilere sahip reaktif moleküllerdir. Miktarları belirli seviyelerde korunduğunda konak hücre savunması, hücresel sinyalizasyon ve kan basıncının korunması gibi önemli

işlevlere sahiptir. Ancak vücutta aşırı miktarda serbest radikal birikimi, protein, lipid, karbonhidrat, nükleik asit gibi temel makromoleküllerin zarar görmesine ve hücre ölümüyle sonuçlanan oksidatif strese neden olur (Baysal ve ark, 1999). Oksidatif stres yaşlanma sürecini teşvik eder, kolajen üretimini yavaşlatır, hücresel onarım ve hücresel savunmayı azaltır. Oksidatif stres fenomeninin insanda çok çeşitli inflamatuar hastalıklarla ilişkili olduğu günümüzde bilinmektedir. Günümüzde kanser, diyabet, ateroskleroz, nöro-dejenerasyon ve kalp hastalıkları miktarındaki artış oksidatif strese bağlı gerçekleşmektedir (Baysal ve ark, 1999).

Süpürücü özellikleri sayesinde serbest radikalleri etkili bir şekilde mötralize edebilen ve insan vücudunda yıkıcı etkisini yok eden maddeler antioksidan olarak adlandırılır. Antioksidanlar, hücresel disfonksiyonu önlemek için radikal süpürücü, hidrojen verici, elektron verici, peroksit ayrıştırıcı, singlet oksijen söndürücü, enzim inhibitörü, sinerjist veya metal şelatlayıcı ajanlar olarak işlev görebilir (Demirhan ve ark,2021). Literatür verileri doğal birçok bitkide yer alan mikro besinlerin güçlü antioksidan barındırdığını göstermektedir. Önemli bu eksojen antioksidanların vücutta alım dozu olup yüksek dozda antioksidan takviyesi yarardan çok zarar verebileceği konusunda bilim dünyasında endişelerde bulunmaktadır. Bitkisel özler yapısında çok sayıda farklı bileşikleri barındırır. Bu anlamda oldukça karmaşık oldukları söylenebilir. Doğal ürünlerin kimyası çalışmaları, aktif bileşenleri tanımlamayı yönelik olup antioksidan kapasiteyi ortayı çıkarmayı hedeflemektedir. Bu sayede ilaç geliştirme çalışmalarına kadar ilerleyen bu süreçte bitkisel özlere dair karmaşıklık ta giderilmiş olacaktır.

Günümüzde doğal antioksidanlar birçok bitkide tanımlanmış zengin içerikleri sayesinde yerel halk tarafından hastalıkların tedavisi amacıyla kullanılmaktadır. Antioksidan maddeler arasında A, C ve E vitaminleri, selenyum, glutatyon, bakır, demir, lipoik asit gibi mineral ve peptidler bulunmaktadır. Antioksidan maddelerin bazıları vücutta doğal olarak üretilirken bazılarının dışardan alınması gerekmektedir (Koca ve Karadeniz, 2005). Sağlığın korunması ve devamının sağlanmasında antioksidanların vücuda alınması elzemdir. Aksi durumda ROS'ler ile ilişkilendirilen birçok hastalık (diyabet, eklem hastalıkları, kanser, kalp ve damar hastalıkları vb.) bireyde gelişebilmektedir. Antioksidanlar, belirli oranlarda alınması gerekli maddeler olup azlığı ya da fazlalığında ciddi sağlık sorunları oluşturabilir. Kırmızı biber, beta karoten, kapsantin, kapsorubin gibi çeşitli karotenoid pigmentlerini içermektedir ve sahip olduğu antioksidan özelliği ile serbest radikalleri temizlemede oldukça etkilidir (Cız ve ark, 2010) . Kırmızı biber, C vitamini ve karotenoidlerin yanında kuersetin, luteolin gibi fenolik maddeleri de içermektedir. Fenolik maddeler, serbest radikal temizleme özellikleriyle fitokimyasallar arasında önemli bir yere sahiptir ve bu bileşiklerin miktarı gelişme ve olgunlukla birlikte değişmektedir. (Deepa ve ark., 2006).

Kahramanmaraş ve Şanlıurfa illeri taşıdığı zengin yemek kültürü ve iklimi ile ülkemizin nadide illeri arasında yer almaktadır. Bu iki ilimiz yetiştirdiği kırmızı biber ile ünlenmektedir. Üretilen kırmızı biber ürünleri yurt içi ve yurt dışı pazarda önemli bir paya sahip olup özellikle Covid-19 salgını süresince yerel halk tarafından sağlığın korunması amacıyla yaygın olarak kullanılmıştır. Kırmızı biber baharat olarak yaygın kullanımı yanında geniş bir fizyolojik ve farmakolojik etki yelpazesine sahiptir, safra oluşumunu uyarır ve kolesterolün vücuttan atılımı için önemli olan safra asitlerinin sekresyonunu artırır. Acı kırmızı biber (Capsicum annum) kapsaisin olarak adlandırılan bir fenol içermektedir. Kapsaisin (8-metil-N-vanilil-6-nonenamide) bir homovalinik asit derivesi ve yağda eriyen bir fenoldür (Datta ve ark, 2004).

Bu çalışma ile salgın dönemi ile tüketimi hızla artan kırmızı biber çeşitlerinin antioksidan içeriklerinin araştırılarak karşılaştırma yapılması amaçlanmıştır.

ARAŞTIRMA VE BULGULAR

Ekstrelerin Hazırlanması

Evde hazırlanan bitki örneklerinden 10'ar gr alınarak 100ml etanol ile 24 saat süreyle 55 ºC'de çalkalamalı su banyosunda (Memmert, SV 1422) ekstrakte edilmiştir. Bu süre sonunda Whatman no.1 filtre kağıdı ile koyu renkli cam şişelere süzüldükten sonra kalan bitki parçacıklarının üzerine yine 100 mL etanol eklenerek aynı prosedür bir kez daha tekrarlanmıştır. Her bir ekstraksiyondan elde edilen çözeltiler toplanmış ve düşük basınç altında 42-47ºC'de rotary evaporatör (IKA RV 10D) kullanılarak, etanol uzaklaştırılmıştır. Ekstraktların yapısında kalan su, liyofilizatörde (Labconco FreeZone) dondurularak kurutulmuştur. Elde edilen ekstraktlar deneylerde kullanılmak üzere +4ºC'de muhafaza edilmiştir.

Antioksidan Ölçümler

DPPH Giderme Aktivitesi: DPPH serbest radikal giderme aktivitesi Blois metoduna göre gerçekleştirildi (Blois, 1958). Etanol içerisine 0.1 mM DPPH çözeltisi hazırlandı ve bu çözeltinin 1 mL'si, farklı konsantrasyondaki stok çözeltilerden 10, 20, 40 mL alınarak etanol ile 3 mL olacak şekilde tamamlandı ve örnek çözeltisine ilave edildi. Bu çözeltiler iyice vortekslendi ve karanlıkta 30 dakika inkübe edildi. Absorbans, 517 nm'de spektrofotometrede ölçüldü. DPPH radikalini giderme aktivitesi aşağıdaki denklem kullanılarak hesaplanmıştır.

DPPH Giderme Etkisi (%)= (Kontrolün absorbansı – Numunenin absorbansı) / Kontrolün absorbansı X 100

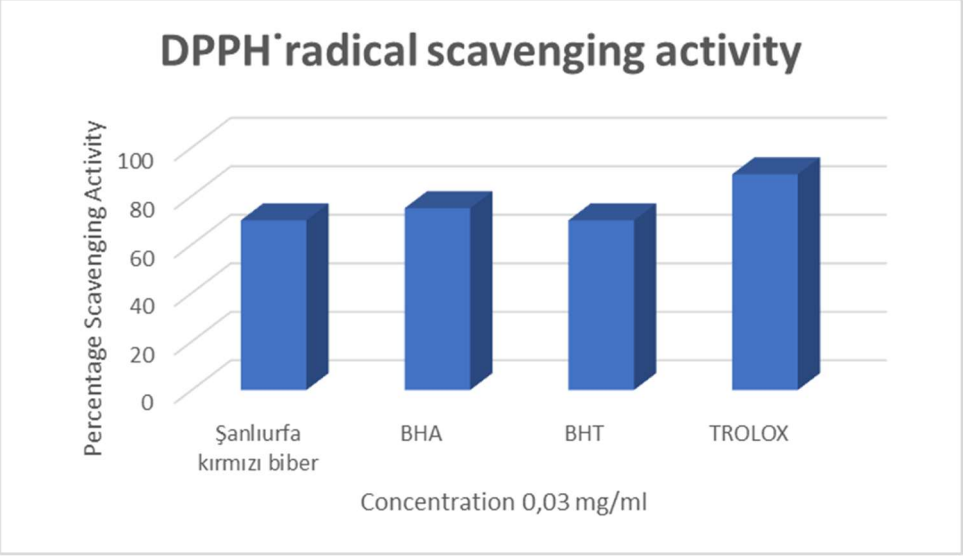
$ABTS^{+}$• Giderme Aktivitesi: Koyu mavi/yeşil renkli $ABTS^{+}$ katyon radikalinin antioksidanlarla muamelenin sonucunda, radikalik özelliğinin kaybettiğinin bir göstergesi olan renk değişimi metodu ile yapıldı (Re et al., 1999). $ABTS^{+}$• katyon radikali, 2 $mmolL^{-1}$ H_2O ile hazırlanmış ABTS çözeltisinin ve 2,45 $mmoL^{-1}$ potasyum persülfat ($K_2S_2O_8$) çözeltisi ile 1:2 oranında karıştırılarak karanlıkta ve oda sıcaklığında 14 saat inkübasyonu ile elde edildi. Bitkiden elde edilen ekstreler üzerine stok çözeltilerden 10, 20, 30 µL alınarak hacmi 3 mL oluncaya kadar fosfat tamponu eklendikten sonra son olarak üzerlerine 1 mL $ABTS^{+}$ çözeltisi eklenerek vorteks yapıldı. İnhibisyon, her konsantrasyon için 734 nm'de hesaplandı. $ABTS^{+}$ katyon radikalini giderme aktivitesi aşağıdaki denklem kullanılarak hesaplanmıştır.

$ABTS^{+}$ Giderme Etkisi (%) = (Kontrolün absorbansı – Numunenin absorbansı) / Kontrolün absorbansı X 100

Antioksidan Aktivite Yöntemlerine Ait Sonuçlar

DPPH radikallerinin indirgeme kapasitesi, antioksidanların indüklenmesi sonucunda 517 nm'deki absorbansındaki azalma ile belirlenmiştir. Stabil bir DPPH radikalinin etanol içinde maksimum absorbans 517 nm olarak kaydedildi. Antioksidan moleküllerin DPPH radikaline hidrojen protonu vererek inaktif radikal olmasını sağlarlar. Bu reaksiyon sonucunda düşük absorbans elde edilir. Bu etkileşim mordan sarıya bir renk değişikliği görsel olarak fark edilir. Bu nedenle, DPPH genellikle antioksidan moleküllerin antioksidan aktivitesini değerlendirmek için bir substrat olarak kullanılır (Duh ve ark,1999). DPPH, kararlı bir serbest radikaldir ve kararlı bir diyamanyetik molekül haline gelmek için bir elektron veya hidrojen radikalini alır (Soare ve ark, 1997).

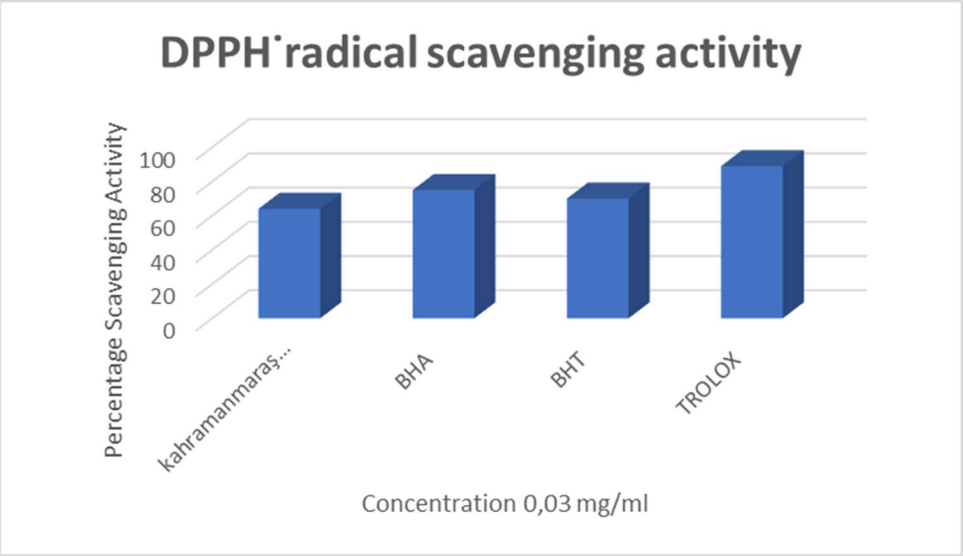
Şekil-1'de Şanlıurfa isot baharatı etanol ekstresine ait DPPH radikal giderme aktivitesi standartların radikal giderme aktivitesi ile karşılaştırmalı olarak verilmiştir.



Şekil 1. Şanlıurfa isot baharatının etanol ektresinin DPPH• radikal giderme aktivitelerinin birer standart antioksidan olan BHA, BHT ve Trolox ile karşılaştırması.

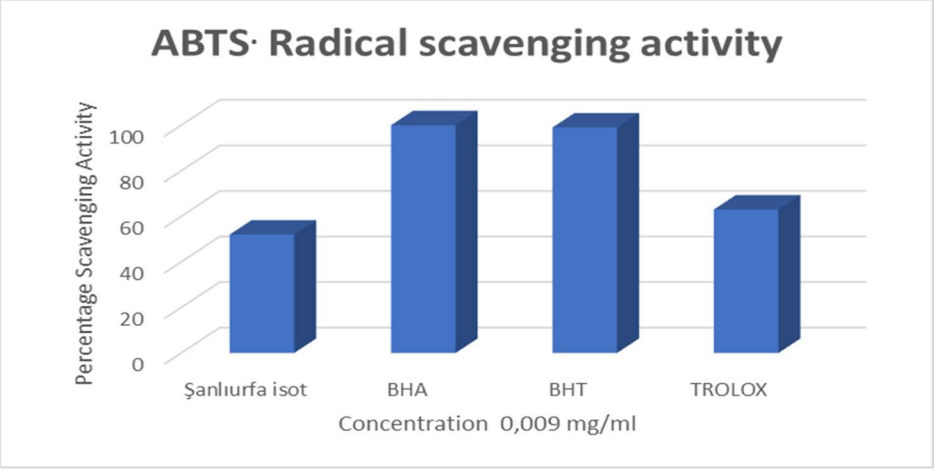
Aynı konsantrasyonda baharat ekstresi ve standartların DPPH radikali üzerindeki giderme etkisi Trolox (%89)> BHA (%75) >BHT (%70) = Şanlıurfa isot (%70) sırasına göre azalmanın olduğu görülmüştür. Bu sonuçlar, Şanlıurfa isot baharatının serbest radikal giderme üzerinde etkiye sahip olduğu sonucunu göstermektedir.

Kahramanmaraş acı kırmızı biber baharatına ait DPPH radikali üzerindeki giderme etkisi Trolox (%89)> BHA (%75) >BHT (%70)> Kahramanmaraş kırmızı biber (%64) sırasına göre olduğu görülmektedir (Şekil 2).

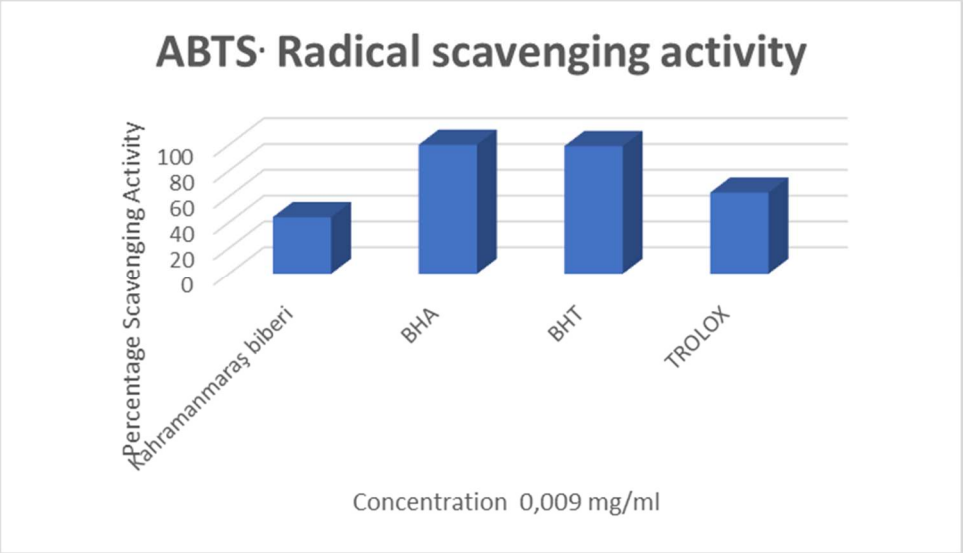


Şekil 1. Kahramanmaraş acı kırmızı biber baharatının etanol ektresinin DPPH• radikal giderme aktivitelerinin birer standart antioksidan olan BHA, BHT ve Trolox ile karşılaştırması.

ABTS radikal katyonunu giderme aktivitesi, koyu renkli katyon radikalini oksitleyerek koyu rengin azalması meydana gelir. Şanlıurfa isot biberi ve Kahramanmaraş acı kırmızı biber baharatlarının etanol ekstreleri mavi-yeşil renkli ABTS radikal katyonunu giderme aktivitesi, satandart antioksidanlar olan BHA, BHT ve Trolox'un radikal giderme aktivitesine göre ölçüldü. $ABTS^{+}$ radikali üzerindeki giderme etkisi BHA (%100) >BHT (%99)> Trolox (%63)> Şanlıurfa isot baharatı (%52) >Kahramanmaraş acı biber baharatı (44) sırasına göre azalmıştır (Şekil.3 ve Şekil.4).



Şekil 3. Şanlıurfa isot biberi baharatının etanol ekstresinin ABTS radikal giderme aktivitelerinin birer standart antioksidan olan BHA, BHT ve Trolox ile karşılaştırması



Şekil 4. Kahramanmaraş acı kırmızı biber baharatına ait etanol ekstresinin ABTS radikal giderme aktivitelerinin birer standart antioksidan olan BHA, BHT ve Trolox ile karşılaştırması

Biber, Dünya'da yaygın olarak yetiştirilen Capsicum cinsinden tek yıllık bir bitkidir. Kırmızıbiber (Capsicum annum L.) sahip olduğu renk ve aroması ile domatesten sonra, yaygın üretilen sebzeler arasında ikinci sırada yer almaktadır (Korkmaz ve ark, 2016). Taze kırmızı biberin 100 gramında 92 g su, 6 g karbonhidrat, 1 g protein, 0,3 g yağ bulunmaktadır ve enerji değeri 31 kaloridir. Kırmızı biberin üretimi en yaygın sırasıyla Çin, Meksika ve Türkiye'de yapılmaktadır (Baysal ve ark, 1986). Türkiye'de üretilen toplam yaş kırmızıbiberin yarısına yakını Şanlıurfa il sınırlarında yetiştirilmektedir (Atasoy ve ark, 2017). Ülkemizdeki en yaygın kullanım biçimi kurutularak elde edilen baharat ve salça olan kırmızıbiber, taze ve sos gibi farklı şekillerde de yaygın olarak tüketilebilen bir sebzedir. Acı biberlerin yapısında antiinflamatuar, antikanserojenik, antilipemik, antioksidan, anti-dispeptik ve antibakteriyel etkisi olan kapsaisinin insan sağlığı üzerine birçok olumlu etkisi yapılan araştırmalarla rapor edilmiştir. Doymuş yağ ve sodyum açısından oldukça düşük değerlere sahip olan kırmızı biberin A vitamini ve C vitamini içeriği ise oldukça zengindir. Ayrıca birçok sebze içerisinde de kırmızı biber C vitamini içeriği bakımından ayrı bir yer tutmaktadır. Yapılan bir çalışmada brokoli, lahana, ıspanak ve domatesin de içinde bulunduğu birçok sebzenin C vitamini değerleri incelenmiş ve kırmızı biberin C vitamini değerinin diğer sebzelerden çok daha fazla olduğu görülmüştür (Çiçek ve ark, 2019). Bu etkilerinin yanısıra acı biberler gıda sanayiinde doğal antimikrobiyal, aroma ve renk katkı maddesi olarak da pek çok alanda kullanılmaktadır (Careaga ve ark, 2003; Dündar ve ark, 2001). Et ürünlerinde kullanılan baharatların çeşidi kullanılan ürüne, bölgeye ve bölge halkının damak tadına göre değişebilmektedir. Baharatların kendine has aroması yanında ürünün kalitesini iyileştiren antibakteriyel ve antioksidan etkileri de bulunmaktadır.

Araştırmamızda tam olarak olgunlaşmış ve bekletilmiş ev yapımı acı kırmızı biber türleri tercih edilmiştir. DPPH radikal giderme aktiviteleri Şanlıurfa isot biberinde ve kahramnmaraş acı kırmızı biberinde sırasıyla %70 ve %64 olarak bulunmuştur. Her iki baharat türünün radikal giderici aktivitesinin olduğu bununla birlikte isot baharatının daha etkili antioksidan aktiviteye sahip olduğu söylenebilir. Bu durumun oluşmasında iklim ve bitki örtüsünün farklı olması mümkündür. Önceki çalışmalar çoğunlukla acı kırmızı biber üzerinden yapılmış olup genel bir ifade sunmaktadır. Bu araştırma bu yönüyle önceki çalışmalardan ayrılarak iki bitki türünü kıyaslamaya yönelik olmuştur. Depaa ve ark. araştırmalarında DPPH indirgenme aktivitesini acı kırmızı biber baharatında %72 olarak değerlendirmişlerdir. Yapılan bir tez araştırmasında DPPH aktivitesi %80 olarak bulunmuştur (Erdoğan, 2013). Antioksidan aktivite ölçümünde gözlenen bu ufak farklılıklar biber baharatının olgunlaşma durumu ile ilgilidir. İlaveten olgunlaşmış biberde, olgunlaşmamış biber baharatına göre daha yüksek düzeyde antioksidan aktivite gözlenmiştir (Ghasemnezhad ve ark., 2011). Chitravathi ve ark. (2015) ve ark araştırmalarında DPPH radikal giderme aktivitesini %71 olarak bulmuş olup araştırmamızla paralellik gösterdiği görülmektedir. Ayrıca olgunlaşma süresince en yüksek antioksidan aktivitesinin orta olgunlaşma

aşamasında yani biber sarı renkte iken bulunduğunu bildiren çalışmalar da literatürde kayıtlıdır (Rahman ve ark, 2013; Cervantez- Paz ve ark. 2014). Bazı araştırmalarda Şanlıurfa biberi isot'un tam olgunlaşma döneminin 15 Ağustos Maraş biberinin ise 28 Ağustos olduğu bildirilmektedir (Guil ve ark, 2006).

Araştırmada ABTS•+ radikal katyonunu yakalama kapasiteleri Şanlıurfa isot biberi>Kahramanmaraş kırmızı biberi şeklinde değerlendirilmiştir. Araştırma sonuçlarımızla paralel sonuçlar literatürde kayıtlıdır.

SONUÇ

Araştırmada acı kırmızı biber türlerinin yüksek oranda antioksidan aktivite gösterdiği gözlenmiştir. Özellikle acı kırmızı biber baharatının antioksidan potansiyelinin yüksek düzeyde olduğu söylenebilir. Mevsiminde ve olgunlaşma döneminde hasat edilen biber baharatının tüketimiyle birçok hastalığın önüne geçilebileceği düşünülmektedir. Bu değerlendirmeler, yapılan in vivo çalışmalar ile desteklenmektedir. Dünyada ülkemiz biber baharatı üretiminde 3. sırada yer almaktadır. Özellikle Güney Doğu Anadolu Bölgesi'nde yerel halk tarafından yaygın olarak tüketilen kırmızı biber baharatının tüketiminin bütün bölgelere yayılması hedeflenmelidir. Bu araştırma, yöresel biber baharatının sağlık açısından öneminin daha geniş kitlelere iletilmesinde yararlı olacağı inancındayız.

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April 26, 2022/Tobasco, Mexico

THE EFFECT OF HOT PEPPER WASTE POWDER ON MEAT QUAIL PERFORMANCE, CARCASS YIELD AND SMALL INTESTINE MICROFLORA

ACI BİBER ATIĞI TOZUNUN ETLİK BILDIRCIN PERFORMANSI, KARKASI RANDIMANI VE İNCE BAĞIRSAK MİKROFLORASI ÜZERİNE ETKİSİ

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ABSTRACT

This study was carried out to determine the effect of adding hot pepper waste powder to Japanese quail rations on performance, carcass and small intestinal microflora. Each group consisted of 4 replications and each replication consisted of 10 chicks. A total of 160-day-old meat Japanese quail were used in the animal study, and the experiment lasted for 42 days. Trial groups: Control fed with standard feed (0 ppm Hot Pepper Waste Powder (HPWP)) consisted of groups that added 100 ppm HPWP, 200 ppm HPWP and 400 ppm HPWP to the ration. HPWP used in the study constitutes the waste parts of chili peppers and pepper paste produced in Şanlıurfa-Türkiye. The study was carried out in Kırşehir Ahi Evran University- Türkiye, Agriculture Faculty, Animal Science Department, Poultry Unit.

At the end of the study, average live body weights were determined as 275.39 (0 mg/kg HPWP), 276.91 (100 mg/kg HPWP), 276.15 (200 mg/kg HPWP) and 285.92 g (400 mg/kg HPWP) respectively. Average feed consumption in the last week was determined as 887.13, 907.33, 890.47 and 936.29 grams, respectively. There was a significant increase in feed consumption ($P<0.01$-0.05) in all groups, especially during the growth period (at 2-5 weeks). Feed conversion rates in the last week were determined as 3.22, 3.28, 3.23 and 3.28, respectively. At the end of the experiment, the fact that the averages of feed consumption and live body weights were statistically insignificant indicates that the animals completed their development in the fifth week. There was no statistical difference in the experimental groups in terms of the slaughter parameters: hot carcass, cold carcass, thigh, breast, wing, back-neck, abdominal fat, gizzard, liver, heart, proventriculus, gastrointestinal tract weight and the percent values of these parameters, as well as the length of the gastrointestinal tract, hot and cold carcass yield ($P>0.05$). The total number of bacteria and yeast count, which are parameters of the small intestinal microflora, were determined as $1.5*10^6$, $1.5*10^7$, $1.5*10^6$ and $1*10^6$ log cfu/g, and $5.2*10^5$, $1.7*10^6$, $1.6*10^6$ and $6.6*10^5$ log cfu/g, respectively. Aerobic and anaerobic lactic acid bacteria counts were found to be $5.2*10^4$, $2.4*10^5$, $1.2*10^4$ and $1.8*10^5$ log cfu/g, and $2.1*10^6$, $8*10^5$, $8*10^5$ and $2.5*10^6$ log cfu/g, respectively.

As a result, while feed consumption and body weight increased in HPWP added groups compared to the control, a decrease was observed in feed conversion as well. This result is thought to be since HPWP added to the ration increases the metabolic rate of the animals.

Keywords: hot pepper waste, performance, sustainability, quail, waste recycling

ÖZET

Bu çalışma, Japon bıldırcın rasyonlarına acı biber atığı tozu ilavesinin performans, karkas ve ince bağırsak mikroflorasına etkisini belirlemek amacıyla yapılmıştır. Her grup 4 tekerrür ve her tekerrür 10 civcivden oluşmuştur. Hayvan denemesinde toplam 160 adet günlük yaşta etlik bıldırcın civcivi kullanılmış ve deneme 42 gün sürmüştür. Deneme grupları; standart yemle beslenen kontrol (0 ppm Acı Biber Atığı Tozu (ABAT)), rasyona 100 ppm ABAT, 200 ppm ABAT ve 400 ppm ABAT ilave edilen gruplardan oluşmuştur. Çalışmada kullanılan acı biber atığı tozu, Şanlıurfa-Türkiye'de üretilen pul biber ve salça yapımındaki biberlerin atık kısımlarını oluşturmaktadır. Çalışma Türkiye'de Kırşehir Ahi Evran Üniversitesi, Ziraat Fakültesi, Zootekni Bölümü, Kümes Hayvanları Ünitesi'nde gerçekleştirilmiştir.

Çalışma sonunda ortalama canlı ağırlıklar sırasıyla 275.39 g (0 mg/kg HPWP), 276.91 g (100 mg/kg HPWP), 276.15 g (200 mg/kg HPWP) ve 285.92 g (400 mg/kg HPWP) olarak belirlenmiştir. Son hafta ortalama yem tüketimi ise sırasıyla 887.13, 907.33, 890.47 ve 936.29 gram olarak belirlenmiştir. Tüm gruplarda hayvanların özellikle büyüme döneminde (2-5. Haftalarda) yem tüketimlerinde önemli bir artış meydana gelmiştir ($P<0.01$-0.05). Son hafta yemden yararlanma oranları ise sırasıyla 3.22, 3.28, 3.23 ve 3.28 olarak belirlenmiştir. Son hafta yem tüketimleri ve canlı ağırlıklarının ortalamalarının istatistiksel olarak önemsiz çıkması ise hayvanların gelişimlerini beşinci haftada tamamladıklarını göstermektedir. İnce bağırsak mikroflorası parametreleri olan toplam bakteri sayısı ve maya sayısı sırasıyla $1.5*10^6$, $1.5*10^7$, $1.5*10^6$ ve $1*10^6$ log kob/g ve $5.2*10^5$, $1.7*10^6$, $1.6*10^6$ ve $6.6*10^5$ log kob/g olarak belirlenmiştir. Aerobik ve anaerobik laktik asit bakteri sayıları ise sırasıyla 5.2*104, 2.4*105, 1.2*104 ve 1.8*105 log kob/g ve 2.1*106, 8*105, 8*105 ve 2.5*106 log kob/g olarak bulunmuştur.

Sonuç olarak, kontrole göre HPWP ilave edilen gruplarda yem tüketimi ve canlı ağırlık artarken yemden yararlanma da ise aynı şekilde bir düşüş görülmektedir. Bu sonucun ise rasyona ilave edilen HPWP'nin hayvanların metabolizma hızını yükseltmesinden kaynaklandığı düşünülmektedir.

Anahtar Kelimeler: Bıldırcın, Acı Biber Atığı, Sürdürülebilirlik, Performans, atık geri dönüşümü

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THE EFFECT OF MICROWAVE METHOD ON SURFACE AREA AND PORE STRUCTURE OF ACTIVATED CARBON OBTAINED FROM WASTE BIOMASS (HOT RED PEPPER STALKS)

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ABSTRACT

Activated carbon has proven by many studies that it is an adsorbent material that is widely used in the removal of environmental pollutants by the adsorption process. In recent years, activated carbon production using waste biomass resources has been preferred due to its advantages such as waste disposal and obtaining high porous, cheap adsorbent [1]. Waste biomass is the result of the use and processing of agricultural products, which are abundant in nature. Hot red pepper (Capsicum annuum L.), which is widely used in spice production in Turkey, is one of these agricultural products. The isot pepper grown in Sanliurfa province is documented by geographical indication regulations. The stalks of isot pepper are separated from the fleshy parts during the production of spice.

Within the scope of this study, activated carbon production was carried out with two different methods using isot pepper stalks, which are considered as waste. In the first method, the stalks impregnated in 100%H_3PO_4 solution were carbonized in N_2 medium at 650ºC for 30 min. In the second method, the stalks impregnated with 100% H_3PO_4 for 15 min. at 500 W wave power in a microwave oven in CO_2 atmosphere were carbonized at 650ºC for 30 min. in N_2 medium. The obtained activated carbons from two methods were characterized by using surface area analyzer device for The Brunauer-Emmet-Teller(BET) surface area and micropore analysis, Fourier Transform- Infrared(FT-IR) for structurally and Scanning Electron Microscopy(SEM) for morphologically. According to results, it was found that the surface area of activated carbon produced by microwave method was higher than the activated carbon produced by other method.

Keywords: Hot Red Pepper (*Capsicum annuum)*, Waste Pepper Stalk, Microwave, Activated Carbon.

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OBTAINING HIGH VALUE-ADDED PRODUCT FROM "*İSOT*" PEPPER WASTE STALKS: THE PRODUCTION AND CHARACTERIZATION OF ACTIVATED CARBON

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ABSTRACT

Hot Red pepper *(Capsicum annuum L.)* is one of the most consumed spices in the World (1). A typical spice of Turkish cuisine a unique taste, "*isot"* is obtained from reddish and purple ground dried pepper. In order to obtain "*isot"*, the fleshy parts of fresh red peppers are cleaned from the seeds and stalks and then they are dried in the sun.

In recent years, it has become very important to convert waste biomass into different products with high added-value, cheap and environmentally friendly. One of these products is activated carbon, which is commercially produced and very expensive. Activated carbons are the most common adsorbent materials used in adsorption technology, which is accepted as a sustainable treatment technology due to its environmentally friendly, low cost, high efficiency and simple processing properties.

In this study, it was aimed to product activated carbon with a high surface area was obtained by using the stalks, which are separated from the fleshy part and come out as waste during the production of "*isot"* spice in Sanliurfa region. In the first stage for production, the stalks were impregnated with 100% zinc chloride ($ZnCl_2$) and boric acid (H_3BO_3) chemicals for 24 hours. Then they were washed with de-ionized water and dried in an oven at 80 ^oC for 24 hours. In the next stage, carbonization was carried in 650 ^oC for 30 min in N_2 gas atmosphere. Obtained activated carbons were characterized by using surface area analyzer device for The Brunauer- Emmet- Teller (BET) surface area and micropore volume analysis, Fourier Transform- Infrared (FT-IR) for structurally and Scanning Electron Microscopy (SEM) for morphologically. As a result, the waste parts of isot peppers were also evaluated and a high value-added product was obtained.

Keywords: Hot Red Pepper (*Capsicum annuum),* İsot Spice, Stalk, Activated Carbon

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A SHORT HISTORY OF SPICES: AN OVERVIEW ON PEPPER HISTORY

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ABSTRACT

Throughout history, mankind has continued to seek to season foods and extend their storage period. Spices create flavor combinations, offering a diverse and almost endless palette of flavors in cooking made from the same ingredients. At the center of this quest are feelings of taste and pleasure. Spices, which traveled from hand to hand, from land to land throughout civilizations, have been an important treasure for the prosperity of empires. Just as there are empires destroyed for the sake of spice, there are geographies discovered for its sake (Rosengarten, 1969). Spices have increased interaction by building bridges between civilizations. Today, spices and herbs are still used in many fields such as gastronomy and medicine and are an integral part of world history.

Spices have continued to exist as an ingredient that human beings value and cannot give up since ancient cultures. It can be accepted that it is one of the most sought-after commodities in the inter-civilizational journey made through the Silk Road. Monarchies, which held the power and wealth of many civilizations and periods such as China, India, Egypt, Iran, Arabia, and Rome, struggled to dominate over spices. With the discovery of the Silk Road, which connects Asia to the Mediterranean world, including North Africa and Europe, the use of other trade routes has decreased (Sharangi, 2018). The word "Pepper", known as the King of Spices, comes from the Sanskrit word "Pippali", which is a relative of Indian pepper. Black pepper is a valuable spice that has been used since ancient times. In ancient times, the Romans used it to season their food (Dalby, 2003). There are many varieties of peppers that come in a variety of flavors and colors, depending on their origin and how they are processed.

It is the aim of this study to record a chronological compilation of the use and prevalence of spices in the historical context. In this research, it is aimed to present a brief history of spices and a general evaluation of the history of pepper. This study, which was written with the literature review method, is a short summary of spice history.

Keywords: Spice History, Pepper History, Gastronomy, Ancient time, Silk Road.

ÖZET

İnsanoğlu, tarih boyunca gıdaların çeşnilendirilmesi ve saklanma süresinin uzatılması için arayışlarını sürdürmüştür. Baharatlar lezzet kombinasyonları yaratarak, aynı malzemelerden yapılan pişirmelerde çeşitli ve neredeyse sonsuz bir lezzet paleti sunmaktadır. Bu arayışın merkezinde lezzet ve haz duyguları bulunmaktadır. Medeniyetler boyunca elden ele, diyardan diyara gezen baharatlar, imparatorlukların refahı için önemli bir hazine olmuştur. Baharat uğruna yıkılan imparatorluklar olduğu gibi, yine onun uğruna keşfedilmiş coğrafyalar vardır (Rosengarten, 1969). Baharat medeniyetler arası köprüler kurarak etkileşimi arttırmıştır. Günümüzde halen baharat ve bitkilerden gastronomi ve tıp gibi birçok alanda yararlanılmakta ve dünya tarihinin ayrılmaz birer parçasıdır.

Baharat Antik kültürlerden bu yana insanoğlunun değer verdiği ve vazgeçemediği bir emtia olarak mevcudiyetini sürdürmüştür. İpekyolu aracılığıyla yapılan medeniyetler arası yolculukta en rağbet gören emtialardan olduğu kabul edilebilir. Çin, Hindistan, Mısır, İran, Arabistan ve Roma gibi birçok medeniyet ve

dönemin güç ve zenginliğini elinde bulunduran monarşiler baharat üzerinde egemenlik kurmak için mücadele etmişlerdir. Asya'yı Kuzey Afrika ve Avrupa da dahil olmak üzere Akdeniz dünyasına bağlayan İpek Yolu'nun keşfi ile birlikte diğer ticaret rotalarının kullanımı azalmıştır (Sharangi, 2018:11). Baharat Kralı olarak bilinen *"Biber"* kelimesi Hint karabiber akrabası olan Sanskritçe *"Pippali"* kelimesinden gelmektedir. Karabiber antik çağlardan bu yana kullanılan değerli bir baharat türüdür. Antik Çağlarda, Romalılar yiyeceklerini baharatlamak için kullanmıştır (Dalby, 2003). Kökenlerine ve nasıl işlendiklerine bağlı olarak çeşitli lezzetler ve renklere sahip birçok biber çeşidi bulunmaktadır.

Baharat kullanımı ve yaygınlaşmasının tarihsel bağlamda kronolojik derlemesini kayıt altına almak bu çalışmanın amaçlarındadır. Bu araştırma da baharatların kısa tarihi ve biberin tarihine ilişkin bilgiler verilmiştir. Literatür taraması yöntemiyle yazılan bu çalışma baharat tarihinin kısa bir özeti niteliğindedir.

Anahtar Kelimeler: Baharat Tarihi, Biberin Tarihi, Gastronomi, Antik Dönem, İpek Yolu

1. INTRODUCTION

Human beings meet their nutritional needs by consuming the nutrients and vitamins they need with the instinct of survival (Baysal, 2016). Nutritional diets of people are affected by regional and climatic differences, as well as adapting to their living conditions and cultures (Önay, Bayrak, and Akman, 2007, Yılmaz and Akman, 2018). The people of the region living in rural and terrestrial climates have also added endemic plants that grow spontaneously in the mountains and pastures to their diets. In addition to being a nutrient, these plants provide medical benefits in consumption (Kendir and Güvenç, 2010). Since ancient times, plants have been used as flavoring agents, preventing food spoilage and antimicrobial activity, aiding food digestion, and used as medicinal and flavoring due to their diaphoretic effects (Alcock, 2016).

Spices have passed into our language from Arabic as the origin of the word. It is the general name given to substances such as cinnamon, cloves, black pepper, and ginger, which are used to give a pleasant smell and taste while preparing food (TDK, 2022). According to Larousse Gastronomique, it is defined as "the general name of herbal aromatic substances that have different levels of odor and sharpness and are used to season dishes with their special taste" (Montagne, 1938 as cited in Gürsoy, 2012: 15). The definition of culinary herbs and spices by the British Spice Association (ESA) is as follows; "culinary herbs and spices are the edible parts of plants traditionally added to foodstuffs for their natural aroma, aromatic, and/or visual properties" (ESA Spices, 2022: 1).

Spices are used to increase flavor in food and beverages. It is possible to reach the information that the spices, which are sold in jars by herbalists, are used in trade, mythology, religious rituals, and instead of money, apart from their culinary and medical benefits in history (İzer, 1988). Vinegar, salt, lemon, and sugar were considered spices because of their use as a flavoring during the Middle Ages. Salt, which is first used for the preservation and longevity of foods, is vitally important for human beings. Although salt, which is a mineral, is counted as a spice today, vinegar, sugar, and lemon are no longer called spices (Gürsoy, 2012). In this context, the history of spices was examined within the scope of the study. The historical process of spices, which are used quite frequently today, has been investigated.

2. HISTORY OF SPICES

Spices have continued to exist as an ingredient that human beings value and cannot give up since ancient cultures. It can be accepted that it is one of the most sought-after commodities in the inter-civilizational journey made through the Silk Road. Monarchies, who held the power and wealth of many civilizations and periods such as China, India, Egypt, Iran, Arabia, and Rome, struggled to dominate over spices (Sharangi, 2018). The history of spices grown in India, known as the land of spices, dates back thousands of years. In addition to influencing the world economy, herbs and spices also have written history for gastronomy and medicinal purposes (Krondl, 2008). When Brahman's religious texts and Ayurvedic texts are examined, it is BC. It is known that spices and herbs were used even before 1000 (Rosengarten, 1969). Today, there were Sumerians and Babylonians in the south of Mesopotamia, which is between the Euphrates and Tigris rivers, and Assyrians in the north. B.C. Due to the rule that "surgeons must have their hands amputated as a result of causing the

death of a patient" in the laws of Hammurabi in 1700, Sumerian doctors turned to treat with herbal medicines instead of surgery. It is thought to be a variation of the modern form of drug therapy. While the Sumerians used spices and herbs for medical purposes, the Assyrians were used for perfume and cosmetic purposes due to their fondness for a luxurious and refined lifestyle (Sevin, 2000). Gardening was common among Babylonians. In Babylonian gardens, spices such as thyme, saffron, garlic, turmeric, cardamom and coriander were grown. The Persians, on the other hand, produced oil from plants such as onions, garlic, roses, lilies, coriander, and saffron after they conquered Egypt, and the oil made from sesame seeds was used by the wealthy for medicinal and cosmetic purposes (Köroğlu, 2013; Rosengarten, 1969; Kaynakçı Elinç, 2007). In the Urartians, the remains of wild plants and spices such as cumin, coriander, parsley, yogurt herb, shepherd's wand, and delice were found in archaeological excavations of the period (Gökçe, 2016; Cocharro et al., 2001). Spices, which had an important role in ancient Greece, were used for therapeutic purposes by Hippocrates. He stated that great care should be taken when using herbs such as saffron, cinnamon, thyme, coriander, mint, and marjoram during the treatment phase. Today, at least half of the more than 400 herbal medicines used by Hippocrates are still in use (Khan, 1990).

Prestigious foods are imported products due to relatively scarce resources and expensiveness. Spices, especially pepper and cinnamon, which are among these products, were of great importance in ancient times. Therefore, imported food was first offered to those with the highest rank in the social hierarchy. Due to the rare, exotic, and always expensive nature of spices, and the difficulty of the import process, the spice traders did not share their sources of supply (Dalby, 2000). Cinnamon imported from China was transported in human-powered canoes. Information on the route of the canoes, called Cinnamon Way, was not shared. The Greek historian Herodotus wrote that in the 5th century BC, cinnamon was anchored in Arabian mountain peaks by large birds in their nests on steep cliffs inaccessible to humans, and the natives renounced freshly cut animal meat to gain access to cinnamon (Rosengarten, 1969). As a result, the Ancient Greeks and Romans, who learned their ideas about spices from the East, believed in legends that were hardly true. Romans BC. When they conquered Egypt after 30 BC, they had a large spice academy. Roman reliance on the Arabian road decreased with the discovery of a new route that reduced the sea journey from Egypt to India to 70 days during the reign of Emperor Claudius (AD 40-54). They discovered a new sea route to the spice country China and India (Alcock, 2016). When the Romans officially conquered Egypt in 30 BC, all doors were opened to the spice and herb trade. B.C. Between 285 and 246 BC, a canal was built connecting the Nile River to the Red Sea to facilitate the spice trade in Egypt. The canal is seen as the first constructed version of what is now known as the Suez Canal. As a result of these efforts, spices were carried from India via the Red Sea to the Nile, then to Alexandria, and then to Greece and Italy via the Mediterranean. During the Roman Empire, Indian trade expanded to South Asia and Indonesia (Sharangi, 2018). Constantinople (Istanbul), BC. It was founded in 330 by Emperor Constantine and became the largest center in the Near East for the trade of spices (saffron, pepper, cloves, nutmeg, etc.).

After it became the eastern capital of the Roman Empire, Constantinople became the "city of spices" with the exotic Asian spices (garlic, parsley, dill, mint, sage, thyme) and Indian spices coming from the Roman colonies (Detienne, 1994; Sharangi, 2018; Raghavan, 2007). Realizing the value of the spice trade, the Europeans sought to discover new routes to Asia and conquer the countries where the spices were grown. European countries—first the Portuguese, then the Spaniards, then the Dutch, and finally the British—stood the trade routes into Asia and the spice-producing regions, one by one.

At the end of the 15th century, exploration races began, and the Portuguese, led by Vasco da Gama, were the first Europeans to reach India. Thus, it can be said that the Arab and Venetian monopoly in the spice trade has come to an end. Portugal took control of the Indian and Far Eastern spice trade, paying the local Indian rulers gold and silver. In addition, the Portuguese established trading ports in Goa, India, and Sri Lanka, and traveled east to Malacca, Malaysia, and the Maluku Islands, bringing pepper, cloves, and nutmeg. Until the sixteenth century, the spice trade was dominated by the Portuguese (Raghavan, 2007). In the fifteenth century, the spice trade was transformed into the Age of Discovery by Europe due to better navigational equipment and long-distance sailing techniques. Various journeys of relatively wealthy, adventurous merchants have discovered new lands and new fortunes. As the Portuguese monopolized the spice trade, the Spanish government sponsored the explorers and sent ships to go to India. In 1492, Christopher Columbus began his journey in search of India but discovered the Americas instead. He took the new riches (cayenne pepper, allspice, and

vanilla) he discovered in America to Spain (Rosengarten, 1969). Hot pepper seeds were brought from the Americas after the Spaniards discovered that peppers were easily transportable and resistant to ship voyages. In this period when the first colonization in America was established, spices in the luxury goods category were important in terms of accessing spices to the public because of the cheapness of red pepper imported in large quantities (Raghavan, 2007). With the domination of Egypt by the Ottoman Empire in the 16th century, Portugal's pepper power began to shake. The Ottoman Empire, which had both the production and trade of the pepper known as Hungarian pepper, developed a strict taxation system against the merchants with its dominance over the region. The Ottoman Empire, which completed its deficiencies in the sea by dominating the ports, maintained its dominance in the regions where trade was intense (Casale, 2006).

In the seventeenth century, the Dutch conquered Portugal and established dominance in Java, Malacca, and South India. The Dutch inflicted cruel and inhumane treatment on the native workers and peasants in the East India colonies, and this strong exposure caused a great public reaction. The government had to make reforms because of the backlash that had a profound effect on the Netherlands (Rosengarten, 1969). The Dutch occupied the Spice Islands from 1811 to 1816. Dutchs, II. They controlled it until the arrival of the Japanese during World War II. During their colonization of South Africa, they brought chile peppers from America and Malay slaves, ivory, and spices from the Spice Islands (Rosengarten, 1969; Raghavan, 2007). In the eighteenth century, the United States of America changed the course of the spice trade with improvements such as vanilla powder, garlic powder, and onion powder, along with developing technological innovations. As trade routes expanded, spices became more accessible to ordinary people. People began to grow spices, gradually learning agrotechnical. As a result, the wealthy monopolies began to disintegrate, abandoning the incredible history of spice, which at that time was one of the most surprising and attractive trade items in the world (Sharangi, 2018).

Significant spice plantations were established in North and South America. The finest nutmeg and cardamom from Grenada, selected black pepper from Guatemala and Brazil, and substantial quantities of sesame seeds from Mexico and Nicaragua began to be imported (Rosengarten, 1969). In ancient and medieval times, spices, as an important commodity, had a very important role in the development of the economic welfare of the countries. In order to have power, the search for spices began and allowed the discovery of the new world (Alcock, 2016). Centuries ago, consumer preferences for Asian spices inspired the creation of vast trade networks and the expansion of colonies. But in the nineteenth century, food had an economic value in international trade and shaped global politics. In the twentieth century, Asian and Western culinary traditions, with increasingly complex economic structures, led to the emergence of fusion cuisines (Cwiertka and Walraven, 2001).

Spices improve the taste of food, but also have properties that support human health. While the use of spices in the human diet has a long tradition spanning thousands of years, it's not just the taste that makes spices worth a closer look, but the effect they have on our digestive system, blood pressure, and heart activity. Spices can be used as aphrodisiacs and as preservatives to help keep the food free of bacteria and molds, and last but not least, many perfumes are used for specific types of fragrance, are processed into perfumes, or can be burned to produce aromatic smoke. Spices were used for many different purposes in the Ancient World. However, the spread of the spice was only possible when it reached the Mediterranean lands from the Far East. Spices were used to make perfumes by some civilizations, and in others, they were offered to the gods at festivals for religious purposes. It was mostly used for the medicinal effects of spices in a medical sense. It was used in cooking to give flavor and aroma to food. Many civilizations have been caught in the mystery of spices due to medicinal benefits such as aiding digestion (Alcock, 2006).

2.1. Black Pepper

Black pepper is a valuable spice that has been used since ancient times. The word “Pepper”, known as the King of Spices, comes from the Sanskrit word “Pippali”, which is a relative of Indian pepper (Dalby, 2003), and has also been defined as “Yavanapriya”, “the lover of the Greeks” (Ravindran, 2016). Black pepper, whose botanical name is *Piper nigrum*, has a wide variety of flavors and colors depending on its origins and processing techniques. There are black, white, red, and green types of pepper, which is a spice native to the southwestern Malabar coast of India (Dalby, 2003).

Today, the largest producers of spices include Madagascar, Vietnam, India, Singapore, Sri Lanka, Thailand, Malaysia, and Brazil. The dried pepper has an appearance reminiscent of a grape branch. Green, black and red varieties appear with the harvesting of grains at different times. It is dried and used as powder, coarse pieces or balls. The usage areas of the pepper, whose aromas change according to the regions, also change. The peppers have different aromatic intensities in the Indian, Malabar, Indonesian and Malaysian regions depending on their origin. Tellichery pepper, with its fruity aroma typical of the Southwest Indian coast, is a rather mildly pungent variety. Malabar pepper, on the other hand, is a well-flavored variety with a normal pungency. Lampong pepper, which is native to Indonesia, has a very strong aroma. Malaysia's Sarawak pepper is known to have a milder bitterness (Raghavan, 2007).

White peppercorns are fruits that are peeled from the outer stem and harvested when ripe, yellowish-red or red. The fruits, which are kept in water, are steamed in order to peel their skins. After clearing the peeled peels, light colored peppers emerge. Bleached peppers are left to dry in the sun after rinsing with water. At the same time, white pepper can be obtained from black pepper by a method called decortication. In this context, it is possible to mention that white pepper is formed by revealing the inner seed part of the pepper. Brazilian green peppers, on the other hand, are obtained by picking the pepper before it is ripe. Air-dried fruits are packaged using methods such as brine. Red pepper is obtained by drying and fermenting the ripe pepper fruit at high temperatures (Raghavan, 2007).

Pepper, known to have been brought to Europe by Egyptian traders, is a very important spice from a historical perspective. The earliest reference to the history of the pepper is thought to be in an Egyptian papyrus deciphered by the German Egyptologist George Ebers, dated 1550 BC. It is known that a fleet of five ships was sent by the Egyptian queen Hatshepsut in 1000 BC to bring pepper to the city of Malabar, India. In the book of the Greek physician Dioscorides, named Materia Medica, information about the medicinal values of pepper is given (Ravindran, 2016).

Pepper was the most widely used spice in medieval Europe. It is thought that the pepper first arrived in the Corbie monastery in Normandy, France, in 716 BC along with cinnamon and cloves (Pilcher, 2017). In ancient times, it was used by the Romans to season their food. It was consumed in very small quantities only by individuals belonging to the upper class. Known to have been used by the Greeks since the fourth century BC, pepper was used as a currency in its own right. The Romans were the first Europeans to cook their meals with spices and use them extensively for food. This argument is supported by the recipes given in the book of Apicius, which is considered one of the first gastronomes in history. During this period, black pepper was the most popular and most expensive seasoning, while cumin and coriander were used to preserve meat and sausages. The fish is flavored with dill, mint, salt, pepper, cumin, and mint (Detienne, 1994). It is of great importance to examine the history of pepper, which gained value as the first spice of the ancient period. It has been used in medieval medicine because it relieves stomach and intestinal gases and help with expectoration and digestion. In the Middle Ages, pepper, which was a luxury good, was exported to Europe at an estimated rate of 1000 tons per year (Adamson, 2004).

Peppers were used in ancient times to preserve meat. Today, pepper is the most important table spice in the world. Used in many ethnic cuisines, peppers are used in marinades or spice mixes. It is added during cooking or sprinkled on food during a presentation to adjust flavor. Cracked black pepper is popular in marinades, salad dressings, and spice mixes. Chili pairs well with garlic, ginger, coconut milk, lemon, vinegar, pork, beef, basil, cilantro, seafood, eggs, creamy sauces and vegetables, red wine, fermented soybeans, and soy sauce. In ancient times, pepper was used as a material resource such as the bride's dowry, a currency, or rent money. It has also been used to preserve meats to prevent spoilage. Black pepper is traditionally used to treat headaches, constipation, and diarrhea. In India and China, pepper is widely used to improve circulation and reduce hypersensitivity to colds, coughs, asthma, kidney inflammations, and muscle and joint pains (Raghavan, 2007).

2.2. Chili Pepper

Chili pepper and its types have been one of the most popular spices throughout history. It is accepted that the origin of peppers in Mexico. Evidence of capsicums is known from places in Peru where they were buried in pre-Colombian times. Chili is a Mexican word that is mentioned in Aztec inscriptions. On his expedition to

India, Christopher Columbus encountered these New World fruits (even more bitter than bird's-eye peppercorns). He became known all over the world thanks to Columbus, who returned to Europe with the treasures he found. Thanks to the long shelf life of the seeds (maybe 2-3 years), it provided an advantage on sea voyage days. It is thought that the chile pepper, which is known to have been used in Spain in 1493 and in England in 1548, reached the Ottoman Empire in the sixteenth century (Verit, Yeni and Ünal, 2001; Dasgupta and Fowler, 1998; Şeniz, 1992).

In South America, it was used by the Aztecs for coughing by mixing salt, honey, and pepper. In India, it has been used to cure bronchitis and sore throat (Dasgupta and Fowler, 1998). In the Ottoman Empire, red pepper, which was consumed for its appetizing benefits, was also mixed with molasses to relieve colds and sore throats (Verit, Yeni, and Ünal, 2001).

The plants grow at altitudes of 1,800-6,000 meters above sea level in the tropics. Their bitterness is affected by a variety of factors, such as high nighttime temperatures, drought, or excessive irrigation. Green peppers are immature fruits, they are kept for 4 weeks to mature and become red peppers. As the peppers mature, they can be orange, purple, dark brown or black. While pepper is mostly produced in India, it is also produced in large quantities in countries such as Japan, Thailand, Mexico and Turkey. Chili peppers, which are very rich in vitamin C, are an indispensable nutrient in hot climatic geographies due to their appetizing and sweating properties. The characteristic feature of peppers, which are known to have more than 150 species taxonomically, varies with the amount of capsaicin they contain. By providing different taste sensations, capsaicin compounds can provide different tastes in the perception of bitterness level (Morris and Mackley, 2001).

3. CONCLUCION

When we look at 5000 years of recorded history, spices play an important role in the development of modern civilization. The Europeans fell under the aromatic charm of the East, and the merchants that the kings sent on expeditions for this purpose risked their lives to trade. The exploited peoples were enslaved by the passion for spices, for which wars were fought, and the new world was discovered. Wide-ranging changes such as the Renaissance led to fierce competition, and spices became a valuable commodity like gold.

When using spices, it is very important for gastronomes to have knowledge about their history and chemistry in terms of creating flavor components. Today, it is still used as a raw material in many industries and finds its place as a touristic product in tourism activities. Spices, which are seen as the hidden secrets of the cuisine in terms of gastronomy, enable flavors to be enriched and authentic experiences. When evaluated in this context, it is very important to examine the history of spices in order to determine the origin of the fusion flavors of the modern world.

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USE OF FRESH AND DRY SPICES IN THE CUISINE: THE CASE OF SİVAS

MUTFAKTA TAZE VE KURU BAHARATLARIN KULLANIMI: SİVAS İLİ ÖRNEĞİ

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ABSTRACT

Plants have been used as food, medicine and spice since ancient times. Spices attracted the attention of people are included in many world cuisines and it was first used for food preservation. Afterwards, spices were used such as dye, incense, firewood, adornment, cosmetics, medicine, flavor and aroma. As the demand for spices increased, it gained value and became tradeable over time. Besides, spices also spread all over the world by spice road.

Turkey has a great wealth in 11,707 plant varieties due to its location where three biogeographies intersect and hosts two gene centers in the world. This situation provides advantageously for our country in terms of medicinal, aromatic plant, and spice cultivation compared to other countries. Many of the plants grown in Turkey are region specific endemic species, depending on the climate and soil conditions. In various studies, it has been determined that 15.5% of the plant varieties in Turkey are found in Sivas and its environs and the endemism rate in Sivas is 35.8%.

The influence of local cuisines in the emergence of traditional Turkish cuisine, which is known in international platforms, is quite large. The spices used in these cuisines are as important as the raw materials and cooking techniques. Spices not only add flavor to the products prepared in local cuisine, but also increase the existing flavor, and also give a cultural identity to meals. In other words, if the food made from the same materials is enriched with a specific spice to the region, it will take on a local identity.

Sivas has a rich cultural structure as it is on the trade routes as well as being home to many civilizations due to its geographical location. The combination of cultural richness with endemism and richness of flora has made a great contribution to the emergence and development of Sivas cuisine culture. As a result of the literature study, it has been determined that there is no one-to-one study related to spices and Sivas cuisine culture. In this study, it is aimed to research the spices used in Sivas cuisine. Thus, the place of spice in the identity of the local cuisine was defined and the recognition of Sivas local cuisine was focused by emphasizing the spice-flavor relationship. In this context, document analysis was carried out in the qualitative research method. Eight studies on Sivas local meals were examined using written secondary data sources. In this study; classification was made like soups, meat and vegetable meals, pilafs, pastries, desserts and beverages. As a result of the study, besides the spices used throughout Turkey (such as mint, red&black pepper, cumin, sumac); it has been determined that regional spices (such as coriander, thyme, pennyroyal, sand leek, summer savory) are used among the meals and beverages analyzed.

Keywords: Spice, Sivas, Local Cuisine

ÖZET

Bitkiler; eski çağlardan beri gıda, ilaç ve baharat olarak kullanılmıştır. İnsanların ilgisini çeken ve birçok dünya mutfağında yer alan baharatlar ise; ilk olarak gıdaların muhafaza edilmesi için kullanılmıştır. Daha sonrasında baharatlar; boya, tütsü, yakacak, süsleme, kozmetik, ilaç, tat ve aroma verici gibi geniş bir yelpazede kullanım

alanı bulmuştur. Baharatlara olan talep arttıkça değer kazanmış ve zamanla ticareti yapılır hale gelmiş, ayrıca baharat yolu ile dünyanın dört bir tarafına yayılmıştır.

Türkiye, dünyada üç biyocoğrafyanın kesiştiği ve iki gen merkezini barındıran konumu dolayısıyla 11 bin 707 bitki çeşidi ile büyük bir zenginliğe sahiptir. Bu durum tıbbi, aromatik bitki ve baharat yetiştiriciliği açısından ülkemizi, diğer ülkeler arasında avantajlı kılmaktadır. Türkiye'de yetişen bitkilerin birçoğu, iklim ve toprak şartlarına bağlı olarak yöreye özgü endemik türlerden oluşmaktadır. Yapılan çeşitli çalışmalarda Türkiye'de bulunan bitki çeşitlerinin %15,5'inin Sivas ve çevresinde bulunduğu ve Sivas'ta endemizm oranının %35,8 olduğu belirlenmiştir.

Uluslararası platformlarda tanınan geleneksel Türk mutfağının ortaya çıkmasında yöresel mutfakların etkisi oldukça büyüktür. Bu mutfaklarda kullanılan ham maddeler ve pişirme teknikleri kadar kullanılan baharatlar da oldukça büyük önem taşımaktadır. Baharatlar; yöresel mutfaklarda hazırlanan ürünlere aroma katmasının yanı sıra var olan lezzeti de artırırken yemeklere, ait olduğu kültüre özgü bir kimlik de kazandırmaktadır. Yani aynı malzemelerden yapılan yemek, yöreye özgü bir baharatla zenginleştirilirse o yöreye ait bir kimliğe bürünecektir.

Bulunduğu coğrafi konum nedeniyle birçok uygarlığa ev sahipliği yapmasının yanı sıra ticaret yolları üzerinde olduğu için Sivas, zengin bir kültürel yapıya sahiptir. Kültürel zenginliğin endemizm ve flora zenginliği ile birleşmesi Sivas mutfak kültürünün ortaya çıkmasında ve gelişmesinde büyük bir katkı sağlamıştır. Yapılan literatür çalışması sonucunda baharatlar ve Sivas mutfak kültürü ile birebir ilişkili bir çalışmanın olmadığı tespit edilmiştir. Bu çalışmada Sivas mutfağı yemeklerine özgü kullanılan baharatların incelenmesi amaçlanmıştır. Böylece baharat-lezzet ilişkisi vurgulanarak yöresel mutfak kimliğinde baharatın yeri tanımlanmaya çalışılmış ve Sivas yöresel mutfağının tanınırlığı üzerinde durulmuştur. Bu kapsamda nitel araştırma yöntemi ile doküman analizi yapılmıştır. Yazılı ikincil veri kaynakları kullanılarak Sivas yöresel yemeklerinin anlatıldığı sekiz adet çalışma incelenmiştir. Çalışmada; çorbalar, et ve sebze yemekleri, pilavlar, hamur işleri, tatlılar ve içecekler şeklinde bir sınıflandırma yapılmıştır. Çalışmanın sonucunda incelenen yemekler ve içecekler arasında Türkiye genelinde kullanılan baharatların yanı sıra (nane, kırmızıbiber, karabiber, kimyon, sumak gibi); aşotu (Coriandrum sativum), kekik, yarpuz (Mentha pulegium), körmen (Allium scorodoprasum L.), anık (Satureja hortensis L.) gibi yöre ve bölgeye özgü baharatların kullanıldığı belirlenmiştir.

Anahtar Kelimeler: Baharat, Sivas, Yöresel Mutfak.

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FEATURES OF CHILI PEPPER

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ABSTRACT

In today's world, due to the active rhythm of life, people forget to monitor their health and nutrition, and therefore face a deficiency in the body of vitamins, trace elements, minerals. Consumption of chili pepper (*Capsicum annuum*), known as a multivitamin product, can play a significant role in reducing micronutrient deficiencies in the human body. It contains a large amount of ascorbic acid, which exceeds almost all vegetable and fruit crops, and is from 100 to 400 mg per 100 g of dry matter. The content of P-active substances can reach up to 400 mg per 100 g of dry matter. Chili pepper contains carotene (0.5-16 mg), B vitamins, folic acid, nicotinic acid. The daily dose for a person of ascorbic acid is 50-100 mg, and P-active substances 15-150 mg, ie to meet the daily requirement of these vitamins a person needs only 20-50 g of peppers. Dry matter in the fruits of pepper contains from 6 to 20%, which are mainly carbohydrates. Sugars are represented by glucose and fructose - 28.0-52.7%, starch - 1.78-9.34, crude fiber - 9.68-24.0, hemicellulose - 0.85-3.14, pectin – 4.0-13.0%. The content of nitrogenous substances (protein) is 11.2-35.7%. Minerals make up 1.03-11.82% of dry matter, but the highest content among them belongs to potassium salts - more than 50%. In addition to potassium salts, minerals are represented by salts of sodium, calcium, magnesium, iron, aluminum, as well as substances containing phosphorus, sulfur, chlorine, silicon, etc.

Chile is one of the most famous and popular major commercial types of hot peppers. The most popular varieties of chili have a length of 3-7 inches and a maximum diameter of 1-2 inches. However, not all types of hot peppers belong to *Capsicum annuum*, but only serrano, cayenne and jalapeno. Another popular variety, habaneros, belongs to *C. chinense*, while many hot peppers, including tabasco, which are often used in Asian dishes, are *C. Frutescens*. Aji peppers, including Aji Amarillo and Aji Colorado, belong to the *C. baccatum* group, while chilipicins and chiltepines, wild peppers grown in Mexico, belong to the *C. glabriusculum* group.

Chili peppers are a rather ambiguous product. Most often, chili peppers due to the sharpness of its pods are eaten not fresh, but as a flavoring of other products. It can be harvested in the phase of full ripeness, dried or green for fresh use. Drying can be carried out in sunlight, on bushes, or in special dewatering plants. They are also often marinated.

Keywords: Capsicum annuum, chili pepper, multivitamin product, popular varieties.

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BASIL CULTIVATION IN HYDROPONIC SYSTEM

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ABSTRACT

Basil (*Ocimum basilicum L.*) is one of the most popular herbs in the world. This type of spice is widely used in the food industry and medicine due to the content of biologically active substances necessary for the human body, such as anthocyanins, essential oils, micro and macro elements. The innovative method of hydroponics - growing plants without soil in a closed system - will combine the environmental friendliness and economy of the process with growing basil.

The growing season for basil is about 90 days, but due to the weather conditions of the temperate climate zone and due to global climate changes, it is almost impossible to get more than one harvest per year throughout the year. When using hydroponic installations, it is possible to obtain several harvests per year due to the fact that this type of production is not dependent on weather conditions and the growing season of plants is reduced in a hydroponic system. Plants are placed on a sterile substrate, fixed on a foam tray. Mineral wool is often used as a substrate. The plants mainly obtain all the necessary inorganic substances from the water, which in this type of soilless installation acts as the growing medium. Particular attention is paid to the quality of the water that enters the system: the pH and salt content must be at a level that suitable for the normal growth and development of plants. To artificially saturate the water with oxygen, you can use various types of aerators. For hydroponic installations, it is advisable to use additional lighting - LED lamps with different spectrum colors to stimulate plant growth, flowering and fruiting. The backlight can be made cyclic by setting the lighting schedule using a timer. The management of the system can be made fully automated thanks to modern technologies.

The use of hydroponic installations allows to get an environmentally friendly crop of basil in the face of global climate change and lack of land for agricultural activities. Hydroponic vertical farms can be an economically and environmentally viable solution for growing crops in megapolises, and can solve the problem of expensive transportation of agricultural products from remote areas.

Keywords: basil, hydroponics, ecology, growing conditions, production automation.

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RESEARCH ON THE USE OF PAPRIKA AS A NATURAL FOOD DYE

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ABSTRACT

Natural dyes are widely used in several industries: textile, paper, food, plastic, printing, leather and pharmaceutical industries and more. The demand for natural dyes in the food industry is growing due to the fact that consumers are concerned about the negative impact of synthetic dyes on their health. Often products that use synthetic dyes cause allergic reactions, problems with the skin, stomach and more. Therefore, the search for bright natural food dyes that will attract the eye of consumers and will not harm their physical condition continues in the food industry.

Little is known today about natural dyes of plant origin. This is especially true of red pigments belonging to the group of carotenoids. In large quantities, these pigments are contained in paprika. The carotene content varies significantly depending on the variety in the range of 0.2-4.8 mg per 100 g of raw material in green fruits and 0.5-16.7 mg - when ripe. Ivory varieties do not have carotenoids at technical maturity, they appear only when ripe. Essential oils give a specific aroma to pepper fruits, their content is 0.1-1.25% of dry matter.

Today there is a hybrid of paprika of Chinese selection, the feature of which is that the resulting dye has no taste or smell. The dye gives a uniformly saturated color throughout the volume of the painted material. The color saturation of the dye depends on the content of carotene pigment in paprika fruits, so the color saturation can vary from light orange to deep red.

Experiments on quality control of natural dye were conducted on the basis of the research laboratory of Kherson State Agrarian and Economic University. Among the conducted researches it is necessary to note organoleptic researches of organic dye (smell, color, taste, presence of pests, etc.), and also definition of moisture content in dye samples. The quality of the powder color was checked using the table of indicators ASTA (American Spice Trade Association). According to the standard method of ISO 7540- 2008 "Powdered ground paprika. Technical conditions "experiments were conducted to determine the presence and intensity of the smell of the dye.

During the experiment, 5 samples of pasta with different concentrations of dye powder were created, the color of which differed from light orange to red, depending on the content of dye. Made of pink bread, multi-colored buttery pastries, red scented candles.

Keywords: food industry, natural dye, paprika, organoleptic research, carotenoids.

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A NEW SPICE FOR UKRAINE IS SAFFRON

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ABSTRACT

Saffron is the most valuable and labor-intensive herbaceous plant, which is valued in gold in the modern world. Among all the spices in the world, saffron is known for its high value. However, its price is quite specific and changes every year, and also differs in the quality and origin of the spice. Iran is a producer and supplier of 90% of saffron in the world. But trends are changing. Since 2014, saffron has been grown in the south of Ukraine in the Kherson region. Currently, the sown area is 4 hectares. Yields over the years were 4-10 kg of stigmas, which were sold at a price of $ 5-10 per gram. Currently, saffron crops have spread to the West and East of the country. This is facilitated by the country's climate and the plant's resistance to drought and heat. In one place saffron crocus grows up to 8 years. Reproduction of saffron is very slow and only vegetative bulbs. This is due to the lack of sexual reproduction in plants, so breeding work with him is not conducted. About 50% of the world's crop losses are due to imperfect sanitary and phytosanitary conditions, which lead to diseases of planting material and the destruction of plants by disease. Another problem in saffron production in Ukraine is the small number of people who are ready to perform monotonous work. To obtain a large amount of crop, the crop is planted in open ground for sunlight, which also needs to be saturated with a large amount of nutrients. It takes about 250-350 man-hours to perform all operations manually, from planting bulbs to harvesting. One person in the production for 1 hour can collect the stigmas of a flower weighing 3-4 grams. The flower itself is collected early in the morning, when it has not yet opened, so not everyone will be able to cope with it. To do this, the worker must have certain skills and patience to perform monotonous work. In Ukraine, saffron is grown on a small scale, but it is only a matter of time. Every year the culture attracts more and more Ukrainian farmers with its amazing properties and value, so in the near future, the production of saffron in our country will be well established and will increase several times.

Keywords: saffron, productivity, price, Ukraine, costs.

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PEPPER AND SPICES PRODUCTION IN THE WORLD

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ABSTRACT

Spices have been an integral part of our food around the world. The word spice originates from French word espice. Spices are primarily used as food flavoring. Spices are used to add for aroma in cosmetics and incense. Spices were used to preserve the dead bodies as mummies found inside pyramid in Egypt for thousands of years. Spices have been used to cure different diseases in humans and animals since ancient times due to its excellent medicinal properties. It is often claimed that spices were used either as food preservatives or to mask the taste of spoiled meat, especially in the middle Ages. Spices are expensive due to its low production, rare, and exotic commodities, and their conspicuous consumption. Spices have been a symbol of wealth and social class in earlier times. World pepper production has stagnated around 3.5 million tons in the past decade. About 35% of total world production is contributed by Vietnam and is the largest producer of pepper in the world followed by India and Indonesia with about 16% shares each. The production as well consumption of pepper has declined in the past decade. As per the data published by the International Pepper Community, domestic consumption of pepper declined to about 42.5 thousand tons in 2011-12 from more than 60 million tons in the early 2000s.

Keywords: spice, pepper, ancient, world, production

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MECHANISMS AND ASPECTS OF FOOD PRESERVATION AND PROCESSING

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ABSTRACT

Food additives have been used for many years to preserve, flavour and colour foods, and have played an important and essential role in reducing serious nutritional deficiencies. Food additives help to assure the availability of wholesome, appetizing and affordable foods that meet consumer's demands from season to season while also helping to preserve food from spoilage from microorganism. Synthetic food additives react with the cellular component of the body leading to the various food disturbances (effects). To minimize the risk of developing health problems due to food additives and preservatives, one should avoid the foods containing these additives and preservatives. Purchase only organic foods, which are free from artificial additives. Many food additives are organic substances that are intentionally added to food in small quantities during production or processing to improve the organoleptic quality of the food. The food additives must be added in permissible amounts, concentration and should be within the acceptable daily intakes. When considering future developments concern needs to be given to the demands imposed on the industry by any changes to the regulations with respect to safety issues. Colour suppliers will continue to mirror the flavor industry by offering bespoke formulations and pre blends along with a comprehensive technical advice.

Keywords: Food Colour, Preservatives, Storage, Antimicrobial and Antioxidants

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PEPPER CULTIVATION AND WOMEN EMPOWERMENT IN NIGERIA: REVISITING RUTH AND BOAZ NARRATIVE

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ABSTRACT

Literature on how pepper cultivation can foster women's empowerment in Nigeria is scanty. In Nigeria, chilli, cayenne, habanero, and sweet peppers are some of the most popular peppers in the country. In Nigeria, pepper is an antioxidant and also a crucial source of vitamins and minerals in a country like Nigeria, where the usual diet is dominated by carbohydrates. Unfortunately, women are mostly involved in the cultivation and sales of pepper. But in recent times, most women are idle, preferring to stay at home without venturing into pepper cultivation, for gainful employment. This runs in opposition to what is obtainable in the Book of Ruth, where Ruth engaged herself in the cultivation of crops and it brought unprecedented help to her. Findings reveal that a lack of relevant knowledge in agricultural practice and new technologies and a lack of support from the government, banks, and philanthropists have greatly hampered the cultivation of pepper in Nigeria. This is the reason most women are dependent on men: they have nothing to do. This is the reason most women are manhandled and abused by their husbands, because their husbands know that they have no other source of income. Women's empowerment is a critical component of development and poverty reduction. There's no denying that empowered women improve the health and productivity of entire families, communities, and the country. Investing in women's empowerment, on the other hand, is critical for achieving long-term economic growth and other development goals. As part of the recommendation, women should start the cultivation of pepper at the subsistence level and develop it thereafter. Also, the government should assist women with financial empowerment.

Keywords: Pepper, women empowerment, Nigeria, Ruth, Boaz, Agriculture

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ETHNOBOTANICAL SURVEY ON TRADITIONAL KNOWLEDGE AND USE OF WILD FOOD PLANTS IN SIDI BENNOUR REGION (CENTRAL MOROCCO)

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Abstract

An ethnobotanical survey was conducted in the Moroccan province of Sidi Bennour, from February 2019 to February 2020, aiming to collect detailed information on the different traditional uses of wild food plants (WFPs). The survey was based on the Semi-Structured Interview method. A total of 200 interviews were conducted with the local population in the study area. The majority of the study population was women (86%), from rural areas (95%) and of over 40 years old. The results showed that a total of 71 plant species representing 66 genera and 33 families were used to make different food dishes. The most cited wild food plants families were *Asteraceae* (16%), followed by *Apiaceae* (13%) and *fabaceae* (8%). The leaves (36%) and stems (30%) were the most parts commonly used in food. Four utilization categories were cited, as vegetables, as spices, as drink and Other (plants used to decorate or flavor traditional dishes). The use of these WFPs as vegetables was the most cited mode of consumption (35%) by the local population. the majority of WFPs are used to prepare the *Beqoula* dish. this last is prepared by a combination of several plants collected at the young stage, cooked and added with spices such as ginger, turmeric, pepper and paprika to season the dish and improve its taste. The use of wild plants as a seasoning or spice is also appreciated by the people of this region. The preparation of spices is done by combining a group of plants. The major organ for preparing spices is the root. These spices are added to a range of traditional dishes used in winter as a means of warming the body and for the treatment of an important range of diseases such as cold and rheumatism. The study results showed also that local people have sufficient information on the safe use of WFPs. Moreover, the study population underlined the sharp decline in the consumption of most of the species recorded. Consequently, this study data draw attention to the urgent need to document in order to protect the knowledge related to the traditional uses of wild plant resources which constituted untapped potential as dietary supplements and therapeutic products.

Keywords: ethnobotanical survey, wild food plants, beqoula, Spices, Morocco

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GUT MICROBIOTA MEDIATES THE IMMUNOMODULATOR EFFECT OF DIETARY CAPSAICIN

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ABSTRACT

Background Dysbiotic gut microbiota has been identified as a primary mediator for triggering the chronic low-grade inflammation. The impact of capsaicin on gut microbiota has not been well studied. Growing evidences showed that the microbiota plays a fundamental role on the induction, training, and function of the host immune system. Capsaicin has attracted interest in the field of antimicrobial studies.

The objective of this study to assess whether the modulation of the gut microbiota induced by the administration of capsaicin has the immunomodulator effect. To determine whether the anti-inflammatory effect is related to the modulation of the gut microbiota.

Materials and methods The gut microbiota has numerous physiological and pathological interactions with the host, such as the chronic inflammatory state. The dietary Capsaicin induced increased levels of butyrate. Capsaicin significantly increased butyragenic bacteria and decreased lipopolysaccharide producing bacteria and lipopolysaccharide biosynthesis.

Results Therefore, our experiments showed that gut microbiota dysbiosis may reduce inflammation. Here, we found that the beneficial effects on inflammation of capsaicin treatment were associated with a modest modulation of gut microbiota. Capsaicin seems to have bacteriostatic activity against some Gram-negative bacteria. It also inhibits the formation of biofilm, which is essential for bacteria adhesion.

Conclusion These data suggest that the immunomodular effect of capsaicin is associated with a modest modulation of the gut microbiota. Our study has demonstrated the critical role of the gut microbiome in mediating the protective effects of capsaicin.

Keywords: capsaicin, chronic low-grade inflammation, gut barrier, gut microbiota

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"ADVANTAGES OF SPICES AND HERBS FOR HUMAN HEALTH NUTRITION AND RECOVERIES"

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ABSTRACT

Spices and herbs always have been used for centuries for cooking and medical requirements. Spices improve the taste, smell a colour of the food and beverages; it also helps to protect human health from severe, long-lasting disease. In the United States, more Americans bear in mind the use of spices for medical and therapeutic discoveries and their use in daily life. The Department of Agriculture of the United States reported that spices in the United States had been climbed up over the last half-century with spices such as ginger, chilli pepper etc. According to the Nutrition and Health inspection survey, an estimated 5-10 percent of the United States nationals use botanical additions like spices for their health benefits. In China, there was a survey based on eating spices, and it has been observed that people in China who eat spicy food 1-2 days a week were at an estimated 10% reduced risk of death, and people who eat spices seven days a week were at calculated 14% reduced risk of death. It has been proved that spices and various plants have antioxidant, anti-inflammatory, antitumorigenic, anticarcinogenic, glucose and cholesterol-lowering objects and activities, and favourable aspects that influence human thoughts, understanding and temper. Spices are foods with resources of bioactive molecules like sulphur-containing mixes, vitamins, and many organics. Spices and herbs such as clove, rosemary, sage, oregano, and cinnamon are phenomenal bases of antioxidants with their high substance of phenolic mixes. Spicy foods have things that save lives from early death, especially from cancer and ischemic cardiac diseases. However, it is also unclear about the specific role of spices and herbs in protecting human health against the making of chronic, noncontagious illnesses. This paper aims at possible health advantages of usually used spices and herbs such as chilli, pepper, cinnamon, black pepper, ginger, turmeric, rosemary, and garlic. The paper's outcome is to learn about the benefits of spices for developing human health and nutrition and protection against chronic illness. The document has been assumed through subordinate sources of data. Subordinate sources of data include academic articles, websites etc. The description of sources has taken the essay's method of reading, gathering in-depth insights on topics, exploring ideas, summarising, and

interpreting and mainly expressed in words (documentary analysis through qualitative approach). The feature question is, what are the consequences of spices in human lives in the context of health and safety?

Keywords: Chronic Diseases, Peeper, Plants, Medics of the United States, Health &Nutrition, Health &Beauty, Minerals, Inflammable, Ease, Antioxidation, Medicinal, Asia and Europe.

Introduction: Spices have consistently been recognized as a part of the culinary ethos[1] (Jiang, 2019). In the culinary industry, it has been a history from its beginning that the flavouring and colouring have been used to preserve food and used for medical purposes. The use of spices as food flavour is now a significant course globally. Spices do not only cover the colour of food, aroma, and flavour; it also used for the duration of chronic illness to help human beings for the maintenance of their health and beauty. Spices and herbs have been described in many countries based on their activities in disease curation, such as their role in protection against cardiovascular and neurodegenerative diseases. The U.S. Department of Agriculture[2] analyzed that the use of spices has increased in American lifestyles and the exploration of pills for diseases (Jiang, 2019). [3]U.S. National Health and Nutrition Examination Survey analyzed that an estimated 5 percent to 10 percent of adults in the United States have used botanical additions such as various spices for health consciousness. Especially for medicinal and therapeutic purposes, Americans prefer to use spices. [4]A survey has shown that half percentage of the people among 703 are interested in using spices to benefit their health and beauty. They use spices like ginger, estimated at 64 percent; garlic, estimated at 58 percent, cinnamon, estimated at 56 percent, to promote their good health (Jiang, 2019). They also expressed that positiveness has been found in the use of ginger, garlic, and cinnamon. [5]1/10 of the infants and children were given spices to cure coughs, stomach problems and colds. Culinary herbs and spices are those resources where bioactive molecules exist, such as sulphur mixing, tannins, vitamins etc. Spices like rosemary, cinnamon, and oregano, have an excellent percentage of antioxidants[6]. Research has found that spices have reduced tremendous rates of many diseases like cancer and heart diseases.

Literature Review: [7]The use of herbs and spices is a cultural bond of many societies. It has promoted cultural heritage (Williams, 2021). However, when spices and herbs have been used to benefit the human being in the context of health issues, it always brings challenges—particularly when compared to the criteria used to assess medicinal agents. Pharmaceuticals are shortened small-molecular-weight agents that are consumed. On the other side, food is consumed in many ways and comparatively large in highly entertained scenarios. The anticarcinogenic properties of many bioactive mixes found in herbs and spices have been exercised in animals. Therefore, it is now a time to participate in this data in humans to see any results detected in them and within cuisines. Research should be more accurate and in-depth based on long-term depletion behaviour. More particular guidelines should be provided to society regarding the role of a proper diet. [8]The benefits of spices have not been proven clinically. Therefore, the maintenance of traditionalism should be followed with concern (Gottardi et al., 2016).

Methodology: The paper has been assumed through subordinate sources of data. Subordinate sources of data include academic articles, websites etc. The description of sources has taken the method of writing the essay, reading, gathering in-depth insights on topics, exploring ideas, summarizing, interpreting, and mainly expressed in words (documentary analysis through qualitative approach). The article describes the contribution of spices and herbs to human health and beauty. Therefore, it is not only contributing to the deliciousness of food and beverages but also contributes to the duration of many diseases. It has described the benefits of spices and herbs as well. This paper also discussed the critical evaluation of the topic through a literature review.

[1] Health Benefits of Culinary Herbs and Spices. Introduction.
[2] Health Benefits of Culinary Herbs and Spices. Use and Knowledge of Spices and Herbals. Paragraph 1st.
[3] Health Benefits of Culinary Herbs and Spices. Use and Knowledge of Spices and Herbals. Paragraph 1st
[4] Health Benefits of Culinary Herbs and Spices. Use and Knowledge of Spices and Herbals. Paragraph 2nd.
[5] Health Benefits of Culinary Herbs and Spices. Use and Knowledge of Spices and Herbals. Paragraph 2nd.
[6] Health Benefits of Culinary Herbs and Spices. Biological Activities of Spices and Herbs Constituents. Paragraph 1st.
[7] Herbs and Spices Role in Human Health. Editorial, Paragraph 1st.
[8] Beneficial Effects of Spices in Food Preservation and Safety. Importance of Spices.

Result and Discussion: [9]According to Monica Auslander (Pagán, n.d), "Herbs and spices make food tastier while boosting your health." As a professor at the University of Miami, she also said that [10]"You should be cooking herbs and spices regularly and use several at a time" (Pagan, n.d.) Herbs are basil as a leaf of the plant, while cinnamon is considered a level of spices equipment. Therefore, [11]spices and herbs, cinnamon and basil, make foods flavour. [12]According to research, both basil and cinnamon are packed with healthy mixes, which may have health benefits. Scholar Moreno has expressed that "Herbs and spices fight inflammation and reduce damage to your body's cells because each one is rich in phytochemicals, which are healthful plant chemicals" (Pagan, n.d). Cinnamon and basil (Pagan, n.d.) are an example of spices and herbs. Generally, both herbs and spices[13] cut back on less healthy elements such as salt and sugar and add fat. According to scholar [14]Youdim, eating herbs and spices as food is the best activity instead of taking them in pill form. [15]Monero said that "food is an army" (Pagan, n.d.). Therefore, mixes of herbs and spices and other food help humans make healthy. It is the best option to find out which combination of herbs and spices is the best fil for individual health, according to Monero[16]. Some other spices can be thought to add as food. Such as Cardamom[17]. It is a sweet spice that has many pumpkin spice combinations. [18]Cardamom as a spice helps ease an upset abdominal and helps human health fight against inflammation. [19]According to Monero, Cardamom has high reserves of magnesium and zinc. Chilli peppers are another important spice for the benefit of health. [20]Powder like chilli will help to provide a thrill on food. They boost individuals' digestion and help to keep blood vessels well and strong. Capsaicin[21] , a combination of chilli peppers, make them spicy. Cinnamon as a spice is sweet but low in calories and sugar-free. [22]According to Monero, It is an easy finding and unexpensive spice example that can be added to everything, including tea and coffee (Pagan, n.d.). [23]Cinnamon helps with irritation and keeps away free die-hard staffs that can harm individuals' cells, and it helps fight against bacteria. Cinnamon helps to reduce diabetic disease and has the potential to become a healthy diet. But it is not a spice as an absolute diabetic cure, according to Monero[24]. Cocoa[25] seems like a bar of chocolate, but it is a spice with several healthy perquisites. The cocoa bean is crowded with flavonoids, which are antioxidants and have been shown to boost heart health. [26]Flavourings help reduce cholesterol and blood pressure and help make the heart healthy. [27]Cumin is another spice especially used for Indian cuisines. It is rich in iron (Pagan, n.d.). It may help to lose weight. Garlic is a plant which has a powerful mixture of allicin[28]. Garlic may help to lower heart disease. [29]Ginger is another spice which helps to solve upset stomach (Pagan, N.d.). [30]Rosemary is another herb that helps to protect against cell damage due to the mixture of antioxidants[31] . According to research, the mixture of 1,8-cineole with rosemary will help to boost brains activity. [32]Turmeric is a yellow spice. Turmeric is a good source of antioxidants[33] that simplify inflammation. Alzheimer's disease can be cured by eating turmeric every day. Vanilla paste is a modern herb for the next generation[34]. Vanilla paste has a similar benefit that comes from vanilla beans. It can be appetizing in a single colour dish such as sugar, cookies, etc. Epazote (Magee,

[9] Spices and Herbs That Can Help You Stay Healthy. Paragraph 1st.
[10] Spices and Herbs That Can Help You Stay Healthy. Paragraph 1st.
[11] Spices and Herbs That Can Help You Stay Healthy. Paragraph 2nd.
[12] Spices and Herbs That Can Help You Stay Healthy. Paragraph 3rd.
[13] Spices and Herbs That Can Help You Stay Healthy. Paragraph 3rd.
[14] Spices and Herbs That Can Help You Stay Healthy. Choose the Real Thing. Paragraph 1st.
[15] Spices and Herbs That Can Help You Stay Healthy. Choose the Real Thing. Paragraph 2nd.
[16] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 1st.
[17] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 2nd.
[18] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 3rd.
[19] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 3rd.
[20] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 4th.
[21] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 4th.
[22] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 5th.
[23] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 6th.
[24] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 7th.
[25] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 8th.
[26] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 8th.
[27] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 9th.
[28] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 10th.
[29] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 11th.
[30] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 12th.
[31] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 12th.
[32] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 13th.
[33] Spices and Herbs That Can Help You Stay Healthy. Best herbs for your health. Paragraph 13th.
[34] 6 Spices and Herbs You Should Be Using. Vanilla Paste.

n.d.) is a new herb used in American cooking. It has been used in Mexico as an herb and for medics for a long time. It is a favourite in Mexico for flavouring bean dishes and making herbal tea. [35] Epazote is a strong herb with powerful flavours like licorice (Magee, n.d.) that can be used in bean dishes and used on eggs, rice, soups, salads, and meat dishes. [36]Herbs of the province is a spice of five to six mixtures in Sunny province of France. This can be used as a rub on meat, fish etc. it can be useful for grilling food (Magee, n.d.). [37]It can be used to cook an omelet, vegetable dishes etc. [38]Peppermint (Jennings, 2021) is another spice that can help to improve mood, boost concentration, catch [39]IBS (irritable bowel syndrome) signs, and help reduce. According to the research, a minty aroma[40] helps to improve mood and reasoning. It also helps to soothe an upset adamant. Oregano (Jennings, 2021) is another spice in which small leaves help to improve nutrients and increase [41]vitamins K, E, calcium, iron, and fibre. Oregano improves heart health and fights against infection. [42]According to research by the American, one tablespoon of oregano has more antioxidant activity than a medium apple. Therefore, the antioxidant can reduce heart disease, stroke, and cancer. Black peppercorn[43] is another spicy which may reduce the risk of cancer, especially breast cancer (Jennings, 2021), lung cancer, and digestive tract, according to [44]an applied sciences review in 2019.

Conclusion: The feature question is, what are the consequences of spices in human lives in the context of health and safety? Spices have been essential for the wellbeing of humanity[45]. The use of spices is from ancient times. [46]Many scripts like The Bhagwat Gita, Epic of Gilgamesh described its uses doting ancient times. Spices have been used for mummying due to their preservative capabilities. Spices have helped to maintain the human body's humour. It has changed the physical looks of many foods. Turmeric and (Gottardi et al., 2016) pepper change the colour of the food; it changes the taste of the food. Ginger and cinnamon have improved absorption. Both have been considered suitable for anger and throat (Gottardi et al., 2016). According to FDA (U.S. Food and Drug Administration), spice is an[47] "aromatic vegetable substance in the whole, broken, or ground form, the significant function of which in food is seasoning rather than nutrition" (Gottardi et al., 2016). Estimated 100 types of spices are shaped globally. Cinnamon, pepper, nutmeg, cloves, and ginger are produced in Asia as the leader in the production of spices globally. While in Europe[48] , basil, celery, watercress, coriander grows. Therefore, the consequences of spices in human lives are enormous throughout their nutritious fulfillment, health, and benefit. Contemporary studies also emphasized the contribution of spices over antimicrobic, antioxidant, and anti-inflammatory areas.

[35] 6 Spices and Herbs You Should Be Using. Epazote.
[36] 6 Spices and Herbs You Should Be Using. Herbs de Provence.
[37] 6 Spices and Herbs You Should Be Using. Herbs de Provence.
[38] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Peppermint.
[39] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Peppermint.
[40] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Peppermint.
[41] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Oregano.
[42] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Oregano.
[43] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Black peppercorn.
[44] 9 of the World's Healthiest Spices & Herbs You Should Be Eating. Black peppercorn.
[45] Beneficial Effects of Spices in Food Preservation and Safety. Importance of Spices.
[46] Beneficial Effects of Spices in Food Preservation and Safety. Importance of Spices.
[47] Beneficial Effects of Spices in Food Preservation and Safety. Introduction. Paragraph 1st.
[48] Beneficial Effects of Spices in Food Preservation and Safety. Introduction.

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A WELLBEING REVIEW FOR THE BENEFITS AND WEAKNESSES OF PEPPERS AND CHILIES

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ABSTRACT

Hot peppers, or stews, get their hotness from a slick synthetic compound called capsaicin, observed essentially in the film encompassing the seeds. Capsaicin supports thermogenesis the cycle by which the body transforms calories into hotness to use for fuel in investigations on people and creatures. The impact is slight, be that as it may, and won't accelerate digestion to get more fit just by eating hot peppers. To shed additional pounds, Will have to adjust the calories take in with the sum consume actual work. A couple of food varieties energize thermogenesis, including protein food varieties, food varieties containing caffeine, green tea, and hot bean stew peppers. Because of hot peppers, nonetheless, would need to eat them consistently at an extremely high portion to get in shape, as indicated by an article in the American Journal of Physiology in 2018. Their impactful flavor makes this hard to do. Adding hot peppers to slim down upholds weight the board and in general great wellbeing since they are low-calorie and loaded with supplements; yet don't expect weight reduction results to be everything except humble, say the creators of a report distributed in Chemical Senses in 2021. Among different supplements presented by hot peppers are L-ascorbic acid, An and E and potassium. At the point when chomp into a hot pepper, may feel like mouth is ablaze. The TOP-TECH proposes drinking milk or eating curds to control the blazes. The casein in dairy food varieties overpowers the capsaicin and eliminates it from tongue. Essentially, bland food sources like bread can help put out the fire. Attempting to eat such many hot peppers on the double to accelerate digestion can blow up. Whenever acclimated with these fiery veggies, throat might enlarge, requiring clinical consideration. Likewise, body might see the peppers as poisonous and cause to upchuck so cautiously utilization of the pepper and chilies in food.

Keywords: synthetic, varieties, wellbeing, humble, supplements, acclimated, veggies, upchuck.

RELEVANCE OF BIOTECHNOLOGY ON NUTRITION: IMPLICATION FOR HUMAN HEALTH

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Abstract

Technology is a spectrum of science and engineering that embraces the use of tools and crafts to aid and improve on the quality of life. Technology has found its way into all fields of human endeavor. These include "State-of-the-art technology", "Medical technology" and "Biotechnology" to mention a few. Biotechnology has tremendously emerged as one of the sky rocking sectors in food and health industry today. It has made significant achievements in its application in the areas of healthcare, agriculture and many more. This studies is a descriptive design survey of the concept of biotechnology. The study evaluates the relevance of biotechnology on nutrition and how it affects human health. Questionnaires were given to 100 respondents using online Google form questionnaire instrument which were collated and subjected to reliability analysis. It was concluded that the application of biotechnology techniques would improve nutritional status and overall human's health.

Keyword: Biotechnology, Science, Tools, Nutrition, Health.

INTRODUCTION

For the first time in history, human beings are becoming the architects of life. Utilization of biological systems to design beneficial technologies for human welfare comes under the umbrella of biotechnology. The variety of traits introduced into crops are astonishing, including insect protection, delayed ripening, herbicide tolerance, modified oils, disease resistance and genetically altered foods. Increase in human population has given a big challenge to science to combat with food and health enhancement. With the initiation of biotechnological science a new world of science has opened the doors to overcome these challenges.

RELATED LITERATURE

As stated by Barış and Fatma (2015), Biotechnology has affected everyday life through its different inventions. Biotechnology products are found almost in all fields of life. In line with this, Knockaert et al (2015) opined that Biotechnology has opened a whole new world of science. The vast applications of Biotechnology are clearly seen all over in agriculture.

The introduction of Biotechnology crops have served as substitute over the use of pesticides. According to James (2012), the core objective of biotechnological crops are modest yield and grains. The introduction of genetically modified crops have resulted to valuable increase in the quantity and quality of the crops. This and many more techniques have been developed so as to aid the study of the genome of crops in general.

There is need for improvement in the yield of crops and vegetables like potato, wheat, corn, rice, sugarcane, cotton, chills, tomato and chickpea through conventional and non- conventional techniques (Ali et al., 2013; Ali et al., 2014; Ali et al.,2015; Dar et al., Javeed et al., 2014; Khan et al., 2014; 2014;Masood et al., 2015; Saeed et al., 2014; Waseem et al., 2014; Zameer et al., 2015;).

MATERIALS AND METHODS

This study adopted a descriptive survey approach to ensure appropriate and accurate analysis of data collated from the response of respondents gathered using online Google form questionnaire instrument. In order to ensure accurate reliability index, the drafted copies of questionnaire were subjected to Cronbach's alpha reliability analysis. The result of 0.76 gave a good reliability index of the instrument. The whole exercise was carried out at the space of two weeks.

RESULTS AND DISCUSSION

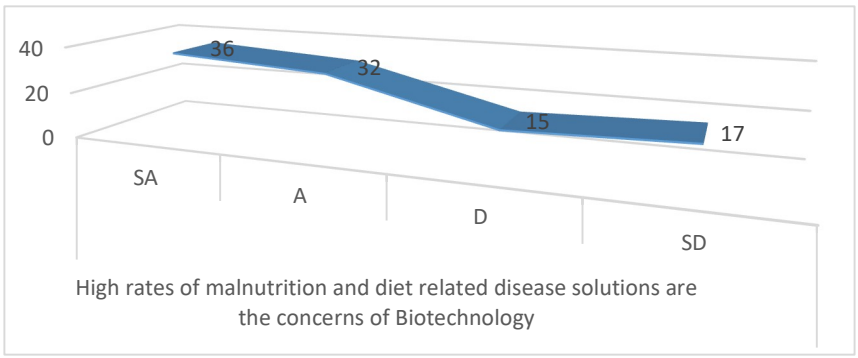

Fig 1: Analysis table

As shown in the graph plotted in Fig/ 1, the questionnaire instrument administered and collated from the response of 100 respondents depicts that the general concern of people all over the world is to find long lasting solution to the alarming rates of malnutrition and diet- related diseases. The table shows that majority of the respondents (i.e 36%) agree that foods with high levels of anti-nutritional components and toxicants have led to changes in the eating patterns, nutrition habits and invariably it affects human health negatively.

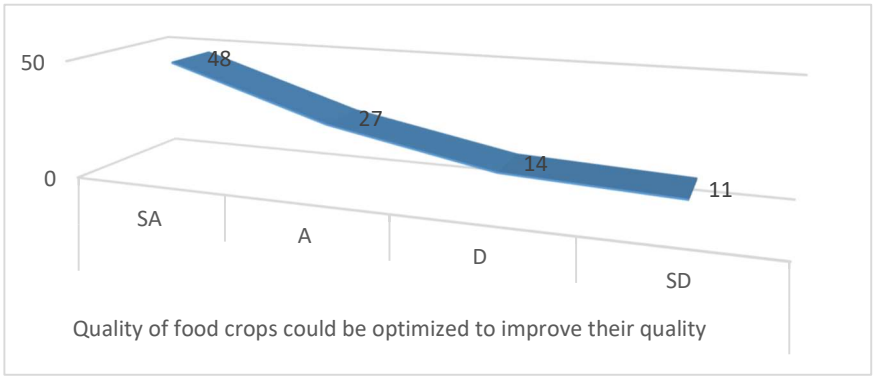

Fig 2: Analysis table

Fig. 2 seeks to illustrate that the reason for optimizing and modifying the quality of food crops is to improve their functionality in the areas of nutritional statue and improved health. This according to the respondents will help contribute to disease prevention and management.

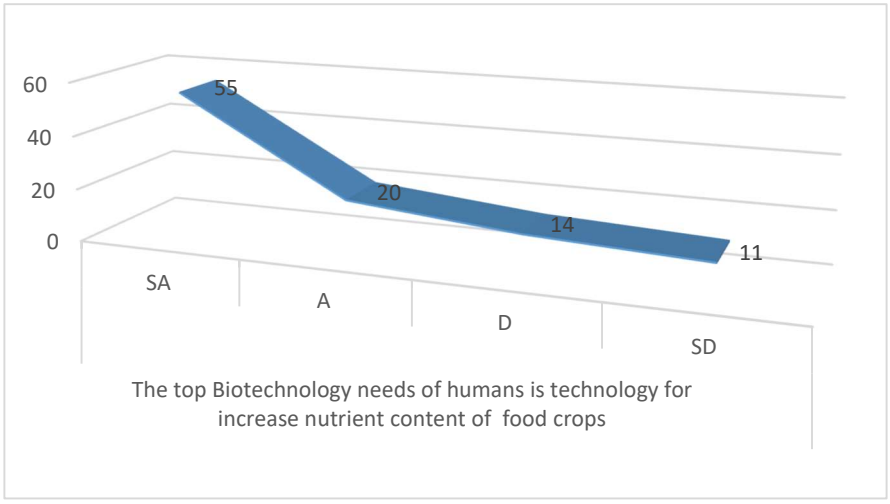

Fig 3: Analysis table

As suggested by a high proportion of the respondents in Fig. 3, the major needs of people all around the world is food crops with improved nutrients content. This they agree, can help to reduce aging process because food crops such as vegetables, legumes and grains contain physiologically beneficial bioactive compounds. They also added that some plants contain active compounds and antioxidants that can help protect and prevent against diseases and improve overall health.

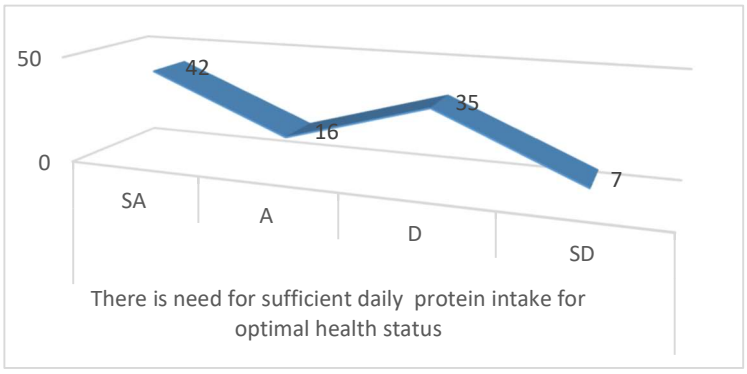

Fig 4: Analysis table

It is very essential to consume enough or adequate protein content in every day food so ensure balanced according to the graph in Fig 4 recorded from the respondents. Biotechnology is therefore a tool for genetic modification which is applicable so as to improve the availability and quality of protein in food crops.

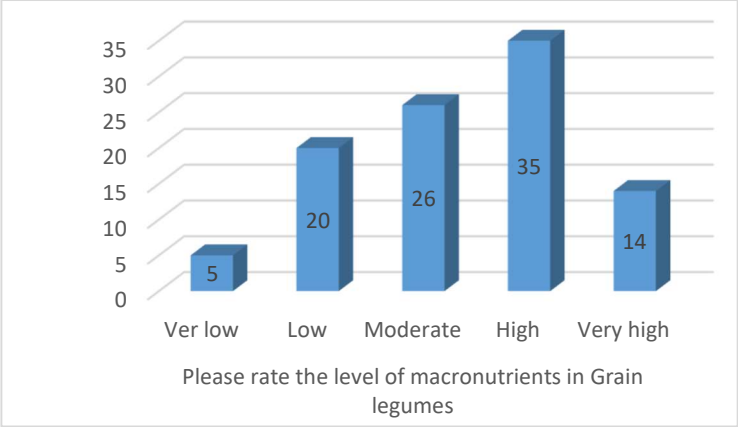

Fig 5: Analysis table

From the rating shown in Fig 5, it is very clear that grain legumes contain a very high levels of macronutrients. It should be noted that macronutrients. Legumes are said to contribute to enhanced food quality. It is therefore inferred that the consumption of legume is beneficial to improved human health.

ROLE OF BIOTECHNOLOGY IN FOOD AND NUTRITION

According to Shahidi (2009), consumers feed on food which fulfill their basic nutritional needs for a better health and disease prevention, this is as a result of the increase in consumers' level of awareness on the relationship between diet, health and disease prevention. The importance of functional foods cannot be over emphasis because they have some importance in the growth and development of rapidly growing number of people across the world. The main focus of biotechnology is not about extending human life span but to improve the quantity and quality of foods and their nutritional values.

CONCLUSION

Biotechnology have significantly helped in producing enriched food and nutrition. It has offers a range of tools to improve man's understanding on the management of genetic resources for food and Nutrition. It has aided the production of more functional foods with little or no adverse effect when compared to the traditional agricultural culture. These functional foods are said to have some impact on human health either positively or negatively.

Biotechnology have developed innumerous number of applications with maximum impacts in fields of medicine and public health. Biotechnology has immensely supported the well- being of consumers, helped in the sustainability farm products and has the power to improve human health globally.

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SPICES ARE THE BEST AT GROCERIES FOR FINE DISHES AND STRONG BODIES

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ABSTRACT

Piper longum offers us new lead molecules for drug improvement against various pharmacological targets. The plants covered on this own family are annual, continuous herbs or shrubs, native to the little northern part of the world. Piper longum is widely recognized for its medicinal and pharmaceutical importance.

The *Piper longum* or Pipali which was normally used for culinary purposes as a spice and as a seasoning is now part of the medicines as evidenced by several studies.

The fruit includes a wide variety of alkaloids and related compounds, the most important of which is piperine, along with methyl piperine.

The aim of this study is to explore the pharmacological variety of *Piper longum* by cannulation of the jugular and carotid veins in rats. And anti-inflammatory activities are evaluated on a version of the edema induced by carrageenin injection under the plantar fascia of the right hind paw of rats.

The anti-diabetic activity of Piper longum has been elucidated as an anti-hyperglycemic. Moreover, that ethanolic fruit extract is able to control hyperglycemia and diabetic complications in rats, this spice is one of the potential sources for the isolation of new anti-hypoglycemic agents. Anti-inflammatory controls suggest that *Piper longum* and paracetamol attenuate carrageenin-triggered edema.

Keywords: *Piper longum*; cannulation des rat; anti-diabetic activity; Anti-inflammatory activity

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IMPROVING MEAL EXPERIENCE AND HEALTH WITH HERBS AND SPICES: INTEGRATING DEDICATED SPICE DISPENSERS WITH TABLEWARE TO EAT AWAY FROM HOME

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ABSTRACT

It is commonly recognized that eating healthy food has a positive impact on people's health and wellbeing. Eating a well-balanced diet is crucial for maintaining physical and mental health. Even though most people are aware of the benefits of avoiding carbohydrates and sugars, they often overlook the impact that salt has on their diet. According to the World Health Organization, lowering salt intake is one of the most cost-effective measures to improve the population's health outcomes by contributing to reducing blood pressure and the risk of cardiovascular disease, stroke, and coronary heart attack. The use of dedicated herbs and spices is a simple technique to reduce salt intake without altering the taste of meals. Using such salt replacements to season food allows for tastier and more satisfying culinary experiences whilst contributing to disease prevention.

Considering current lifestyles, a significant number of persons usually prepare their meals at home to take with them to work or to school. Furthermore, having the opportunity to season low salt food with herbs and spices while eating may enhance the ultimate taste and experience. Current design proposals aim at presenting dedicated solutions to take along spices and herbs to be used alone, or in blends with the food to be eaten away from home. By integrating dedicated spice dispensers with specific tableware to eat at the workplace or in any outdoor location, the food seasoning may enrich the meal flavor and improve the eating experience. Given the high cost of particular herbs and spices, the designed dispensers allow for better organization and sealing to protect their organoleptic and quality properties.

Keywords: Tableware design, Healthy living, Spice dispensers, Meal experience.

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CURCUMIN: GOLDEN SPICE WITH THERAPEUTIC PROPERTIES

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Abstract

Curcumin (diferuloylmethane) is a low-molecular-weight hydrophobic polyphenol derived from turmeric that has a yellow colour (also known as curry powder). Because of its diverse biological qualities, it has been utilized for inflammatory ailments for years. It is commonly used as a spice and food coloring ingredient, and it also has a variety of biological properties. However, because curcumin has low systemic absorption, its pharmacology remains unknown yet. As curcumin is used commony and found in high concentration in the gastrointestinal system after oral ingestion, it may have a regulating influence on the gut microbiota. Curcumin is a promising natural component with several therapeutic potentials, including anticancer, inflammatory, metabolic disorders, central nervous system, respiratory, cardiovascular, gastrointestinal, and urogenital diseases. Curcumin thus modulates many targets (multitargeted therapy), which is required for the treatment of most diseases and has proved to be safe in human use. Curcumin's antibacterial and antiviral mode of action was recently examined and showed potential against many human infections such as influenza, HIV, strains of Pseudomonas, Staphylococcus, and Streptococcus, and hepatitis C. Despite its effectiveness, curcumin has yet not been approved as a therapeutic antiviral agent.

HEPATOPROTECTIVE EFFECT OF METHANOLIC ROOT EXTRACT OF *CURCUMA LONGA* (TURMERIC) AGAINST ACETAMINOPHEN-INDUCED HEPATOTOXICITY IN WISTAR ALBINO RATS

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ABSTRACT

Acetaminophen (paracetamol) is commonly used analgesic and antipyretic agent. At high dose, it may lead to undesirable side effects, such as hepatotoxicity. *Curcuma Longa* is an antioxidant possessing plant root that is used in medicines and is recommended for a variety of health conditions. The study was carried out to determine the hepatoprotective effects of methanolic root extract of *Curcuma Longa* (turmeric) against acetaminophen-induced hepatotoxicity. The qualitative, quantitatve, AAS and GC-MS analysis of *Curcuma Longa* (turmeric) extract were determined using standard procedures. Thirty Wistar rats were separated into six groups of five animals each. Group A serves as the control and was given water with normal rat chow for three weeks. Group B received 2g/kg body weight of paracetamol only, Group C received 2g/kg body weight of paracetamol and 200 mg/kg body weight of Vitamin. C. Group D received 2g/kg body weight of paracetamol and 200 mg/kg body weight of the extract. Group E received 2g/kg body weight of paracetamol and 400 mg/kg body weight of the extract while Group F received 2g/kg body weight of paracetamol and 600 mg/kg body weight of the extract. The methanolic root extract of *Curcuma Longa* shows the presence of secondary metabolites like: flavonoids, saponin, alkaloids, tannins, phenolic etc. Different compounds were identified using GC-MS analysis. Mineral analysis shows that turmeric contains non-essential and essential minerals. The data revealed that there were significant decrease ($P<0.05$) in the levels of plasma bilirubin, alkaline phosphatase (ALP) and gamma glutamyl transferase (GGT) and an increase in total protein and albumin in the treated groups and healthy individuals compared to group B animals. Hematological parameters (RBC, HGB, and HCT) significant increase ($p<0.05$) in the control group and the treated groups compared to the untreated group. This implies that the extract is not hematotoxic. The extract significantly ($p<0.05$) increases reduced glutathione (GSH), superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) values while malondialdehyde (MDA) reduces when compared to group B animals. Histopathological

evaluation of the liver architecture revealed that all the treated animals have reduced incidence of paracetamol-induced liver lesions. *Curcuma longa* extract ameliorate the effect of acetaminophen-induced hepatotoxicity in Wistar rats.

Keywords: acetaminophen, antioxidant, *Curcuma Longa*, hematological parameters, hepatoprotective effect, liver biomarker enzymes and histopathology

INFLUENCE OF GINGER EXTRACT ON STABILITY AND SENSORIAL QUALITY OF SMOKED MACKEREL (*Scomber scombrus*) FISH

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ABSTRACT

The effect of ginger extract on the stability and sensorial quality of smoked mackerel fish stored at 28 ± 2°C was determined over 20 days. Chemical, microbiological and sensory analyses were performed to investigate quality changes, and to determine the shelf stability of the products. The proximate, thiobarbituric acid (TBA) value, peroxide value (PV), mould count, and trimethylamine (TMA) were found statistically significant ($p < 0.05$) in the smoked mackerel fish throughout storage. Protein, fat and ash contents of the ginger extract treated samples had marked % increase compared to the control. The lowest TBA (0.08 mg MDA/kg), peroxide (4.50 mEq/kg) and TMA (3.46 mg N/100 g) values were recorded in 5% ginger extract treated samples, while the highest TBA (1.45 mg MDA/ kg), PV(30.07 mEq/kg) and TMA (15.52 mg N/100 g) occurred in the control. The result also revealed that samples treated with ginger extract had lower mould count than the control. The organoleptic results showed that samples treated with 5% ginger extract had the best acceptance, and were significantly different ($p < 0.05$) when compared to the control after 10 days of storage.

Keywords: Smoked mackerel fish, ginger, stability, quality, thiobarbituric acid.

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INFLUENCE OF RICE HUSK ASH ON COMPRESSIVE STRENGTH OF CONCRETE BY THE REPLACEMENT OF FINE AGGREGATES WITH QUARRY DUST

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ABSTRCAT

Concrete is versatile building substance which is utilized in almost all establishment works. The most important component of concrete is cement. Cement is a binder which is a material utilized in construction industry that solidifies, and clings or holds fast to other particles of different material to bind them together. Cement consumption is often heavily linked to the demand from the construction industry. Pakistan is the country where the utilization of cement is 225-250 kg per capita. We trust that the government could impel cement utilization by chasing guidelines that motivate industries and raise the housing and construction sector apart from expanding its development spending on infrastructure. In this research rice husk ash was used as a substitution of cement on a specific fixed percentage by 10% and quarry dust by partial replacing with sand varies with the percentages of 0%, 10%, 20%, 30%, 40% and 50%.After performing the mix design , the concrete was prepared with the mixing ratio of 1:2:4 and w/c of 0.5. Keeping in this view, an experimental study is conducted to reduce structure cost and make it more economical and feasible without compromising the strength and workability of concrete made by the replacement of cement with rice husk ash and sand with query dust. In this connection, thirty-six cylinders of mixes were prepared and curing was done at 7, 14, 21 and 28 days. Slump test was performed for all mixes which showed that as we increase the quantity of quarry dust the workability of concrete was reduced. Similarly, compressive strength test results showed that strength was increased initially but it was reduced by increasing the quantity of quarry dust. Test results showed that rice husk based concrete gives good strength at 30% to 40% replacement of sand with quarry dust.

Keywords: Recycled aggregate concrete, Rice husk ash, workability test, rapid curing, Compressive strength.

INORGANIC, ORGANIC AND BACTERIAL FERTILIZATION EFFECT ON MAIN CHEMICAL COMPOSITION AND YIELD OF PARSLEY

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ABSTRACT

In 2019, the research was carried out in pot experiments under semi-controlled conditions in the greenhouse of the Institute of Soil Science (Belgrade, Serbia), from the begining of March until the end of July. The experiment was performed with 3.0 kg of homogenized acid Lessivated Cambisol, and parsley (*Petroselinum crispum* (Mill.) Nym. ex A.W. Hill) as experimental crop, in three replications. The main purpose of this research was to investigate the effects of inorganic (NPK fertilizer, N:P:K = 15%:15%:15%), organic (liquid fish fertilizer) and mixed bacterial (*Enterobacter* sp. + *Klebsiella planticola*) fertilizers appliance on main chemical composition (N, raw proteins, P, K, Ca and Mg) and yield of parsley, the spicy herb chosen as it grows well in a well-drained soil of a pH around 6.0-7.0 and very acidic conditions could stunt its growth. The control was used as an untreated soil. Phosphorus (P) was determined by spectrophotometer, potassium (K) - by flame emission photometry, total nitrogen (N) and carbon (C) - using elemental CNS analyzer Vario EL III, while calcium (Ca) and magnesium (Mg) were determined by AAS. The content of raw proteins in dry biomass of parsley was calculated on the basis of N content. The plant biomass from each experimental variant was first air-dried and then the yield was measured. The results of the research indicated that all tested fertilization variants had statistically significant positive effect on all studied parameters, including yield, in relation to the control, whereby organic and mixed bacterial fertilizers was more effective than inorganic fertilizer. Concluding, studied liquid fish fertilizer and *Enterobacter* sp. + *Klebsiella planticola* mix have high potential in promoting the yield and main chemical growth parameters of parsley on acid soil.

Keywords: Parsley, Lessivated Cambisol, NPK, liquid fish fertilizer, bacterial mixed fertilizers.

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^{238}U, ^{232}TH, ^{40}K IN SPICES SAMPLES OF IRAQ

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ABSTRACT

In this study, natural radioactivity (^{238}U, ^{232}Th, ^{40}K) was measured in 19 spice samples (Ginger, salad seasoning, cress, onion powder, Chinese garlic, and Black seed) collected from different Iraqi markets. Samples were measured using NaI(Tl) detector. The results of the average value of the specific activity for ^{238}U, ^{232}Th, and ^{40}K in unit Bq/kg were 11.77±1.33, 8.30±0.61, and 233.82±5.69, respectively. The values of ^{238}U, ^{232}Th, and ^{40}K in all samples were within the acceptable limit (33, 45, and 420 Bq/kg) according to UNSCEAR 2008. Therefore, can be concluded that most spice samples in the present study are safe, from the health and environmental point of view.

Keyword: ^{238}U, ^{232}Th, ^{40}K, NaI(Tl), spice samples, and Iraqi markets.

1. INTRODUCTION

Food is known to contain natural and artificial radionuclides that, after ingestion, contribute to an effective internal dose. It has been estimated that a large portion, at least one eighth, of the mean annual dose due to natural sources is caused by the intake of food [1]. Average radiation doses to various organs of the body also represents important pathway for long term health considerations. ^{232}Th,^{238}U and ^{40}K are three long-lived naturally occurring radionuclides present in the earth crust. They generally enter human body through the food chain and also through the inhalation of the suspended dust in the air. When inhaled or ingested these elements accumulate in critical organs and deliver radiation doses. Thorium accumulates in human lungs, liver and skeleton tissues, uranium in lungs and kidney and potassium in muscles. Depositions of large quantities of these radionuclides in particular organs produce radiation damages, biochemical and morphological changes. This results in weakening of immune systems, development of various types of diseases/cancers and increase in mortality rate. The potential harmfulness is based on their long half-lives and chemical behavior (^{232}Th: 1.4×10^{10} yr, ^{238}U: 4.47×10^{9} yr and ^{40}K: 1.28×10^{9} yr). ^{232}Th is mainly radiotoxic, ^{238}U is both radiotoxic as well as chemically toxic whereas ^{40}K is radiotoxic as well as nutritionally important element [2]. Owing to the health risks associated with the exposure to indoor radiation, many governmental and international bodies such as the international commission on Radiological Protection (ICRP), the World Health Organization (WHO), etc. have adopted strong measures aimed at minimizing such exposures [3]. Spices and herbs are valued for their distinctive flavors, colors and aromas and are among the most versatile and widely used ingredient in food preparation and processing throughout the world. The main objective of this study is therefore to determine the activity concentration levels of ^{226}U, ^{232}Th, and ^{40}K in some spices, consumed by the population of Iraq, to ensure that food safety is not compromised and that the external and internal effective doses are within the specified safety limits. The purpose of this work is to measure the natural radioactivity of ^{238}U, ^{232}Th, ^{40}K in spice samples collected from Iraqi markets using NaI(Tl) gamma ray spectroscopy.

2. METHODOLOGY OF RESEARCH

2.1. Collections of Samples

This study includes 19 types of spice samples (Ginger, salad seasoning, cress, onion powder, Chinese garlic, and Black seed), these samples were collected from different sites of Iraqi markets. The Spice samples were labeled with special codes. The information complete about samples was written, as shown in Table 1.

TABLE 1. Spice samples in the present study

No.	Sample code	Traditional name	Country of origin
1	A1	Ginger	India
2	A2	salad seasoning	Iraq
3	A3	Cress	Syria
4	A4	onion powder	Iraq
5	A5	Chinese garlic	Chain
6	A6	Black seed	Syria
7	A7	Mustard	India
8	A8	Dried Limon	Iraq
9	A9	Iranian garlic	Iran
10	A10	Pomegranate peel	Iraq
11	A11	Pickled spice	Iraq
12	A12	Kibbeh spice	Iraq
13	A13	Alum	Syria
14	A14	Clove	China
15	A15	Grill spice	Iraq
16	A16	Curry	India
17	A17	Kofta spice	Iraq
18	A18	Oats	Iraq
19	A19	Rosmary	Iran

2.2. Preparations of Samples

Spice samples were taken from different Iraqi markets. Samples were kept in polyethylene bags and then marked with the collection location and date for each sample. The samples were heated in an oven at 100 ^{o}C for about 2 h to remove moisture, the samples were pulverized several times using a hand mill and sieved to obtain a homogeneous powder. The weight of these samples was 750 gm. Then the samples were packed in Marinelli beakers (1 L) of constant volume, in order to obtain a geometric homogeneity around the detector. Next, Marinelli beakers with samples were closed and stored for about one month before counting to obtain secular equilibrium between ^{226}Ra and ^{222}Ra [4].

2.3. Measurement System

In this study, Our measurements of specific activity for ^{238}U, ^{232}Th, ^{40}K were using a gamma-ray spectrometer system (ORTEC company) that contains three main part; NaI(Tl) detector with "3×3" dimension, MCA with 4096 channel, and software program (MAESTRO-32) into the PC. An energy calibration and efficiency in NaI(Tl) detector were determined using standard gamma-ray sources from USNRC and State License Expert Quantities, "Gamma Source Set", Model RSS–8. Also, it is found that the energy resolution of NaI(Tl) detector was 7.9% for ^{137}Cs standard source (661.66 keV). The specific activity of three radionuclides was detected according to secular equilibrium property. They included: the radionuclide that belongs to the Uranium-238 series was (^{214}Bi, 1764.5 KeV); the radionuclide that belongs to the Uranium-232 series was (^{208}TI, 2614 KeV), and the radionuclide that belongs to the single series (^{40}K, 1460 KeV) [5].

2.4. Theoretical equations

The specific activity (A) was estimated using to the equation [6]:

$$A\left(\frac{Bq}{kg}\right) = \frac{N - B}{t \times \varepsilon \times I\gamma \times m}$$

where, N and B are the areas under photopeak for samples and background, respectively. t is counting time (18000 sec), ε is the efficiency of the detector, I_γ is the probability of gamma emission, and m is the mass of sample.

3. RESULTS AND DISCUSSIONS

Table 2, represents the results of specific activity for ^{238}U, ^{232}Th, and ^{40}K in Spice samples that collected from different Iraqi markets. According to the results, specific activity of ^{238}U were ranged from 6.29+0.72 Bq/kg to 20.11+1.78 Bq/kg with an average value of 11.77±1.33 Bq/kg, for ^{232}Th ranged from 3.73+0.31 Bq/kg to 14.01+0.81 Bq/kg, with an average value of 8.30±0.61Bq/kg, and for ^{40}K ranged from 126.18+4.05 Bq/kg to 414.26+7.58 Bq/kg, with an average value of 233.82±5.69 Bq/kg. Also from table 2, the highest values of specific activity for ^{238}U, ^{232}Th, and ^{40}K was in A18 (Oats; original of Iraq) and the lowest value was in A9 (Iranian garlic; original of Iran). Natural radioactivity of gamma-ray emitted from all types of spice samples in present study were compared with world limit (33 Bq/kg for ^{238}U, 45 Bq/kg for ^{232}Th, and 420 Bq/kg for ^{40}K) that reports from UNSCEAR 2008 [7]. All the results of ^{238}U and ^{232}Th were within the permitted UNSCEAR 2008 [7], also, the results of ^{40}K were within the permitted UNSCEAR 2008 [7]. These increasing the levels in ^{40}K for some samples may be because of these samples treated by high levels with chemical fertilizers that usually it is contains high concentrations of potassium-40. The specific activities of ^{238}U, ^{232}Th, and ^{40}k have different values in each sample of the study, this difference can be attributed to a difference in the geological nature of soil that grown these spice samples under study.

TABLE 2. Results of ^{238}U, ^{232}Th, and ^{40}K in spice samples in present study.

No.	Sample code	The specific activity Bq/m^3					
		^{238}U		^{232}Th		^{40}K	
		Average	±S.D	Average	±S.D	Average	±S.D
1	A1	10.96	1.18	8.7	0.64	342.01	6.89
2	A2	12.78	1.31	8.69	0.66	177.62	5.1
3	A3	10.94	1.19	7.42	0.59	229.83	5.68
4	A4	20.11	1.78	5.71	0.57	409.15	8.37
5	A5	16.84	1.75	7.18	0.69	235.09	6.81
6	A6	13.18	1.35	10.13	0.72	238.66	6.01
7	A7	9.03	1	4.24	0.41	134.83	4.02
8	A8	9.65	1.03	7.81	0.56	291.62	5.9
9	A9	6.29	0.72	7.42	0.47	114.38	3.21
10	A10	7.12	0.9	9.53	0.63	148.89	4.32
11	A11	13.79	1.37	12.46	0.79	167.76	4.97
12	A12	14.41	1.4	5.14	0.51	277.96	6.42
13	A13	14.01	1.43	8.2	0.66	205.23	5.71
14	A14	8.91	0.78	3.73	0.31	131.22	3.14
15	A15	18.38	1.62	11.12	0.77	341.08	7.31
16	A16	11.02	1.15	8.57	0.61	381.36	7.06
16	A17	9.99	1.13	8.6	0.64	224.4	5.6
18	A18	8.9	1.06	14.04	0.81	414.26	7.58
19	A19	7.49	0.94	9.21	0.63	126.18	4.05
Average		11.77		8.3		233..82	

4. CONCLUSION

In the light of the results described in the present study, we found the results of the specific activities of ^{238}U, ^{232}Th, ^{40}K in in spices samples that collected from different markets in Iraq were within the world average values which have been identified by specialized scientific committees and organizations such as (UNSCEAR 2008). So, all samples are safe for human consumption.

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PECULIARIDADES DE LOS ENVASES MINORISTAS DE ESPECIAS EN LOS ESTADOS POSTSOVIÉTICOS

PECULIARITIES OF SPICES RETAIL PACKAGING IN POST-SOVIET STATES

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RESUMEN

En la mayor parte del territorio de los estados postsoviéticos, la gente usaba: pimienta roja y negra, laurel, eneldo y perejil todavía secos, algunos tipos de hierbas: tomillo, hojas de grosella, ajo, cebollas verdes finamente picadas. Todas estas especias se almacenaron en frascos y se usaron para el propósito previsto. Es decir, en los días de la URSS había un surtido muy limitado y no había absolutamente ninguna cultura de embalaje industrial. También en la época soviética, las mezclas nacionales de hierbas eran populares localmente, como la mezcla georgiana Khmeli suneli. o la tradicional mezcla de especias armenias.

A pesar de que han pasado más de 30 años desde entonces, la mayoría de los exsoviéticos y sus hijos todavía no están acostumbrados a comer muchas de las especias conocidas en todo el mundo. Por eso la clave no es solo la calidad de las especias, la comodidad de su molienda, sino también el tipo y diseño de su envase.

El diseño más atractivo se crea para los envases de consumo, que terminan en el estante de la cocina. Hay muchas opciones de envasado de especias para clientes minoristas, pero la mayoría son opciones bastante caras, lo que a su vez hace que las especias sean mucho más caras. Para evitar un aumento excesivo del precio de las especias en el mercado de los países postsoviéticos, se utilizan con mayor frecuencia bolsas flexibles impresas. Son fácilmente accesibles, buenos para imprimir y livianos. Además, son económicos de fabricar y la laminación o película es fácil de cambiar con fines comerciales.

Las bolsas flexibles están disponibles en una variedad de formas: 3 o 4 lados sellados, de pie, almohada, pirámide y barra. Dichos paquetes se ven con mayor frecuencia en los supermercados diseñados para el público en general: especias económicas para todos, en una pequeña cantidad. A veces, el envase está provisto de una tira especial con cremallera que le permite cerrar la bolsa después de su uso para mantener la hermeticidad y reducir la volatilización del aroma.

También hay tendencias en el desarrollo del diseño de envases para especias: se suma una apariencia estética a la facilidad de uso y almacenamiento adecuado. Algunas opciones de empaque nuevas incluyen ofrecer dos o más especias en un solo paquete. Se complementan entre sí, y es conveniente que los chefs utilicen especias recolectadas en un solo lugar en lugar de varios paquetes.Otro atractivo sistema permite que el evasado de especias de forme parte de la decoración de la cocina. Por ejemplo, hay paquetes que imitan manojos de hierbas frescas; estos paquetes se pueden colgar en ganchos.

Sin embargo, la mayoría de los diseñadores ofrecen imágenes de frascos de vidrio, diseño con la estética de las telas naturales y etiquetas con fuentes elegantes. La imagen de la tela de yute, la imitación gráfica de las inscripciones de tiza, los colores naturales están diseñados para crear una sensación de calidez y comodidad, que es lo que se requiere en el interior de la cocina.

También puede encontrar a menudo envases de concepto de 'escaparate', el diseño es extremadamente minimalista y consta de una gran inscripción del nombre de la especia en la parte superior, así como una

"ventana" transparente que ocupa casi todo el envase y demuestra la especia o su mezcla a un comprador potencial.

Otra tendencia es el brillo y el atractivo de los envases. En este caso, se invita al consumidor potencial al brillante y desconocido mundo de las nuevas especias. Por lo general, todas las especias envasadas de esta manera en el anverso contienen un fondo brillante en el que se representa la especia en sí, y en la parte posterior del paquete puede leer el texto que lo acompaña sobre qué tipo de especia es, cómo y dónde puede utilizarse en la cocina.

Por lo tanto, en el mundo de las especias, no existen reglas estrictas, más allá de las restricciones razonables de almacenamiento. El diseño del empaque para especias y condimentos puede ser cualquier cosa, depende de la audiencia a la que se dirija el fabricante.

Palabras clave: especias, envases, estados postsoviéticos, diseño de envases paquetes, bolsas flexibles .

ABSTRACT

In most of the territory of the post-Soviet states people used: red and black pepper, bay leaf, still dried dill and parsley, some sorts of herbs: thyme, currant leaves, garlic, finely chopped green onions. All these spices were stored in jars and used for their intended purpose. That is, in the days of the USSR there was a very limited assortment and there was absolutely no culture of industrial packaging. Also in Soviet time, national blends of herbs were locally popular, such as the Georgian Khmeli suneli mixture or the traditional Armenian spice mixture.

Despite the fact that more than 30 years have passed since then, most of the former Soviet people and their children are still not used to eating many of the spices familiar to the whole world. That is why the key is not only the quality of spices, the convenience of their grinding, but also the type and design of their packaging.

The most attractive design is created for consumer packaging, which ends up on the shelf in the kitchen. There are many packaging options for spices for retail customers, but most of them are quite expensive options, which in turn makes the spices themselves much more expensive. To avoid an excessive rise in price of spices in the market of post-Soviet countries, printed flexible bags are most often used. They are easily accessible, good for printing, and light in weight. In addition, they are economical to manufacture, and the lamination or film is easy to change for marketing purposes.

Flexible pouches are available in a variety of shapes: 3 or 4 sided sealed, stand-up, pillow, pyramid, and stick. Such packages are most often seen in supermarkets designed for the mass public - inexpensive spices for everyone, in a small amount. Sometimes the packaging is provided with a special zip-strip that allows you to close the bag after use to maintain the tightness and reduce the volatilization of the aroma.

There are also trends in the development of packaging design for spices: an aesthetic appearance is added to ease of use and proper storage. Some new packaging options include offering two or more spices in one package. They complement each other, and it is convenient for chefs to use spices collected in one place instead of several packages.

Another attractive system allows the packaging to be part of the decor of the kitchen. For example, there are packages that imitate bunches of fresh herbs - such packages can be hung on hooks.

However, most designers offer images of glass jars, design in the aesthetics of natural fabrics and labels with elegant fonts. The image of jute fabric, graphic imitation of chalk inscriptions, natural colors are designed to create a feeling of warmth and comfort, which is what is required in the interior of the kitchen.

You can also often find 'showcase' concept packaging, the design is extremely minimalistic and consists of a large inscription of the name of the spice on top, as well as a transparent “window” that occupies almost the entire package and demonstrates the spice or their mixture to a potential buyer.

Another trend is the brightness and catchiness of packaging. In this case, the potential consumer is invited to the bright and unknown world of new spices. Usually, all spices packaged in this way on the front side contain

a bright background on which the spice itself is depicted, and on the back of the package you can read the accompanying text about what kind of spice it is, how and where it can be used in cooking.

Thus, in the world of spices, there are no strict rules, other than reasonable storage restrictions. The packaging design for spices and seasonings can be anything, it depends on what audience the manufacturer is targeting.

Keywords: spices, post-Soviet states, packaging, flexible bags, design of packaging.

STUDY ON PHENOLIC COMPOUNDS AND ANTIOXIDATIVE PROPERTIES OF SOME ORIGANUM VULGARE L. EXTRACTS

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ABSTRACT

Origanum vulgare L. (oregano, wild marjoram), an herbaceous Mediterranean species of the Lamiaceae family, it is mainly used as an ingredient culinary but also for its therapeutic properties. *Origanum vulgare* L. has a complex chemical composition consisting of volatile oil, polyphenols (flavonoids and phenolic acids), triperpenoids, sterols and mineral substances, active principles that confer a complex pharmacological action among which we can mention antispasmodic, anti-inflammatory, antiproliferative, neuroprotective, anxiolytic sedative, antiviral, antimicrobial and antioxidant action. The research presented in this paper has a purpose obtaining selective fractions enriched in phenolic compounds and in vitro investigation of of the antioxidative properties. The crude extracts and then selective fractions, were obtained by employing the Soxhlet extraction method, with various solvents (methyl chloride, ethyl acetate, ethyl alcohol), procedure followed by filtration at normal pressure and concentration the crude extracts by roto-evaporation under vacuum. After obtaining the selective fractions, by UV-VIS (Jasco, Japan, V-570 spectrophotometer) spectrometric method were determined the total phenolic contents (TPC) expressed as gallic acid equivalent/g (mg/GAE g^{-1}) using the Folin-Ciocalteu reagent, total flavonoid contents (TFC) expressed as rutin equivalent/g (mg/RE g^{-1}), by aluminum chloride colorimetric assay and the caffeic acid derivatives content (CAD_C) expressed as mg caffeic acid equivalent/g dry extract (mg/CA g^{-1}) by using Arnows' reagent in according with according to the procedure described in European Pharmacopoeia 6th edition. The antioxidative properties were investigated in vitro non cellular assays, by: ABTS (2,2′azinobis-(3-ethylbenzthiazoline-6-sulfonic acid), DPPH(2,2-diphenyl-1-picrylhydrazyl) free radical scavenging, and chemiluminescence(CL) technique, in aminophthalhydrazide-hydrogen peroxide system, at pH 8.5. The results obtained respectively, the high antioxidant activity, as well as the content of polyphenolic compounds existing in *Origanum vulgare* L. extracts, prove that they are an important natural source for pharmaceutical products and also for the preservation of different food or demato-cosmetics.

Keywords: *Origanum vulgare* L., phenolic compounds, antioxidative properties, chemiluminescence.

ANTIOXIDANT ACTIVITY OF CAPSICUM ANNUUM L. EXTRACTS OBTAINED BY SUPERCRITICAL FLUID EXTRACTION

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ABSTRACT

Supercritical fluid extraction (SFE) represents an ecological, economical and non-toxic technology for obtaining plant extracts, based on supercritical fluids, as an alternative to organic solvents to extract the chemicals active principles from a vegetal matrix. In this paper has been used the SFE technology to obtain polyphenolic fractions extracted from *Capsicum annuum* L. (Family Solanaceae). In the application of SFE technology, was used ethanol as a co-solvent and carbon dioxide (≥99.99%, Linde Gas Romania) as a supercritical fluid, because it has several advantages: non-toxic, non-inflammable, non-explosive, including mild critical conditions (31.1°C and 73.8 bar), which makes it the ideal solvent for vegetal products, because it does not involve thermal degradation during extraction. *Capsicum annum* L. it is an important vegetable source having a complex phytochemicals composition (capsaicinoids, vitamin C, vitamin E and carotenoids, polyphenols, essential oils, minerals), that gives flavor, aroma and color to foods, as well as multiple therapeutic uses, such as the treatment of cough, throat, parasitic infections, rheumatism, wound healing, being also used as an antiseptic, counter irritant, appetite stimulator, antioxidant and immunomodulator. *Capsicum annum* L. extracts obtained by SFE, were characterized from a physico-chemical point of view (color, density by pycnometer method, pH by potentiometric method) and by UV-VIS (Jasco, Japan, V-570 spectrophotometer) spectrometric method for evaluation the total phenolic contents (TPC) expressed as gallic acid equivalent/g (mg/GAE g^{-1}) using the Folin-Ciocalteu reagent, the total flavonoid contents (TFC) expressed as rutin equivalent/g (mg/RE g^{-1}), by aluminum chloride colorimetric assay and the caffeic acid derivatives content (CADC) expressed as mg caffeic acid equivalent/g dry extract (mg/CAg^{-1}) by using Arnows' reagent. The antioxidant activity were investigated *in vitro* non cellular assays, by: DPPH(2,2-diphenyl-1-picrylhydrazyl) free radical scavenging, ABTS (2,2′azinobis-(3-ethylbenzthiazoline-6-sulfonic acid), and chemiluminescence(CL) technique, in aminophthalhydrazide-hydrogen peroxide system, at pH 8.5. The results obtained for antioxidant activity and the amount of phenolic compounds find, recommend their use SFE extracts, for exploitation both in nutrition and for development of new pharmaceuticals.

Keywords: *Capsicum annuum* L., supercritical fluid extraction, DPPH, ABTS, chemiluminescence

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EFFECT OF HEAT TREATMENT OF SOME SPICES FROM THE ROMANIAN MARKET ON TOTAL PHENOLIC AND ANTIOXIDANT ACTIVITY OF THEIR EXTRACTS

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ABSTRACT

Spices and herbs represent rich sources of powerful antioxidants. Spices and herbs have been used for flavour, colour and aroma since ancient times. The spices and herbs have been used as antioxidants as whole or ground spice/herb, extracts, encapsulated or as emulsions. When added to foods, antioxidants control rancidity development, retard the formation of toxic oxidation products, maintain nutritional quality, and extend the shelf-life of products. Due to safety concerns and limitation on the use of synthetic antioxidants, natural antioxidants obtained from edible materials, edible by-products and residual sources have been of increasing interest.

More than 5000 years ago, the ancient Egyptians used spices and herbs in their food, for medicinal purposes and for mummification in which they used a mixture of spices such as cumin, cinnamon and onion, among others.

Spices and herbs are rich sources of phytochemicals. Phytochemicals represent a large group of bioactives derived from plants with potential protective effects against diseases. This group consists of flavonoids and other phenolic compounds, carotenoids, plant sterols, glucosinolates and other sulphur-containing compounds.There are more than 6000 known flavonoids. Phenolic compounds exhibit various functions in the plant such as structural, defence, as attractants for pollinators and seed-dispersing animals. Plants also produce these substances to protect themselves against UV light for their survival and for adaptation to their environment.

Plant phenolic compounds are expected to play a role for chemo preventive action of cancer, chronic disease and coronary heart diseases. They can act as free radical scavengers and metal ion chelators and are widely used as antioxidants. Some of them have a higher antioxidant activity than the common antioxidants, vitamins C and E. Among polyphenols, caffeic acid, ferulic acid and vanillic acid are widely distributed in the plant kingdom.

Changes in the antioxidant activities and the total phenolic content of seven spices, namely basil (*Ocimum basilicum*), black pepper (*Piper nigrum*), clove (*Syzygium aromaticum*), cinnamon (*Cinnamomum cassia Presl*), oregano (*Oreganum vulgare*), thyme (*Thymus vulgares*) and sage (*Salvia officinalis*) were determined for different heating times (0 h, 1h, 2h and 4 h) at $+90^0$C. Untreated spices served as control. Results show that heat treatment of spices influenced antioxidant activity of their extracts.

Keywords: spices, total phenolic, antioxidant activity