Sarajevo

ICABB 2017 CONGRESS

International Congress on Advances in Bioscience and Biotechnology

BOOK OF ABSTRACTS

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Dear Scientist,

The first International Congress on Advances in BioScience and Biotechnology (icabb) was organized in Sarajevo / Bosnia and Herzogoniva. We are very happy for organizing this congress in such a beautiful city and country that we have strong historical ties.

We wanted to make this conference little bit special by bringing scientist together from different disciplines of bioscience area and also to open new research and cooperation fields for them. In this sense, we desired to bring the distinguished scientist together to get know each other and to develop and implement new joint projects.

The scientist joined the congress was from different country and mostly from Turkey. The total number of submission were 103 and after a careful evaluation 82 submissions were accepted by our scientific committee and 23 of them were accepted as poster presentation and 59 of them were accepted as oral presentation and all those presentation was taken place in the conference booklet.

We would like to send our special thanks to Mr. Musa Köse and Mr. İsmet Uzun, ZENITH Group workers for their special efforts. And finally the most importantly I would like to thank to all the participants individually who came from far away to join this conference.

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PROGRAM OVERVIEW	
October 25, 2017	
	Airport transfers (Only for BLUE - GREEN - ORANGE PARTICIPANTS ID HOLDERS)
16:00-21:30	Sarajevo City Tour (Only for BLUE PACKAGE ID HOLDERS) MEETING IN THE HOTEL LOBBY
October 26, 2017	
08:00-09:30	Registration
09:30-09:45	Opening remarks - Welcome address - Opening speech
09:45-10:15	Plenary Session - **Prof. Dr. Özcan Erel -** Invited Speaker
10:15-10:30	Break Coffee &Tea
10:30-11:30	Session 1
11:30-11:50	Break Coffee &Tea
11:50-12:50	Session 2
13:00-14:00	LUNCH IN THE HOTEL RESTAURANT (Only for BLUE - GREEN - ORANGE Package ID Holders)
14:00-14:50	Session 3
14:50-15:10	Break Coffee &Tea Poster Session I
15:10-16:00	Session 4
16:00-16:20	Break Coffee &Tea Poster Session II
16:20-17:10	Session 5
17:10-17:30	Break Coffee &Tea Poster Session III
17:30-18:20	Session 6
19:30-20:30	Dinner in the Hotel Restaurant (Only for BLUE PACKAGE ID HOLDERS)
October 27, 2017	
08:00-09:00	Breakfast (Only for Blue and Green Package ID Holders)
09:00-09:50	Session 7
09:50-10:10	Break Coffee &Tea Poster Session IV
10:10-11:00	Session 8
11:00-11:20	Break Coffee &Tea Poster Session V
11:20-12:00	Session 9
12:00-13:30	Lunch (Only for BLUE - GREEN - ORANGE PARTICIPANTS ID HOLDERS)
13:30-14:20	Session 10
14:20-14:40	Break Coffee &Tea Poster Session VI

14:40-15:20	Session 11
15:20-15:40	Break Coffee &Tea Poster Session VII
15:40-16:10	Session 12
16:30-17:00	Closing Session: Closing remarks - Announcements - Closing speech
20:00-22:00	Gala Dinner (Only for BLUE - GREEN - ORANGE PARTICIPANTS ID HOLDERS) MEETING IN THE HOTEL LOBBY
October 28, 2017	
Social Cultural Tour to Mostar - Blagaj - Pocitelj (Only for BLUE PACKAGE ID HOLDERS)	
08:00	Breakfast (Only for Blue and Green Package ID Holders)
08:30	Departure from the Hotel
13:00	Lunch
19:00	Dinner
21:00	Departure to the Hotel
October 29, 2017	
08:30	Breakfast (Only for Blue and Green Package ID Holders)
09:00 - 12:00	Tunnel of Hope and Vrelo Bosna Tours
	Departures to Airport (Only for BLUE - GREEN - ORANGE PARTICIPANTS ID HOLDERS)

ORAL PRESENTATIONS OCTOBER 26, 2017

in honour of Prof. Özcan Erel

SESSION I

	Chairmans: Prof. Dr. Özcan Erel - Prof. Mustafa Numan Bucak
10:30	20 - Overexpression of PHAC1 gene encoding PHA synthase 1 in Pseudomonas aureofaciens for overproduction of mcl-PHA. **Emre Erden**, Serap Evran, Nurdan Kasıkara Pazarlıoğlu.
10:40	26 - Association of MnSOD gene polymorphism and SOD activity and the risk of coronary artery disease in patients with non-diabetic metabolic syndrome. **Seda Güleç Yılmaz**, Atike Tekeli Kunt, Orhan Fındık, Selim İsbir, Turgay İsbir.
10:50	39 - The effect of ankaferd blood stopper and polyvinyl pyrrolidone on the model organism. **Mehmet Okan Erdal**, Eda Güneş, Lokman Gemi.
11:00	60 - D-lactic acid production from corn cob using L-LDH gene deficient Lactobacillus helveticus OZH12. **Harun Önlü,** Saadet Baltacı, Haluk Hamamcı, Özlem Osmanağaoğlu.
11:10	64 - Protective effect of omega-3 fatty acids on msg induced hippocampal neuronal apoptosis in the adolescent rats. **Nurcan Umur**, S. Gülşen Gürgen.
11:30	**BREAK COFFEE / TEA**

SESSION II

	Chairman: Prof.Bülent Topcuoğlu
11:50	72 - Green synthesis of silver nanoparticles using Thymbra spicata var. spicata L. leaf extract and evaluation of their biological activities. **Fatih Erci**, Rabia Çakır Koç.
12:00	105 - The effects of prophylactic and therapeutic sulfasalazine in liver of experimental endotoxemic rats. **Hatice Eser Fakı,** Gonca Sönmez, Emre Bahçıvan, Burak Dik.
12:10	22 - The effects of silymarin on the cell viability in F-98 cell culture. **Efe Kurtdede**, Remzi Soner Cengiz, Ayşenur Gök, Ufuk Kaya, Görkem Kısmalı.
12:20	56 - Comparision of the beneficial effects of vitamin e and n-acethyl cysteine supplementations with therapeutic ultrasound application on the treatment of muscle injury of rats. **Ayşe Merve Tat**, Halil Ozkol, Yasın Tuluce.
12:30	57 - Investigation of biochemical and histopathological effects of vitamin C, selenium and therapeuthical ultrasound application on muscular injury formed in rats. **Necati Muhammed Tat**, Yasın Tuluce, Mehmet Kara, Ayşe Merve Tat, Halil Ozkol.
12:40	54 - Effects of Metoclopramide in Maternal Rat Brain: Use to Increase of Breast Milk Production. **Oya Sayın,** Seren Gülşen Gürgen.
13:00	**Lunch in the hotel restaurant (only for blue - green - orange package id holders)**

SESSION III

	Chairman: Prof. Mehmet Kubilay Önal
14:00	18 - Plant nutrient status of sour cherry (prunus cerasus l.) cultivars grown in Aegean region of Turkey. **Bülent Topcuoğlu**, M. Kubilay Onal.
14:10	19 - Characterization and evaluation of sour cherry (prunuscerasus l.) Genetic resources in Aegean region of Turkey. **Mehmet Kubilay Önal**, Bülent Topcuoğlu.
14:20	33 - The effect of spent mushroom compost on the growth, mineral nutrition and heavy metal status of lettuce (lactuva sativa l.) and spinach (spinaceae oleraceae l.). **Bülent Topcuoğlu**, M. Kubilay önal.
14:30	34 - The clonal selection breeding of akça pear (pyrus communis l.) in Aegean region of Turkey. **Mehmet Kubilay Önal,** Bülent Topcuoğlu.
14:40	85 - Shoot regeneration of Hypericum perforatum L. from axillary buds. **Şeyma Önlü**, Hussein Abdullah Ahmed Ahmed, Serkan Uranbey.
14:50	**BREAK COFFEE / TEA Poster Session I (P1- P2- P5- P6)**

SESSION IV

	Chairman: Assoc. Prof. Hidayet Argun
15:10	21 - Modelling of phenazine-1-carboxylic acid production by pseudomonas chlororapsis subsp. aureofaciens in submerged cultures and investigation of its antimicrobial and anticancer activity. **Kübra Aslan**, Emre Erden.
15:20	27 - Hydrogen gas production using hot spring microflora. Ayşe Çalkaya, Handan Han, İkbal Ören, Nurçe Keskin, Zeynep Karaoğlan, Muhammed Enes Mıynat, İsmail Görgül, **Hidayet Argun**
15:30	24 - Effects of initial inoculum culture concentration on dark fermentative hydrogen gas production from waste paper towel hydrolysate. Özgür Gökdemir, İsmail Görgül, Zeynep Saylam, Atakan Erdoğan, Gülizar Onaran, **Hidayet Argun**
15:40	28 - Investigation of biosorption kinetics of an agricultural residual on dye removal. **Levent Gürel**.
15:50	29 - Investigation of nickel biosorption by an agricultural residual. **Levent Gürel,** Tuğba Meşe, Arife Şeker, Aslı Kılıç, Ali Serkan Yıldırım.
16:00	**BREAK COFFEE / TEA Poster Session II (P11- P20- P21)**

SESSION V

	Chairman: Asst. Prof.
16:20	74 - A Deep convolutional neural network model for detecting diabetıc retinopathy. **Buse Melis Özyıldırım**, Mustafa Oral, Serkan Kartal.
16:30	73 - Measuring nitrate consumption by C. vulgaris using NO3- ion selective electrode (ISE). **Vildan Erci**, Didem Özçimen.
16:40	87 - Sulfasalazine may prevent disseminated intervascular coagulation in experimental endotoxemic rats. **Emre Bahçivan**, Hatice Eser Faki, Burak Dik.
16:50	30 - A new humanized mouse model for auto-immune myocardıtıs and its use to devise immunomodulation therapy. **Mehmet Emrah Şelli**, David C. Wraith, Andrew C. Newby.
17:00	31 - Autoimmunity to HSP60 during diet induced obesity in mice. **Mehmet Emrah Şelli**, David C. Wraith, Andrew C. Newby.
17:10	**BREAK COFFEE / TEA Poster Session III (P4- P7- P8)**

SESSION VI

	Chairman: Asst. Prof.Numan Gözübenli
17:30	107 - Pharmacokinetics of ceftriaxone following single ascending intravenous administration in sheep. Duygu Durna Çorum, Orhan Çorum, **Hatice Eser Fakı**, Emre Bahçıvan, Ayşe Er, Kamil Üney
17:40	106 - Shear bond strength of ceromer bonded to zirconium oxide infrastructure treated with different types of lasers. Oğuzhan Gorler, Ihsan Hubbezoglu, Melih Ulgey, Recai Zan, **Serra Kutlu**.
17:50	76 - Memory-enhancing, anxiolytic and antidepressant effects of inhaled Achillea pseudoaleppica essential oil on scopolamine-induced amnesic rats. **Emel Akbaba**, Eyüp Bağcı.
18:00	111 - The effects of juniperus oxycedrus ssp oxycedrus essential oil on memory, anxiety and depression in amnesic rats. **Emel Akbaba**, Safeen Ahmed Othman, Eyup Bagcı.
18:10	108 - Doxorubicin loaded clamshall type four dithiol-o-carborane bridged metallophthalocyanines for photodynamic therapy. **Berke Bilgenur Şener**, Sevil Şener, Abdullah Tahir Bayraç.

ORAL PRESENTATIONS OCTOBER 27, 2017

in honour of Prof. Özcan Erel

SESSION VII

	Chairman: Asst. Prof. Hasan Türe
09:00	8 - Antimicrobial Properties of Alginate and Zein Films Containing Natamycin against Penicillium camemberti and Aspergillus niger. **Ömer Faruk Çelik**, Gökçe Sarıtaş, Bekir Gökçen Mazı, Hasan Türe.
09:10	9 - Alginate beads for the removal of dyes from aqueous solution. **Hasan Türe**.
09:20	2 - Influence of trolox and alpha-lipoic acid on post-thawed pırlak ram sperm parameters and dna damage in non-breeding season - **Fatih Avdatek**, Deniz Yeni, Muhammed Kürşad Birdane, Mustafa Gündoğan.
09:30	13 - A cyclopia case with otocephaly in a pirlak lamb. **Muhammed Kürşad Birdane**, Oktay Yılmaz, Mehmet Uçar.
09:40	96 - Comparision of prostaglandin $F_{2\alpha}$ treatment in the Ovsynch protocol 6 or 7 days after first GnRH in non lactating Anatolian Buffaloes. **Muhammed Kürşad Birdane**, Fatih Avdatek, Hacı Ahmet ÇELİK.
09:50	**BREAK COFFEE / TEA Poster Session IV (P3- P12- P15)**

SESSION VIII

	Chairman: Asst. Prof. Muhammed Kürşad Birdane
10:10	10 - mRNA expression of muscarinic receptors on human mesenchymal stem cells. **Arash Alizadeh Yegani,** Erkan Maytalman, İlknur Kozanoglu, Fazilet Aksu.
10:20	55 - The study of the effect on the bone tissue depending on the age gingko biloba extract and growth factors. **Seren Gülşen Gürgen**, Gülce Naz Yazıcı.
10:30	66 - A comparative investigation of the effects of various antiepileptic agents in the retina and corneal layers. **Ayşe Tuç Yücel**, Seren Gülşen Gürgen, Ali Cansu.
10:40	91 - Ethanol induced changes in the expression of selected genes downstream to Nrf2 pathway in granulosa cells in vitro. **Md. Mahmodul Hasan Sohel,** Mustafa Abdulkareem Salman, Abdurrahman Ayvaz.
10:50	98 - Time and dose-dependent effects of oxidative stress induced by hydrogen peroxide in ovarian granulosa cells. **Md. Mahmodul Hasan Sohel**, Yusuf Konca, Mehmet Ulaş Çınar.
11:00	**BREAK COFFEE / TEA Poster Session V (P9- P10- P13- P14)**

SESSION IX	
	Chairman: Prof. Nurettin Gülşen
11:20	44 - Effects of entodinium caudatum monoculture inoculation on in vitro fermentation, methane production and prevention of sub-acute ruminal acidosis. **Nurettin Gülşen,** Huzur Derya Arık, Mustafa Selçuk Alataş, Muhammad Naeem Tahir.
11:30	11 - Protective Effect of Colon Targeted Linalool and Lycopene Against Acetic Acid Induced Ulcerative Colitis in Rats. **İbrahim Ozan Tekeli,** Mustafa Yipel, Abdullah Aslan, Songül Çeribaşı, Ahmet Ateşşahin, Fatih Sakin
11:40	62 - Effect of feeding different protein levels on preference and some blood values in dogs. Fatma İnal, **Oğuzhan Kahraman**, Mustafa Selçuk Alataş, Şeref İnal, Mustafa Uludağ.
11:50	63 - Comparison of pelleted and extruded dog foods. Fatma İnal, Mustafa Selçuk Alataş, **Oğuzhan Kahraman**, Şeref İnal, Mustafa Uludağ.
12:00	**LUNCH IN THE HOTEL RESTAURANT (Only for BLUE - GREEN - ORANGE Package ID Holders)**
SESSION X	
	Chairman: Prof. Feride Koc
13:30	61 - Investigation of possibilities of using mobile bags in determining digestibility in dog foods. **Mustafa Selçuk Alataş**, Oğuzhan Kahraman, Fatma İnal, Nurettin Gülşen.
13:40	14 - Ameliorating effect of kisspeptin-10 on methotrexate-induced testicular oxidative stress and sperm quality in rats. **Mehmet Güvenç**, Mesut Aksakal.
13:50	92 - The effects of chrysine on cypermethrin-induced acute toxication in rainbow trout (Oncorhynchus mykiss). Özge Cerit, **Feride Koç.**
14:00	93 - The protective effects of Anethum graveolens on paracetamol-induced acute toxication in mice. Serap Korkmaz, **Feride Koc**
14:10	65 - The effect of heat treatment applied to cereals used in dog foods on gelatinization and digestibility of starch. Fatma İnal, **Abdullah Özbilgin**, Mustafa Selçuk Alataş, Oğuzhan Kahraman.
14:20	**BREAK COFFEE / TEA Poster Session VI (P17- P 18- P19- P23)**

SESSION XI	
	Chairman: Asst. Prof. Mehmet Güvenç
14:40	99 - Antimicrobial application of green synthesis of zinc oxide nanoparticles by euphorbia macroclada extract. **Suzan Sahin Dogan,** Aytac Kocabas.
14:50	70 - Some reproductive parameters in primiparous awassi sheep. Şeref İnal, Behiç Coşkun, Dursun Ali Dinç, **Mustafa Çam**.
15:00	71 - Pair housing for calves. **Mustafa Çam,** Şeref İnal.
15:10	78 - Effects of Thymol and Carvacrol on Sperm Quality and Antioxidant System. **Mehmet Güvenç,** Mustafa Cellat, Ishak Gökçek, Ilker Yavaş, Şule Yurdagül Özsoy.
15:20	**BREAK COFFEE / TEA Poster Session VII (P16- P22)**
SESSION XII	
	Chairman: Asst. Prof. Güzin Camkerten
15:40	109 - In vitro maturation in mouse. **Mustafa Numan Bucak**, Ali Erdem Öztürk
15:50	89 - Investigation of iron, copper and zinc levels in sheep in district of Akçakale. Metin Boz, **Ilker Camkerten.**
16:00	88 - An investigation of blood iron, copper and zinc levels in sheep at region of Suruç. İbrahim Halil Çelik, Ilker Camkerten, **Guzin Camkerten.**
16:10	3 - Scalable fabrication of electrodes of tribo nanosensors based on highly uniform colloidal nano arrays**. Numan Gözübenli**. (Video Conference)

POSTER PRESENTATIONS OCTOBER 5 2017	
1	110 - DNA library design for SELEX using bioinformatic tools. **Berke Bilgenur Şener**, Deniz Yiğit, Abdullah Tahir Bayraç.
2	25 - Analysis of protein and mRNA expressions of CYP1A1 and CYP2E1 enzymes in liver, colon and prostate cancer cell lines to study drug and carcinogen metabolism. **Emre Evin**, Serdar Karakurt, Orhan Adalı, Merve Akkulak.
3	35 - Comparative evaluation of small t gene and large t gene based real-time pcr methods for the detection of the bk and jc viruses in clinical samples. Uğur Tüzüner, **Mehmet Özdemir**, Murat Şevik, Mahmut Baykan.
4	41 - Effect of blood hormone levels and body condition score in success of artificial ınsemination in cow. İlker Yavaş, **İshak Gökçek**, Ece Koldaş, Tuğba Korkmaz Yavaş.
5	47 - The hemoglobinopathy prevalence of the patients with suspected hemoglobinopathy who have applied to Afyon Kocatepe University Practice and Research Hospital. **Ahmet Kahraman**, Mustafa Örmeci, Zeliha Çelik, Muhammed Kaya.
6	49 - Antioxidant properties of dietary flavonoids. **Ahmet Kahraman**.
7	52 - Investigation of immunological infertilit in non-fertilizated cows. İlker Yavaş, Bestami Kemal Gümüşay, **İshak Gökçek**
8	59 - L-ldh gene knock-out of Lactobacillus helveticus OZH12. **Harun Önlü**, Marie-Clemence Duchene, Pascal Hols, Ozlem Osmanagaoglu.
9	68 - Effects of acetylsalicylic acid on inflammation and oxidative stress in rats with experimentally induced type 2 diabetes mellitus. **Sefa Çelik**, Serkan ŞEN.
10	69 - The effect of caffeic acid phenethyl ester (CAPE), a bioactive compound of propolis extract, on endoplasmic reticulum (ER) stress-induced apoptotic cell death in INS1-β cells. **Sefa Çelik**, Ahmet Kahraman, Ömer Hazman, Serkan Şen.
11	75 - Effect of hyperosmotic stress on MINPP1 expression. **Fatih Erci**, Mustafa Yöntem, Behiç Selman Erdoğdu.
12	79 - Biochemical and haemotological markers in patients with chronic HBV İnfections. **Bilgen Özdemir**, Ayşe Rüveyda Uğur, Mehmet Özdemir, Mahmut Baykan.
13	82 - Investigation of parainfluenza virus caused lower respiratory tract infections in pediatric patients. Aysun Görkem, Ayşe Rüveyda Uğur, Bahadır Feyzioğlu, Mehmet Özdemir, **Mahmut Baykan**.
14	83 - Investigation of parvovirus B19 IgM and IgG positivity rates in pediatric hematology patients. Aysun Görkem, Ayşe Rüveyda Uğur, Fatma Taşbent, Mehmet Özdemir, **Mahmut Baykan**.
15	84 - Investigation of Bokavirus-related lower respiratory tract ınfections in pediatric patients. Ayşe Rüveyda Uğur, Aysun Görkem, FATMA TAŞBENT, Bahadır Feyzioğlu, **Mehmet Özdemir.**

16	86 - An investigation of blood selenium, copper and zinc levels in sheep at region of Siverek. Mehmet Batmaz, **Ilker Camkerten**. Mehmet Batmaz, İlker Camkerten
17	97 - The post-hoc power analysis of forest productivity attributes in experimental study in central Bosnia. **Azra Čabaravdić,** Aida Ibrahimspahić, Mirsada Starčević.
18	101 - Rigorous identification of tissue specific genes in silico: revealing the interplay between cancer specific expression and tissue specific expression. **Hatice Büşra Konuk**, Alper Yılmaz.
19	102 - Generating lossless compression of genome scale k-mer frequency table as raster image. **Hatice Büşra Konuk**, Alper Yılmaz.
20	103 - Design and production of a lab-scale solar bioreactor. **Vildan Erci,** Didem Özçimen, İbrahim Işıldak.
21	122 - Evaluation of ischemia modified albumin levels in subclinical mastitis cows before and after the vaccination. Gaye Bulut, **Güzin Camkerten**, Özcan Erel.
22	104 - Diversity in mixed uneven aged forest of beech, fir and spruce on mountain Igman. Aida Ibrahimspahić, **Azra Cabaravdic**, Mirsada Starcevic.
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FATIH AVDATEK, DENİZ YENİ, MUHAMMED KÜRŞAD BİRDANE
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The present study was conducted to examine the protective roles of trolox and alpha-lipoic on post-thawed Pirlak ram sperm parameters and DNA damage in non-breeding season. Semen samples from 10 healthy Pırlak rams (2-3 years of age) were used in the study. Six ejaculates for each rams were collected and pooled. Pooled ejaculate, splitted into three equal aliquots and then diluted with Tris-based extender at 37 °C containing trolox 1 mM, alpha-lipoic acid (ALA) 1 mM and no antioxidant (control) were cooled to 5 °C and then frozen in 0.25 ml French straws. Frozen straws were then thawed at 37°C for 20s in a water bath for evaluation. Sperm motility was increased, acrosome rate and DNA damage were decreased significantly ($p<0.05$) in ALA, head abnormal sperm rate and membrane integrity were increased, acrosome rate and DNA damage were decreased significantly ($P < 0.05$) in trolox when compared to the control group. Results of this study suggest that alpha-lipoic acid and trolox improve sperm parameters and DNA damage in non-breeding season.

Keywords: Alpha-Lipoic Acid, Non-Breeding Season, Ram Sperm, Trolox

SCALABLE FABRICATION OF ELECTRODES OF TRIBO NANOSENSORS BASED ON HIGHLY UNIFORM COLLOIDAL NANO ARRAYS

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Self-assembled two-dimensional (2-D) nanoarrays have been extensively utilized for fabricating a wide spectrum of functional periodic nanostructures for important technological applications. Here we report a simple and scalable colloidal transferring technique for fabricating highly ordered 2-D colloidal nanoarrays with unusual non-close-packed structures on a large variety of substrates (e.g., plastics and glass electrodes of triboelectric generators (TENG's)). A copolymer made of mixture of 1:1 ratio of ethoxylated trimethylolpropane triacrylate (ETPTA) and urethane (PU) monomers is used as the particle transferring agent to transfer colloidal particles from a self-assembled 3-D colloidal crystals in a layer-by-layer manner. The unique combination of optical transparency, flexibility, and durability of the copolymer enables wafer-scale transfer of colloidal monolayers onto both flat and curved surfaces, which are not easily available by current top-down and bottom-up approaches for fabrication of electrodes of TENG's. We also show that this method provides large-area production of hexagonally ordered nanostructures (e.g., periodic nanoarrays for potential applications of TENG's) which have important applications ranging from self-powered portable devices harvesting electricity to biosensors.

Keywords: Triboelectric Nanosystems, Contact Electrification, Layer By Layer Transfer Tech, Tribo Nanosensors

ALGINATE BEADS FOR THE REMOVAL OF DYES FROM AQUEOUS SOLUTION

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Several types of industries including paper, textile and rubber use significant amount of dye to color their products. However, contamination of water by dyes discharged from these industries is a significant threat to human and ecosystems since they are toxic and pose carcinogenic and mutagenic effects. Several types of technologies are available to remove dyes from water such as coagulation-flocculation, membrane filtration, ion exchange, and electrochemical techniques. On the other hand, most of these methods are expensive and can produce other waste products. Thus, there is a need to develop effective and environmentally friendly technologies to remove the dyes from water. Adsorption is one of the most preferred methods to remove organic and inorganic pollutants from wastewater owing to its simplicity of design, flexibility and ease of operation. Various low cost and easily available adsorbents have been used to remove dyes from water. In this study, alginate beads were prepared by ionic gelation method and the adsorption of methylene blue dye (MB) on wet and dry alginate beads was tested as a function of pH, contact time,initial MB concentration, and temperature in batch system. In addition, montmorillonite was also incorporated into the alginate beads and their characterization was performed. Results indicated that the amount of dye adsorbed is highly depended on the initial dye concentration,pH and temperature. Dry alginate beads showed higher adsorption capacity than wet beads.SEM-EDX analysis revealed that montmorillonite was existed as agglomerates. Obtained alginate beads could be used not only for removal dyes but also used to eliminate toxic metal ions from water.

Keywords: Alginate, Dye, Beads, Adsorption

ANTIMICROBIAL PROPERTIES OF ALGINATE AND ZEIN FILMS CONTAINING NATAMYCIN AGAINST PENICILLIUM CAMEMBERTI AND ASPERGILLUS NIGER

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The decline in food sources as a consequence of the increasing world population and environmental pollution has made conservation of natural and processed foods even more important. New packaging technologies as well as packaging and storage techniques that provide longer shelf life should be developed. Edible films and coatings obtained from renewable resources could be considered as promising packaging materials since they are biodegradable, inexpensive and environmentally friendly.

Kashar cheese is a cooked-curd cheese and it is usually classified in the same group with Mozzarella cheese. One of the main issues concerning the quality and shelf life of kashar cheese is mould spoilage. A recent methodology proposed to maintain the food safety and to extend the shelf life of foods is incorporation of natural antimicrobial agents into the biobased packaging materials. Natamycin (NA) is a natural antifungal agent and has been approved as Generally Recognized as Safe (GRAS) in many countries for surface application of cheese.

The goal of this study is to investigate the antifungal activities of alginate and zein films containing different amounts of NA (0-2-5-10-20-40 mg) against Penicillium camemberti and Aspergillus niger inoculated on the surface of kashar cheese during refrigerated storage. Both zein and alginate films containing 20 and 40 mg NA were found to be effective against A. niger with reductions of 1.41 and 1.5 logs for zein and 0.65 and 1.21 logs for alginate. Zein films with 10, 20 and 40 mg NA were found to decrease P. camemberti population by 1.69; 1.78 and 1.85 logs, respectively. Conversely, alginate films incorporated with NA had weak inhibition effect against P. camemberti during storage and no effect at the end.

Although both films incorporated with NA appear to be successful systems, zein films could practically serve better to overcome the surface contamination of the dairy products.

Keywords: Alginate, Zein, Edible Film, Cheese, Natmaycin

PROTECTIVE EFFECT OF COLON TARGETED LINALOOL AND LYCOPENE AGAINST ACETIC ACID INDUCED ULCERATIVE COLITIS IN RATS

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The study was carried out with the aim of the investigation of protective effect of conventional and colon targeted linalool and lycopene comparatively in rats with experimental ulcerative colitis (UC). A total of 49 Wistar Albino rats (7 animals in each group) were used. Conventional and colon targeted linalool (200 mg/kg) and lycopene (10 mg/kg) were given to them for 7 days and then UC was induced using 4% acetic acid intrarectally. To exhibit the oxidative damage and antioxidant activity and the inflammation status of the colon tissues that were taken at end of the experimental model. Malondialdehyde (MDA), reduced glutathione (GSH), catalase (CAT), glutathione peroxidase (GPx), tumor necrosis factor α (TNF-α), interleukin 1β (IL-1β), interleukin 6 (IL-6) levels and cyclooxygenase 2 (Cox-2), nuclear factor erythroid 2-related factor 2 (Nrf-2) and nuclear factor kappa B (NF-kB) expression levels were examined. In addition, histopathological scoring was performed in terms of depth and width of ulcerative lesions. Consequently, the usage of targeted agents was found to be more effective than conventional usage against to histopathologic, oxidative and inflammatory damage occurred in the colon in the experimental UC model. Also, targeted lycopene was found to be more effective than targeted linalool against acetic acid induced UC in rats.

Keywords: Colitis, Acetic Acid, Rat, Colon Targeting, Protective Effect

MRNA EXPRESSION OF MUSCARINIC RECEPTORS ON HUMAN MESENCHYMAL STEM CELLS

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Cells carry out their functional activities by communicating with each other through endogenous substances and receptors. For regeneration purposes, it may be possible to demonstrate the functional activities required for transplantation of new stem cells, where stem cells are placed by transporting appropriate receptors on cell surfaces. Demonstration of which receptors are present in mesenchymal stem cells will allow these cells to be used more appropriately for regeneration purposes. In this study the mRNA expression levels of M1, M2, M3, M4, M5 subtypes of muscarinic receptors in the 1st, 2nd and 3rd passages of Mesenchymal stem cells (MSCs) obtained from human fetal membrane (FM) and bone marrow (BM) were shown by RT-qPCR. In our study, a generally significant increase in FM groups was detected in M1 mRNA expression compared to the control group. Differently in the BM groups was seen as a decrease. Results were obtained significant decrease in the M5 mRNA expression the of BM groups compared to the control group. These results indicate that the cells obtained from different sources in that the expressions of muscarinic receptors behave differently and there are also some changes derived from the same sources cells according to the passages and differentiations.

Keywords: Mesenchymal Stem Cells, Muscarinic Receptors, RT-Qpcr

AMELIORATING EFFECT OF KISSPEPTIN-10 ON METHOTREXATE-INDUCED TESTICULAR OXIDATIVE STRESS AND SPERM QUALITY IN RATS

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The purpose of this study is to determine effects of methotrexate (MTX) on oxidative stress, antioxidative system and spermatogenesis and changes caused by Kisspeptin-10 (Kiss) administration on these effects. For this purpose, total of 32 wistar albino rats were divided into groups as; group I control (n:6, saline), group II MTX (n:10, i.p MTX 20 mg/kg single dose), group III (n:6, Kisspeptin-10, 50 nmol/kg, 10 days/dose), and group IV (n:10, MTX 20 mg/kg single dose + Kisspeptin-10, 50 nmol/kg, 10 days/dose). Spermatological parameters (including motility, epididymal sperm concentrations live-dead sperm rate and morphological sperm abnormalities), biochemical parameters (MDA, GSH, GSH.Px and CAT) of testicular tissue were evaluated. At the end of the study, MDA levels increased by MTX applications in testicular tissue ($p<0.05$) and showed significant decrease in group IV by Kisspeptin administration ($p<0.05$). The levels of GSH in the testicular tissue were significantly increased in group IV ($p<0.05$). While testicular tissue GSH.Px levels decreased with MTX administration ($p<0.05$), in group IV was increased by Kisspeptin administration ($p<0.05$). In spermatological parameters, MTX administration (group II), decreased motility ($p<0.001$), and increased rates of abnormal spermatozoon ($p<0.05$), in treatment group (group IV) an improvement was observed with increased motility ($p<0.001$), and decreased abnormal spermatozoon ($p<0.05$). As a result, MTX administration caused damage on some spermatological parameters, increased oxidative stress when compared to the control group. However, Kiss treatment mitigates these side effects when compared to the MTX group. It is concluded that Kiss treatment may reduce MTX-induced reproductive toxicity as a potential antioxidant compound.

Keywords: Kisspeptin, Methotrexate, Oxidative Stress, Sperm Quality

EFFECTS OF THYMOL AND CARVACROL ON SPERM QUALITY AND ANTIOXIDANT SYSTEM

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In this study, the effects of different doses of thymol and carvacrol on sperm quality and antioxidant status were investigated. For this purpose, 49 rats were divided to 7 animals in each group; Control(saline), T-10; (Thymol 10 mg/kg), T-20; (Thymol 20 mg/kg), C-10; (Carvacrol 10 mg/kg), C-20; (Carvacrol 20 mg/kg), T+C-10; (Thymol 10 mg/kg + Carvacrol 10 mg/kg) and T+C-20; (Thymol 20 mg/kg + Carvacrol 20 mg/kg). The application lasted 10 weeks for all animals. In the study, spermatological parameters (including motility, concentration, morphological sperm abnormalities, live-dead sperm rate), biochemical parameters (MDA, GSH, GSH.Px, Catalase) and histopathological analyzes were evaluated. As a result of the study, MDA levels decreased compared to the control group in the group T-10, group T-20, group C-10 and group C-20 ($p < 0.001$). GSH levels were increased in group T-10 and in group T-20 compared to the control group($p<0,01$). GSH.Px levels were higher in group C-10 and in group C-20 than in the control group ($p<0,05$). Catalase levels were increased in Group C-10 and Group C-20 compared to the control group ($p<0,05$). In spermatological parameters, both spermatozoon density and motility were significantly higher in the group T-10, group T-20, group C-10, group C-20 and group T+C-10 compared to the control group ($p<0,01$). There was a decrease in group T+C-20 in spermatozoon concentration, compared to control group ($p <0,001$). In the live-dead sperm rate and abnormal spermatozoon ratio there was significantly decrease in group T-10, group T-20, group C-10, group C-20 compared with the control group ($p<0.001$). Histopathological analysis of animals from testicular tissues revealed no differences among the groups. In conclusion, it was found that thymol and carvacrol treatment decreased oxidative damage, increased antioxidant status and showed improvement in spermatological parameters, while the combined use of these two active substances showed no improvement effect on the parameters mentioned.

Keywords: Antioxidant, Sperm Quality, Thymol, Carvacrol

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A CYCLOPIA CASE WITH OTOCEPHALY IN A PIRLAK LAMB

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In this report, a case of cyclopia with otocephaly in a Pirlak lamb was presented which has not been reported previosly in ruminants. A two years old-nulliparous Pirlak ewe was referred to the clinics of Afyon Kocatepe University, Faculty of Veterinary Medicine with the complaint of dystocia. Cesarean section was performed and a dead female lamb was extracted out from the uterus. The number and size of placentomes were reduced at the placental sites. Morphologic and macroscopic examination of the lamb demonstrated that there were some congenital anomalies, especially an eye (cyclopia) and otocephaly, at the head of lamb, however no other anomalies were defined at the other parts of body. On the other hand there were no whole mouth space, maxillar and mandibular bones, teeth (dysgnathia), no nose (arhinia) and tongue (aglossia). Nevertheless, there was a small hole at the bottom of the one eye opening to pharynx, oesophagus and trachea (microstomia). The left and right auricles were adherent together on the both sides of the small hole (synotia). At necropsy, the brain was not normal, rather small and edematous, having any brain lobes and gyrus. Examination of thoracic, abdominal and pelvic spaces revealed no abnormality

Keywords: Congenital Anomalies, Pirlak Lamb, Cyclopia, Otocephaly

COMPARISION OF PROSTAGLANDIN F_2A TREATMENT IN THE OVSYNCH PROTOCOL 6 OR 7 DAYS AFTER FIRST GNRH IN NON LACTATING ANATOLIAN BUFFALOES

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In this study, Ovsynch versus modified Ovsynch protocols on follicle size at insemination day and pregnancy rate. The total of 26 non lactating buffalo cows whose ages were between 6-8 year old age, belonging to a private buffalo farm in Afyonkarahisar were used in this study. In February, estrous synchronization of Group 1 (n = 14) was performed with GnRH at day 0, PGF2α at day 7, and GnRH at day 9 (12 µg buserelin, Receptal®, 3 ml i.m). Estrous synchronization of Group 2 (n=11) was similar with Group 1 except PGF2α treatment at day 6. The rate of response to synchronization was determined at the time of insemination and the pregnancy rates were determined at day 42 using transrectal ultrasonography. Artificial insemination was performed using frozen thawed Italian buffalo semen, 16-20 h later last GnRH injection in Group 1 and 2. Ovulation investigation was made after 1 day of insemination. The ovulatory follicle diameter (>1cm) were found 1.30 ± 0.10 cm in Group 1 and 1.26 ± 0,12 cm in Group 2. The response to Ovsynch in the groups were 78,5% (11/14) in Group 1 and 81,8 % (9/11) in Group 2. Pregnancy rates were found % 36,3 (4/11) in Group 1 and % 33,3 (3/9) in Group 2. As a result, It is thought that there is a need for a larger number of animals in groups to establish the difference between the day 6 and 7 PGF2α injection in Ovsynch protocols.

Keywords: Anatolian Buffaloes, Non Lactating, Ovsynch, Pregnancy Rate

EFFECT OF FEEDING DIFFERENT PROTEIN LEVELS ON PREFERENCE AND SOME BLOOD VALUES IN DOGS

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This study was conducted to observe the effect of feeding different protein levels in dogs. The mix breed castrated young mature male dogs at approximately 15-30 kg live weights have been used. 4 extruded foods containing 18%, 21, 25 and 28 crude protein in dry matter were prepared in Bil-Yem facilities. Foods were eaten for a month. The dogs were divided into 4 similar groups, each consisting of 7 dogs according to locations in the unit, live weights and body condition scores. The animals were housed in individual compartments with a closed and a walking area. The foods were given at the rate of 1.8 times of maintenance once a day. The blood samples were taken at the beginning and end of the study. It was determined that BUN values were affected by protein level (P=0.002) and creatinine, total protein, albumin and phosphorus levels not. Body conditions were not affected by protein levels. Thirty dogs were used in two-pan palatability test. Two foods with 21% and 28% protein were tested according to dog's preference. Dogs have preferred the food with high protein at the rate of 67%. As the protein increases, the cost of the food increased.

Keywords: Dog Food, Protein, BUN, Preference

COMPARISON OF PELLETED AND EXTRUDED DOG FOODS

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In the study, 30 young adult mixed breed neutered male dogs weighing 15-30 kg were used. One of the two formulations, which had the same composition, was produced in the form of a pelleted and the other an extruded in a private factory. Feeding experiments were conducted at the Selçuk University, Veterinary Faculty Dogship Unit. Gelatinized starch was found to be 4.87% in pelleted and 17.81% in extruded food (P<0.001). The rate of preference of extruded food by dogs was 0.66. The pelleted and extruded dog foods produced in this study were compared in terms of digestibility, fecal score, and cost with the most common one imported and one native product in the market. Dry matter digestibility of pelleted, extruded, imported and domestic commercial dog foods determined by fecal collection method was 81.2%, 84.2%, 83.7%, 83.5% (P <0.05) respectively. The fecal score was 3.48 for those who consumed pelleted food, and 3.68 to 3.91 for the others. In calculating the cost, it was determined that extruded food produced in this study could be 5 times more economical than imported food.

Keywords: Dog Food, Pellet, Extrude, Digestibility, Preference

OVEREXPRESSION OF PHAC1 GENE ENCODING PHA SYNTHASE 1 IN PSEUDOMONAS AUREOFACIENS FOR OVERPRODUCTION OF MCL-PHA

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Polyhydroxyalkanoates or PHAs are linear polyesters synthesized and stored in the cell cytoplasma as water-insoluble incusions by bacteria under the limited nitrogen and excessive carbon sources. These biopolymers are alternative to oil-derived polymers and they have different physical and chemical properties. Besides they are biocompatible and biodegradable, PHAs can be used in most of biomedical applications including tissue engineering as a tissue scaffold, controlled drug release and biomedical implants. The most common problem encountered in PHA production is high production costs of PHA. The production costs can be reduced by developing efficient bacterial strains and optimizing the production process. The aim of this study is to develop recombinant strain by harboring phaC1 gene encoding PHA synthase 1 to wild-type P. aureofaciens. For this purpose, phaC1 gene fragment from P. aureofaciens was amplified with PCR and inserted into pBBR1MCS2 plasmid. The recombinant plasmid was firstly introduced into E. coli S17-1 and then, it was introduced into P. aureofaciens via conjugation in order to carry out the homolog recombination. The efficiencies of recombinant- and wild-type strain were compared. The results showed that the mcl-PHA production was increased up to 25% and yield of mcl-PHA production was increased from 4.1% to 7,6% with recombinant strain.

Keywords: PHA Synthase, Overexpression, P. Aureofaciens, Mcl-Pha

Acknowledgements:*This study was supported by BAP-Ege University/Turkey (2010FEN056).*

MODELLING OF PHENAZINE-1-CARBOXYLIC ACID PRODUCTION BY PSEUDOMONAS CHLORORAPSIS SUBSP. AUREOFACIENS IN SUBMERGED CULTURES AND INVESTIGATION OF ITS ANTIMICROBIAL AND ANTICANCER ACTIVITY

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Phenazines and derivatives are nitrogen containing heterocyclic compounds that are synthesized by Pseudomonas and Streptomyces species. These molecules are redox agent with broad spectrum anti-microbial, anti-tumor and anti-parasitic activity. Over the past decades, there has been great interest in their biotechnological production because of their unique properties. Bacterial fermentation processes have advantages over chemical synthesis, since necessity of the highly toxic substrates and harsh conditions during the chemical synthesis, formation of toxic by-products and also low productivity. The aim of the study is to produce phenazine-1 carboxylic acid (PCA) by bacterial fermentation as a bioactive agent. For this purpose, PCA was produced by P. chlororapsis subsp. aureofaciens on batch mode in submerged cultures. Modelling of PCA production and growth of organism were determined by temporal analysis of variations of biomass, product, depleted carbon and nitrogen source. Chromatographic and spectroscopic methods were used for purification, quantification and characterization of PCA produced by fermentation. Besides, in vitro anti-cancer and antimicrobial activity of characterized pigment was also investigated.

Keywords: Kinetic Modelling, Phenazine-1-Carboxylic Acid, Anticancer, Antimicrobial, Pseudomonas

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THE EFFECTS OF SILYMARIN ON THE CELL VIABILITY IN F-98 CELL CULTURE

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Objective: Silymarin is flavonoid has been well studied and reported antioxidant agent. The effects of silymarin on cell viability and proliferations in rat glioblastoma F-98 cell line are investigated. Methods: F-98 cells were seeded in 96 well plates in 100 µl medium DMEM. The cells were either left untreated (control) and treated with different concentrations of silymarin (200,100,50,25,12.5,6.2,3.3 µM) for 24, 48, 72 hours. Measurement of silymarin treated and control groups cell proliferation performed with MTT assay and Wound Healing assay. Medium were collected and glucose levels measured to determine cell viability via spectrophotometric method. Results: The effects of Silymarin 50-3.3 µM increased cell viability and proliferations in 24, 48 and 72 hours. However significant decrease was observed at 100 and 200 µM in 48 and 72 hours. Difference observed in supernatant levels of glucose activity in 48 hours. (according to control 156,24%, 170%). The increase glucose level of medium indicates that silymarin has cytotoxic effect in F-98 cells at higher concentration. Also in Wound healing assay 100 and 200 µM silymarin according to control 17%, and 0,6% decrease observed in 48 hours. In the MTT assay 100 µM and 200 µM compare with control groups was significant found in 24 and 48 hours. Conclusion: These results suggest that role of silymarin dose dependent activity in F-98 cells.

Keywords: Silymarin, F-98, Mtt, Wound Healing

EFFECTS OF INITIAL INOCULUM CULTURE CONCENTRATION ON DARK FERMENTATIVE HYDROGEN GAS PRODUCTION FROM WASTE PAPER TOWEL HYDROLYSATE

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This study reports the effects of initial inoculum culture concentration on dark fermentative hydrogen gas production from waste paper towel hydrolysate. In this context batch dark fermentation experiments were carried out at mesophilic conditions in serum bottles using heat treated anaerobic sludge as inoculum culture. The hydrolysate was obtained after sulphuric acid hydrolysis of waste paper towel and inoculation was carried out after the removal of toxic levels of 5-Hydroxymethylfurfural by resin treatment. The inspected initial inoculum culture concentration interval was between 0-6 g/L and all other factors were kept constant during the experiments. Cumulative hydrogen volumes and hydrogen formation yields were almost the same for all inoculum concentrations. However, specific hydrogen formation rates and lag phases were different. Most effective hydrogen production resulting maximum hydrogen yield (1.11 mol H2/mol glucose), specific hydrogen formation rate (181.43 mL H2/ g biomass.h) and total volatile fatty acid formation yield (0.46 g TVFA/g glucose) was obtained at 0.1 g/L inoculum concentration. This result was attributed to the most convenient substrate to biomass ratio (0.014 g biomass/g substrate) at 0.1 g/L initial inoculum concentration.

Keywords: Waste Paper Towel, Hydrogen Production, Acid Hydrolysis, Initial Inoculum Concentration

HYDROGEN GAS PRODUCTION USING HOT SPRING MICROFLORA

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Hydrogen (H2) is considered as one of the most attractive fuels of the future. However, most of the H2 in the market is produced from natural gas. In this context H2 production from waste materials has gained attention due to the depletion risk of fossil fuel reserves in the future and environmental concerns. In this study H2 was produced from molasses using hot-spring culture as inoculum. Highest H2 yields in the literature are reported at thermophilic conditions and therefore the hot-spring was supposed to be a source for thermophilic H2 producing microorganisms. Hence H2 production at psychrophilic, mesophilic and thermophilic conditions were tested at different inoculations. Among three different tested temperature scales mesophilic conditions with ten percent inoculum addition (v/v) resulted most efficient H2 formation. The hot-spring culture was found to be an effective inoculum source for H2 production from molasses.

Keywords: Molasses, Dark Fermentation, Hydrogen, Hot-Spring

A NEW HUMANIZED MOUSE MODEL FOR AUTO-IMMUNE MYOCARDITIS AND ITS USE TO DEVISE IMMUNOMODULATION THERAPY

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Myocarditis is the principal cause of heart failure in young adults. Its progression to dilated cardiomyopathy is associated with the development of auto-immunity, especially to human cardiac α-myosin (hCAM). Consistent with this, HLA genotype influences prevalence of the disease. Previous studies showed that humanised DQ8 transgenic non-obese diabetic mice spontaneously developed autoimmune cardiomyopathy, whereas the DR4 allele is over represented in patients and there is no association with diabetes. We therefore attempted to induce experimental autoimmune myocarditis in DR4 transgenic mice (DR4 mice) as a more relevant model of the human disease.DR4 mice were injected with purified hCAM or vehicle subcutaneously in complete Freund's adjuvant (CFA). After 3 weeks, anaesthetised mice were subjected to cardiac ultrasonography. The hearts were then perfused fixed for histology and spleens were harvested for proliferation assay. in silico predicted potentially immunomodulatory peptides were proven water soluble and effective in T-cell proliferation assays. For immunotherapy, mice were pre-dosed with escalating doses of mixtures of 3 each of 6 soluble hCAM-derived peptides (pools 1 and 2) according to an established protocol. All mice immunized with hCAM developed high titres of both IgG1 and IgG2c antibodies. Consistent with this, splenic T-cell proliferation responses to hCAM significantly increased compared to un-immunized mice. Immunized mice showed a significant decline in cardiac output and fractional shortening and increase in diastolic dimension. 5/5 immunized vs 0/5 control mice showed cardiac inflammation based on histology. Pre-treatment with hCAM derived peptide pools 1 or 2 blunted the T-cell proliferation response and pool 2 also decreased both IgG1 and IgG2c levels. Pools 1 and 2 significantly improved the left ventricular cardiac. Pool 2 also significantly reduced cardiac inflammation. We have developed a novel, more relevant humanized mouse model of autoimmune myocarditis and demonstrated its ability to validate the immunomodulatory activity of hCAM derived peptides.

Keywords: Autoimmunity, Myocarditis, Cardiomyopathy, Immunotherapy

AUTOIMMUNITY TO HSP60 DURING DIET INDUCED OBESITY IN MICE

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Although the association of a chronic low-grade inflammation with obesity has long been appreciated, its molecular basis is yet to be defined. The proven involvement of adaptive immunity, coupled with a phenotypic switch from autoimmune suppressive tolerogenic Treg to pro-inflammatory CD4+ Th1 and CD8+ T cells, during progression of obesity necessitates the presence of a triggering antigen as an activator of T and B cells. HSP60 is an evolutionary conserved mitochondrial chaperonin which can be located in the cytosol or exposed on the cell membrane also. An increase in cell membrane HSP60, which may be accompanied by HSP60 release into circulation, is especially considered a signal of autoimmunity. HSP60 is linked to obesity as a mediator of adipose tissue inflammation and insulin resistance. Moreover, circulating HSP60 levels are found to be higher in obese individuals than lean controls (Märker et al. 2012). We observed an increase in circulating HSP60 levels and an adaptive immune response against HSP60 at both T cell and B cell (antibody) levels during continuous high fat feeding of C57bl6 mice. Hence HSP60 appears to be one of the mystery auto-antigens triggering the early T and B cell responses during obesity. Furthermore, we attempted a peptide therapy in a dose escalation protocol aiming to down-regulate the inflammatory related adverse effects of obesity by achieving tolerance in T cell populations and suppressing the pathogenic antibody response. Treatment with a mixture of three proven immunomodulatory HSP60 peptides did not reduce weight but completely reversed the increase in VLDL/LDL levels and partially reversed the glucose intolerance in obese mice, which encourages further research to improve peptide therapy. We clearly showed that obese mice mount an autoimmune response to HSP60, which partly underlies the resulting metabolic disturbances.

Keywords: Autoimmunity, Auto-Antigen, Obesity, Immunotherapy

INVESTIGATION OF BIOSORPTION KINETICS OF AN AGRICULTURAL RESIDUAL ON DYE REMOVAL

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This study was conducted to examine biosorption kinetics of an agricultural residue called pepper seeds. Several adsorption models were applied to the results obtained from the kinetic tests of pepper seed biosorbent on dye solutions. In many literature papers, the most used models for kinetic analyses were pseudo-first and pseudo-second order kinetic models. So to evaluate the other models on kinetic analyses, detailed studies were conducted using different kinetic models. The kinetic adsorption models used in this work are Elovich, Weber-Morris, liquid film diffusion and Dumwald-Wagner kinetic models. At the end of these kinetic analyses, it was found that the Dumwald-Wagner kinetic model best described the biosorption of dye by using this biomass. The R-squared (R2) results obtained for the kinetic models were found as 97.75, 95.48, 94.18 and 99.30% for the kinetic models of Elovich, Weber-Morris, liquid film diffusion and Dumwald-Wagner, respectively. High R-squared (R2) values obtained in this study for different kinetic models along the mostly used pseudo-first and pseudo-second order kinetics showed that all these kinetic models should be calculated and evaluated in all studies regarding biosorption processes to ensure the biosorption mechanism.

Keywords: Biosorption Kinetics, Dye Removal, Pepper Seed, Wastewater Treatment

INVESTIGATION OF NICKEL BIOSORPTION BY AN AGRICULTURAL RESIDUAL

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The removal of an important heavy metal found in water bodies because of improper discharge from several industries was investigated in this study by using an agricultural residual material called pepper seed. Peppers are very important foodstuff for Turkey. Especially, they are extremely used in several industrial plants to obtain pepper paste. Also, paste manufacturing in houses is very widespread in some regions of the country. The seeds of the peppers are the residuals, and they are generally thrown away from houses and also industries. So, to evaluate the treatment potential of these residuals, biosorption studies were conducted. Raw pepper seeds with no chemical pre-treatment were used. The pepper seeds used in these studies were in the size of 125 µm. Optimum pH for the tests were found as 5.5 in pH studies. Also, a maximum sorption capacity of 6.33 mg/g was obtained in all studies carried out for nickel removal. At the end of the results, it was seen that this residual material had a potential for nickel removal from solutions.

Keywords: Nickel Removal, Wastewater Treatment, Biosorption, Pepper Seed

Acknowledgement: *This study was supported by Pamukkale University Scientific Research Projects Coordination Unit with a project number of 2014BSP023.*

ASSOCIATION OF MNSOD GENE POLYMORPHISM AND SOD ACTIVITY AND THE RISK OF CORONARY ARTERY DISEASE IN PATIENTS WITH NON-DIABETIC METABOLIC SYNDROME

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BACKGROUND AND AIM: The purpose of this study was to investigate the activity of MnSOD and also analyze the association of MnSOD gene polymorphism and the risk of CAD in a cross-sectional study of non-diabetic MetS patients. **METHODS**: A total of 81 adult subjects manifesting metabolic syndrome (MetS) participated in this study. The non-diabetic MetS patients were divided into two groups either having coronary artery disease (CAD) (n= 29) or not (n= 36). Blood samples were stored in EDTA tubes and DNA samples were extracted from whole blood with a salting-out procedure. **RESULTS**: Statistical analysis revealed no association of genotype on the risk of CAD development (OR= 1.180, 95% CI= 0.542-2.570, p= 0.676). However MnSOD genotype was not associated with plasma levels of MnSOD activity (p= 0.468, mitochondrial MnSOD activity was shown to be lower in CAD (+) than the CAD (-) group (p= 0.036). Also MnSOD activity was reported to be lower in male population than the females (p=0.003) and CAD risk was more common in males than females (p=0.007). **CONCLUSIONS:** We have demonstrated that lowest SOD activity was associated with increased risk of CAD and male gender was associated with lowest SOD activity and also increased risk of CAD in this non-diabetic MetS population. However we could not demonstrate an association with CAD and MnSOD activity with MnSOD Ala16Val polymorphism. Further prospective randomized studies with larger number of patients are warranted to confirm or refute these results.

Keywords: Mnsod, Polymorphism,Metabolic Syndrome

COMPARISION OF THE BENEFICIAL EFFECTS OF VITAMIN E AND N-ACETHYL CYSTEINE SUPPLEMENTATIONS WITH THERAPEUTIC ULTRASOUND APPLICATION ON THE TREATMENT OF MUSCLE INJURY OF RATS

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Background: Increased oxidative stress has been reported after muscle injury. **Objective:** In this study, for the first time in the literature, ameliorative efficiency of some antioxidant substances such as vitamin E, N-acetyl cysteine were compared with therapeutic ultrasound application in muscular injury of rats. **Method:** Thirty-six rats were equally divided into 6 groups: control (C), only injury (OI), therapeutic ultrasound (U), vitamin E (Vit E), N-acetyl cysteine (N) and mixed (M). Serum creatine kinase (CK), aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH), interleukin-6, TNF-α levels and whole blood myeloperoxidase (MPO) activity were measured in laboratory. **Results:** Significant ($p<0.05$) elevations of CK, AST and ALT as well as slight ($p>0.05$) escalation of LDH were observed in OI group compared with C group. Activities of CK, LDH and AST reversed to C values in almost all treatment groups ($p>0.05$), whereas ALT decreased markedly ($p<0.05$) only in Vit E group. When comparing with C, MPO activity increased in OI and significantly ($p<0.05$) decreased in all treatment groups (except U). With regard to serum interleukin-6 and TNF-α, slight ($p>0.05$) increases of their levels were observed in all groups compared to C. **Conclusions:** Our data revealed that supplementations of Vit E and NAC with TU application may be beneficial in treatment of muscle injury. Patient with muscle injury should be encouraged in vitamin and antioxidant intake.

Keywords: Muscle Injury, Oxidative Stress, Therapeutic Ultrasound, Antioxidant.

INVESTIGATION OF BIOCHEMICAL AND HISTOPATHOLOGICAL EFFECTS OF VITAMIN C, SELENIUM AND THERAPEUTHICAL ULTRASOUND APPLICATION ON MUSCULAR INJURY FORMED IN RATS

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INTRODUCTION: Muscle injury is the type of soft tissue injury and then occured increased oxidative damage . **PURPOSE:** The efficiency of therapeutic ultrasound treatment and various antioxidant substances was compared in experimental muscular injury. Some serum enzymes, oxidative stress biomarkers, myeloperoxidase (MPO) activity, inflammation markers interleukin-6 (IL-6) and tumor necrosis factor-α (TNF- α) were evaluated histopathological examination. **METHODS:** Each group enclosing 6 rats were constituted to six groups control, only injury (OI), ultrasound (U), vitamin (Vit C), selenium (S) and mix (M). The muscle injury was formed through laceration of gastrocnemius muscle. Treatment was applied three times to groups. Therapeutic ultrasound, vitamin C, selenium and combination of them was applied respectively to the rats. Rats were sacrificed in the sixth day. Blood and tissue samples were obtained for biochemical and histological analyses. **RESULTS**: While OI group compared to control in terms of serum enzymes, significant ($p<0.05$) elevations of CK, AST and ALT as well as slight increase of LDH. CK, ALT and AST levels reversed to control values in almost all treatment groups ($p<0.05$) as well as slight decrease of LDH. The shifts in total antioxidant level were insignificant. Total oxidant status (TOS) and oxidative stress index (OSİ) increased in OI group and it decreased in S and M. However; among these alterations only TOS in muscle tissue was found to be statistically significant ($p<0.05$). While MPO activity increased in OI group, it decreased other treatment groups. However only the increase on MPO in the blood tissues of OI group and the decrease in Vit C group were statistically significant ($p<0.05$). There were not any marked alteration between groups in terms of serum inflammation markers (IL-6 and TNF-α) and histological findings. **CONCLUSION:** Results of this study revealed that apart from therapeutic ultrasound treatment, supplementation of vitamin C and selenium may also be useful treatment of muscular injury. However further studies are needed to support these results.

Keywords: Rats, Muscular Injury, Therapeutic Ultrasound, Vitamin C, Selenium, Oxidative Stress.

THE EFFECT OF ANKAFERD BLOOD STOPPER AND POLYVINYL PYRROLIDONE ON THE MODEL ORGANISM

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Polyvinyl pyrrolidone (PVP) which is soluble in organic liquids similar to proteins, is used in pharmaceuticals and many fields (food, beauty, cleaning products and medical applications, photography, testing, glue making). Ankaferd Blood Stopper (ABS) is used as a haemostatic agent. Despite their useful potential, nanofiber PVP and ABS containing nanofibers have not been studied for their potential for co-use, and in this study their availability for ecosystem and health has been investigated. For this purpose diets were coated with 10% PVP (produced by the electrospinning, ABS (0,1-1%) and PVP-ABS. Drosophila melanogaster Meigen larvae were feed and matured with these diets survival and sex ratio, development time were determined. It has been determined that the separate use of the two substances (PVP and ABS 1%) were reduced the proportion of mature and female individuals. The combined use of PVP and ABS were found to have a positive effect, similar to the control. **As a result**, the nanofiber and drug (ABS 1%) can be used in the medical field, but more detailed studies are needed to make definite inferences

Keywords: Nanofiber, Polyvinyl Pyrrolidone, Ankaferd, Drosophila Melanogaster, Nutrition

INVESTIGATION OF PARVOVIRUS B19 IGM AND IGG POSITIVITY RATES IN PEDIATRIC HEMATOLOGY PATIENTS

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Human parvovirus B19 is a frequent etiologic agent causing erythema infectiosum in children. It has recently been suggested that parvovirus B19 may be latent after infection and cause reactive infections especially in immunosuppressive patients with hematological problems. In this study, we aimed to investigate the parvovirus B19 IgM and IgG positivity rates in sera of patients consulted Pediatric Hematology clinic. **We retrospectively** screened the laboratory results of parvovirus B19 IgM and IgG antibody assays of children < 18 years, who consulted Pediatric in and outpatient clinics at between 2013-2016. Parvovirus B19 IgM and IgG antibodies were investigated in serum samples by using enzyme linked immunosorbent assay method in the Medical Microbiology Laboratory. **Regarding** all kinds of pediatric in and outpatients, the total number of patients from whom parvovirus B19 IgM antibodies were investigated was 2697 and parvovirus B19 IgM antibodies were detected in 168 (6.2%). On the other hand, of all, the number of patients attending Pediatric Hemotology clinics was 602 and parvovirus B19 IgM antibodies were detected in 109 (18.1%). A total of 1299 patients were asked for parvovirus B19 IgG antibody and 368 (28.3%) of them were positive for parvovirus B19 IgG. Of all, parvovirus B19 IgG antibody was detected in 244 (25.6%) of the 952 samples collected from Pediatric Hematology clinics. Parvovirus B19 IgM and IgG positivity in samples from Pediatric in and outpatient clinics other than Pediatric Hematology were 2.8% and 35.7%, respectively. Parvovirus IgM positivity in serum samples sent from the Pediatric Hematology in and outpatients was statistically significant compared to those sent from Pediatric clinics other than Pediatric Hematology ($p = 0.0001$). **The higher detection** rate of serum parvovirus B19 IgM positivity in patients under the follow-up of Pediatric Hematology clinics suggests that immune suppression-related virus reactivation or persistence may occur in these patients.

Keywords: Parvovirus B19, Igm, Igg, Child Patient

INVESTIGATION OF IRON, COPPER AND ZINC LEVELS IN SHEEP IN DISTRICT OF AKÇAKALE

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Trace elements which constitute the basis of life have of great importance. Various diseases may occur in sheep and lambs in the absence of trace elements. Especially enzootic ataxia, swayback, alkali disease which occur in case of Cu, Zn and Fe deficiency, and anemia has of great importance in sheep breeding. Today's animal breeding, diseases caused by lack of trace elements has become as important as parasitic and infectious diseases. In this study, it is aimed to determine the blood serum iron, copper and zinc levels in healthy sheep in Akçakale region where this kind of investigation has not been done before. Akçakale is district of Şanlıurfa province and was chosen as a study area and the region was divided into three regions. Total of 107 blood samples from the sheep, 34 samples from the first region, 37 samples from the second region and 36 samples from the third region, were taken. Analysis performed by ICP-OES, and serum iron, copper and zinc concentrations were measured in region 1, 2, and 3 were 109,44 ± 20:40 mg / dl, 58.55 ± 13:15 mg / dl and 59.60 ± 8:38 mg / dl, respectively. When the results were evaluated, serum iron, copper and zinc levels were determined lower compared to reference values. In variance analysis, serum zinc levels were determined to be lower (statistically significant, $p < 0.05$) compared to other regions. **As a result**, hidden deficiency in the terms of iron, copper and zinc in sheep can be considered, and especially zinc deficiency was more appealing in Akçakale region.

Keywords: Copper, Iron, Zinc, Sheep, Şanlıurfa, Akçakale

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EFFECTS OF ENTODINIUM CAUDATUM MONOCULTURE INOCULATION ON IN VITRO FERMENTATION, METHANE PRODUCTION AND PREVENTION OF SUB-ACUTE RUMINAL ACIDOSIS

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The **objective** with this study was to look at the possibilities to reduce the chances of sub-acute ruminal acidosis (SARA) by the use of protozoa (Entodinium caudatum) monoculture. This study included the in vitro fermentation and gas production recordings of two substrates i.e. wheat and corn incubated with two varying levels (1 and 2 ml of monoculture with 5.5x104/ml) of E. caudatum. The rumen fluid used to study was supplied by 2 rumen cannulated holstein heifers (450 kg live weight) fed with alfalfa only.30 g/L wheat and 50 g/L maize substrate were used to induce SARA in vitro. The fermentation bottles contained the substrate, incubation medium, protozoan free rumen fluid and E. caudatum monocultures and incubations continued for 24 hours. From the beginning of the incubation, it was observed that the protozoa were motile and started to engulf the substrate. The mobility was reduced after eight h of incubations as the inside was completely filled with substrate. The concentrations of volatile fatty acids (VFA) and lactate as well as general fermentation parameters did not change in the medium as a result of E. caudatum inoculation or substrate. However, E. caudatum inoculation increased the cumulative gas production ($P < 0.002$) and tended to increase the methane concentration in the total gas ($P < 0.061$). **It is concluded** that E. caudatum monoculture inoculation have little importance in reducing the chances of SARA as a result of poor relationship between protozoa and lactate levels in the rumen in vitro. **Additionally**, it may enhance methane production in the total gases produced in the rumen, thus posing serious impacts on climate

Keywords: Sub-Acute Ruminal Acidosis, In Vitro Rumen, Entodinium Caudatum, Methane

EFFECTS OF METOCLOPRAMIDE IN MATERNAL RAT BRAIN: USE TO INCREASE OF BREAST MILK PRODUCTION

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Background: Metoclopramide is an anti-emetic drug widely used in nausea and vomiting, and also has recently used for increasing maternal breast milk production in the lactation period. **Purpose**: The aim of this study was to investigate the extrapyramidal effects of metoclopramide to induce breast milk output in the lactation period in the central nervous system of mother. **Methods**: 18 young adult female Wistar albino rats that had recently given birth, together with their pups, were divided into 3 groups; Group 1: healthy control. Group 2: administered a low dose of MCP (10 mg/kg for 21days, twice daily, ip), and Group 3: administered a high dose of MCP (45 mg/kg 21 days, twice daily, ip). The experiment continued throughout the lactation period. Each mother's brain tissues and blood samples were removed at the end of the 21st day. Dopamine D2 receptor (DRD2), brain derived neurotrophic factor (BDNF) and neural growth factor (NGF), markers of extrapyramidal reaction in the brain, as signal molecules were assessed using the immunohistochemical staining. DRD2, BDNF and NGF levels were performed using the ELISA kits in the brain tissues and blood samples. **Results**: Immunohistochemical and biochemical evaluations showed that there were no statistical difference in expression and serum levels of DRD2, BDNF and NGF between the three groups ($p<0.05$). **Conclusions**: The results of this study suggest that there were no differences between three groups regarding expression and serum levels of DRD2, BDNF and NGF. The metoclopramide no have effect on the mother, on the other hand, our previous study, we show that metoclopramide causes the extrapyramidal reactions in newborn brain tissue. For this purpose, metoclopramide should be used carefully during in the lactation period by mothers.

Keywords: Metoclopramide, Brain, Extrapyramidal Reactions

THE STUDY OF THE EFFECT ON THE BONE TISSUE DEPENDING ON THE AGE GINKGO BILOBA EXTRACT AND GROWTH FACTORS

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AIM: Ginkgo Biloba leaf extract is a medicine used to treat Alzhemier, vascular demance and mental memory disorders. Aim of this study the effect of Ginkgo biloba extract on bone tissue and the epiphyseal cartilage is investigated in comparison between groups of young and old in terms of growth factors. **MATERIALS-METHODS**: In the study, 40 male wistar albino rats were divided into 4 groups. Group 1. 30 days young control (serum physiological, 2 months, 2 doses) Group 2: 30 days young ginkgo (GbE 100 mg/kg/days, 2 months, 2 doses) Group 3. 24 months old control (serum physiological, 2 months, 2 doses) Group 4: 24 months old gingko (GbE 100 mg/kg/days, 2 months, 2 doses). Decalsified femur bone tissue sections was performed immunohistochemical staining with antibodies to FGF-2 and PDGF-A. **RESULTS**: FGF-2 expression in the epiphyseal plate of young ginkgo and young control groups, particularly around the ossification in the cartilage matrix in proliferating chondrocytes was quite strong. In addition, the young control group was observed in osteoblasts and endosteum FGF-2 immunoreaction is moderate young ginkgo groups was strong release. FGF-2 expression was observed stronger in the elderly proliferation in the control group, the old ginkgo group was remarkable reduction in the reaction. In both groups, FGF-2 release is weak identified as ossification areas. In addition, osteoblasts, FGF-2 reaction is quite different from the young group decreased. PDGF-A immunostaining in all groups were weak to moderate staining in tissue. **CONCLUSIONS**: Ginkgo biloba aged younger than those in the bone tissue, especially in chondrocytes FGF-2 expression in osteoblast cells, and further increase in proliferation. For this reason, bone structure than those of the elderly than the young group concluded that a positive effect. Development of bone formation and release of PDGF-A to have no effect on the FGF-2.

Keywords: Ginkgo Biloba, Bone, FGF-2, PDGF-A

D-LACTIC ACID PRODUCTION FROM CORN COB USING L-LDH GENE DEFICIENT LACTOBACILLUS HELVETICUS OZH12

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Introduction: In recent years, concerns over the microbial production of commercially valuable products have been growing. Lactic acid has great potential for the production of biodegradable and biocompatible poly-lactic acid (PLA) polymers that drive the current market expansion for lactic acid which is a good alternative to petroleum-based plastics. Lactic acid is a chiral molecule that present in nature as two different optical isomers (D-LA and L-LA). D-Lactic acid is used for the production of poly d-lactic acid (PDLA). These pure polymers (PLLA and PDLA) are relatively heat sensitive, while stereocomplexes of PLLA and PDLA have a melting point ~50 ◦C higher than their respective pure polymers and are more biodegradable. The ratio of L- and D-lactic acids influences the properties and the degradability of PLA. These findings increased the interest to D lactic acid. **Method**: In this study, in order to meet the demand of the existing D-lactic acid, L-lactate dehydrogenase gene of Lactobacillus helveticus OZH12 was knock-out and disruption and substitution of the ldh-L gene of OZH12 were carried out using pGIT707 plasmid-based double-crossover homologous integration. We designed a fermentation process using corn cob which is industrial waste for production of lactic acid. Total lactic acid and L-lactic acid production were measured by HPLC and Lactate analyzer, respectively. D-lactic acid production was calculated by subtracting L-lactic acid difference from total lactic acid. **Results and Discussion**: The results showed that clone P8 consumed 41% of the available sugar, and produced totally 25.5 mg / ml lactic acid. 22,6 % of this lactic acid is D-lactic acid and 2,9 % is L-lactic acid. These findings indicate that the strain can be used in the production of lactic acid by using industrial wastes.

Keywords: L-Ldh Gene, Lactic Acid Bacteria, Lactic Acid Production, Knock-Out, Corn Cob

PROTECTIVE EFFECT OF OMEGA-3 FATTY ACIDS ON MSG INDUCED HIPPOCAMPAL NEURONAL APOPTOSIS IN THE ADOLESCENT RATS

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Monosodium glutamate (MSG) is used as a flavor enhancer in processed foods and was reported to have neurotoxic effects. The aim of this study is to investigate the possible toxic effect of MSG on histological and apoptotic features of hippocampus of adolescent rats to evaluate the possible protective role of eicosapentaenoic (EPA) and docosahexaenoic acid (DHA) against this effect. Wistar albino rats divided 5 groups 6 adolescent in each one. 1 Group: Healthy control. 2. Group: MSG applied group (4 mg/kg 1.3.5.7.9. days intraperitoneal (IP)), 3. Group: MSG+ EPA applied group (MSG + 300 mg/kg 9 days IP), 4. Group: MSG + DHA applied group (MSG + 300 mg/kg 9 days IP), 5. Group: MSG + EPA + DHA applied group (MSG + 300+300 mg/kg 9 days IP), 9 days later brain tissues took from rats. TUNEL technique was performed. Examination of the hippocampus of adolescent brain revealed powerful TUNEL positive reaction in granular form in the neuron cytoplasm of the CA1 and DG areas in the MSG group. Expression weak in both areas in the control group. Decreased reaction was determined in hippocampal neurons in all areas in the MSG-EPA, MSG-DHA and MSG-EPA+DHA groups. No significant difference was observed in the expression between the MSG-EPA and DHA groups. We conclude that since MSG caused an increase in TUNEL positive expression in hippocampus CA1 an DG area in the brain, while MSG-EPA and MSG-DHA caused a decreased apoptosis in hippocampal neurons from both CA1 and DG areas, care needs to be taken with the omega-3 fatty acids use of MSG in the adolescent period due to the possibility of neuronal apoptosis.

Keywords: Msg, Epa, Dha, Brain, Tunel

A DEEP CONVOLUTIONAL NEURAL NETWORK MODEL FOR DETECTING DIABETIC RETINOPATHY

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In this study, a deep convolutional model is proposed and its performance is compared with that of transfer learning methods such as GoogleNet, AlexNet. There exist some deep learning studies in the literature for detecting diabetic retinopathy. Generally, Kaggle dataset which classifies images into five categories according to the level of disease, was utilized in these studies. Unlike other studies existing in the literature, in this study lesions (hemorrhagic, soft and hard exudates, red dots) are detected separately. DIARETDB1 and DIARETDB0 datasets were utilized for training and testing the proposed model. Firstly, these images were cropped into 129x129 size images and these images were labelled according to the lesion types that they include. Then, for each lesion, different convolutional model was trained. Finally, according to the results from each trained model, a report was provided. 5-cross validation was implemented to test the proposed model, GoogleNet, and AlexNet. **According to the test results**, while proposed model achieved almost 80% overall classification accuracy, GoogleNet and AlexNet provided almost 60% and 47%, respectively.

Keywords: Diabetic Retinopathy, Deep Learning, Convolutional Neural Network

SHEAR BOND STRENGTH OF CEROMER BONDED TO ZIRCONIUM OXIDE INFRASTRUCTURE TREATED WITH DIFFERENT TYPES OF LASERS

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Objectives. Laser modalities are investigated for the preparedness of infrastructures for the bonding of superstructures. We aimed to examine the shear bond strength (SBS) of ceromer and nanohybrid composite to zirconium oxide (ZrO2) infrastructures treated with Er:YAG, Nd:YAG, and KTP laser modalities in vitro settings. **Research Methods**. The study specimens had 2 sets including 32 ZrO2 infrastructures with ceromer superstructures and 32 ZrO2 infrastructures with nanohybrid composite superstructures. These specimens divided randomly into 4 treatment modalities (n=8): no treatment (controls), Er:YAG, Nd:YAG, and KTP lasers. The ZrO2 infrastructures were prepared in the final dimensions of 7 mm in diameter and 3 mm in thickness in line with ISO 11405 standard. Ceromer as superstructure was applied after their surface treatments according to selected treatment modality. SBS test was performed to test the preparedness of ZrO2 infrastructure to bonding obtained after laser preparation. **Results**. All laser preparations had positive effect on the SBS value compared to no treatment, and with ceromer and ZrO2 combination, Nd:YAG and KTP laser preparations were more effective than Er:YAG laser preparation; and with nanohybrid composite and ZrO2 combination, Nd:YAG, Er:YAG, and KTP laser, in order of decreasing efficacy, had positive effect on the SBS value. When the SBS values of ceromer and nanohybrid composite were compared, there were significant differences among specimens prepared with Er:YAG, Nd:YAG, and KTP lasers and no treatment ($p<0.05$). In all preparation modalities, the nanohybrid composite specimens had more SBS value compared to the ceromer ones ($p<0.05$) except KTP laser praparation that was more effective in ceromer specimens ($p<0.05$). **Conclusions**. Overall, in current experimental settings, KTP, Nd:YAG and Er:YAG lasers, in order of strength, increases the bonding of ceromer to ZrO2 infrastructure. The studied laser modalities need to be subjected for further studies to determine their appropriate settings and specifications for their future usage in prosthodontics.

Keywords: Er:YAG Laser, Nd:YAG Laser, KTP Laser, Ceromer, Zirconium Oxide, Shear Bond Strength

INVESTIGATION OF POSSIBILITIES OF USING MOBILE BAGS IN DETERMINING DIGESTIBILITY IN DOG FOODS

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This study was **conducted** to determine dry matter digestibilities of dog foods by in vivo and mobile nylon bag methods and compare them. **Thirty** of castrated young mature male dogs at approximately 15-30 kg live weights have been used. 6 dog foods have been evaluated. **In the study**, 30 young adult neutered male dogs with live weights ranging from 15-30 kg were used. A total of 6 dry dog foods, one of which is in pellet form, were examined. **The dry matter** digestibility rates of the dog foods determined by classical fecal collection method were 84.20, 81.17, 83.66, 83.47, 86.10 and 83.85%. The samples were fed to approximately 35 mg/cm2 of dogs at 2x2 cm size mobile nylon bags with 35 µ pores and the bags were collected from the stool. The bags were washed for 4 minutes and 3 times changing water. Washing losses were also determined in the same way. The corrected for washing losses the dry matter digestibilities were determined as 83.06, 91.24, 79.53, 86.62, 94.58 and 87.21% (P<0.000), respectively. **The mobile nylon bag method** was used in dogs for the first time and it needs to be reconsidered and developed in terms of pore size of the bag, the amount of dog food put in it and the washing method.

Keywords: Digestibility, Dog Food, Mobile Bag

THE EFFECT OF HEAT TREATMENT APPLIED TO CEREALS USED IN DOG FOODS ON GELATINIZATION AND DIGESTIBILITY OF STARCH

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Barley, wheat, corn, rice, sorghum and oat were used in this study to determine the effects of soaking with hot water, cooking in water and extrusion processes on the gelatinization and digestibility of starch applied to cereals are used in dog food. After grinding, the grains were soaked with boiling water, cooked with water for 10 min and 20 min, and cooked with an extruder. The heat treated cereals were dried and ground. Dry matter, starch, gelatinized starch and in vitro starch digestibility analyzes were performed in all samples. The amount of starch in the heat treated cereals decreased. It was found that the richest cereal in terms of starch is rice and the poorest one is oat. The starch damage was determined as 4.64% in raw cereals, 30.99-31.83% in cereals cooked with water and 31.59% in extruded cereals($P<0.05$). Heat treatments increased starch gelatinization by 581%. The highest gelatinization occurred in the oat. In vitro starch digestibility was found 14.62 in raw grains, 55.46 after cooking for 10 min and 72.47 mg maltose/mg starch after extrusion($P <0.05$). Heat treatments increased starch digestibility by 308%. The highest starch digestibility occurs in the oat and the lowest in rice. There was not any gelatinized starch ratio difference between the cooking and extrusion, but starch digestibility was found higher after the extrusion process. Soaking with hot water was not effective in increasing starch gelatinization and digestibility.

Keywords: Dog Food, Cereals, Starch, Digestibility

A COMPARATIVE INVESTIGATION OF THE EFFECTS OF VARIOUS ANTIEPILEPTIC AGENTS IN THE RETINA AND CORNEAL LAYERS

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Aim: The number of studies suggesting that several antiepileptic agents used in the treatment of epilepsy may cause vision impairment has increased in recent years. We planned to perform a comparative investigation of the damage that may be caused in the retina and corneal layers by the antiepileptic agents sodium valproate (VPA), oxcarbazepine (OXC), levetiracetam (LEV) and topiramate (TPM) using nitric oxide synthase molecules. **Materials and Methods**: Five groups, each consisting of seven Wistar albino rats aged 21-24 days, were established. Group 1 represented the control group. Group 2 received VPA (300 mg/kg/day), Group 3 received OXC (30 mg/kg/day), Group 4 received LEV (50 mg/kg/day) and Group 5 received TPM (100 mg/kg/day) in two doses by gavage. At the end of the study period the eye tissues were removed and stained immunohistochemically with inducible nitric oxide synthase (iNOS) and endothelial nitric oxide synthase (eNOS) antibodies. **Results:** In contrast to the control group, quite powerful iNOS immunoreaction was observed in the inner plexiform layer of the retina in the VPA, OXC and LEV groups. Moderate reaction was observed in the VPA and OXC groups and weak reaction in the LEV group in the rod and cone layer. Moderate iNOS expression was observed in the inner and outer plexiform layers of the retina, and widespread weak iNOS expression in the rod and cone layers in the TPM group. Moderate release was observed at eNOS immunoreaction in the plexiform layer of the control group retinas, while weak reaction was observed in the outer plexiform and rod and cone layers. Moderate eNOS expression was noted in the inner plexiform layers in the VPA and OXC groups, while weak to moderate expression was observed in the inner plexiform layer in the TPM group.

Keywords: Epilepsy, Antiepileptic Agent, Sodium Valproate, Oxcarbazepine, Levetiracetam,Topiramate, Retina Corneal Layers

SULFASALAZINE MAY PREVENT DISSEMINATED INTERVASCULAR COAGULATION IN EXPERIMENTAL ENDOTOXEMIC RATS

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Disseminated intervascular coagulation is one of the most obvious causes of death in endotoxemic patients. The aim of the current study is to determine the effects of sulfasalazine treatment at different times on hematological, biochemical and coagulation factors. The **study** was performed on 30 Wistar albino rats and they were divided into 4 groups Groups; healthy control (HC), endotoxemic control (LPS) that was administration LPS (4 mg / kg, single dose), prophylactic sulfasalazine treatment group (SL5) that was treatment sulfasalazine (300 mg / kg, single dose daily) for 5 days before the endotoxemia model (4 mg / kg, single dose LPS) and sulfasalazine treatment group (LS) that was treatment sulfasalazine (300 mg / kg, single dose) at the same time with the endotoxemia model (4 mg / kg, single dose LPS). The blood was collected at 3 and 6 hours after the last applications in the all groups. Hematology, biochemical and coagulation [antithrombin (AT) III, fibrinogen and protein C] factors were measured in the blood samples. **The decreased** in fibrinogen level was partially inhibited in LS and SL5 groups. In addition, ATIII level in SL5 group was similar HC group at 3 hours. Protein C levels of SL5 group at 3 hours and LS group at 6 hours, was close to HC group. Sulfasalazine treatment partially elevated liver enzymes and the endotoxemia reduced erythrocyte, leukocyte and thrombocyte levels but decreased leucocyte levels were inhibited by sulfasalazine application (LS and SL5) at different times. all biochemical values were within the reference range reported for rats. **In conclusion**, application of sulfasalazine at different times may prevent acute intravascular coagulation on endotoxemia. In addition, the use of sulfasalazine at different times and at different doses may reduce the morbidity and mortality of the disease.

Keywords: Endotoxemia, Sulfasalazine, Hematology, Biochemistry, Coagulation

SOME REPRODUCTIVE PARAMETERS IN PRIMIPAROUS AWASSI SHEEP

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In this study, it was investigated reproductive parameters, birth weight, weaning weight and survival rates of 985 primiparous Awassi sheep, done by controlled mating, which were transferred from Ceylanpınar Agricultural Enterprise to İlci Çiçekdağı Agricultural Enterprise where the climate is colder and more rainy than Ceylanpınar, arid and hot climate conditions, to check their adaptation and productivity in colder climates. **Estrous rate**, birth rate, lambs born per ewe were calculated as %96.45, %95.47, 1.08 respectively. Twinning rate was found as %8,27. It was determined that %52,79 of lambs from the ewes were male. **32 of 34** breeding rams (%94,12) used in this study were able to mated with the ewes. Average number of ewes mated to the ram was 29,7 and maximum number was 75. The fertility rate of rams were between %27,78 and %100. **Even though** stillbirths were %0.12 for single lambs and %4 for twin lambs; mortality rate of lambs until weaning were found as %22,74 for single lambs and %20.14 for twin lambs. **Lamb birth and weaning weights** were determined as 4,756 and 28,436 kg for single lambs; 3.822 and 27.740 kg for twin lambs; 4,469 and 27,740 kg for females; 4.754 and 28,861 kg for males. The differences between lambing type and sex groups for birth weight were found really important ($P<0.000$); but not for lamb weaning weight ($P>0.05$). **As a result**; it can be said that reproductive parameters of Awassi sheep raised in the unnormal climate conditions such as rainy and cold weathers were not affected as much as expected. Obtained satisfying results from the study regarding to reproductive parameters in different climates, it can be also concluded that genotypes and preservation of Awassi population in Ceylanpınar Agricultural Enterprise was really in good conditions.

Keywords: Awassi Sheep, Primiparous, Reproductive Performance, Birth Weight, Weaning Weight

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING THYMBRA SPICATA VAR. SPICATA L. LEAF EXTRACT AND EVALUATION OF THEIR BIOLOGICAL ACTIVITIES

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In recent years, the use of metal nanoparticles for industrial applications has become an important field of study. The use of plant extracts in the development of fast, clean, non-toxic and eco-friendly process for nanoparticle synthesis has gained great importance. Here, for the first time, silver (Ag) nanoparticles (NPs) were green synthesized using Thymbra spicata leaf extract, also known as an important medicinal and aromatic plant species, is grown naturally in semi-arid climatic conditions of Turkey. Leaves and flowers are widely used for food, drink and medical purposes. Previous studies have reported antimicrobial analyses of essential oil, hydrosol and solvent-based extracts of T. spicata. The aqueous plant extract acted as reducing agent in the synthesis of nanoparticles. Characterization of the synthesized nanoparticles was performed by spectroscopic (UV-visible spectroscopy, FT-IR spectroscopy and XRD) and microscopic (AFM, SEM and TEM) analysis. Also, the average size, size distribution and PDI of the synthesized AgNPs in reaction mixtures were investigated by dynamic light scattering (DLS). The morphological characterization and size variation of the synthesized AgNPs with change in the extract quantity was carried out by microscopic analysis using TEM. The results showed that T. spicata leaf extracts mediated nanoparticle synthesis was cheap and reliable in room temperature conditions without any requirement for highly toxic chemicals. The synthesized AgNPs were studied for their antibacterial activities towards Gram-positive and Gram-negative bacteria. Also, we have carried out a comparative study on the cytotoxic effects of the synthesized AgNPs. The present study **demonstrates** that the size and shape are important parameters in controlling biological activities of nanoparticles.

Keywords: Thymbra Spicata, Green Synthesis, Silver Nanoparticles, Biological Activity.

MEASURING NITRATE CONSUMPTION BY C. VULGARIS USING NO3- ION SELECTIVE ELECTRODE (ISE)

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Microalgae can use substances such as nitrate in wastewater as nutrient and can continue both to purify the wastewater and their development. The reusability of wastewater makes its importance undeniable when considering the increasing population and living conditions. In this study, NO3- ion selective electrode (ISE) that is used for selective determination of nitrate changes induced by C. vulgaris microalgae in a solar bioreactor containing 70 liters growth medium. Nitrate consumption by C. vulgaris microalgae in the solar bioreactor (designed specially and increased effectiveness) after approximately 60 days of ISE measurements revealed that the NO3- concentration in the solar bioreactor decreased from 5 mg/L to 3 mg/L. **As a result**, it can be suggested that integration of nitrate ISE electrode into the solar bioreactor developed here would be useful for real time follow-up nitrate consumption at very close and certain intervals, and ISEs such as phosphate and pH should also be tested and integrated into the system.

Keywords: Microalgae, C. Vulgaris, Solar Bioreactor, NO3- ISE.

MEMORY-ENHANCING, ANXIOLYTIC AND ANTIDEPRESSANT EFFECTS OF INHALED ACHILLEA PSEUDOALEPPICA ESSENTIAL OIL ON SCOPOLAMINE-INDUCED AMNESIC RATS

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Achillea pseudoaleppica (Asteraceae) is an endemic plant species of Turkey. Several species of the genus has been used in folk medicine in the treatment of wounds, bleedings, headache, inflammation, pains, spasmodic diseases, flatulence and dyspepsia. In the present study, memory-enhancing, anxiolytic and antidepressant-like activities of A. pseudoaleppica essential oil on scopolamine-induced amnesic rats are assessed. In order to evaluate memory- enhancing activities of A. pseudoaleppica essential oil (1% and 3%, for 21 continuous days) Y-maze and radial arm maze tasks were used. As expected, scopolamine administration decreased spontaneous alternation percentage in Y-maze test and increased the number of working memory errors and the number of reference memory errors in radial arm-maze test. A. pseudoaleppica essential oil used in this study displayed an improved effect on acquisition of the short-term memory of scopolamine-treated rats within the Y-maze task as evidenced by increased spontaneous alternation percentage. A. pseudoaleppica essential oil administered rats also showed significant improvement of reference memory formation, but not working memory formation in radial arm maze test. Furthermore, A. pseudoaleppica essential oil induced anxiolytic effect on elevated plus maze test as evidenced by increased percentage of open arm time, open arm entries and the number of crossings as compared to scopolamine-alone treated rats. A. pseudoaleppica essential oil also exhibited antidepressant-like effects as evidenced by decreased immobility time on forced-swimming test. These results suggest the neuroprotective potential of Achillea pseudoaleppica essential oil on scopolamine-induced amnesia in rats and could act as a promising therapeutic agent for the neurological abnormalities related to Alzheimer's disease.

Keywords: Achillea Pseudoaleppica Essential Oil, Spatial Memory, Alzheimer's Disease, Anxiety, Depression

THE EFFECTS OF JUNIPERUS OXYCEDRUS SSP OXYCEDRUS ESSENTIAL OIL ON MEMORY, ANXIETY AND DEPRESSION IN AMNESIC RATS

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In the present study, memory-enhancing, anxiolytic and antidepressant-like activities of Juniperus oxycedrus ssp oxycedrus (Cupressaceae) essential oil on scopolamine-induced amnesic rats are assessed. Scopolamine is a drug comprising highly amnesic properties; therefore it has been used to create dementia animal model. Scopolamine is known to induce memory impairment as well as anxiety and depressive-like behavior in animals and humans. In this study, we evaluated the neuroprotective effects of Juniperus oxycedrus ssp oxycedrus essential oil in scopolamine treated rats. Two different doses, 1% and 3%, of essential oil were administrated to the rats by inhalation for 21 continuous days prior to the behavioral analysis. Y-maze task and radial arm maze task were used to evaluate spatial memory performances of the rats. As expected, scopolamine treated rats exhibited the following: decreases in spontaneous alternation percentage in Y-maze task, and increases in working memory errors and reference memory errors in radial arm maze task. Juniperus oxycedrus ssp oxycedrus essential oil treated rats exposed to scopolamine showed significant improvement in spatial memory function as compared to scopolamine-alone treated rats. Furthermore, anxiety and depressive like symptoms were assessed by elevated plus maze task and forced swimming task. Juniperus oxycedrus ssp oxycedrus essential oil inhalation significantly increased the number of open arm entries in elevated plus maze, indicating anxiolytic behavior. The essential oil also reduced the immobility time and increased the swimming time in forced swimming test indicating antidepressant activity. Taken together, Juniperus oxycedrus ssp oxycedrus essential oil could be a good candidate for the treatment of dementia and deserves further investigation.

Keywords: Juniperus Oxycedrus Ssp Oxycedrus Essential Oil, Memory, Dementia, Anxiety, Depression

SHOOT REGENERATION OF HYPERICUM PERFORATUM L. FROM AXILLARY BUDS

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Hypericum perforatum L. is a medicinal plant, spread out in Turkey. Hypericum species have medicinal properties such as antidepressant, antibacterial, antivirale and has been used traditionally for many years in the world. Hypericum perforatum L. is a traditional medicinal plant containig biologically active and numerous secondary metabolites with anti-cancer, anti-depressive and anti-viral properties. The goal of the research was also to achieve high compact calli production and regeneration of H. perforatum L. by somatic embryogenesis or organogenesis. **Material-Methods:** The seeds of H. perforatum L. were collected from Uşak Universtiy Campus in Turkey. The seeds were treated with 1.5 g /L GA3 solution in 100 ml of distilled water for 2 days and then sterilized in 70% bleach for 20 minutes. The sterilized seeds were transferred and germinated on LS medium containing 3 % sucrose and 0.6 % agar. Axillary buds explants were izolated from germinated seeds for callus formation and cultured on LS medium suplemented with different concentrations of BAP (0.5 mg / L, 1 mg / L and 2 mg / L) and 0.1 mg/L NAA. All explants were kept at growth room with photoperiod for 16 hours light and 8 hours dark, at 24±2 ^{o}C. **Results and Discussion:** The best callus formation was obtained on LS medium containing 1 mg/L BAP and 0.1 mg/L NAA. The best adventitious shoot regeneration was also achieved on LS medium with 1mg/L BAP. The shoots derived from regenerative calli were rooted on MS medium supplemented with 1.5 mg / L IBA, and the roots of the plants were provided 8 days after culture initation. The rooted plants were acclimatizated adaptation in a mixture of peat, perlite and field soil (in a 1:1:1 ratio) in the growth chamber with high survival ratio (100%).

Keywords: Hypericum Perforatum L., Medicinal Plant, In Vitro Culture, Shoot Regeneration

ETHANOL INDUCED CHANGES IN THE EXPRESSION OF SELECTED GENES DOWNSTREAM TO NRF2 PATHWAY IN GRANULOSA CELLS IN VITRO

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Alcoholic beverages are a part of the social life in the west. However, chronic alcoholism may cause severe mental and physical damages including reproductive disorders. Granulosa cells (GCs) are the major cellular component in a follicular microenvironment and played an indispensable role in the maturation and protection of oocyte, the release of the oocyte, and the formation of corpus luteum. Therefore, the health and function of GCs dictate the outcome of a reproductive cycle as well as the pregnancy. This study was conducted to investigate the effects of chronic alcohol consumption on the function of ovarian GCs. For this purpose, we used in vitro culture of primary GCs from the bovine origin and different concentration of ethanol (0, 50, 200, and 500) to simulate the effects of alcohol consumption. Subsequently, cell viability and proliferation, mitochondrial activity, and expression of candidate genes were investigated. The results showed that there was a gradual loss of cell viability with the increase of the ethanol concentration, i.e. lowest viability was observed at the highest concentration (1000 mM), which is further supported by cell proliferation assay. Mitochondrial activity decreased significantly at higher concentrations. Candidate gene expression measured by qRT-PCR revealed that expression of NRF2 decreased significantly ($p<0.05$) in ethanol exposed cells compared to the cells in control group whereas the expression of KEAP1, negative regulator of NRF2, increased significantly ($p<0.05$) at 50 and 200 mM, however, no significant difference was observed at 500 mM concentration. The expression of antioxidant genes, downstream to Nrf2-pathway activation, showed that overall expression was decreased at 200 and 500 mM, however, increased at 50 mM concentration compared to the control. The result of this study provoked us to postulate that ethanol exposure decreases the ability of GCs to handle stress by downregulating the expression of genes involved in Nrf2-pathway.

Keywords: Alcohol, Nrf2-Pathway, Oxidative Stress, Granulosa Cells

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TIME AND DOSE-DEPENDENT EFFECTS OF OXIDATIVE STRESS INDUCED BY HYDROGEN PEROXIDE IN OVARIAN GRANULOSA CELLS

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When the production of prooxidant molecules such as reactive oxygen species (ROS) overwhelmingly exceeding the cellular antioxidant capability, it potentially leads to a condition known as oxidative stress. Physiological level of ROS plays important roles in the reproductive process including follicular development, granulosa cell expansion, oocyte maturation, ovulation, and pregnancy. However, consistent production of an elevated level of ROS may disrupt the cellular homeostasis and results in oxidative stress. Many chemical compounds have been shown to be a potential inducer of oxidative stress in mammalian cells by increasing ROS level including hydrogen peroxide H2O2. Micromole of H2O2 is able to generate excessive ROS that may cause peroxidative damage to the cellular macromolecule and results apoptosis. The oxidative effects of H2O2 have been investigated in different types of cells, however, time and dose-dependent effects of oxidative stress induced by H2O2 in granulosa cells (GCs) have not been investigated yet. GCs were exposed to different concentrations of H2O2 (0, 100, 200, and 500 µM) for different time points (4 h, 12 h, and 24 h) and viability, cytotoxicity, and ROS accumulation was measured using trypan blue, WST-1 kit, and H2DCFDA, respectively. The results showed that there were time and dose-dependent loss of cell viability in GCs due to H2O2 exposure. For instance, lower cell viability was observed at 500 µM concentration and 24 h time point while highest viability was observed at 100 µM concentration. Similar results were observed in cytotoxicity experiment. Analysis of ROS accumulation showed a concentration-dependent increase, i.e. higher ROS at higher concentration, and time-dependent decrease, i.e. lower ROS at higher time points, of ROS accumulation in GCs. Our results confirm that higher concentration fo H2O2 is highly cytotoxic and cause a loss of cell viability of GCs by generating excessive ROS in a time and dose-dependent manner.

Keywords: Oxidative Stress, Cell Viability, Granulosa Cells

THE EFFECTS OF CHRYSINE ON CYPERMETHRIN-INDUCED ACUTE TOXICATION IN RAINBOW TROUT (ONCORHYNCHUS MYKISS)

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Cypermethrin (SP) is a pyrethroid insecticide. It is high toxic for fishes and aquatic live, also. Chrysine (KR), anti-inflammatory, antiviral, anticarcinogen and antioxidant characteristic, is a flavonoid and it is obtained from propolis, some mushroom, and some natural plants. The purpose of this study is to determine effects of the KR on SP-induced acute toxication in fish. **In study**, 60 fish divided into 6 groups (n=10). Group 1: control, Grup 2: 0.4 µg/L SP; Grup 3: 50 mg/kg KR; Grup 4: 0.4 µg/L SP+50 mg/kg KR; Grup 5: 0.4 µg/L SP+100 mg/kg KR; Grup 6: 100 mg/kg KR. After, blood and tissues was collected. It was determined cytokines (IL-1ß, IL-6, IL-10 and TNF-α), ALT, AST in serum and MDA, SOD, GSH and CAT levels in tissues (liver and kidney). **In this study**, AST, ALT, cytokines (except IL-10) and MDA increased, SOD, GSH and CAT decreased in SP group. On the contrary, when we compared KR groups with SP group, KR significantly decreased IL-1ß, IL-6, and TNF-α, ALT, AST and MDA. Also, GSH, SOD and CAT increased depending on dose in KR groups. **In conclusion**, KR can prevent tissue damage via antiinflammatory and antioxidative effects in SP-induced acute toxication in fish.

Keywords: Fish, cypermethrin, chrysine, antioxidant, cytokine

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THE PROTECTIVE EFFECTS OF ANETHUM GRAVEOLENS ON PARACETAMOL-INDUCED ACUTE TOXICATION IN MICE

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Objective: Parasetamol (PT), paraaminophenol group is a drug and cause damage on liver tissue when used in high doses with formation of its toxic metabolite n-asetil-p-benzokuinonenimin. Anethum graveolens (AG), antiinflammatory and antioxidant characteristic, is a plant. The purpose of this study is to determine effects of the AG on PT-induced acute toxication in mice. **Methods**: In study, 50 mice divided into 5 groups (n=10). Group I: control, Group II: 400 mg / kg a single dose PT orally, Group III: PT + AG1 (100 mg / kg AG), Group IV: PT + AG2 (200 mg / kg AG), Group V: AG2 (200 mg / kg). After, blood and tissues was collected. It was determined serum cytokine (IL-1ß, IL-6, IL-10 and TNF-α), ALT, AST and MDA, SOD, GSH in tissues with histopathological examinations. **Results**: AST, ALT, cytokines and MDA increased, SOD and GSH decreased in PT group. On the contrary, when we compared AG groups with PT group, AG significantly decreased cytokine, ALT and AST. The MDA decreased, and GSH, SOD increased depending on dose. Histopathological findings are consistent with biochemical findings. **Conclusion**: AG can prevent organ damage via affected cytokine answer and oxidative stress in PT-induced acute toxication in mice.

Keywords: Mice, Anethum Graveolens, Paracetamol, Lipid Peroxidation, Toxication

Acknowledgements: *This study is the MSc thesis of Serap KORKMAZ. This study was supported by the Scientific Research Council of Erciyes University, Kayseri, Turkey (Project no: TYL-2016-6375).*

ANTIMICROBIAL APPLICATION OF GREEN SYNTHESIS OF ZINC OXIDE NANOPARTICLES BY EUPHORBIA MACROCLADA EXTRACT

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The purpose of the study is to investigate antimicrobial activity of biologically synthesized Zinc Oxide (ZnO) nanoparticles. ZnO nanoparticles have been of great interest due to their unique properties such as chemical stability, virtuous conductivity, catalytic and antibacterial, antifungal anti-inflammatory activities. ZnO nanoparticles are used as antimicrobial agent in various areas like medical, pharmaceutical, food and agricultural science. Green nanotechnology provides easy shape and size control of synthesized nanoparticles in addition to eco friendly synthesis of nanoparticles by utilizing biological materials such as microorganisms, fungus and plants. The aqueous extract of Euphorbia macroclada was applied as biological capping and surface stabilizing agent for the synthesis of ZnO nanoparticles. Sochlet extractor was performed to acquire the aqueous extract of Euphorbia macroclada. Creamish-white colored precipitation was confirmed the synthesis of nanoparticles. UV-vis spectrophotometer, Zeta sizer, FTIR and XRD were used ZnO nanoparticles characterization. Antimicrobial activities of ZnO nanoparticles were investigated on Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa and Escherichia coli by using well diffusion method.

Keywords: Zinc Oxide, Nanoparticle, Euphorbia Macroclada, Antimicrobial

THE EFFECTS OF PROPHYLACTIC AND THERAPEUTIC SULFASALAZINE IN LIVER OF EXPERIMENTAL ENDOTOXEMIC RATS

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Lipopolysaccharide (LPS) is obtained from gram (-) bacteria cell wall including E. coli, and it has an important role in the formation of septic shock and endotoxemia. In this study, it was aimed that determination of prophylactic and therapeutic effects of sulfasalazine in the experimentally induced endotoxemia in rats. The study was carried out with 4 groups of 30 Wistar albino rats. Groups was established as control group (C), experimental endotoxemia model group (EE) with LPS (4 mg/kg, single dose), prophylactic sulfasalazine treatment in experimental endotoxemia model group (PSE) (300 mg/kg, single dose daily, for 5 days before the experimental endotoxemia model) and lastly sulfasalazine treatment in experimental endotoxemia model group (SE) (300 mg/kg, single dose daily, at the same time as endotoxemia model). The rats were euthanized at 6 hours after the last applications in the all groups, and mRNA levels of IκB, EDN1, BCL2 and BAX gene expression were examined from liver tissues by real-time PCR. It was determined that the level of IκB in the liver increased with endotoxemia and this increase was inhibited by the application of prophylactic sulfasalazine. Expression of EDN1, which is important for the perfusion of the organs, statistically changed by prophylactic and therapeutic sulfasalazine applications. Anti-apoptotic BCL-2 increased in liver mRNA expressions in SE group and BAX expression partially decreased in the PSE and SE groups. As a result, prophylactic and therapeutic sulfasalazine may prevent apoptosis and inflammation via inhibiting IκB in endotoxemia. The effects of different doses and durations of sulfasalazine should be determined on other organs in the endotoxemia model.

Keywords: Endotoxemia, Sulfasalazine, Iκb, BCL-2, Bax

PHARMACOKINETICS OF CEFTRIAXONE FOLLOWING SINGLE ASCENDING INTRAVENOUS ADMINISTRATION IN SHEEP

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Ceftriaxone (CTX) is a third-generation cephalosporin, which used more frequently in veterinary clinical practice because of the activity of its broad spectrum including Gram-positive and Gram-negative microorganisms and the low toxicity. Although different dose levels of CTX may be used in the treatment of infections caused susceptible pathogens in sheep, the pharmacokinetics of ascending doses of CTX in sheep was not found in literature research. The objective of this study was to evaluate the pharmacokinetics of CTX following intravenous administrations of single ascending doses in sheep. In this study, six clinically healthy Akkaraman sheep (2.4±0.4 years and 50±3 kg body weight) were used. CTX was administered intravenously to each sheep at doses of 20, 40 and 80 mg/kg in a crossover design with a 15-day washout period. Plasma concentrations of CTX were measured using the HPLC-UV method. Pharmacokinetic parameters were calculated by non-compartmental analysis. CTX is well tolerated following administration at doses of 20, 40 and 80 mg/kg. While mean residence time (MRT) of CTX at the dose of 80 mg/kg was longer than those in other doses ($P<0.05$), its elimination half-life ($t1/2\lambda z$) following the administration at doses of 40 and 80 mg/kg were longer than that in 20 mg/kg dose ($P<0.05$). While total clearence of CTX after 40 and 80 mg/kg doses decreased significantly compared to 20 mg/kg dose, its dose-normalized area under the plasma concentration-time curve ($AUC0-\infty$) at 80 mg/kg dose increased significantly compared to 20 mg/kg dose. The volume of distribution at steady-state of CTX was not significantly different between the dose groups ($P >0.05$). Our study showed that CTX can be used at 12 h interval to maintain T>MIC of >40 for the treatment of infections caused bacteria with MIC values ≤2, ≤4, and ≤16 µg/mL, respectively, after 20, 40, and 80 mg/kg doses of CTX. This information may be helpful in adjusting the dosage regimen but there is a need for future work.

Keywords: Ceftriaxone, Ascending Doses, Pharmacokinetics, Sheep

DOXORUBICIN LOADED CLAMSHALL TYPE FOUR DITHIOL-O-CARBORANE BRIDGED METALLOPHTHALOCYANINES FOR PHOTODYNAMIC THERAPY

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INTRODUCTION: Cancer is one of the leading causes of death worldwide. Among cancer therapies, photodynamic therapy (PDT) was shown to be a clinically approved minimally invasive therapeutic method which can show a selective cytotoxic activity toward malignant cells. Phthalocyanines are used as photosensitizers which are components of PDT and with light and oxygen they initiate aphotochemical reaction that culminates in the generation of a highly reactive product termed singlet oxygen (1O2). **METHODS**: In this study clamshall-type 1,2-bis(2-thiol)-o-carborane bridged binuclear metallophthalocyanines (M = Zn, Co; Zn-Pc and Co-Pc, respectively) were synthesized. Structures of the target compounds were characterized by UV-Vis, FT-IR, MALDI-TOF mass and H-NMR spectroscopy techniques. Doxorubicin (DOX) loading on the Pcs were analyzedusing spectrofluorometric techniques. Cytotoxicities of Pcs alone and Pcs loaded with DOX were tested using cell viability tests with N2a, MCF 7, HEK 293 and MIA PaCa-2 cells. All samples were prepared in two separate groups and one of the groups were subjected to PDT throughout the incubation (PDT (+) cells). **RESULTS**: Fluorescence intensity of DOX decreased by 12 % and 62 % for 1:1 and 1:10 DOX: Zn-Pc (mol: mol) combinations, respectively, and 25 % and 79 % in presence of Co-Pc (DOX: Co-Pc, 1:1 and 1:10, respectively). Viabilities of PDT (+) cells incubated with DOX loaded Pcs were lower when compared to PDT (-) cells. The most dramatic decrease was seen in MIA PaCa-2 cell line with Co-Pc PDT (+) with 54 % when compared to untreated cells. **CONCLUSION**: Zn-Pc and Co-Pc release DOX in response to light irradiation and this system could be a potential component of a stimuli responsive drug delivery system.

Keywords: Phthalocyanine, Photodynamic Therapy, Doxorubicin, Cancer Therapy

IN VITRO MATURATION IN MOUSE

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As oocyte sources, we can use preantral or superovulated follicles. For using of preantral follicles, female mouse is killed by cervical dislocation at 14 days old. All selected follicles are placed into in vitro maturation conditions. Several effective maturation media are used for maturing of mouse oocytes. Follicles are cultured in an incubator for 12 days at 37°C, 100% humidity and 5% CO2. After EGF and hCG are added the maturation medium from days 13, maturing follicles start to ovulate (14 hours later) and matured MII oocytes are released. For using of superovulated follicles; after hormonal tretaments, ovaries are cleaned from fat and oviduct tissues. Then oocytes are removed with the help of 26G needles into washing solution. They are putted into 50µL culture medium and evaluated the expansions of oocytes for IVF. In this study, we explain detail procedures of in vitro maturation of mouse. **In vitro maturation** in mouse is different from some other mammals. Understanding of unknown mechanism in maturation stage requires effective studies with well controlled. In this way, mouse is getting more important, and can be used for developing new effective media and understanding mechanisms of embryo blocking/developing systems.

Keywords: Follicles, In vitro maturation, Mouse

AN INVESTIGATION OF BLOOD IRON, COPPER AND ZINC LEVELS IN SHEEP AT REGION OF SURUÇ

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The case of **lack or excess of trace elements** in animals causes serious clinical disorders and significant economic losses. Imbalances of trace element in farm animals are results in all the animal productivity decline including hair loss, depigmentation, parakeratosis, continuous diarrhea, anemia, anorexia, bone formation disorders, tetany, the abortion which is not due to infection, fry efficiency as well as infertility, stunted and pica. **The project area** was identified as Suruc district of Sanliurfa. Aşağıoylum, Yönlü, Kaplan and Ayhan villages were selected as study area which belonging to Suruc. Randomly 25 blood samples were collected from each village. **Serum iron, zinc and copper levels** of the four villages were measured as 67.37 ± 2.29 mg/dL, 77.29 ± 2.59 mg/dL and 157.64 ± 6.99 mg/dL, respectively. The levels of iron and copper were normal compared to the reference values, but the zinc levels were low. The copper levels of Aşağıoylum and Yönlü villages were significantly lower than those of the other regions ($P < 0.01$), and also zinc and iron levels of Kaplan region were significantly higher than those of the other regions ($P < 0.01$) in the analysis of variance of inter-regional. **As a result**; zinc levels were low and copper and iron levels were found to be normal in the sheep in Suruc. It was pointed out that the zinc supplementation in the area was priority important for the preventive medicine.

Keywords: Copper, Zinc, Iron, Sheep, Suruc, Sanliurfa.

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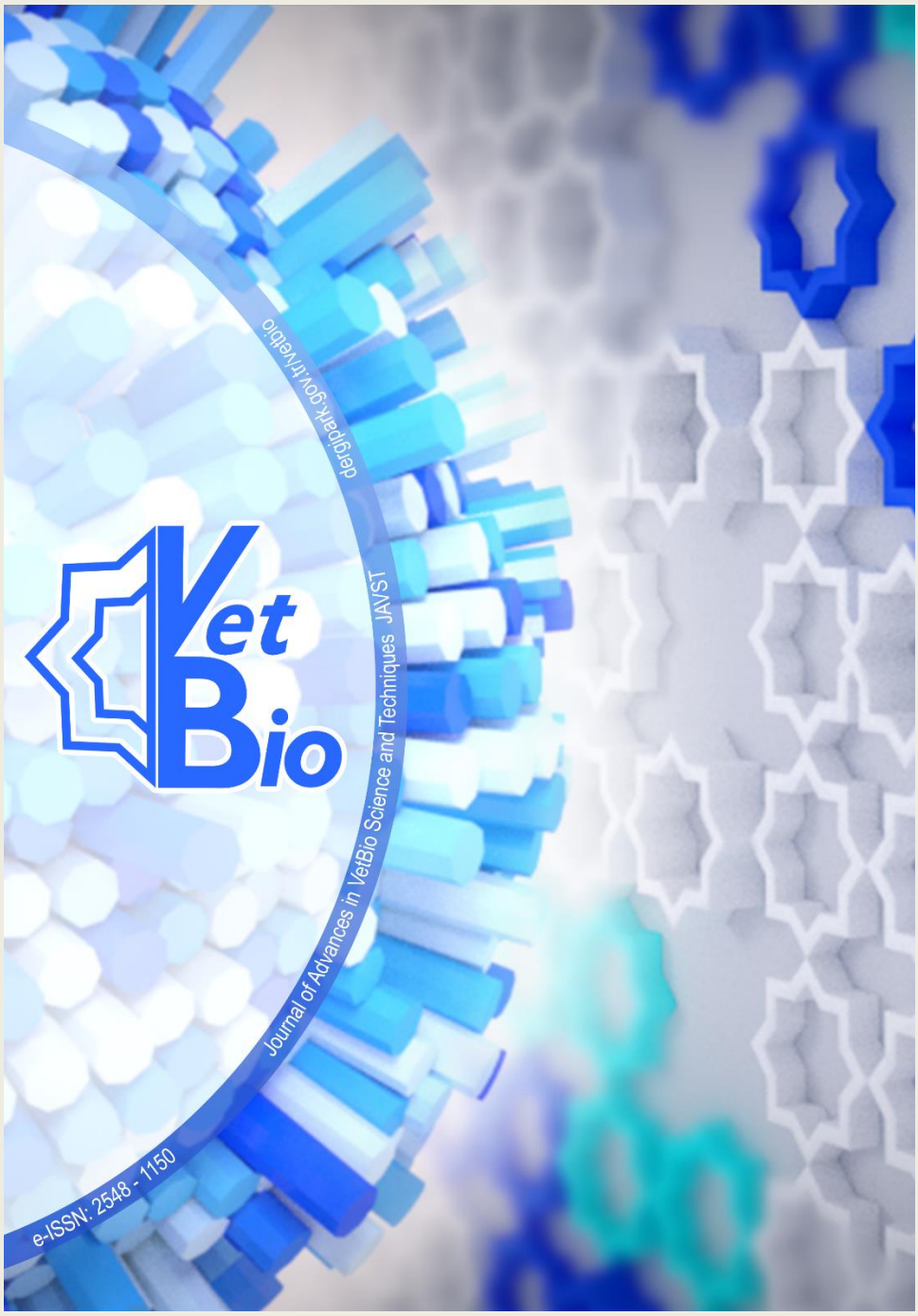

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POSTER PRESENTATIONS

Poster - 1

DNA LIBRARY DESIGN FOR SELEX USING BIOINFORMATIC TOOLS

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INTRODUCTION: Systematic evoluation of ligands by exponential enrichment (SELEX) is used to selectDNA aptamers and uses PCR method for enrichment of sequences that capture targets with their 3D structure. A 80 bases long sequence of DNA library 5'- F-Primer - (N45) – R-Primer-3',composed of two primer binding regions atboth ends and 40-45 base long random sequence in between was designed using bioinformatic tools in this study. Forward primer (F-primer) was tagged with FITC on 5' end and was in the form of 5'- /5Fluor (N18) -3'. PCR is a major part of aptamer selection and therefore it is important to use primers and a library set that have high PCR efficiency. Since random region in the designed libraries already causes unwanted PCR products primer regions had to be carefully designed. **METHOD**:The primers of DNA library were designed to have appropriate annealing temperatures and GC content higher than 50%.Possibilities of G-quadruplex formation that could result from high G content of the sequences werecalculated using QGRS Mapper software (bioinformatics.ramapo.edu/QGRS/) and sequencescontaining any G-quadruplex structure were eliminated. Additionally,heterodimers between two primer sequences and their complementary sequences on DNA library, self dimers and hairpins for each of the primer sequences, and hairpins within DNA library sequence were avoided.The stabilities of possible undesired structures within designed sequences at both 4°C and 37°C were analysed using NUPACK Nucleic Acid Package software (www.nupack.org/) and IDT DNA Technologies-OligoAnalyzer tool (www.idtdna.com/calc/analyzer). **CONCLUSION**:Two DNA library sequences were selected from five candidate sequences.The selected DNA library sequences could be used in various SELEX procedures for DNA aptamer development.

Keywords: SELEX, DNA Library Design, Nupack

Poster - 2

ANALYSIS OF PROTEIN AND MRNA EXPRESSIONS OF CYP1A1 AND CYP2E1 ENZYMES IN LIVER, COLON AND PROSTATE CANCER CELL LINES TO STUDY DRUG AND CARCINOGEN METABOLISM

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Most of the marketed drugs are metabolized by Cytochrome P450s (CYPs) known as phase I enzymes. A phase I enzyme, CYP1A1 catalyzes the conversion of many pro-carcinogens and hydroxylation of many endogenous substrates. CYP2E1 is also important in the metabolism of drugs, pre-toxins and pro-carcinogens. The present study was aimed to describe the best cell line model for studying phase I xenobiotic metabolizing CYP1A1 and CYP2E1 enzymes and possible effects of xenobiotics on these enzymes. In this study HT29 and SW620 (colon); HEPG2 and HUH7 (liver); PNT1A and PC3 (prostate) cell lines were chosen. Then, mRNA and protein expressions of the CYP1A1 and CYP2E1 enzymes in these cell lines were analyzed by qRT-PCR and Western blotting techniques, respectively. It has been found that CYP1A1 protein was expressed in all cell lines and relative protein expression is highest in the HT29 (100%). In addition, HEPG2 (0.63 fold) and HUH7 (1 fold) expressed highest CYP1A1 mRNA. CYP2E1 protein expression was found in all cell lines at relatively high levels except PC3. CYP2E1 mRNA expression was significantly higher in HUH7 (1 fold) and HT29 (0.59 fold). **According to the results**, there was no significant correlation between mRNA and protein expressions. Thus choosing the best cell line as model depends on the purpose of the research. For studying metabolism of a chemical by CYP1A1 and CYP2E1 or effect of a chemical on translational regulation of these enzymes, it is better to consider protein expression levels. However, if the aim is to study effect of a chemical on transcriptional regulation of these enzymes, it is better to choose a cell line that expressing highest mRNA of gene of interest. Considering both mRNA and protein expression levels together, the best model cell lines for studying CYP1A1 and CYP2E1 are HT29 and HUH7, respectively.

Keywords: Xenobiotic Metabolism, CYP1A1, CYP2E1, Western Blot, Qrt-PCR, In Vitro

Poster - 3

COMPARATIVE EVALUATION OF SMALL T GENE AND LARGE T GENE BASED REAL-TIME PCR METHODS FOR THE DETECTION OF THE BK AND JC VIRUSES IN CLINICAL SAMPLES

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Objective: The aim of our study is to compare and evaluate the results of real-time PCR methods targeting the small and large T gene regions of the viral genome, taking into account polymorphisms occurring in the viral genome of BK and JC viruses. **Method**: Urinary specimen of 82 patients over 18 years old who were sent with suspicion of BKV and JCV to Molecular Microbiology laboratory of Necmettin Erbakan University, Meram Medical Faculty were taken into study. The small t gene was investigated using a commercial kit (LightMix, Roche, USA) and real-time PCR method. Large T gene-specific nucleic acid probes were investigated using the optimized in-house real-time PCR method using primers and probes as described by Dumoulin and Hirsch. Sequence analysis of the VP1 region was also performed using the Sanger method in 19 samples that has different PCR results. **Results**: BKV positivity in 9 samples and JCV positivity in 61 samples by real-time PCR method specific to small t gene region; BKV positivity in 21 samples and JCV positivity in 67 samples were determined by real-time PCR method specific to the large T gene region. Statistically, there are two methods; There was a significant difference for BKV, no significant difference for JCV. Sequence analysis is accepted as the standard method and the in-house method we designed with primers and probes; Sensitivity for BKV was 100%, specificity was 81.3%, positive predictive value was 33.3%, negative predictive value was 100%, sensitivity for JCV was 98.5%, specificity was 100%, positive predictive value was 100% and negative predictive value was 93.3%. **Conclusion**: It was thought that polymorphisms in the different gene regions targeted were responsible for the different outcomes obtained at the end of our study. With this sensitivity and specificity, our method is a candidate for routine diagnosis.

Keywords: BK Virus, JC Virus, Real-Time PCR, Polymorphism

EFFECT OF BLOOD HORMONE LEVELS AND BODY CONDITION SCORE IN SUCCESS OF ARTIFICIAL INSEMINATION IN COWS

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Fertility rate with artificial insemination obtained depends on various factors. One of these factors is the body condition score. In this study, the body condition scores determined during artificial insemination, follicle development, steroid hormone (estrogen) and the impact on the level of estrus symptoms and aimed to reveal the possible cause of infertility. In this study, cows with no obstacles impeding fertility and at least one birth without any problems have been used at the private farms in Hatay Region. Body Condition Score: The oestrus assessments of cows that have been identified have been made according to the following criteria: Uterian flow, edema of Vulva, Vagina's color, Duldung reflex and diameter of follicle. Cows that are determined to be at estrus were inseminated by recto-vaginal method. Estrogen levels were determined by immunological methods (ELISA). As a result, it has been observed that if the body condition score is less than 2.5 in artificial insemination, the amount of estrogen is decreased, the first insemination pregnancy rate may decrease from 10% to 18% and the birth-first insemination interval may be prolonged.

Keywords: Body Condition Score, Infertility, Hormone Levels, Artificial Insemination.

Acknowledgements: *This research was financed by Research Fund of Mustafa Kemal University (Project Number:13882)*

Poster - 5

THE HEMOGLOBINOPATHY PREVALENCE OF THE PATIENTS WITH SUSPECTED HEMOGLOBINOPATHY WHO HAVE APPLIED TO AFYON KOCATEPE UNIVERSITY PRACTICE AND RESEARCH HOSPITAL

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Objectives and aimed: Hemoglobinopathies are the most common autosomal recessive hematological diseases in the world. According to World Health Organization data, the carrier frequency is around 7% in the world and 300.000-500.000 children with hemoglobinopathy are born every year. In our country, the mean β thalassemia carrier is 2%, and the most common of hemoglobinopathies are the sickle cell anemia (HbS) carrier (% 0.6). It is estimated that there are a total of 1,300,000 carriers and about 4,000 thalassemia patients in Turkey. In our country; the carriage of thalassemia in Çukurova, Mediterranean coastal strip, Aegean and Marmara regions is more common than in other regions. The aim of our study is to determine the prevalence of hemoglobinopathy in suspected patients who come to Hospital of Afyon Kocatepe University and to shed light on the establishment of control programs that have an idea about the frequency of hemoglobinopathy in Afyonkarahisar and its region and to prevent the birth of sick children. **Materials and Methods**: In our study, HbA and HbA2 values of 285 suspect patients who came to Medical Biochemistry Laboratory of Afyon Kocatepe University hospital were examined retrospectively according to archival records. Results: HbA and HbA2 values were found to be healthy in 176 and thalassemia minor patients in 109 (HbA2>3.5%) of the 285 cases. Conclusions: As a result, it was determined that the proportion of carriers of β-thalassemia in the suspect patients who applied to Medical Biochemistry Laboratory of Afyon Kocatepe University hospital was much higher than the average of Turkey (2%) and for this reason, it was **concluded** that the future suspect patients should be made aware of the issue and that the screening of premarital hemoglobinopathy is mandatory.

Keywords: Thalasemi Prevalence, Afyon Region, Hba2

Poster - 6

ANTIOXIDANT PROPERTIES OF DIETARY FLAVONOIDS

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Recent studies have demonstrated that reactive oxygen species (ROS) such as superoxide anion radical, hydroxyl radical and lipid peroxidation play an important role in the pathogenesis of various diseases such as cancer, inflammatory diseases, cardiovascular and cognitive disorders. Nevertheless, the studies in recent years also indicated that widely consumed some foods contain some compounds capable of protecting individuals from the development of cancer, cardiovascular disorders and chronic diseases. Those compounds are called dietary antioxidants and their protective effects attributed to their scavenging activity. Flavonoids are a large group of antioxidants naturally occur in vegetables, fruits, cereal, tea and red wine. **In this study**, we want to present recent knowledge about structure, function and sources of flavonoids.

Keywords: Flavonoids, Antioxidant Properties, Relationship Of Structure- Activity

INVESTIGATION OF IMMUNOLOGICAL INFERTILITY IN NON-FERTILIZATED COWS

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The most important productivity of animals is the productivity of the offspring. Reproduction infertility is one of the major problems of income reduction in livestock enterprises. Causes of infertility in cows are very diverse. These include hereditary, functional (anoestrus, subestrus, cysts), infectious diseases, care and feeding disorders. It is noteworthy that in some cows the cases of repeat breeder have been observed despite the many seeds made even in the absence of these reasons. **In this study**, it was aimed to investigate the incidence of immunological infertility by determining immunological infertility by looking at immunglobulin levels in repeat breeder cows. **In the study**, cows who had never been pregnant at least 3 times insemination in the private farms and did not have any disorders preventing fertility in the rectal and ultrasonographic examinations were used. Antisperm antibodies were detected by ELISA test in blood serum and cervical mucus samples obtained after insemination. **As a result**, 14.33% of sperm antibodies (ASA) immunity against sperm were detected in the sera of cows that were inseminated at least 3 times but not conceived, without any disease tested in normal field conditions. These animals have the potential to become pregnant with appropriate treatment (corticosteroid).

Keywords: Loss Of Fertility, Immunological Infertility, Immune Globulin, Artificial Insemination

Acknowledgements: This research was financed by Research Fund of Mustafa Kemal University (Project Number:13881)

Poster - 8

L-LDH GENE KNOCK-OUT OF LACTOBACILLUS HELVETICUS OZH12

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Lactic acid is a good alternative to petroleum-based plastics because of its many properties. In recent years, production of lactic acid has attracted researchers because of its great potential applications in widespread range of industrial fields. It is the aim of this study to knock-out the gene responsible for L-lactic acid production to obtain strain producing optically pure D-lactic acid to be used in polymer synthesis. **Material-methods**: PCR amplified chromosomal DNA of Lb. helveticus OZH12 was used in this study. Disruption and substitution of the ldhL gene of YN were carried out using pGIT707 plasmid-based double-crossover homologous integration. The gene expression level of L-lactate dehydrogenase gene was controlled by qRT-PCR. **Result and Conclusions**: Plasmid pGIT707 was transferred to Lb. helveticus OZH12 by electroporation. Following transformation the cells were developed in antibiotic containing MRS agar medium and integration was checked by PCR using integration control primers. Positive clones P7, 27b, and 47a were selected and used for the measurement of LDH enzyme activity. Control of gene expression level results demonstrated reduction in ldh-L gene expression level and increment in ldh-D activity in clone 47a when compared with wild type strain. These results are in parallel with the results obtained from enzyme activity assays and confirm that the lactic acid pathway has changed towards to D-lactic acid production.

Keywords: Lactate Dehydrogenase Gene, Lactic Acid Bacteria, D-Lactic Acid, Knock-Out, Qrt-Pcr

Acknowledgements: *Thanks to THE SCIENTIFIC AND TECHNOLOGICAL RESEARCH COUNCIL OF TURKEY (TUBITAK-BİDEB) and Ankara University Scientific Research Project Coordination Unit (AU BAP) for their support.*

EFFECTS OF ACETYLSALICYLIC ACID ON INFLAMMATION AND OXIDATIVE STRESS IN RATS WITH EXPERIMENTALLY INDUCED TYPE 2 DIABETES MELLITUS

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Abstract:

It is believed that adipose tissue-derived molecules contribute to systemic insülin resistance and to the pathogenesis of most of the metabolic complications of type 2 diabetes mellitus, atherosclerosis, and obesity. Diabetes is considered to be a very important factor in promoting low density lipoprotein (LDL) oxidation. Stimulation of lipid peroxidation in LDLs during diabetes is associated with strong oxidation of cholesterol and glucose during oxidative and carbonyl stress, respectively. These data describe the relationship between hyperglycemia and atherosclerosis in diabetic patients. Many studies have shown that inflammation plays a very important role in the pathogenesis of T2DM. The aim of this study was to determine the effects of acetylsalicylic acid (ASA) on inflammation and oxidative stress in rats with experimentally induced T2DM. Obesity was established by body weight gain at a 5% level and insulin resistance was determined in the rats fed with a high-fat diet. T2DM was induced by a streptozotocin injection in obese rats. ASA at a dose of 150 mg/kg b.w. was given orally once daily for five weeks. The levels of pro-inflammatory cytokines, total antioxidant status (TAS), total oxidant status (TOS), and c-reactive protein (CRP) were analysed. Although TNF-α was increased in the blood, ASA treatments did not effect the levels of cytokines in the blood and brain tissue of diabetic rats. Induction of diabetes increased both TOS and TAS in the blood. ASA treatment also increased blood TOS of diabetics. These results indicated that diabetes induced inflammation and oxidative stress. It may be said that ASA treatment at a dose of 150 mg/kg b.w. for five weeks is not sufficient for amelioration of the inflammation induced by diabetes. **This study confirmed** that ASA has antioxidant effects. Further studies are needed to investigate the role of ASA in pro-inflammatory immuno-modulation in diabetes.

Keywords: Acetylsalicylic Acid, Inflammation, Oxidative Stress, Type 2 Diabetes

THE EFFECT OF CAFFEIC ACID PHENETHYL ESTER (CAPE), A BIOACTIVE COMPOUND OF PROPOLIS EXTRACT, ON ENDOPLASMIC RETICULUM (ER) STRESS-INDUCED APOPTOTIC CELL DEATH IN INS1-B CELLS

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Caffeic acid phenethyl ester (CAPE), a bioactive component of propolis extract, has many biological and pharmacological properties such as antitumoral, antiinflammatory, and antineoplastic. Endoplasmic reticulum (ER) is the main intracellular organelle responsible for protein folding, translocation and post-translational modification. The ability of the cell to respond to perturbations in ER function or 'ER stress' is critical for cell survival. However, chronic or unresolved ER stress can lead to apoptosis. It is well known that ER stress inducing agents are potential anticancer therapies. In this study, it was aimed to investigate the effect of CAPE on ER stress-induced apoptotic cell death in INS1-β cells in vitro. For this aim, mRNA expression levels of some mediators including CCAAT-enhancer-binding protein homologous protein (CHOP), c-Jun N-terminal kinase (JNK), caspase-12, activating transcription factor 6 (ATF6), B-cell lymphoma (Bcl)-2 and Bcl-2-associated X protein (Bax) involved in ER stress-induced apoptosis were analyzed by Real Time Quantitative PCR in INS1-β cells. After reaching the appropriate number, the cells were incubated with CAPE (10 mmol/L) for 18h. After the incubation, INS1- β cells were harvested for total RNA isolation and quantitative real-time PCR to determine the changes in mRNA expression levels of selected genes following 10 mmol/L CAPE treatment. RNA was extracted after treatment and the fold changes were calculated with β–actin as the internal control. CAPE treatment was able to induce ER stress and apoptosis. Finally, CAPE treatment has resulted in a significant CHOP, JNK, CAS-12 and Bax overexpression, which are also involved in the molecular mechanism of ER stress-induced apoptosis. In addition, antiapoptotic BCL-2 expression was suppressed by CAPE treatment. In conclusion, these findings have raised the exciting possibility of targeting UPR components in pancreatic neuroendocrine tumors therapy. It was also concluded that CAPE administration may be exploited as a strategy for insulinoma treatment.

Keywords: INS1- B Cell, Insulinoma, Caffeic Acid Phenethly Ester, Endoplasmic Reticulum Stress, Apoptosis.

Poster - 11

EFFECT OF HYPEROSMOTIC STRESS ON MINPP1 EXPRESSION

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Hyperosmotic stress is a specific state that can lead to cell death by apoptosis. A hyperosmotic environment provides us an applicable perspective to examine the identifications of the novel signaling models. The studies of the MINPP1, which acts as a phosphoinositide 5- phosphatase and phosphoinositide 6-phosphatase and regulates cellular levels of inositol pentakisphosphate (InsP5) and inositol hexakisphosphate (InsP6) and has an important role in bone development, is essential to know what means cells control the signaling activities of `higher' inositol polyphosphates. Here we tried to identify hyperosmotic stress effect of Minpp1 expression in Hela cell line by expecting effects of hyperosmotic stress on mammalian cells can be determined by its intensity and duration. In this study, HELA cells were exposed for different times (15 min and 30 min) and with different amount of sorbitol. After protein extraction, samples were run into sds-page gel. In order to determine the effect of hyperosmotic stress on Hela cell lines, immunoblotting assay was done with western blot technique and related protein bands were detected on X-Ray film. Hela cells showed a significant response change in the expression of the protein in 15 minutes with increased concentrations of sorbitol. Expression of Minpp in Hela was induced by 100mM and 200mM sorbitol while it decreased in 400 mM sorbitol. The range of hyperosmotic stress to which Hela cell was exposed, up to 200 mM, induced expression of Minpp and this range can be thought as sublethal whereas increasing this amount, namely, the concentration of sorbitol is higher than 400 mM can be thought as an amount for starting limitation of expression Minpp. We **conclude** that certain amount of sorbitol and long duration exposure on Hela cell line can lead to apoptosis.

Keywords: Hyperosmotic Stress, Apoptosis, Minpp1

BIOCHEMICAL AND HAEMOTOLOGICAL MARKERS IN PATIENTS WITH CHRONIC HBV INFECTIONS

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Chronic hepatitis B virus (HBV) infection is one of the major public health problems all over the world. Pathophysiology of the development of chronic HBV infection remain poorly understood. A better understanding of biochemical markers of chronic HBV infection may be useful in the disease progress. The aim of this study is to investigate the levels of biochemical and hematological markers, and alpha-fetoprotein (AFP), a tumor marker, in patients with chronic hepatitis B infection. Serum aspartate transaminase (AST), alanine transaminase (ALT) levels, lymphocyte/leukocyte ratio, and AFP levels of patients with chronic HBV infection were retrospectively investigated in Medical Microbiology Laboratuary Meram Medical Faculty Hospital between January and December 2016. HBV DNA levels were determined by using real time PCR assay via an automatic system COBAS AmpliPrep-COBAS TaqMan (Roche, France). AST and ALT levels were measured by the catalytic activity concentration of enzymes according to IFCC (International Federation of Clinical Chemistry). AFP levels were measured by using chemiluminescence assay. Lymphocyte/leukocyte ratios were determined by using Complete Blood Count with 5-part differential assay. Of 2349 patients with chronic HBV infection, 237 were enrolled to the study based on the cut-off value of 20.000 IU/mL for HBV DNA. AST levels of 56 and ALT levels of 64 patients were higher than normal. Only 30 (12.7%) patients had a high AFP levels except for two pregnant women whose AFP levels were increased due to pregnancy. Fifteen patients had a lower level than normal for lymphocyte/leukocyte ratio, and only one patient had a higher lymphocyte/leukocyte ratio than normal. A considerable amount of patients with chronic HBV infection still have a higher level of AST and ALT. Further detailed investigations are needed to clarify the importance of biochemical and hematological markers.

Keywords: Chronic, HBV, AST, ALT, Lymphocyte/Leukocyte Ratio, Afp

INVESTIGATION OF PARAINFLUENZA VIRUS CAUSED LOWER RESPIRATORY TRACT INFECTIONS IN PEDIATRIC PATIENTS

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Objective: Parainfluenza viruses are associated with significant morbidity and mortality in infants and children. The aim of this study is to investigate the rate of parainfluenza infections in pediatric patients with lower respiratory tract infections. Materials and Methods: Nasopharyngeal swab specimens of pediatric patients with the diagnosis of lower respiratory tract infection were collected in Medical Microbiology Laboratory, Meram Medical Faculty Hospital between January 2014 and December 2016. Parainfluenza types 1, 2, 3, and 4 were identified by using two different commercial kits by multiplex real time PCR method. Results: One of the four parainfluenza types was identified in 224 of 1983 nasopharyngeal swab specimens of patients aged under 18 years (11.3%). Parainfluenza type 3 was the most common agent among the subtypes (75%) followed by parainfluenza type 4 (15.2%). The rate of parainfluenza type 1 and parainfluenza type 2 were 5.8% and 4%, respectively. Of all pediatric patients, 75.9% were under 5 years of age. When the seasonal distribution was examined, it was found that there was an increase in the rate of parainfluenza virus infections in the end of summer and autumn (65.6% between July and November). Conclusion: Parainfluenza type 3 was the most common subtype. Prompt identification of parainfluenza viruses by rapid diagnostic methods would be very helpful for clinicians in the diagnosis and prevention of morbidity and mortality caused by these viruses.

Keywords: Parainfluenza Virus, Pediatric, Multiplex Pcr

INVESTIGATION OF PARVOVIRUS B19 IGM AND IGG POSITIVITY RATES IN PEDIATRIC HEMATOLOGY PATIENTS

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Human parvovirus B19 is a frequent etiologic agent causing erythema infectiosum in children. It has recently been suggested that parvovirus B19 may be latent after infection and cause reactive infections especially in immunosuppressive patients with hematological problems. In this study, we aimed to investigate the parvovirus B19 IgM and IgG positivity rates in sera of patients consulted Pediatric Hematology clinic. We retrospectively screened the laboratory results of parvovirus B19 IgM and IgG antibody assays of children < 18 years, who consulted Pediatric in and outpatient clinics at between 2013-2016. Parvovirus B19 IgM and IgG antibodies were investigated in serum samples by using enzyme linked immunosorbent assay method in the Medical Microbiology Laboratory. Regarding all kinds of pediatric in and outpatients, the total number of patients from whom parvovirus B19 IgM antibodies were investigated was 2697 and parvovirus B19 IgM antibodies were detected in 168 (6.2%). On the other hand, of all, the number of patients attending Pediatric Hemotology clinics was 602 and parvovirus B19 IgM antibodies were detected in 109 (18.1%). A total of 1299 patients were asked for parvovirus B19 IgG antibody and 368 (28.3%) of them were positive for parvovirus B19 IgG. Of all, parvovirus B19 IgG antibody was detected in 244 (25.6%) of the 952 samples collected from Pediatric Hematology clinics. Parvovirus B19 IgM and IgG positivity in samples from Pediatric in and outpatient clinics other than Pediatric Hematology were 2.8% and 35.7%, respectively. Parvovirus IgM positivity in serum samples sent from the Pediatric Hematology in and outpatients was statistically significant compared to those sent from Pediatric clinics other than Pediatric Hematology ($p = 0.0001$). The higher detection rate of serum parvovirus B19 IgM positivity in patients under the follow-up of Pediatric Hematology clinics suggests that immune suppression-related virus reactivation or persistence may occur in these patients.

Keywords: Parvovirus B19, Igm, IgG, Child Patient

INVESTIGATION OF BOKAVIRUS-RELATED LOWER RESPIRATORY TRACT INFECTIONS IN PEDIATRIC PATIENTS

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Objective: Human Bokavirus is a newly discovered virus belonging to Parvoviridae family and frequently detected in children's respiratory tract specimens. The aim of the present study is to investigate the frequency of bokavirus in pediatric patients with lower respiratory tract infections. **Materials and Methods**: Nasopharyngeal swab specimens of patients with the diagnosis of lower respiratory tract infection, who are aged < 18 years and followed in various pediatric clinics, were collected between August 2014 and July 2017 in Medical Microbiology Laboratory, Meram Medical Faculty Hospital. Bokavirus was consecutively identified by using two different commercial kits by multiplex real time PCR method. **Results**: As a result of the study, bokavirus was detected in 85 of 1524 pediatric patients (5.6%). Of these 85 patients, 65 were found to be ≤ 5 years old (76.4%). When the seasonal distribution was examined, it was found that the frequency of bokavirus infection was higher in June and July (41.1%). Cough and fever were the most frequent symptoms of the patients (70.5% and 61.1%, respectively). **Conclusion**: The findings of the present study suggest that bokavirus may be a rare but important viral agent causing lower respiratory tract infections especially in children younger than 5 years. On the other hand, since it is a newly discovered virus, further studies are needed on prevalance and risk factors of bokavirus infections.

Keywords: Bokavirus, Pediatric, Multiplex PCR, Prevalance

Poster - 16

AN INVESTIGATION OF BLOOD SELENIUM, COPPER AND ZINC LEVELS IN SHEEP AT REGION OF SIVEREK

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Backround: Due to its critical role in organism, trace elements have a very important place in the life of the creatures. Trace mineral deficiencies in animals are one of the major economic problems in our country as well as in the whole world. Trace element deficiencies that it's frequently seeing are as important as macro- and micro-element deficiencies, as those resulting from infectious and parasitic diseases. In our country, trace element deficiencies are common but its incidence and severity can't be determined completely. According to Turkvet data, as of 2011 there are 1,223,823 head sheep in Şanlıurfa. **In this study**, it was aimed to determine the levels of Se, Cu and Zn elements in sheep breeding in Şanlıurfa-Siverek region in the context of preventive medicine. **Materials and Methods:** In this study, Siverek district was divided into four regions as north, south, east and west in the spring lambing period, and blood samples were collected from 100 sheep randomly selected from a total of 25 sheep from each region. Whole blood samples were transplanted to Elazığ Veterinary Control Research Institute, Se, Cu and Zn analyzes were carried out by Perkin Elmer Aanalyst 800 (HGA Graphite Equipments, USA) with AOAC 2000 and 999.10 method. The SPSS statistical package program was used to evaluate individual data, variance analysis was performed, Duncan multiple comparison test was used to determine the difference between the groups. **DISCUSSION:** In this study, values were determined using Full Blood. Considering that reference values are obtained from serum / plasma for Cu and Zn, in particular, it was also considered that the use of whole blood may be an effect of high blood Cu and Zn levels in our study. **In conclusion**, we consider that the data obtained in this respect, which is very important for humanity, animal husbandry, region and country economy, contributes to the geographical differences and the selenium, copper and zinc levels in the region.

Keywords: blood, selenium, copper, zinc, sheep

Acknowledgements: *This study is the MSc thesis of Mehmet Batmaz, DVM, MSc.*

Poster - 17

THE POST-HOC POWER ANALYSIS OF FOREST PRODUCTIVITY ATTRIBUTES IN EXPERIMENTAL STUDY IN CENTRAL BOSNIA

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Forest productive attributes changes over time in native forests has been recognized as crucial challenge for management of mixed uneven aged forests in Bosnia and Herzegovina since middle of the last century. Experimental study has been carried out on set of experimental plots established in mixed stands on mountain Igman in central Bosnia. The most important forest productivity attributes changes based on repeated measures have been monitored over time. The aim of this research was to conduct the post-hoc power analysis for monitored forest attributes: basal area per ha (BA), growing stock per ha (GS) and current annual increment per ha (CAIv). **Here are used repeated measures** conduced on the 10 experimental plots in two type of mixed stands: fir-spruce and fir-spruce-beech plots (five plots per each type) measured in five (BA and GS) and four (CIVv) occasions in periods between 10-20 years. Analyses of variance (ANOVA) within and within-between repeated measures were applied and power analysis was performed. ANOVA within forest type over time showed highly significant differences for all attributes ($\alpha=0.05$, $p<0.001$). Here, power analysis for comparison of stand attributes resulted in observed high power values ranged from 82% to 99% (very low risk of Type II errors). Then, ANOVA between two forest types over time showed different significances for forest attributes ($\alpha=0.05$, $pBA=0.25$, $pGS=0.23$ and $pCIVv=0.02$). The risks of Type II errors were high for BA and GS (from 66% to 72%) while conclusions for CAIv could be accepted with very low risk (4%). So, the post-hoc power analysis of comparisons of stand attributes between forests types found low power for BA (28%) and GS (34%) and high power for CAIv (96%). **These findings** confirm importance of proper forest species composition planning in mixed stands related to highest wood productivity and other forest characteristics as biodiversity.

Keywords: Forest Productivity, Mixed Uneven Aged Forest Stands, Experimental Study, Repeated Measures, Power Analysis

RIGOROUS IDENTIFICATION OF TISSUE SPECIFIC GENES IN SILICO: REVEALING THE INTERPLAY BETWEEN CANCER SPECIFIC EXPRESSION AND TISSUE SPECIFIC EXPRESSION

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Tissue-specific genes are a class of genes whose function and expression are preferred in one or several tissues, specifically. Identification of tissue-specific genes is essential for discovery of tissue-specific targets and understand molecular mechanism. In this study, we aimed to identify tissue-specific genes in more rigorous fashion, examine intersection between differentially expressed genes (DEGs) in various cancers and tissue specific genes, interpret tumor heterogeneity, reveal tissue specific molecular targets for different cancers and elucidate role of tissue specific genes in biological processes. **Gene expression data**, derived from five large RNA-Seq projects, spanning 96 different human tissues was retrieved from ArrayExpress and ExpressionAtlas. We developed an algorithm using R programming language and rigorous identification of tissue specificity was calculated by integrating tau score and statistical distance methods. DEGs of 18 different cancers were taken from BioExpress and we investigated intersection of cancer DEGs with corresponding tissue-specific genes. Tissue-specific genes and overlapping genes were analyzed with DAVID for GO terms, related diseases and pathways associated with each gene. In addition, tissue-specific unusual transcripts from RNA-Seq data is under investigation by our group. **We successfully** assigned genes to multiple tissues for specificity using novel approach. Functional metadata of these genes showed that they are associated with diseases related with corresponding tissue. After intersection, overlapping genes was found to be quite small, it can be significant for targeted treatment of solid tumors. If we investigate subtypes of one cancer, overlapping genes can be different. These result shows us mechanism of subtypes are different. More importantly, we observed that many DEGs in one cancer might contain genes specific to other tissues which might be due to tumor heterogeneity. These results suggest that cancer tissues might be heterogeneous and cancer networks might have complex interplay with tissue-specific genes.

Keywords: Tissue-Specific Genes, RNA-Seq, Tau Score, Statistical Distance, Tumor Heterogeneity

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GENERATING LOSSLESS COMPRESSION OF GENOME SCALE K-MER FREQUENCY TABLE AS RASTER IMAGE

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K-mer frequency of any DNA sequence is calculated by counting occurrences of all possible substrings of length k. The k-mer frequency of genome or next generation sequencing data is an invaluable tool to gain insights about the DNA sequence and its grammar. For genomes, k-mer counts can be used for motif discovery, classification and alignment-free comparison of multiple genomes. For short reads, k-mer counts are used for quality check, diagnosis, error correction and assembly. The initial step k-mer counting requires storage of frequency tables which tend to get bigger by increasing length of k. In this study we propose a method for lossless compression of k-mer data which is expected to simplify and facilitate storage and analysis of k-mer data. In a raster image, such as PNG, each pixel has two components; coordinate and color. We implemented Chaos Game Representation (CGR) to map k-mers to coordinates and k-mer occurrence was mapped to RGB color via bit-level operations. CGR maps can be divided and labeled according to the corresponding substring, each substring is mapped onto a sub-square, creating a fractal-like structure. Basically, the whole set of frequencies of the k-mers found in each genomic sequence are displayed in the form of a single image in which each pixel is associated with a specific k-mer and its occurrence. As result, file size has been reduced by approximately 10 times compared to plain text and reduced 5 times compared to binary storage (Jellyfish). Storage of k-mer data as image will not only save storage space but also facilitate genomic analysis in a manner previously not implemented. Image related algorithms can be used to process, analyze and manipulate collection of images representing genomic or next-generation sequencing data k-mer signatures.

Keywords: Genome, K-Mer, Lossless Compression, Chaos Game Representation, Png

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DESIGN AND PRODUCTION OF A LAB-SCALE SOLAR BIOREACTOR

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Microalgae have a great biotechnological potential in the production of valuable raw materials used in silage, food, agriculture, cosmetics and pharmaceutical industries as well as biotechnological productions. For this reason, it is an important issue to base microalgae production on a biotechnological basis. In both open and closed microalgal culture systems, light source and light intensity are critical factors affecting the phototrophic growth performance of microalgae. In this study, a solar bioreactor design was carried out in order to provide controllable, high efficiency and low cost production. The designed bioreactor was built on a laboratory scale solar system for microalgae growth. The solar system consists of 3 cylindrical tubes, windscreen wipers on the tubes, fresnel lenses and fiber optic cables.. Fresnel lenses enrich the sun light and transferred into the bioreactor by fiber optic cables. In the system, each fresnel lens is connected to a fiber optic cable so that the sunlight is delivered homogeneously through the fiber optic cables to the area where microalgae are present and the daylight required for microalgae for photosynthesis can be provided. Fiber optic cables transfer the light to the cylindrical tubes where they are placed, and illuminate inside of the reactor homogenously in which needed by the microalgae. We can conclude that the microalgae, which are thought to be the nutrients of the future, are produced in a controlled and rapid manner, making this system valuable. In addition, it is revealed that the problems such as the high costs of the production and contamination can be eliminated by this system. Finally, it would be possible to get about 4-5 times higher quality product with 100 lt closed bioreactor used in this study than an open system.

Keywords: Microalgae, Solar Bioreactor, Fiber Optic Cable.

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EVALUATION OF ISCHEMIA MODIFIED ALBUMIN LEVELS IN SUBCLINICAL MASTITIS COWS BEFORE AND AFTER THE VACCINATION

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Introduction: Mastitis is the inflammatory response of the mammary gland tissue to physiological and metabolic changes, traumas, and allergies and, most frequently, to injuries caused by various microorganisms. The inflammation formed during these events leads to a decrease in milk production and to some changes in its structure. Also, it is seen that blood values changed in all types of inflammatory response of the mammary gland. **This investigation** was implemented to assess the IMA that is a marker for inflammatory processes in dairy cattle with subclinical mastitis by vaccination. **Methodology:** A fifty-one dairy cow were included in the study. SCC: Tank milk sample was collected only one and transferred into 200 ml plastic tubes, and SCC were measured from fresh milk samples by Bentley -Merkim B-150 M150 instruments. A total of 51 blood sample before and after mastitis vaccination. 37 of the sera samples were taken and were done biochemical evaluation for IMA. The others were hemolysis. Groups were compared using Student's t-test. **Results and Discussion:** In our study, there was no statistically significant change in classic IMA. But There was statistically significant change in Modified IMA ($p<0.05$). Elevated ischemia modified albumin (IMA) levels have been reported as a result of ischemia, which is due to increased inflammatory processes. **We determined** increase of modified IMA as markers of inflammation. Ischemia-induced oxidative stress may start proinflammatory processes. On the other hand, IMA may come forward as a marker for inflammatory processes. **Summary:** Our study will be the first report in the literature. The knowledge oxidative defense mechanisms of animals will serve as a guiding principle for future studies.

Keywords: Sub clinical mastitis, ischemia modified albumin, vaccination, cow

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DIVERSITY IN MIXED UNEVEN AGED FOREST OF BEECH, FIR AND SPRUCE ON MOUNTAIN IGMAN

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With the aim of understanding of complicated laws regarding the process of trees and stands' growth, and precise prediction of their development within up-to-date researches, most of attention is focused on spacial configuration and individual differences. During structural analysis numerous indicators are determined which are, apart from horizontal and vertical description of stems' structure also useful for diversity descriptions of species, positions and dimensions on stand level or nearby to referential trees. Based on data collected on eight permanent experimental plots in uneven aged mixed forests of beech, fir and spruce on mountain Igman the determined sizes of Shannon-Weaver (H': 0,68-1,12) and Simpson (λ: 0,34-0,57) indices indicate high level of species diversity. The determined sizes of Clark and Evans index (CE: 1,10-1,40) indicate that the horizontal spatial distribution of trees strives for being regular. Vertical one, according to the sizes of species profile index (A: 1,24-1,95) and index by Kotar (B: 0,16-0,40), are even for five experimental plots and uneven for other three. Mixing of tree species on experimental plots, according to the Mi index sizes (fir 0,24-0,61; spruce 0,28-0,75; beech 0,18-0,76;), are different. Mixing by inividual trees, tree species of a smaller portion are individually mixed with tree species of a bigger portion, trees of present species are in groups and trees of present species individually and in groups. Detemined sizes of index of size differentiation (T: 0,31-0,44) indicate that diameters of referential and neighbouring trees are in such relation that the smaller diameter makes about 60-70% of the bigger one. According to sizes of index of dominance (U: fir 0,31-0,67, spruce 0,38-0,70, beech 0,33-0,73) referential trees of fir are dimensionally relatively more dominant than ones of another tree species on four experimental plots, referential trees of spruce are more dominant on two plots as well as beech.

Keywords: mixed uneven aged forest, species diversity, positions diversity, dimensions diversity

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PAIR HOUSING FOR CALVES

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Calves usually rear at individual hutches till weaning in dairy farms. But it should be known that socialization has some beneficial effects on calves with regard to stress, behaviour, performance, appetite. Also it's known that rearing calves with small groups doesn't have serious adverse effect on their health and comfort. Recentlyi it has been done some researches about calf housing systems affected calf socialization, comfort and health. So in **this presentation** it was aimed to give some information about rearing calves with pair housing.

Keywords: Pair, Calf, Housing, Dairy

FULL TEXT PRESENTATIONS

THE EFFECT OF SPENT MUSHROOM COMPOST ON THE GROWTH, MINERAL NUTRITION AND HEAVYMETAL STATUS OF LETTUCE (LACTUVA SATIVA L.) AND SPINACH (SPINACEAE OLERACEAE L.)

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Abstract

This research was carried out to determine the effects of spent mushroom compost (SMC) as an organic material source on the growth, plant nutrient and heavy metal content of lettuce and spinach plants grown in greenhouse soil. Lettuce and spinach plants were grown in pots containing different amounts of SMC (corresponding to 0, 20, 40, 60 and 80 T/ha, as dry weight basis). The effects of SMC on plant dry matter and N, P, K, Ca, Mg, Fe, Zn, Cu, Ni, Cd, Pb and Cr contents of lettuce and spinach plants were determined.

SMC application increased soil organic matter and EC values but decreased pH value. No changes in soil mineral and heavy metal content were detected. SMC applications caused statistically important effects on dry matter yield, and N, P, K, Fe and Zn contents both in the lettuce and spinach plants. SMC applications increased yield until to 60 ton/ha of SMC application, but highest application rate of SMC compost depressed plant growth only in lettuce. Spinach plant was more tolerated to higher SMC levels than lettuce. All spent mushroom compost treatments resulted high mineral content both in lettuce and spinach.

No important changes in heavy metals except Fe and Zn were detected in all plants by SMC applications. All metal concentrations were ranged in background levels, below the phytotoxic maximum limits and no metals exceeded referenced food codex values by the SMC applications. This research showed that SMC could be applicable in vegetable cultivation at the agronomic rates without heavy metal contamination concern but salinity defects in salt sensitive plants should be taken into consideration.

Key Words: Spent Mushroom Compost, Mineral Nutrition, Heavy Metals, Lettuce, Spinach

MANTAR COMPOST ATIĞININ MARUL (LACTUVA SATİVA L.) VE ISPANAK (SPİNACEAE OLERACEAE L.) BİTKİLERİNDE GELİŞME, MİNERAL BESLENME VE AĞIR METAL İÇERİKLERİ ÜZERİNE ETKİSİ

Özet

Bu araştırma bir organik madde kaynağı olarak mantar compost atığı'nın (MKA) serada yetiştirilen marul ve ıspanak bitkilerinde gelişme, bitki besin ve ağır metal içerikleri üzerine olan etkilerini belirlemek amacıyla yürütülmüştür. Marul ve ıspanak bitkileri değişik miktarlarda MKA içeren (kuru madde bazında 0, 20, 40, 60 ve 80 T/ha) saksılarda yetiştirilmiştir. MKA'nın marul ve ıspanakta kuru madde ve N, P, K, Ca, Mg, Fe, Zn, Cu, Ni, Cd, Pb ve Cr içerikleri üzerine etkileri belirlenmiştir.

MKA uygulaması toprak organik madde ve EC değerlerini arttırmış ancak pH değerini düşürmüştür. Toprak mineral ve ağır metal içeriğinde önemli değişiklik saptanmamıştır. MKA uygulamaları her iki bitkide kuru madde ile N, P, K, Fe ve Zn içeriklerini arttırmıştır. MKA uygulamaları ürün miktarını 60 ton/ha uygulama düzeyine kadar arttırmış, fakat MKA'nın en yüksek uygulama düzeyinde marul bitkisinde gelişim olumsuz etkilenmiştir. Ispanak bitkisi yüksek MKAuygulamalarında marul bitkisine göre daha fazla tolerans göstermiştir. Bütün MKA uygulamaları her iki bitkide daha yüksek mineral içeriği sağlamıştır.

MKA uygulamalarıyla her iki bitkide Fe ve Zn dışında ağır metal içeriklerinde önemli değişiklikler kaydedilmemiştir. MKA uygulamalarıyla bütün metal konsantrasyonları bazal düzeylerde ve de fitotoksik maksimum sınır değerlerin altında saptanmış ve hiç bir metal önerilen gıda kodeks sınır değerlerini aşmamıştır. Bu araştırma MKA'nın agronomik oranlarda sebze üretiminde ağır metal kontaminasyon endişesi olmaksızın kullanılabileceğini ancak tuza hassas bitkilerde kullanımında tuzluluk zararlarının dikkate alınması gerektiğini göstermiştir.

Anahtar kelimeler: Mantar compost atığı, mineral beslenme, ağır metaller, ıspanak, marul

Introduction

The use of Spent mushroom compost (SMC) is become to widespread in horticultural practices as a cheap and abundant waste organic material in mushroom cultivation industry areas alternative to manure. As in manure applications, SMC applications to soils result a number of beneficial effects. SMC contains valuable plant nutrients and organic matter that

can improve soil fertility. It can supply plant nutrients to the crop and thus replace inorganic fertilizer. Trials have shown that it is an excellent source of phosphorus, potassium and trace elements but needs supplementation with nitrogen for best results. Plant nutrient value of the SMC is examined by most of the researchers and it is indicated that the nutrient combination is similar to soil arrangements, based on the organic wastes, applied to the agricultural areas routinely such as cattle manure and compost (Kütük et al., 1998).

The phytonutritive capacity of compost has often been demonstrated to be analogous to that of manure; the same level of productivity, both quantitatively and qualitatively, can be maintained by replacing manure with compost (Beyca et.al.,1993). However, SMC often contains high salt levels remaining from the fertilizer materials applied during mushroom cultivation. High or excessive soluble salts may be injurious to plants (Anonymous, 1995).

In this research, the effects of SMC applications to soil on soil chemical characteristics and soil metals and on plant nutrient contents and heavy metal accumulations in the lettuce and spinach plants those have different toleration to salinity were examined.

Materials and methods

A pot experiment was carried out in the greenhouse and lettuce and spinach plants those have different toleration to salinity (FAO, 1976) were grown in soil treated with SMC. SMC material was collected from mushroom cultivation plant in Korkuteli representative of the major mushroom growing area of Turkey. After collecting the fresh SMC, it was awaited in open air for 6 months, air dried, and applied to the soil.

In the experiment, plastic pots containing 10 kg soil were used. After 6 months open air treatment, SMC was applied to experimental soil as an oven-dry basis, corresponding at the following rates:

- SMC_0: no SMC application (control treatment)
- SMC_{20}: 20 ton/ha of SMC
- SMC_{40}: 40 ton/ha of SMC
- SMC_{60}: 60 ton/ha of SMC
- SMC_{80}: 80 ton/ha of SMC

Pots were arranged in a completely randomized design with four replicates in the greenhouse. Before beginning of experiment, all treatments received supplemental fertilization at a rate of 150, 50 and 100 mg kg^{-1} of N, P and K, respectively.

Seedlings of lettuce were grown on peat-perlite mixture and were transplanted as two plants per pot. Spinach seeds were sowed to pot soil and after the germination, two spinach seedlings were stayed on the pot. All pots were located in the greenhouse under controlled climatic conditions. Pots were maintained around field capacity water tension by daily watering with distilled water. Sixty days after transplanting of lettuce and hand thinning of spinach, plants were harvested by cutting on the soil surface. Plant samples were washed by distilled water, dried at 65 ºC for 48 h and then ground. In dried leaf samples total N were determined by Kjeldahl method. Plant tissues were digested in aqua regia (1:3 HNO_3/HCl). In wet ashed leaf samples total P were determined by molibdophosphoric yellow colour method, total K, Ca, Mg, Fe, Zn, Mn, Cu, Cd, Ni abd Pb were determined by ICP-MS under optimized measurement conditions.

ANOVA procedures for a randomized complete block design and least significant differences (LSD) at $P<0.05$ of data were analyzed by SPSS-16 statistical program.

Results and Discussion

Soil and SMC chemical properties and heavy metal contents

Greenhouse soil and SMC general analytical characteristics are shown Table 1. The heavy metal contents of untreated greenhouse soil and SMC are well within the accepted normal range of values. A comparison of metal contents of SMC with that of untreated soil showed that the metal concentration Fe, Mn, Ni, Pb and Cr of SMC were not present in greater concentrations than in the soil. Zinc, Cu and Cd concentration of SMC was found greater. The heavy metal concentration of SMC is below the referenced levels indicated by the EU (CEC, 1986) for the agricultural use of waste organic material (sewage sludge).

At the end of experiment, changes in soil chemical parameters and heavy metal contents after treatment of SMC were presented in Table 2. Soil pH, EC and organic matter values were importantly changed by SMC applications. SMC applications increased EC value and organic matter content but decreased pH value of soil. All heavy metals were found in referenced heavy metal limits and no changes were detected in heavy metal contents in the soil by SMC applications. Increased EC values by SMC applications could be caused by high salt concentration of SMC. This shows us that salt content is an important factor for a sustainable SMC application and should be considered in horticultural cultivation before treatment.

Table 1. The analytical characteristic of the experimental soil and SMC, and their pollutant limits.

Parameters	Soil	Limit values in soil[1] (pH<6-pH>6	SMC	Limit values in organic materials[1]
Texture	Loam		-	
pH- H2O (1:5 w/v)	7,62		6.74	
EC. (1:5 v/w) dS m^{-1}	0.205		7.85	
CaCO3, %	12,25		-	
Total N, %	0.21		2.35	
Organic Matter, %	2,76		68,21	
Fe, mg kg-1	12200	nls	387	nls
Mn, mg kg-1	460	nls	224	nls
Zn, mg kg-1	123	150-300	672	2500-4000
Cu, mg kg-1	32	50-140	55	1000-1750
Ni, mg kg-1	39	30-75	27	300-400
Pb, mg kg-1	27	50-300	6	750-1200
Cd, mg kg-1	0,55	1-3	0,62	20-40
Cr (total), mg kg-1	41	60-100	12	1000-1750

*: Below detection limit; (< 0.02 mg kg^{-1}); [1]: Total concentrations (mg kg^{-1} dry wt), (C.E.C., 1986); nls: no limitation set

Plant yield and heavy metal contents

The dry matter yield and the concentrations of N, P, K, Ca, Mg, Fe, Mn, Zn, Cu, Ni, Pb, Cd and Cr in the leaves of lettuce and spinach plants treated with SMC are presented in Table 3 and Table 4, respectively. The effect of spent mushroom compost on the dry matter yield of lettuce and spinach were found statistically important and SMC increased dry matter yield in both of plant. The best result for dry matter yield in both plants as regard to productivity was obtained at 60 ton/ha SMC applications. Dry matter yield decreased in lettuce plant at 80 ton/ha of SMC applications, possibly by high salinity. Whereas at 80 ton/ha of SMC applications, no changes in dry matter in spinach plant was observed. This may be possibly due to high toleration of spinach in saline conditions (Table 1 and Table 2).

Plant N, P, K, Fe and Zn contents in both plant were found statistically important. N, P, K, Fe and Zn contents in both plant were increased by SMC applications, however no important changes in other nutrients and metal elements were detected (Table 3 and Table 4). Chong et al. (1991), Wisniewska and Pankiewiez (1989) reported similar findings in their SMC studies. Mineral and heavy metals except P and K in Spinach plant were detected higher than lettuce plant. As can be seen in Table 2, nitrogen content of lettuce and spinach was below the background level. Nitrogen content was increased by SMC applications. This increase was attributed to increased N availability of SMC (Rhoads and Olsen, 1995; Kutuk et al., 1999).

Although no changes were observed in soil Fe and Zn concentration by SMC applications,

plant Fe and Zn contents increased by SMC treatments. This may be possibly caused by higher Zn content of SMC and the decreasing pH value caused by SMC application to soil. All metal concentrations were mostly ranged in background levels and below the phytotoxic maximum limits. SMC applications to soil did not resulted high metal accumulation in both plant and metals in both plant were not exceeded the referenced metal limits.

Conclusion

The findings support that the SMC has positive effects on the growth of lettuce and spinach plants. It can be concluded from this perspective that SMC material can be usable without heavy metal contamination concern in horticultural practices. For this reason, the use of waste SMC may be an alternative safe organic material source in vegetable production, especially in organic farming practices. However, in the long-term SMC applications, high EC values of SMC and its risks on the soil salinity and plant growth should be considered.

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Table 2. Changes in soil chemical parameters and heavy metal contents after treatment with SMC.

Treatments	pH (1:5 w/v)	EC (1:5 v/w) dS m^{-1}	Organic matter %	Fe mg kg^{-1}	Mn mg kg^{-1}	Zn mg kg^{-1}	Cu mg kg^{-1}	Ni mg kg^{-1}	Pb mg kg^{-1}	Cd mg kg^{-1}	Cr mg kg^{-1}
SMC_0	7,62	0,37	2,76	12187	455	672	32	39	25	0,55	41
SMC_{20}	7,62	0,55	2,76	12186	462	680	32	35	28	0,55	39
SMC_{40}	7,59	2,33	2,82	12200	459	678	32	39	27	0,55	41
SMC_{60}	7,59	3,85	2,83	12179	445	688	34	42	28	0,55	44
SMC_{80}	7,60	4,74	2,85	12200	462	678	32	39	27	0,55	41
Significancy	*	**	*	ns	ns	ns	ns	ns	ns	ns	ns

**: P<0.01, *: P<0.05, ns: no significancy, [1]: C.E.C (1986); nls: no limitation set.

Table 3. Plant yield, nutrients and heavy metal contents in dry matter of spinach plant treated with SMC.

Treatments	Dry matter g/pot	N	P	K	Ca	Mg	Fe	Mn	Zn	Cu	Ni	Pb	Cd	Cr
		%					mg kg-1							
SMC_0	33 c	3.24 d[1]	0,277 d	2.14 c	3,14	0,82	62 b	56	33b	7	1,1	3,0	0,25	0,04
SMC_{20}	44 b	3.67 c	0,315 c	2.31 b	3,21	0,88	66 b	62	34 b	7	0,8	2,7	0,25	0,06
SMC_{40}	57 a	4.14 b	0,335 b	2.43 b	2,99	0,78	71 b	77	44 b	9	1,2	2,9	0,30	0,07
SMC_{60}	67 a	4.67 a	0,344 a	2.51 a	3,18	0,85	78 a	79	58 a	8	1,1	3,1	0,25	0,05
SMC_{80}	61 a	4,66 a	0,355	2,58 a	3,14	0,92	82 a	78	62 a	9	1,2	3,2	0,30	0,07
Significancy	**	**	**	**	*	ns	ns	*	ns	*	ns	ns	ns	ns	ns
Background levels[2]		4-5	0,4-0,6	6-7	2,3-3,5	0,5-08	60-200	30-250	25-250	5-25	-	-	-	-
Phytotoxic levels[3]		-	-	-	-	-	-	-	100-400	20-100	10-100	30-300	5-30	5-30
Food codex lmits[4]							nls	nls	<20	<10	<10	<2	<0,05	<1,3

**: P<0.01, *: P<0.05, ns: no significancy, [1]: Means within an amendment followed by the same letter are not significantly different at the 005 level, [2]: Jones et al (1991); [3]: Kabata-Pendias (2000)

[4]: Limitations for fresh vegetables FAO/WHO (2007).

Table 4. Plant yield, nutrients and heavy metal contents in dry matter of lettuce plant treated with SMC.

Treatments	Dry matter	N	P	K	Ca	Mg	Fe	Mn	Zn	Cu	Ni	Pb	Cd	Cr
	g/pot	%					mg kg-1							
SMC_0	55 c	2,88 d[1]	0.425 d	3,22 c	2,74	0,49	79 b	67	24 b	5	0,8	3,1	0,30	0,05
SMC_{20}	62 b	2,96 c	0.459 c	3,53 b	2,81	0.51	75 b	71	23 b	5	0,8	3,2	0,35	0,07
SMC_{40}	73 a	3,15 b	0.538 b	3,45 b	2.88	0.59	88 a	79	27 b	5	0,9	2,8	0,35	0,05
SMC_{60}	68 a	3,25 a	0.564 a	3,88 a	3,15	0.62	90 a	77	32 a	7	0,8	3,3	0,30	0,06
SMC_{80}	57 b	3,32 a	0,574 a	3,77 a	2,78	0,58	98 a	81	35 a	7	0,9	3,0	0,35	0,07
Significancy	**	**	**	*	ns	ns	*	ns	*	ns	ns	ns	ns	ns
Background levels[2]		4-5	0,4-0,6	6-7	2,3-3,5	0,5-08	50-100	15-250	25-250	8-25	-	-	-	-
Phytotoxic levels[3]		-	-	-	-	-	nls	nls	100-400	20-100	10-100	30-300	5-30	5-30
Food codex lmits[4]							nls	nls	<20	<10	<10	<2	<0,05	<1,3

**: P<0.01, *: P<0.05, ns: no significancy, [1]: Means within an amendment followed by the same letter are not significantly different at the 005 level, [2]: Jones et al (1991); [3]: Kabata-Pendias (2000)

[4]: Limitations for fresh vegetables FAO/WHO (2007).

PLANT NUTRIENT STATUS OF SOUR CHERRY (*PRUNUS CERASUS* L.) CULTIVARS GROWN IN AEGEAN REGION OF TURKEY

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Abstract

The study was conducted on 29 sour cherry (Prunus cerasus L.) cultivars collected from Aegean Region of Turkey for assessing the plant nutrient concentrations and their relations with soil characteristics. Total quantities of N, P, K, Ca, Mg, Fe, Zn, Mn and Cu accumulated within the leaf and fruits were used to make provisional estimates of the uptake of plant mineral essential nutrients by the cherry cultivars used in this study. All investigated nutrients were recorded significantly different within the cultivars. The concentrations of all elements except Zn in sour cherry leaves were ranged in referenced limits. Fruit mineral contents of sour cherry cultivars were recorded in higher concentrations both in 1507 and 1525 cultivars for all elements. In low organic matter and slightly alkaline soil conditions, most of sour cherry cultivars contained Zn in deficiency level and most of cultivars also contained low N levels in leaf tissues. Nitrogen and Zn are likely to be a major component of fertiliser programme for evaluated cultivars in possible cultural conditions. Leaf mineral concentrations were recorded higher than that of fruit minerals. Genotype 1512 contained the least mineral contents for all elements both in leaf and fruit tissues. Among the Sour cherry cultivars, the concentration of plant leaf nutrients in 1515 and 1530 cultivars were higher than the other investigated cultivars at the same soil conditions. Application of these data in future studies has potential utility within the fields of agro-biodiversity conservation and nutrition of sour cherry cultivars.

Keywords: Cherry cultivars, Mineral status, Genotypic variability

TÜRKİYE'NİN EGE BÖLGESİNDE YETİŞEN VİŞNE ÇEŞİTLERİNİN (*PRUNUS CERASUS* L.) BİTKİ BESİN DURUMLARI

Özet

Bu çalışma Türkiye'nin Ege bölgesinden toplanan 29 vişne çeşidinde bitki besin içeriklerini ve onların toprak karakteristikleri ile ilişkilerini belirlemek amacıyla yürütülmüştür. Bu çalışmada kullanılan vişne çeşitlerinin yaprak ve meyvelerinde biriken toplam N, P, K, Ca, Mg, Fe, Zn, Mn ve Cu içerikleri belirlenmek suretiyle mutlak gerekli bitki besin elementlerin yaklaşık alımları tahmin edilmiştir. İncelenen bütün bitki besin maddelerinin vişne çeşitleri arasında önemli farklılık gösterdiği belirlenmiştir. Vişne yapraklarında Zn dışındaki bütün elementlerin konsantrasyonları önerilen sınır değerleri içinde saptanmıştır. Vişne meyvelerinde bütün mineral besin içerikleri 1507 ve 1525 vişne çeşitlerinde en yüksek düzeyde kaydedilmiştir. Düşük organik madde ve hafif alkalin reaksiyonlu toprak koşullarında vişne çeşitlerinin çoğunda Zn içerikleri noksanlık düzeyinde ve birçok vişne çeşidinin yapraklarında ise N içerikleri düşük düzeyde belirlenmiştir. İncelenen vişne çeşitlerinin kültüre alınmasında N ve Zn elemenleri gübreleme programının önemli bir bileşeni olarak kaydedilmiştir. Vişne çeşitlerinde yaprak mineral besin içeriklerinin meyve dokusundaki mineral içeriklerinden daha yüksek olduğu saptanmıştır. Vişne genotipi 1512, yaprak ve meyve dokularında bütün besin içeriklerini diğer genotiplerden daha düşük düzeyde içermiştir. Aynı toprak koşullarında yetişen vişne çeşitleri arasında 1515 ve 1530 vişne çeşitlerinin yaprak dokularında mineral içerikleri diğer çeşitlerden daha yüksek düzeyde bulunmuştur. Bu veriler tarımsal biyoçeşitliliğin korunması ve vişne çeşitlerinin beslenmesi konularında gelecekte yapılacak çalışmalar için potansiyel bilgiler sunmaktadır.

Anahtar kelimeler: Vişne çeşitleri, mineral içerikler, genotipik çeşitlilik

Introduction

Sour cherry is widely planted in the Central Anatolia and Aegean Region of Turkey. These districts have the best climatic factors, such as brillant illumination, low temperature and great difference in temperature between day and night. A few studies (Vesterheim 1973; Christersen 1978; Bekefi *et al*. 2000; Cordeiro-Rodrigues *et al*. 2000) have revealed wide variability in cherry types and varieties for different characters.

Differences among species and cultivars in plant response to mineral nutrient deficiency have been reported by many authors. Nutrient concentration and uptake by different plant cultivars are the most important criteria for identifying the existing genetic specificity of plant nutrition (Saric, 1987). The tolerance in a given plant species or genotype to nutrient stress is closely related to its

nutrient use efficiency. For a given genotype, nutrient use efficiency is reflected by the ability to produce a high yield in a soil that is limiting in one or more mineral nutrients for a standard genotype (Graham, 1984). The exploration of genotypic variability in the responses of sour cherry cultivars to mineral nutrient deficiency may allow identification of physiological or biochemical tools to screen tolerant varieties and to improve the productivity of this plant. Variability among cultivars in potential for uptake of mineral nutrients is caused by factors which are at least partly under genetic control. However, balanced nutrition is required for maximum tree performance and foliage is the tissue most generally used in diagnosis.

Although there is extensive research on the pear, literature does not report enough data on the nutritional properties of pear based on this variety. The objective of this study was to determine mineral status of 29 sour cherry (Prunus cerasus L.) samples those were collected from Aegean Region of Turkey.

Material and methods

A study was conducted in Aegean Region of Turkey for assessing the leaf nutrient contents of early-ripening sour cherry (Prunus cerasus L.) cultivars. Samples were collected as scion woody in August from an area between 38º45′-41º10′ N latitude and 27º50′-37º05′ E longitude. Elevation was ranged from 275 to 1150 m. A total of twenty-nine types were collected from wild and feral populations growing Aegean Region of Turkey. Trees have been marked for further visit and recollection. The samples were T-budded onto *Prunus mahaleb* seedlings in the nursery. Budded trees were planted in the experimental fields with 6x 6 m. spacing with tree replicates for each type. Routine cultural practices were performed. After three years of growth, plant leaf samples and fruit samples were collected and analyzed.

Soil characteristics of experimental soil can be summarized as; sandy loam texture, slightly alkaline reaction, low $CaCO_3$, low organic matter, high exchangeable K and Ca contents, normal levels of N and plant available P, K, Ca, Mg, Fe, Zn, Mn and Cu. These values represent the typical Aegean region soil characteristics in Turkey.

Leaf samples were taken on mid may, with five replications. Fruit samples were collected at maturity stage. Leaf and fruit samples were dried at 65 ºC for 48 h and ground for determination of plant analysis. In dried plant samples, total N were determined by Kjeldahl method. Plant tissues were digested in aqua regia (1:3 HNO_3/HCl) for mineral analysis. In wet ashed plant samples total P were determined by molibdophosphoric yellow colour method, total K, Ca, Mg, Fe, Zn, Mn and Cu were determined by atomic absorption spectrophotometry (FAAS) under optimised measurement conditions.

Statistical analyses were performed by using SPSS-16 for Windows program.

Results and discussion

In this study, total quantities of plant nutrients accumulated within the leaf and fruits were used to make provisional estimates of uptake of macro and micro plant nutrients by sour cherry trees.

Table 1 shows that the plant leaf mineral concentrations of sour cherry cultivars and statistic differences among the cultivars. All investigated nutrients were recorded significantly different within the cultivars. Plant leaf mineral contents of sour cherry cultivars were recorded in higher concentrations both in 1515 and 1530 cultivars for all elements. But leaf mineral contents of sour cherry cultivars were recorded in lower concentrations both in 1512 and 1519 cultivars for all elements.

Leaf nitrogen concentrations of many cultivars were recorded in nitrogen deficiency level. The concentrations of all elements except Zn were recorded in normal plants nutrient limits. Only cultivar 1519 contained Zn concentration in acceptable range according to referenced limits. Slightly alkaline reaction of experimental soil could be a cause of zinc deficiency in evaluated cultivars. This also shows that the genotypic sensitivity of these sour cherry cultivars to zinc nutrition in slightly alkaline soil conditions and to nitrogen nutrition in low soil organic matter. According to these data, it is important to planning a balanced nitrogen and zinc fertilization programme for these cultivars in low soil organic matter and slightly alkaline soil conditions.

Table 2 shows that the fruit mineral concentrations of sour cherry cultivars and statistic differences among the cultivars. As in leaf data, all investigated nutrients were recorded significantly different within the cultivars. Fruit mineral contents of sour cherry cultivars were recorded in higher concentrations both in 1507 and 1525 cultivars for all elements. But fruit mineral contents of sour cherry cultivars were recorded in lower concentrations both in 1512 and 1538 cultivars for all elements. Leaf mineral concentrations were recorded higher than that of fruit minerals. According to these data, genotype 1512 has contained the least mineral contents for all elements both in leaf and fruit tissues.

Conclusion

In breeding programs priorities are generally given to traits as adaptability to environmental conditions, high yield and fruit quality or disease resistance. However, mineral nutrition may create marked effects on above mentioned characteristics. In this regard, significant differences were found among the sour cherry cultivars. Among the Sour cherry cultivars, the concentration of plant leaf nutrients in 1515 and 1530 cultivars were higher than the other investigated cultivars at the same soil conditions. A parallel study to this research conducted by authors also showed that these cultivars were taken the first place according to weighed-ranked method with regard to some characteristics such as yield, fruit size and earliness. These results could be helpful in development

of reliable screening parameters for selection of high nutrient containing and high nutrient-use efficient cultivars in breeding programs.

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Table 1. Leaf mineral element concentrations of ‘sour cherry cultivars (P. cerasus L.) at 120 days after full bloom and the three year after grafting.

Tablo 1. Vişne (P. cerasus L.) çeşitlerinin aşılama sonrası üçüncü yılında ve çiçeklenmeden 120 gün sonra yapraklarında belirlenen mineral element konsantrasyonları

Cultivar No.	Cultivars	N	P	K	Ca	Mg	Fe	Zn	Mn	Cu
		%, dw					mg kg^{-1}, dw			
1	1507	2,21	0,34	1,84	1,90	0,65	50,4	15,8	62,4	9,6
2	1509	1,97	0,29	1,54	1,70	0,51	45,9	17,1	54,0	10,2
3	1510	2,12	0,35	1,55	1,74	0,52	41,0	15,5	58,4	8,4
4	1511	1,99	0,31	1,54	1,72	0,52	43,5	15,3	54,9	8,5
5	1512	2,60	0,37	2,05	2,25	0,67	56,7	21,0	71,4	12,8
6	1514	1,97	0,29	1,54	1,70	0,51	42,9	15,1	54,0	8,2
7	1515	1,84	0,25	1,44	1,60	0,43	40,3	14,2	47,7	7,7
8	1517	2,09	0,33	1,63	1,81	0,54	45,6	16,1	57,4	8,7
9	1518	2,48	0,35	1,86	2,06	0,62	51,9	18,3	68,4	9,9
10	1519	3,38	0,52	2,64	2,92	0,88	75,7	26,0	92,7	15,0
11	1520	1,90	0,28	1,40	1,69	0,49	40,3	14,6	52,0	7,5
12	1522	1,94	0,29	1,52	1,68	0,50	42,4	16,0	53,4	7,6
13	1523	2,06	0,33	1,63	1,91	0,52	48,2	15,0	55,7	9,2
14	1524	1,92	0,28	1,60	1,61	0,50	42,9	15,8	52,7	8,0
15	1525	2,26	0,33	1,77	1,85	0,59	46,3	17,4	62,0	9,4
16	1326	1,95	0,26	1,58	1,64	0,45	41,3	15,6	50,0	7,9
17	1528	1,94	0,29	1,52	1,68	0,53	42,4	16,0	58,4	8,1
18	1529	1,85	0,25	1,34	1,55	0,48	42,3	14,2	50,7	9,7
19	1530	1,82	0,27	1,43	1,68	0,45	37,8	12,7	48,0	7,6
20	1531	2,11	0,31	1,65	1,83	0,55	46,1	16,3	58,0	8,8
21	1532	1,80	0,27	1,44	1,65	0,45	40,3	13,2	52,7	6,7
22	1533	1,99	0,25	1,56	1,72	0,57	43,5	16,3	54,7	8,3
23	1535	2,24	0,33	1,65	1,83	0,58	46,8	17,2	61,4	9,3
24	1538	2,19	0,37	1,51	1,81	0,54	45,6	16,1	57,4	8,7
25	1539	1,87	0,28	1,71	1,58	0,49	43,8	14,0	50,0	7,6
26	1540	2,21	0,34	1,74	1,90	0,60	52,4	16,1	67,4	8,6
27	1541	1,97	0,29	1,58	1,70	0,55	46,9	15,1	55,0	8,2
28	1542	2,02	0,27	1,56	1,74	0,55	44,0	14,5	55,4	8,4
29	1543	1,99	0,29	2,03	1,82	0,56	41,5	16,3	54,5	8,1
Mean		2,09	0,31	1,65	1,81	0,50	42,6	16,1	52,4	9,7
Min-Max Values		1,82-	0,27-	1,43-	1,58-	0,47-	39,8-	14-26	50-92,7	7,6-14
St. Deviation		0,311	0,464	0,254	0,269	0,081	6,793	2,401	8,551	1,281
Sig. (2-tailed)		**	**	**	**	**	**	**	**	**
Mineral limits		2,2-3,4	0,16-	1-3	0,7-3	0,4-0,9	nls	25	nls	nls

** : Significant levels at 1 %; nls: no limitation set

Table 2. Fruit mineral contents of Sour Cherry cultivars (P. cerasus L.) at maturity stage and the three years after grafting.

Tablo 2 Vişne (P. cerasus L.) çeşitlerinin aşılama sonrası üçüncü yılında olgunluk aşamasındaki meyvelerinde belirlenen mineral element konsantrasyonları.

Cultivar No.	Cultivars	N	P	K	Ca	Mg	Fe	Zn	Mn	Cu
		%, dw					mg kg^{-1}, dw			
1	1507	1,82	0,173	0,663	0,143	0,173	22,0	8,47	4,59	5,51
2	1509	1,35	0,158	0,640	0,125	0,163	20,4	8,00	4,36	5,40
3	1510	1,45	0,168	0,648	0,135	0,168	21,4	8,22	4,46	5,35
4	1511	1,16	0,139	0,533	0,115	0,139	17,7	6,81	3,69	4,43
5	1512	1,06	0,128	0,488	0,105	0,128	16,2	6,23	3,38	4,05
6	1514	1,34	0,162	0,618	0,133	0,162	20,5	7,89	4,28	5,13
7	1515	1,11	0,148	0,534	0,127	0,143	18,5	6,72	3,75	4,37
8	1517	1,17	0,141	0,540	0,116	0,173	17,9	6,89	3,74	4,48
9	1518	1,16	0,139	0,566	0,120	0,132	17,7	6,91	3,69	4,33
10	1519	1,51	0,182	0,696	0,150	0,182	23,1	8,88	4,82	5,78
11	1520	1,17	0,138	0,520	0,113	0,138	17,5	6,72	3,65	4,37
12	1522	1,09	0,133	0,498	0,116	0,121	16,7	6,27	3,32	4,05
13	1523	1,17	0,140	0,549	0,127	0,136	18,0	7,04	3,77	4,64
14	1524	1,38	0,167	0,637	0,137	0,167	21,2	8,13	4,41	5,29
15	1525	1,96	0,236	0,904	0,195	0,236	30,0	11,54	6,26	7,51
16	1326	1,10	0,133	0,507	0,114	0,135	16,5	6,45	3,41	4,11
17	1528	1,13	0,136	0,520	0,112	0,136	17,3	6,64	3,60	4,32
18	1529	1,28	0,155	0,592	0,127	0,155	19,7	7,55	4,10	4,91
19	1530	1,11	0,134	0,514	0,111	0,134	17,6	6,66	3,66	4,27
20	1531	1,31	0,158	0,605	0,120	0,158	20,1	7,94	4,19	5,02
21	1532	1,10	0,141	0,517	0,105	0,132	17,1	6,49	3,61	4,31
22	1533	1,13	0,136	0,520	0,112	0,136	17,3	6,64	3,60	4,32
23	1535	1,05	0,125	0,490	0,106	0,137	16,4	6,35	3,42	4,10
24	1538	1,06	0,128	0,488	0,105	0,128	16,2	6,23	3,38	4,05
25	1539	1,23	0,148	0,566	0,122	0,148	18,8	7,22	3,92	4,70
26	1540	1,07	0,129	0,494	0,106	0,129	16,4	6,31	3,42	4,10
27	1541	1,16	0,130	0,520	0,110	0,146	17,4	6,71	3,79	4,53
28	1542	1,30	0,156	0,598	0,129	0,156	19,9	7,64	4,14	4,97
29	1543	1,25	0,152	0,559	0,120	0,156	18,6	7,14	3,87	4,64
Mean		1,23	0,149	0,569	0,122	0,150	18,9	7,27	3,94	4,73
Min-Max Values		1,05-	0,125-	0,488-	0,105-	0,121-	16,2-	6,23-	3,32-	4,05-
St. Deviation		0,188	0,227	0,087	0,189	0,023	2,889	1,111	0,603	0,724
Sig. (2-tailed)		**	**	**	**	**	**	**	**	**

** : Significant levels at 1 %.

CHARACTERIZATION AND EVALUATION OF SOUR CHERRY (*PRUNUS CERASUS* L.) GENETIC RESOURCES IN AEGEAN REGION OF TURKEY

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Abstract

The purpose of this study was to determine the phenological, pomological and technological characters of 29 sour cherry (*P. cerasus* L.) types collected from Aegean Region of Turkey. The types were evaluated for the characters of first blossoming, full bloom, end of blossoming, harvesting time, yield, fruit weight, frut flesh/seed, juice content, total solible solids/acidity, pH, juice colour, fruit shape, skin colour, aroma and attractiveness. It was found that the earliest blooming typ was 1528, which usually bloom at the end of March. Harvesting time began in the beginning of June. The earliest ripening typ was 1528. The types that ripen late were 1533 and 1539 about end of June. Average fruit weight was around 4.0 g.-5.0g. Four different colours were observed for fruit skin. The colour of fruit skin ranges from cherry, dark cherry, dark red to light cherry. There was certain amount of variability among sour cherry types which were collected from Aegean Region.

Keywords: evaluation, sour cherry, genetic resources

TÜRKİYE'NİN EGE BÖLGESİ VİŞNE P*PRUNUS CERASUS* L.) GENETİK KAYNAKLARİNİN KARAKTERİZASYONU VE DEĞERLENDİRİLMESİ

Özet

Çalışmada; Ege Bölgesi'nin değişik yörelerinden toplanan 29 vişne (*P. cerasus* L.) tipinin değerlendirilmesi ve karekterizasyonu yapılmıştır. Tiplerin; fenolojik özellikleri (ilk çiçeklenme, tam çiçeklenme, çiçeklenme sonu ve hasat tarihi), pomolojik özellikleri (meyve/ çekirdek oranı, meyve suyu içeriği, suda çözünebilir kurumadde/asit oranı, pH, meyve suyu rengi, meyve şekli,

meyve rengi, aroma ve albeni) ve verim değerleri belirlenmiştir. Tipler arasında geniş bir varyasyonun olduğu gözlenmiştir.

Anahtar kelimeler: vişne, genetic kaynakları, değerlendirme.

Introduction

The 'Kütahya' sour cherry (*Prunus cerasus* L.) is the most planted cultivar in Turkey commercial orchards. This cultivar is self-compatible and characterized by regular and high yield. The fruit is of "morello" type, medium to big in size, with dark red and thin skin. The flesh is red, medium-firm, juicy, quite sour, aromatic and of high quality. (Özçağıran, 1977a; Özçağıran, 1977b; Öz, 1988; Burak et.al.,1999). The numerous positive traits of this cultivar should make it interesting for plantation in other countries.

Anatolia is located in two of eight plant origin centers suggested by Vavilov (1951), "Near Eastern Center" and "Mediterranean Center". Several species of fruit trees or their wild relatives are indigenous to Turkey like fig, walnut, almond, apple, pear, plum, sour cherry and olive (Sykes 1972).

This species is indigenous to Turkey and there is a wide range variation in fruit characteristics. Sour cherry is widely planted in the Central Anatolia and Aegean Region of Turkey. These districts have the best climatic factors, such as brillant illumination, low temperature and great difference in temperature between day and night. A few studies (Vesterheim 1973; Christersen 1978; Bekefi *et al*. 2000; Cordeir Rodrigues *et al*. 2000) have revealed wide variability in cherry types and varieties for different characters.

Thirty-four sour cherry varieties were tested for fruit size and weight, flesh/kernel ratio, percantage juice yield, juice colour, acid content and an evaluation of the quality of the processed product (Liverani *et al*.1981). Moltalti and Camorani (1982) evaluated for dates of flowering and maturity, habit, peduncle length, percantage of soluble dry matter, pH of the juice, acid content of the juice, fruit size, fruit weight, fruit shape, colour of the skin, flesh and juice, and flesh cosistency of 21 cultivars.

In a trial with 6 varieties during 1986-90 at Zajecar on the Beli Timok river in Serbia, Oblacinska was the earliest to flower, and mean fruit weight ranged from 3,1 g. in Oblacinska to 5,8 g. in Hajmanova Konzervna. Total sugar content of fruit varied from 8,5 % in Oblacinska to 9,7 % in Hajmanova Konzervna. Solible solids was highest (at 15,2 %) in Cacanski Rubin (Miletic,1991).

Eight varieties and three selection types were determined from Hungarian breedin programme for different characters (Apostol *et al*.1993)

Six local types and three foreign varieties were examined in Southeast Turkey. Two local types were found to be more suitable for that region (Karaca *et al*. 1998). Morphological variation among

78 local races of sour cherry provided from the Nordic Gene Bank's were observed in Palkane, Southwestern Finland (Palonen *et al*. 2000). On the basis of fruit characteristics, 32 sour cherry samples were classified as morellos, 40 samples as ameralles, and 5 samples being distinct from the other amarelles were proposed to be called Rymattyla-type cherries.

The beginning, peak and end of flowering periods of 90 sour cherry evaluated. The beginning and duration of flowering of the evaluated cultivars differed in the individual years of studies depending on the weather conditions. The erliest flowering was noticed at the end of the second 10 days period of April, while the latest was on the firt day of May. Depending on the year, the earliest flowering cultivars flowered 6 to 12 days earlier than the latest flowering (Hodun and Hodun 2002).

The complete characterization as well as the conservation of autochthonous cultivars is considered of great importance in order to avoid the loss of their germplasm (Rodrigues et al., 2008).

Forty one genotypes of the 'Oblačinska' sour cherry collection, to determine the correlation among the traits, to identify the most useful variables for discrimination among the genotypes and to detect relationships between the genotypes (Rakonjac et. al.,2010).

The objective of this study was to determine phenological, pomological and technological characters of 29 sour cherry (P. **cerasus** L.) samples collected from Aegean Region of Turkey.

Material and Methods

Samples were collected as scion woody in August from an area between 38º45′-41º10′ N latitude and 27º50′-32º05′ E longitude. Elevation ranged from 225 to 950 m. A total of twenty-nine types was collected from wild and feral populations growing Aegean Region of Turkey. Trees have been marked for further visit and recollection.

The samples were T-budded onto *Prunus mahaleb* seedlings in the nursery. Budded trees were planted in the experimental fields with 6x 6 m. spacing with tree replicates for each type. Routine cultural practices were performed.

Types were evaluated for important phenological, pomological and technological characteristics in order to determine their importance for horticulture and breeding during the period of three years. First blossoming, full bloom, end of the blossoming and harvesting time were recorded. Flowering time were observed three times a week. Some other characteristics such as fruit shape, skin colour, pH value of juice, aroma, fruit flesh/seed ratio were also recorded.

Results and Discussion

All types evaluated for phenological characteristics are listed in Table 1. It was found that the earliest blooming typ was 1528, which usually bloom at the end of March. First blossoming date of

types were between 25 March and 17 April. The period from the begining of blooming to the end of blooming was 20 days, changing from years to years.

Harvesting time began in the beginning of June. The earliest ripening typ was 1528. The types that ripen late were 1524 and 1515about end of June. Harvesting period was approximately 20 days.

Several pomological characters are given Table 2 and 3. Fruit weight of the accessions ranged between 3.3 g and 5.9 g, sample 1514 the highest and sample 1538 the lowest. Average fruit weight was around 4.0 g.-5.0g 65% of types were placed between the variation limits of 4.0 to 5.0 g in fruit weight. From the point of view of average fruit weight, the types collected were generally in a good position as in similar researchs carried out both in Turkey and in the other countries. For example Karaca *et al.* (1998) 3.5-4.0 g and Miletic (1991) recorded 3.1.-5.8 g. On the contrary, Nikolic *et al.* (1991) cited that Gaga variety had been determined as having the largest fruit weight with more than 8.0 g in Serbian.

Fruit flesh/seed ratio values calculated were between 6.9 in type 1525 and 4.6 in types 1522, 1526 and 1514. The total soluble solids (TSS)/acidity of types varied from 7.5 to 13.9. Type 1525 had the highest followed by type 1519 with 10.7, and type 1507 had the lowest TTS/acidity value with 7.5.

A large variation was noticed among types for the rate of fruit juice, type 1535 had the lowest, 66.3%, and type 1510 had the highest, 84%. The analysis showed that pH values changed from 2.8 (type 1520) to 3.3 (types 1528 and 1329). It was found out that there was no big differences among types for pH values.

The fruit yield per tree showing considerably large variation was recorded from a single harvest. It ranged from a minimum of 3.8 kg to a maximum of 20.3 kg. The highest yields were obtained from type1539 and 1532 as 20.3 and 19.8 kg/tree, respectively. Type 1522produced the lowest yield as 3.8 kg/tree. Yield correlated not strongly but significantly and negatively with fruit weight.

Four different fruit shapes were determined. Round shape samples were more common than the others with approximately 60% of all types. Flat-round and heart shape types being approximate in numbers were much more than kidney shape (only one sample).

Four different colours were observed for fruit skin. The colour of fruit skin ranges from cherry, dark cherry, dark red to light cherry.

There were five different colours for fruit juice, cherry, dark cherry, dark red, red, light cherry. Cherry and dark cherry colours together were more common than the others for fruit skin colour and fruit juice colour making up a total of 29 and 14 of all types.

Type 1515 had very good aroma and they were found to be suitable for fresh consumptions. Poor aroma was observed for more than half of the sour cherry types studied.

Attractiveness was scored as very good, good, average and poor. Only one type had a very good appraisal. Around 85 percent of types had good and average attractiveness. Close relationshipswere observed between attractiveness and fruit weight and fruite skin colour.

We have also conducted an evaluation of economically valuable characteristics in order to identify the genotypes with a good potential for cultivation or for exploitation in breeding programs.

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Table 1. Some phenological characteristics of sour cherr types.
Çizelge1. Vişne tiplerinde incelenen bazı fenolojik özellikler

Type no	Firs blossoming	Full bloom	End of blossoming	Harvesting time
1507	3.4-12.4	15.4-18.4	25.4-5.5	17.6-25.6
1509	4.4-11.4	15.4-18.4	19.4-7.5	17.6-25.6
1510	7.4-17.4	17.4-22.4	27.4-8.5	25.6-2.7
1511	4.4-12.4	15.4-19.4	26.4-5.5	23.6-25.6
1512	3.4-13.4	15.4-17.4	24.4-30.4	17.6-23.6
1514	4.4-17.4	15.4-24.4	26.4-4.5	17.6-30.6
1515	3.4-14.4	15.4-20.4	26.4-4.5	13.6-23.6
1517	2.4-13.4	16.4-17.4	26.4-2.5	13.6-17.6
1518	3.4-10.4	10.4-15.4	25.4-30.4	13.6-18.6
1519	3.4-13.4	15.4-20.4	27.4-6.5	17.6-23.6
1520	4.4-11.4	15.4-17.4	23.4-1.5	17.6-23.6
1522	4.4-13.4	15.4-17.4	22.4-4.5	17.6-23.6
1523	4.4-13.4	15.4-18.4	24.4-4.5	17.6-23.6
1524	3.4-13.4	15.4-20.4	25.4-4.5	17.6-23.6
1525	12.4-15.4	18.4-22.4	29.4-5.5	17.6-2.7
1326	4.4-13.4	16.4-18.4	22.4-1.5	17.6-23.6
1528	25.3-10.4	5.4-13.4	15.4-20.4	4.6-23.6
1529	3.4-13.4	15.4-19.4	23.4-6.5	13.6-23.6
1530	4.4-13.4	15.4-17.4	22.4-4.5	17.6-23.6
1531	4.4-13.4	15.4-18.4	24.4-4.5	17.6-23.6
1532	3.4-13.4	15.4-20.4	25.4-4.5	17.6-23.6
1533	12.4-15.4	18.4-22.4	29.4-5.5	17.6-2.7
1535	4.4-13.4	16.4-18.4	22.4-1.5	17.6-23.6
1538	5.4-10.4	15.4-18.4	23.4-3.5	17.6-18.6
1539	5.4-12.4	14.4-18.4	22.4-3.5	17.6-23.6
1540	3.4-15.4	15.4-20.4	25.4-5.5	13.6-23.6
1541	4.4-13.4	15.4-18.4	25.4-4.5	17.6-23.6
1542	3.4-13.4	15.4-20.4	27.4-6.5	17.6-23.6
1543	4.4-11.4	15.4-17.4	23.4-1.5	17.6-23.6

Table 2. Some pomological characteristics of sour cherry types.
Çizelge2. Vişne tiplerinde incelenen bazı meyvesel özellikler

Type no	Fruit shape	Skin color	Juice color	Aroma	Attractiveness
1507	Round	Chery	Dark cherry	Poor	Good
1509	Heart	Dark cherry	Cherry	Poor	Good
1510	Round	Dark cherry	Cherry	Good	Average
1511	Round	Cherry	Cherry	Average	Average
1512	Flat-round	Dark red	Dark cherry	Poor	Average
1514	Heart	Dark cherry	Dark cherry	Poor	Average
1515	Flat-round	Dark cherry	Dark cherry	Very good	Good
1517	Round	Light cherry	Cherry	Poor	Good
1518	Flat-round	Cherry	Dark cherry	Good	Good
1519	Round	Dark red	Dark cherry	Poor	Average
1520	Round	Dark red	Red	Poor	Good
1522	Flat-round	Dark red	Dark red	Poor	Good
1523	Round	Cherry	Dark red	Poor	Good
1524	Round	Cherry	Dark cherry	Poor	Good
1525	Round	Cherry	Dark cherry	Poor	Poor
1326	Round	Light cherry	Cherry	Poor	Good
1528	Flat-round	Cherry	Dark cherry	Poor	Good
1529	Round	Dark red	Red	Poor	Good
1530	Flat-round	Dark red	Dark red	Poor	Good
1531	Round	Cherry	Dark red	Poor	Good
1532	Round	Cherry	Dark cherry	Poor	Good
1533	Round	Cherry	Dark cherry	Poor	Poor
1535	Round	Light cherry	Cherry	Poor	Good
1538	Heart	Dark cherry	Dark cherry	Good	Average
1539	Kidney	Light cherry	Cherry	Poor	Very good
1540	Round	Light cherry	Dark red	Poor	Good
1541	Heart	Dark red	Cherry	Average	Poor
1542	Round	Dark red	Dark cherry	Poor	Average
1543	Round	Dark red	Red	Poor	Good

Table 3. Some pomological characteristics of sour cherry types.
Çizelge3. Vişne tiplerinde incelenen bazı meyvesel özellikler.

Type no	Fruit weight (g)	Fruit flesh/seed	Rate of juice (%)	Total solible solids / acidty	pH	Yield (kg/tree)
1507	3,4	5,1	75,3	7,6	3,0	17,9
1509	4,2	5,2	74,6	8,2	3,0	16,8
1510	5,1	5,9	78,0	9,2	2,8	17,1
1511	5,0	5,3	73,0	8,6	2,9	9,6
1512	4,1	5,5	72,3	10,2	3,0	8,7
1514	4,2	5,8	73,0	9,9	3,1	9,5
1515	4,3	5,5	72,6	9,9	3,1	6,8
1517	3,9	5,2	70,5	8,2	3,0	11,4
1518	4,2	5,8	73,0	7,5	3,0	12,6
1519	4,7	6,3	75,0	10,7	3,0	7,6
1520	3,7	5,0	76,0	8,1	3,0	10,7
1522	4,8	5,3	75,0	7,6	2,9	3,8
1523	4,0	5,3	73,6	8,6	3,0	12,4
1524	4,4	5,7	67,3	9,8	3,1	9,8
1525	4,6	6,9	62,0	13,9	3,2	9,1
1326	4,1	5,4	76,0	7,8	3,0	8,5
1528	4,6	5,7	72,6	8,0	3,3	16,3
1529	4,1	5,9	73,3	9,1	3,3	11,2
1530	4,8	5,3	75,0	7,6	2,9	4,3
1531	4,0	5,3	73,6	8,6	3,0	12,4
1532	4,4	5,7	67,3	9,8	3,1	19,8
1533	4,6	6,9	62,0	13,9	3,2	7,4
1535	4,1	5,4	76,0	7,8	3,0	8,5
1538	5,9	6,9	65,0	9,5	3,0	6,8
1539	4,2	5,7	84,0	8,1	3,0	20,3
1540	5,5	5,7	73,3	8,3	3,0	17,2
1541	5,1	5,8	71,5	8,2	3,2	14,2
1542	4,7	6,3	75,0	10,7	3,0	7,6
1543	3,7	5,0	76,0	8,1	3,0	11,9
Mean	4,427	5,628	72,82	9,086	3,038	11,382
St Dev.	0,550	0,535	4,575	1,642	0,115	4,462
Sig.	**	**	**	**	**	**

THE CLONAL SELECTION BREEDING OF AKÇA PEAR (*PYRUS COMMUNIS* L.) IN AEGEAN REGION OF TURKEY

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Abstract

The clonal selection studies were conducted in İzmir, Aydın and Manisa provinces of Aegean region of Turkey on early-ripening Akça pear cultivar (*Pyrus communis* L.) As a result of selection studies conducted by over the two years period, 28 types were selected in the first step. In the second step, 12 out of them were found as promising ones by pre-evaluation studies and were taken into an adaptation trial at the same condition. Pomological and phenological observations were performed on those types during the experimental period, regularly. Types were evaluated on the basis of some characteristics such as yield, fruit size and earliness employing 'weighed-ranked' method. As a result of evaluation studies it was determined that type no 2036 has taken the first place in rank and others viz. no. 2051 and 2103 have followed it.

Key words: Pear, Phenological and pomological observations, 'weighed-ranked' method.

TÜRKİYE'NİN EGE BÖLGESİ AKÇA ARMUT (*PYRUS COMMUNİS* L.) TİPLERİNİN KOLONAL SELEKSİYONU

Özet

Türkiye'nin Ege Bölgesi'ndeki; izmir, Aydın ve Manisa illerinde erkenci bir armut çeşidi olan Akça armudu klon seleksiyonu yapılmıştır. Arazi koşullarında belirlenen 28 tipten, laboratuvar koşullarında yapılan değerlendirmeler sonucu 12 tip ümitvar görülerek aynı ekolojik koşullarda denemeye alınmıştır. Yapılan; tartılı derecelendirme sonucu; 2036,2051 ve 2103 nolu tipler yüksek puan alarak ümitvartipler olarak belirlenmişlerdir.

Anahtar kelimeler: Armut, fenolojik ve pomolojik gözlemler, tartılı derecelendirme.

Introduction

The pear originated in prehistoric times as a fruit crop. Cultivar development has been continuous since early days and a high level of improvement has been achieved. Pears are now grown in all temperate regions of the world (Layne and Quamme,1975).

Species of pear belong to the genus *Pyrus*, the sub-family Pomoideae and the family Rosaceae. The genus *Pyrus* is believed to have arisen during the Tertiary period in the mountainous regions of Western China and to have evolved as it spread along the mountain chains to the east and west (Rubzov, 1944). Three centers of diversity for the genus have been identified by Vavilov (1951): the Chinese, the Central Asian and the Near Eastern / Asia Minor Centers. The Near Eastern Center is of special importance because it is believed that the domesticated forms of european pear (*Pyrus communis* L.) form which the modern cultivars are derived originated there.

During long time course, many local pear cultivars that show different degrees of improvement or adaptability developed in Turkey (Browicz, 1972; Özbek, 1947 and 1978). Akça (*Pyrus communis* L.) is the earliest ripenig pear cultivar in Turkey and has several different types (Ergun, 1989).

In this research, the aim was to determine different types of Akça pear by surveying and select candidate types having high-yielding capacity and better fruit characteristics and adaptable to the conditions of Aegean Region of Turkey.

Material and methods

The clonal selection studies were conducted in the villages and counties of Izmir, Aydın and Manisa provinces of Aegean region of Turkey on early-ripening Akça pear cultivar (***Pyrus communis*** L.). As a result of selection studies 28 types were selected in the first step. In the second step, 12 out of them were found as promising ones by pre-evaluation studies and were taken into an adaptation trial at the Aegean Agricultural Research Institute (AARI) located near Menemen county of İzmir province.

Budwoods were taken from each of original trees and budded on Quince A (**QA**) rootstocks. The experiment was established with 7 budded trees of each type of Akça cultivar at 6x6 spacing in a randomized block design. Akça cultivar has been already planted in orchard of Aegean Agricultural Research Institute (**AARI**) was used as a control in the experiment.

For evaluation of those types, phenological and pomological characteristics were observed and yield efficiency (**productivity**) values were scored.

Bud burst, first blossoming, full bloom, last blossoming and harvesting date were used as criteria for phenological observations.

The shape, fruit weight, length of fruit stalk, taste, juiciness, texture and firmness of fruit flesh, ground and overcolour of fruit skin, russet amount in fruit skin, skin thickness, Total Soluble Solids

(TSS) (%), aroma and eating quality of fruit were characteristics used for pomological evaluation (UPOV, 1974; IBPGR, 1983) and were scored as an average of 20 fruit samples taken 7 trees of each type, randomizely. For determination of colours, Methuen handbook of colour was used (Kornerup and Wanscher, 1978).

Last year of the experiment, morphological characteristics of trees were observed and trees were classified as upright, semi-upright and spreading for tree habit and weak, intermediate and vigorous for tree vigor.

Yield efficiency = productivity (kg / cm^2) were obtained by dividing cumulative yield of each tree to 1 cm^2 of trunk cross-sectional area.

'Weighed-ranked' method was employed in evaluating values (Büyükyılmaz et al.,1992).

The characteristics such as yield, fruit size and earliness and their relative points, class values and class points were used as criteria in evaluation of types. Total points of types were obtained by multiplying relative points with class points of characteristics.

Result and discussion

According to average of four-year phenological observations, dates for bud burst, first blossoming, full bloom and last blossoming were determined as 10-17/3, 23-29/3, 3-9/4, and 9-19/4, respectively. It was observed that harvesting dates of types varied between 13/6-7/7 (table 1).

It was observed that there was no big difference for fruit shape among types. Fruit characteristics such as fruit width, fruit length, fruit stalk length and fruit flesh firmness were determined as 35.7-54.1 mm, 51.8-71.2 mm 24.7-48.5 mm and 9-12 lb/cm^2 restpectivly (Table 2. Fruit characteristics such as fruit weight and total soluble solids were determined as 29.4-90.2g and 11-15 %, also (Table 3).

There was no difference for characteristics such as taste, juiciness, texture and firmness of fruit flesh, ground and overcolour of fruit skin, russet amount in fruit skin, skin thickness and aroma and eating quality of fruit among types.

Cumulative yield varied between 9.112-78.912kg/tree. Yield efficiency (productivity) was found as 0.077-0.350 kg/cm^2 among types.

The ranking of types in respect, to points obtained by ‘weighed-ranked ' method is given at table 3. The types having high points at the table, viz. nos 2036, 2051 and 2103, were chosen as promising types suitable to the conditions of Aegean Region of Turkey.

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Table 1. Some phenological characteristics of Akça pear.

Çizelge1. Armut tiplerinde incelenen bazı fenolojik özellikler.

Type no	Bud burst	Firs blossoming	Full bloom	End of blossoming	Harvesting time
2036	10-14.03	25-29.03	05-09.04	13-17	20-25.06
2039	12-16.03	23-29.03	03-07.04	11-15	20-25.06
2042	10-15.03	25-27.03	05-07.04	13-19	20-25.06
2043	11-16.03	23-29.03	03-09.04	09-15	13-17.06
2045	12-17.03	27-29.03	07-09.04	17-19	29.06-02.07
2051	10-17.03	25-29.03	05-07.04	15-19	29.06-02.07
2099	13-17.03	23-29.03	03-07.04	13-15	20-25.06
2100	14-17.03	23-27.03	03-05.04	09-13	13-17.06
2101	11-14.03	25-27.03	050-9.04	15-19	20-25.06
2102	11-15.03	27-29.03	07-09.04	17-19	29.06-02.07
2103	13-16.03	25-27.03	07-09.04	17-19	07-09.07
2104	12-15.03	23-25.03	03-05.04	09-13	13-17.06
Akça (**C**)	14-17.03	25-29.03	07-09.04	15-19	29.06-02.07

C. Control

Table 2. Some phenological characteristics of Akça pear.

Çizelge 2. Armut tiplerinde incelenen bazı pomolocik özellikler.

Type no	Fruit width	Fruit length	Fruit stalk length	fruit flesh firmness
2036	48.2-54.1	63.7-70.6	29.3-34.5	9.2-11.4
2039	41.6-48.1	62.3-67.4	41.7-46.8	9.7-10.8
2042	39.3-44.2	53.6-61.4	35.7-46.2	10.3-11.7
2043	35.7-42.8	52.4-60.6	29.6-38.5	10.7-12.0
2045	44.3-51.4	55.2-62.7	38.9-47.6	9.6-10.9
2051	47.8-53.7	64.3-71.2	25.4-37.8	10.3-10.7
2099	46.2-50.5	56.3-62.5	27.2-38.3	9.9-10.6
2100	36.2-44.9	51.8-57.9	38.5-46.7	10.9-11.8
2101	39.7-48.3	56.6-63.4	36.6-45.7	10.3-11.4
2102	44.6-51.3	58.3-66.2	28.5-41.4	9.8-10.6
2103	49.3-53.4	58.9-69.3	24.7-35.2	10.4-11.7
2104	36.6-45.2	52.2-60.3	37.5-44.1	10.6-11.9
Akça (**C**)	42.4-48.7	62.4-67.8	39.2-46.5	10.2-11.4

C. Control

Table 3. Yield and some quality characteristics of Akça pear types.

Çizelge 3. Armut tiplerinde incelenen verim ve bazı kalite özellikleri.

Type no	Cumulative yield (kg)	Cumulative yield per 1 cm^2 cross-sectional area of trunk (kg /cm^2)	Average fruit weight (g)	Total soluble solids (%)
2036	27.939	0.260 bcd	90.20 a	11.0
2039	17.662	0.107 de	49.75 defg	13.0
2042	15.608	0.089 e	54.50 cde	13.2
2043	23.333	0.077 e	29.40 g	12.5
2045	60.621	0.236 abc	62.50 bcd	13.2
2051	78.912	0.350 a	73.40 abc	13.0
2099	16.532	0.087 e	51.70 def	13.5
2100	22.216	0.119 de	31.30 fg	11.0
2101	9.112	0.077 e	49.20 defg	12.5
2102	10.635	0.097 de	62.00 bcd	11.0
2103	57.724	0.338 a	81.40 ab	15.0
2104	32.115	0.136 cde	37.20 efg	11.2
Akça (**C**)	28.628	0.264 ab	54.00 cde	11.5

C. Control

Table 4. The ranking of Akça pear types in respect to their total points by 'weighed- ranked' method.

Çizelge 4. Armut tiplerinin tartılı drecelendirmeye gore aldıkları puanlar.

Types	Yield	Fruit weight	Earliness	Total
2036	280	300	210	790
2051	400	240	120	760
2103	400	270	30	700
Akça (**C**)	280	150	120	550
2045	240	180	120	540
2104	120	60	300	480
2100	80	30	300	410
2039	80	120	210	410
2042	40	150	210	400
2101	40	120	210	370
2043	40	30	300	370
2099	40	120	210	370
2102	40	180	120	340

C.Control

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