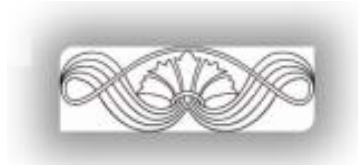


**I COFAAS 2018**  
**INTERNATIONAL CONFERENCE ON FOOD,  
AGRICULTURE AND ANIMAL SCIENCES**

**ANTALYA, TURKEY  
OCTOBER 3-7, 2018**



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# INTERNATIONAL CONFERENCE ON FOOD, AGRICULTURE AND ANIMAL SCIENCES

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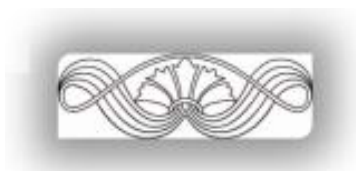
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*Dear dignitaries, colleagues and young researchers!*

*First of all, I would like welcome and greet you for taking part in the second '1st International Conference on Food, Agriculture and Animal Sciences' held by our university which extends its scientific and academic activities with the motto 'In the light of Science'.*

*In this conference held by our university the papers that are going to be presented by dear researchers in the fields of natural and applied sciences and the scientific results that are going to be put forward bear substantial importance in terms of our objectives and mission. By bringing together scientists working and investigating at different universities in the same field in this conference it is aimed at making use of cooperation and opportunities for working together and also bringing together distinguished scientists with young researchers.*

*I hope that in the wake of this elegant scientific activity useful outcomes are going to be obtained for science, technology and society and these outcomes will be published. With the papers presented researchers studying in the same field are going to be informed about up to date scientific developments and also an information exchange is going to be provided within an efficient and productive discussion environment. I would like to thank to all the invited speakers and those presenting their papers for their contribution and participation to our conference. I would like to express my gratitude first to the chair of the organization board and the members of the organization board and secretariat staff.*

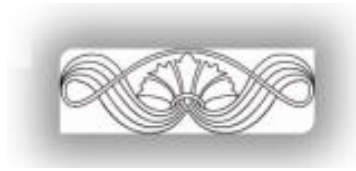
*Further, I would like to thank and express my gratitude to the our sponsors SFCAGRO LTD. Company, Kotan Biotechnology and Supersol LTD. Company, their staff and managers.*

*I would like to highlight the fact that the doors of our university are always kept open to all researchers and scientists. Both in our city, Siirt is a valuable place to be seen with climate that four seasons passes by most beautiful way, productive soils that every kind of vegetable and fruit breed, blankets and carpets that hand made and produced by eye – straining work, curative Pervari honey, large seeded peanut, Zivzik Nari that has unique tasting, natural beauties, historical creations, Islamic saints died in city and at our university which fuses science with human we will be honoured to host you.*

*I wish a fine and productive scientific activity and success.*

***Prof. Dr. Murat ERMAN***

***Rector of Siirt University***



*Dear Conference Participants,*

*Welcome to the 1st International Conference on Food, Agriculture and Animal Sciences.*

*On behalf of the Organizing Committee, I am very happy to open 21st International Conference on Food, Agriculture and Animal Sciences. I believe that this event, which is the fruit of an intensive and devoted teamwork, will have an invaluable contribution to the scientific world. At the end of busy schedule of nearly one year, we have now achieved to organize this conference under the name of Siirt University.*

*Let me express that our university, has completed its physical structure to a large extent and is going on its development through scientific activities. Today, universities need to get their power of existence from their own studies by setting strong relationships with economic, social and cultural resources of their territory as access to information has been simplified, education has become a lifelong activity and rivalry has become dominant. One of the basic features of universities is to produce information, science and technology to serve to next generation and to the people of the region as well as the country, since the responsibilities of universities are not restricted to equip their students with occupation. Universities are those institutions where scientific, technologic, cultural and social benefits are shared with society. In other words, one of the responsibilities of universities is to become institutional leaders as well. Under abovementioned conscious of responsibility, Siirt University leads and collaborates with private and official institutions as well as leading the society. Our university endeavours to convey its scholarly studies to social, cultural, technologic and commercial products by developing interdisciplinary collaboration. We think that, university is a place where reasoning, questioning, sense of responsibility, imagination, gaining a universal vision towards learning is learnt along with learning to learn. Regardless of the conditions, the methods of accessing information are investigated at universities. Universities are universal and dynamic institutions. They are driving powers of their people, society, country and civilization in terms of development. A sustainable,*

*beneficial, humanistic, peaceful and ecologic development necessitates lifelong learning and teaching. University education is one of the crucial phases of a person's educational life; and universities are those institutions where beneficial and scientific knowledge is created and the knowledge is transmitted. The ways of accessing knowledge is also taught at universities. All kinds of views are discussed at universities. Universal peace and love is organised at universities where the main principle is based on the fact that the most dutiful person is the one who is of help to others. Our university aims to provide successful careers to the students by gaining the way approaching to the problems within the scope of solutions oriented and the skill of thinking analytically.*

*In this context, the aim of the 1st International Conference on Food, Agriculture and Animal Sciences is to bring together experts and young researchers from all over the world working in food, agricultural and animal sciences to present their researches, exchange new ideas, discuss challenging issues, foster future collaborations and interact with each other.*

*The main objective of the our conference is to discuss recent results in in food, agricultural and animal sciences and their applications, particularly food, agricultural and aquatic sciences, animal sciences, biodiversity, toxicity and biotechnology. We expect the participation of many prominent experts from different countries who will present best quality papers.*

*The conference brings together about 120 participants from different countries (Algeria, Jordan, Latvia, Slovakia, Germany, Romania, Serbia, India, Iran, Pakistan, Turkey), out of which 80 are contributing to the meeting with oral and 50 with poster presentations, including six keynote talks.*

*It is also a goal of the conference to promote collaborative and networking opportunities among senior scholars and graduate students in order to advance new perspectives. Additional emphasis at 1st International Conference on Food, Agriculture and Animal Sciences is put on applications in related areas, as well as other science, such as natural science, economics, computer science and various engineering sciences. The papers presented in this conference will be considered in the journals listed on the conference websites.*

*I'd like to express my gratitude to all our authors, members of scientific committee, keynote speakers and contributing reviewers. I believe we will see the best papers of scholars in this event. My sincere*

*thanks go to Prof. Dr. Murat ERMAN, the president of Siirt University, sets the goal of being also a top-ranking university in scientific sense, for supporting and motivating us in every respect. Special thanks are also due to the organizing committee members, for completing all preparations that are necessary to organize this conference. I express my gratitude to the members of technical committee of the conference for the design and proofreading of the articles. Last but not least, my special thanks go to the our sponsors SFCAGRO LTD. Company, Kotan Biotechnology and Supersol LTD. Company, that unsparingly supports our event financially and emotionally.*

*We wish everyone a fruitful conference and pleasant memories in Antalya, Turkey.*

***Assist. Prof. Dr. Fatih IĞ***

***Chair of ICOFAAS 2018***

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## Fatty Acids and Immune Function

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### ABSTRACT

The immunomodulatory effect of polyunsaturated fatty acids (PUFA) occurs by affecting intercellular communications and signals that change the reactivity of leukocytes upon antigenic stimulation. This effect is highly associated with down-regulation or up-regulation of different cytokines that are believed to affect the immune function such as IL-1 $\beta$ , IFN $\gamma$ , MGF, IL-1, IL-4, IL-2. There is some concern that diets enriched with n-3 PUFA have detrimental effects on chicken immunity and impair resistance to infection. However, it is not clear whether this concern is justified, since some studies show no effect, some show a detrimental effect, while some show an improvement following feeding of n-3 PUFA. The current paper sheds light on the importance of fatty acids in biological cells and their effect on the immune function.

**Keywords:** cytokines, fatty acids, immune function

### INTRODUCTION

All fatty acids are carboxylic acids characterized by a chain-like structure with a carboxyl group (COOH) at one end, and a methyl group (CH<sub>3</sub>) at the other end. The rest of the chain consists of carbon atoms varying in length from 2 to 20 or more with hydrocarbon bonds (CH<sub>2</sub>). Fatty acids (FA) differ in the number of hydrogen atoms and the number and location of the double bonds between adjacent carbon atoms if hydrogen atoms are removed. If a fatty acid chain is fully loaded with hydrogen atoms, the FA is termed saturated. Consequently, saturated fatty acids form straight chains as there are no double bonds between carbon atoms. These usually contain between 12 and 24 carbon atoms. This kind of FA is abundantly present in adipose tissues of animals, including poultry and used as a source of energy if needed. An example of a saturated FA is stearic acid (C18:0). This is one way to name a fatty acid (C:D) where C is the number of carbon atoms in the fatty acid and D is the number of double bonds in the fatty acid. Sources of saturated FA include meat, dairy products, palm oil, coconut oil and vegetable shortening (Rees et al., 2005).

### ROLE OF FATTY ACIDS AND LIPIDS IN BIOLOGICAL CELLS

The two families of PUFA are classified as omega-3 (n-3) and omega-6 (n-6) fatty acids. The human body is capable of producing all; except for two fatty acids, linoleic acid (LA) and alpha-linolenic acid (ALA) also known as essential fatty acids.

PUFAs regulate a range of biological functions such as blood pressure and blood clotting up till the development and functioning of the brain and nervous system. LA is derived from sources such as plant oils of sunflower, safflower and corn oils. ALA is obtained from green leafy vegetables, flaxseed and rapeseed oils.

FAs form 28-42% of the total energy consumed by European populations. Due to an increased consumption of LA-rich vegetable oils, n-6 PUFA consumption has increased and is higher than n-3 PUFA. The optimal dietary intake of n-6:n-3 ratio is around 1-4:1.

PUFAs play an important role in the composition of cell membranes by maintaining homeostasis for correct membrane protein function and influence membrane fluidity. Thus, helping in the regulation of cell signaling processes cellular functions and gene expression. Fatty acids are mainly energy sources along with being membrane constituents. Their biological activities contribute to cell and tissue metabolism, function, and responsiveness to hormonal and other signals. Their biological activities consist of regulation of membrane structure and function; regulation of intracellular signaling pathways, transcription factor activity, and gene expression; and regulation of the production of bioactive lipid mediators. As a result of these effects, fatty acids influence health, well-being, and disease risk. Fatty acids influence a range of diseases such as cardiovascular disease, type 2 diabetes, inflammatory diseases, and cancer (Calder, 2015). The effects of these fatty acids on membrane structure have been studied using a variety of techniques such as differential scanning calorimetry (DSC), fluorescence spectroscopy, electron spin resonance, light scattering electrophoresis, nuclear magnetic resonance and differential thermal analysis to name some (Ibarguren et al., 2014).

Dietary recommendations are made to reduce the intake of saturated and trans-fatty acids due to their negative cardiovascular effects, whereas mono- and polyunsaturated fatty acids are recommended for their cardio-protective benefits. For example, oleic acid (OA) has proved beneficial in the reduction of blood pressure and low hypertension. Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) have been associated with the prevention of cardiovascular diseases and cancer, while omega-6 polyunsaturated fatty acid (PUFA), gamma linolenic acid ( $\gamma$ -LNA) have anti-inflammatory properties. Altered levels of free fatty acids (FFAs) are associated with pathological states such as diseases like obesity, hypertension, diabetes mellitus, coronary heart disease, alcoholism, schizophrenia, Alzheimers's disease (AD), atherosclerosis and cancer.

Lipids basically form the building blocks of cells. They constitute the key components of the plasma membrane and other cellular compartments such as the nuclear membrane, the endoplasmic reticulum, the golgi apparatus, and trafficking vesicles such as endosomes and lysosomes. The lipid composition of different organelles, cell types and tissues vary; therefore different lipids are required for different functions.

Mammalian cells express a wide range of lipid species and use proteins to synthesis, metabolize and transport them. Lipids may have structural or signaling roles. Most lipids contain hydrophobic side chains and polar head groups which add to lipid diversity. Modification of lipid head groups are crucial to for some lipid functions for example, phosphorylation of phosphatidylinositol 4, 5-bisphosphate [PI (4, 5) P<sub>2</sub>, or P1P<sub>2</sub>] into phosphatidylinositol 3,4,5-trisphosphate [PI(3,4,5)P<sub>3</sub>, or P1P<sub>3</sub>]). Until recently, it has become clear that the identity of the hydrophobic side chains is also important.

To understand the roles of lipids in biological processes, it is important to identify which lipid families and species participate in a process, visualize these lipids in relevant cellular compartments or structures, measure physical and mechanical properties of relevant lipids and membranes and perturb lipid levels for phenotypic and functional analyses (Muro et al., 2014).

## FATTY ACIDS AND THE IMMUNE SYSTEM

The immune system helps in identifying threatening and non-threatening antigens; in protection against pathogens like bacteria, viruses, fungi and parasites. Additionally, it aids in identifying and eliminating tumor cells and response to injury, surgery, burns and irradiation. It is highly complex and thus involves a wide range of specialized cells present throughout the body. Cells of the immune system interact with one another along with other cells (e.g. epithelial cells, endothelial cells, platelets etc.) so as to produce a response which may be local or systemic. The immune response triggers the production of many chemical mediators; which help in the elimination of infectious organisms; some play a regulatory role in the activity of particular cells and some help in the termination of response (Glick, 2000). The immune response is divided into the innate (or natural) immune response and the acquired (or specific) immune response. The former is activated on recognition of the structural features of pathogens for example, lipopolysaccharide (LPS), a component of the cell wall of gram-negative bacteria, known as endotoxin is recognized by Toll-like receptor (TLR)-4 on the surface of innate immune cells whereas the latter, is specific for a single antigen and must be presented by an antigen-presenting cell to an antigen-specific T-cell (Glick, 2000).

Studies on the effect of fatty acids on immunity were started in the 1970s. The earliest study involved evaluating and comparing the effects of common short fatty acids (SFA) and the n-6 fatty acid, linolenic acid. The observations revealed modifications of the physical structure of plasma membrane of immune cells. They also discovered that eicosanoids such as PGE<sub>2</sub>, played a role in inflammation and regulation of the immune cell function. This find initiated studies on the common eicosanoid precursor arachidonic acid and also suggested that the effect of some fatty acids on immune cell responses may be due to modification of eicosanoid production.

Some in-vitro studies led to the discovery of the involvement of EPA and DHA on functional responses of immune cells to stimulation. Experimental studies and clinical trials of the use of fish oil for patients with rheumatoid arthritis showed significant anti-inflammatory activity with combination of EPA and DHA. Eicosanoids are active lipid mediators derived from PUFA, namely n-6 fatty acid arachidonic acid. They play an important role in inflammation and regulation of immune function. Eicosanoid produced from EPA are less biologically active than those produced from arachidonic acid, this may be because eicosanoid receptors have a much lower affinity for EPA-derived mediator than for the arachidonic acid-derived one. EPA acts as a substrate for COX, lipoxygenase and cytochrome P450 enzymes (Calder, 2013).

EPA and DHA have the ability to generate distinct effects on membrane order in immune cells owing to their highly unsaturated nature. The use of EPA and DHA for cells involved in inflammation and immunity occurs at the expense of arachidonic acid, this leads to a decline in the amount of substrate available to produce inflammatory and regulatory eicosanoids. They also inhibit T-cell proliferation and production of key T-helper 1 type cytokine IL-2 in cell cultures. In animals, studies have reported that high amounts of fish oil or individual n-3 fatty acids reduced T-cell proliferative responses and alterations in t-helper 1 cytokine gene expression and production. However, studies in human subjects are limited, though some studies revealed that an increased intake of EPA along with DHA decreased human T-cell proliferation and IL-2 production (Calder, 2013). These effects of n-3 fatty acids on T-cells

are associated with changes in membrane order, altered patterns of eicosanoid production and modification of early signal transduction events in the plasma membrane.

Lipid rafts are membranes with distinct structural compositions. They are enriched with sphingolipids and cholesterol and their side chains are rich in short fatty acids (SFAs). Proteins involved in signal transduction like Src family kinases, G proteins, growth factor receptors, mitogen-activated protein kinases and protein kinase C are found in lipid rafts (Calder, 2013).

## **Implications of the Immunomodulation Effect of Fatty Acids**

There have been rising questions on disease association with relation to interactions between diet, gut and microbiome components, particularly in autoimmunity. Evidences point in the direction that nutrition and bacterial metabolites may have an impact on the immune response with relation to disease and autoimmunity.

Fatty acids form an essential component of our daily diet and are now become an area of concern with special focus on SFAs. These SFAs are primarily metabolized by gut bacteria obtained from indigestible carbohydrates which in turn may prove beneficial for diseases in model of inflammatory bowel disease (IBD) and allergic asthma. Long-chain FAs (LCFAs) are suspected of being a trigger for many diseases. However, researches of these saturated fatty acids on the innate immune system are limited to the cardiovascular disease and their impact on adaptive immune system is not studied comprehensively. The gut microbiome has recently been established as a contributor to pathogenesis or multiple sclerosis (MS), a T-cell mediated autoimmune disease of the central nervous system (CNS) with neurodegenerative effects. A study was undertaken to show dietary-induced changes in the gut shaped Th cell responses as a result of the effect of dietary SFAs and the lesser-studied medium-chain (MC) FAs or LCFAs. The results showed that LCFAs enhanced the differentiation and proliferation of T helper 1 (Th1) and/or Th17 cells impaired intestinal sequestration via p38-MAPK pathway. On the other hand, SFAs expanded gut T regulatory (Treg) cells by the suppression of the JNK1 and p38 pathway (Haghikia et al., 2015).

Experimental autoimmune encephalomyelitis (EAE) was used as a model for T-cell mediated autoimmunity to depict that LCFAs decreased SFAs in the gut and aggravated the diseases by expanding pathogenic Th1 and Th17 cell populations in the small intestine.

Treatments with SFAs helped reform EAE and reduce axonal damage by means of long-lasting imprinting on lamina-propria-derived Treg cells. Thus, the study exhibited a direct dietary impact on intestinal-specific and central nervous system-specific, Th cell response in autoimmunity (Haghikia et al., 2015).

The n-6 PUFAs contribute to the chronic inflammatory conditions in humans such as nonalcoholic fatty liver disease (NAFLD), ID and neurodegenerative diseases such as AD. NAFLD is a hepatic component of the Metabolic Syndrome and is becoming a serious public health problem. It results in severe liver damage beginning with steatosis and leads to steatohepatitis (NASH), advanced fibrosis and cirrhosis. Both, nutritional factors and alterations in lipid metabolism of the liver are the primary metabolic abnormalities which lead to hepatic steatosis. n-3 LC PUFA acts as a therapeutic target in the pathogenesis of NAFLD. In the liver, these PUFAs possess the ability to direct FAs away from triacylglycerol storage



and to enhance their oxidation. However, these PUFAs are low in patients with NAFLD. A higher n-6:n-3 LC-PUFA ratio may lead to the development of fatty liver due to irregularity in liver lipid metabolism. Recently, fish oil has proved beneficial in the alleviation of NAFLD by decreasing plasma nonesterified fatty acids (NEFA) concentrations; decreasing de novo lipogenesis, very low-density lipoprotein (VLDL) export, and plasma triglyceride concentrations and decreased adipocyte size and visceral fat content (Patterson et al., 2012).

Taken together, fatty acids have great role in modulating the immune response by the production of certain cytokine during their metabolic pathways.

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**Research and Applications of Biotechnology in the Fields of Agriculture, Food,  
Environment, Health and Society**

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Biotechnology is technology that utilizes biological systems or derivatives to develop new and different products or processes for specific use in order to improve the quality of human life. Biotechnology covers a wide range of disciplines, including biomolecular sciences, genetics, developmental biology, cell biology, biochemistry, microbiology, animal sciences, plant sciences, neurobiology and psychology, human diet and health, biomaterials science, soil science and related areas of engineering. Biotechnology has applications in four major subfields, called red, white, green, and blue. Red biotechnology is applied to medical processes to produce medicine and drugs such as pharmaceutical drug discovery and production, pharmacogenomics, and genetic testing. Green Biotechnology is applied to agricultural processes involving the use of scientific tools and techniques such as genetic engineering, molecular markers, molecular diagnostics, vaccines, and tissue culture, to modify living organisms including plants, animals, and microorganisms for improving the nutritional quality, quantity and production economics. White biotechnology involves industrial processes used for sustainable manufacturing new chemicals, biomaterials and alternative energy sources. Blue biotechnology covers the marine and aquatic applications of biotechnology which used to improve the health, reproduction, development and growth of aquatic organisms, to control proliferation of noxious water-borne organisms, and develop new drugs. The development and use of modern biotechnology could help not only meet the rapidly growing need and demand for energy, food, healthcare and appropriate environmental management, but also increase productivity and create new jobs. However, the advancement in this field has also the potential for misuses that lead to some concerns and controversies about the ethical, legal, and social implications of biotechnology.



## Beneficial Rhizospheric Bacteria for Enhancing Crop Productivity in Saline Soil

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### ABSTRACT

Soil salinity is one of the major abiotic stresses on earth limiting the agricultural productivity. It is expected that if effective steps are not taken then in the near future salinity will cause more vigorous and degenerating effects on crop production and food security of world along with high soil infertility and land degradation. In context to this problem application of beneficial rhizospheric bacteria can be used as sustainable tool to mitigate the effect of salinity resulting in higher crop production in saline soils. Plant growth promoting rhizobacteria were isolated and selected from saline soils to prepare bioformulations and check them in field conditions. Most potent isolates, mainly identified as fluorescent pseudomonads, showed multiple plant growth promoting activities such as phosphate solubilisation, production of siderophore, growth hormones such as indole acetic acid and exopolysaccharides even at high salt concentrations. These strains also showed antagonistic activity against fungal phytopathogens. Selected salt tolerant strains showed strong antagonism against *Macrophomina phaseolina* which causes charcoal rot in many crops even at high soil salinity. Potent fluorescent pseudomonads strains were applied as bio-inoculants on crops such as sunflower, chickpea and groundnut for trials in salt affected fields. There was significant increase in yield of sunflower, chickpea and groundnut even in *M. phaseolina* infected soil saline soils on application of salt-tolerant PGPR. These beneficial rhizospheric bacterial strains can be used for reclamation of saline soil along with enhanced crop productivity and disease control in eco-friendly way for food security and sustainable agriculture.

**Keywords:** Abiotic stress, soil salinity, rhizospheric bacteria, fluorescent pseudomonads.

## **Biochar-Based Fertilizers: An Emerging Technology for Sustainable Food Security**

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### **ABSTRACT**

In recent decades ecological problems increased in many regions of the world, and these conditions are likely to contribute to increased food security and health risks. The low technological development, improper agricultural methods and policies are major hindrances against agricultural development in many developing economies. Climate change may lead to even more degraded landscapes in many non-irrigated regions since it is accompanied by less rainfall and higher temperatures. These facts represent a serious threat to sustainable food production and to our natural resources. Owing to population growth and increasing food demand, intensive and environment-friendly agricultural techniques such as application of bio-fertilizers have become a promising model for many countries in the world. Biofertilizers contribute environmental benefits and help to conserve resources for crop cultivation, especially for poor farmers. The reduction of chemical fertilizers by using biological fertilizers is one of the effective steps in sustainable agriculture. The application of biochar produced through pyrolysis in the absence or limited oxygen to improve soil fertility and plant growth is gained attention worldwide. The application of biochar to soil is considered to mitigate climate change by increasing carbon storage in soils, improve fertility of degraded soils, plant growth and development, increase fertilizer efficiency, and suppress soil pathogens. In addition soil amendment with biochar increased soil biological activity, such as microbial biomass and enzyme activities. There are also several reports on the improved plant stress tolerance to drought by biochar application. Biochar-type materials have been also suggested as inoculant carriers and will remain stable in the soil and thus may positively influence abundance of the inoculant organisms such as rhizobia, or plant growth promoting rhizobacteria. Efforts to better understand the role of biochar-based biofertilizers in nutrient uptake and plant response to environmental stress is more compelling now, since a continuous use of high amounts of chemical inputs are generating environmental problems and not sustainability.

**Key words:** biochar, biofertilizers, crops, abiotic stress, food security

## Fungal Entomopathogens as Endophytes: A Promising Approach towards Sustainable Agriculture?

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(Keynote presentation at ICOFAAS 2018 in Antalya Turkey)

### ABSTRACT

Fungal entomopathogens have been investigated as important natural enemies of arthropods for more than 100 years. Yet to date, their development as effective biological control agents of insect and other arthropod pests has only been met with limited success, especially when applied under field conditions. An increasing number of recent studies demonstrate that entomopathogenic fungi can play important roles as endophytes, plant growth promoters, plant disease antagonists, and rhizosphere colonizers, in addition to their direct biocontrol action against insect herbivores through inundative releases. Of these recently-discovered roles, endophytic colonization by various genera of fungal entomopathogens is of particular interest and might offer an effective alternative to conventional inundative application of such entomopathogens. As endophytes, entomopathogenic fungi have been shown to endow plants with several benefits including enhanced plant growth and increased protection against not only insect pests but also plant pathogens. Therefore, a deeper understanding of the various ecological roles and potential interactions entomopathogenic microbial agents might display post-application would be of crucial importance for the development of more successful control approaches and sustainable production practices. A series of studies examining multiple roles of fungal entomopathogens, especially *Beauveria bassiana* and *Metarhizium brunneum*, and providing significant evidence for their promising multifaceted and cost-effective use in sustainable agriculture, for instance as biofertilizers as well as dual biocontrol agents of plant pathogens and insect pests, are discussed.

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## In-Vitro Effect of *Ferula communis* L. Essential Oil and Extracts on Some Plant Pathogenic Streptomyces Species

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### ABSTRACT

In this study; it is aimed that determining the in-vitro antimicrobial effect of essential oil and extract of *Ferula communis* on some Streptomyces species causing common scab disease in potato. For this purpose; essential oil and extract of *F. communis* was tested against six pathogenic Streptomyces (*S. stelliscabiei* KS176, *S. scabiei* KS196, *S. bottropensis* KS573, *S. sp.* KS482 and *S. sp.* KS487) strains, from former researches, by agar disc diffusion method. Commercial penicillin and streptomycin discs were used as positive control. According to our results; essential oil of *F. communis* led to inhibition zone in agar plate from 25 mm to 47 mm. Hexane extract of *F. communis* had also antimicrobial effect on all the strains and inhibition zones varied from 13 mm to 25 mm. Inhibition zones of chloroform, methanol and ethanol extracts of *F. communis* were evaluated from 8 mm to 30 mm, 8 mm to 27 mm and 13mm to 20 mm, respectively. While, Streptomycin discs led to inhibition zones varying from 18 mm to 35 mm, 10% Dimethyl sulfoxide (DMSO) did not show any effect. It is believed that use of essential oil and extracts *F. communis* can be a new approach to control common scab disease or can be combined with other control methods.

### INTRODUCTION

Potato is a widely cultivated plant and is susceptible to diseases caused by bacteria, fungi or viruses [1]. Common scab disease caused by *Streptomyces* species is one of them. Streptomyces are spore-forming gram-positive bacteria found in soil in large numbers and are a specialized bacterial group with high G+C content. Some of them can produce numerous antibiotics [2]. *Streptomyces* species can also cause symptoms in tuber and root crops including beet, radish, turnip, peanut, sweet potato and carrot [3]. *Streptomyces* damage in potato was reported in many countries [4, 5, 6, 7, 8, 9].

*Streptomyces* species can lead to different symptoms like netted scab, pitted scab or surface scab [10]. Farmers generally do not harvest potato tubers, which are affected by common scab. In addition to decreasing yield, these tubers serve as inoculum source for next

vegetation period. There are different strategies like chemical, biological, and cultural means or use resistant varieties. Considering these control methods, commercially important varieties generally do not have fully resistance [11]. Cultural practices are recommended, but these alone are not enough to control disease at desired level [12]. Chemicals can be used as effective control method but they have undesirable effects on the environment because they are degraded slowly and they cause some toxic residues for mammalian health [13, 14]

Because of, insufficiency of cultural methods and adverse effect of chemicals, it is important to develop new control strategies. Use of antimicrobial active compounds, including the plant extracts and essential oils of aromatic plants, is a growing interest [15]. In this study; it is aimed that determining the in-vitro antimicrobial effect of essential oil and extract of *Ferula communis* on some *Streptomyces* species causing common scab disease in potato.

## MATERIAL METHODS

*Streptomyces* strains (*S. stelliscabiei* KS176, *S. scabiei* KS196, *S. bottropensis* KS573, *S. sp.* KS482 and *S. sp.* KS487), were isolated from symptomatic potatoes in field. Pathogenicity tests, characterization and identification of the strains by classical and molecular methods, were performed in our former research [16].

*F. communis* plants were collected from Ağrı Province in Eastern Anatolia Region of Turkey at the flowering stages, and were dried in shade. Then essential oil of *F. communis* was extracted. Briefly; powdered plant sample (500 g) was subjected to hydro-distillation using a clevenger-type apparatus for 4 h. The oil was extracted with  $\text{CHCl}_3$  and then were dried over anhydrous sodium sulfate ( $\text{Na}_2\text{SO}_4$ ) and stored in a sealed vial. Powdered plant sample were also used for obtaining the extracts. Briefly; plant sample (500 g) extracted individually with n-hexane, chloroform, acetone and methanol at room temperature. After filtration, the organic solvents were evaporated under reduced pressure and temperature.

Antimicrobial activity tests were performed according to described methods [17] with minor modifications. The Pathogen strains were grown on Oat Meal Agar (OMA) for one week at  $28 \pm 2$  °C. Then one loop spore was transferred to Oat Meal Broth (OMB) and incubated in same conditions in a rotary shaker at 200 rpm. After the incubation period, bacterial cells were harvested by centrifugation at  $8000 \times g$  for 10 minutes and were rinsed twice with sterile distilled water. Bacterial density was adjusted to  $\sim 1 \times 10^6$  cfu  $\text{ml}^{-1}$  with serial dilutions. Then, 100  $\mu\text{l}$  of pathogen suspensions were spread by a sterile swap on OMA. The extracts (at the concentration of 100 mg / ml) and antibiotic at the concentration of 10 mg / ml) were prepared in 10% Dimethyl sulfoxide (DMSO) at concentration of and 10. The discs (6 mm in diameter) were impregnated with 10  $\mu\text{l}$  of the essential oil, extracts or antibiotic solutions and put in the middle of the inoculated plates. The bacterial cultures were incubated at  $28 \pm 2$  °C for one week, and then inhibition zones were measured in diameter (mm) around the discs. Streptomycin was used as positive control and 10% DMSO were used as negative control. The assays were performed with three replicates.

## RESULTS AND DISCUSSION

According to our results essential oil and extracts of *F. communis* have moderate antimicrobial activity on some plant pathogenic *Streptomyces* species in-vitro. Essential oil



of *F. communis* led to inhibition zone in agar plates from 25 mm to 47 mm. While n-hexane, chloroform and methanol extracts of *F. communis* showed antimicrobial effects at different values, acetone extract didn't show any antimicrobial effect. Streptomycin led to inhibition zone in agar plates from 18 mm to 35 mm. Results were presented in Table 1.

Table1. Antimicrobial effect of essential oil and extracts of *F. communis*

Strains	Applications					
	Essential oil	n-Hexane	Chloroform	Acetone	Methanol	Streptomycin
<i>S.stelliscabiei</i> KS176	47*	20	–	–	–	27
<i>S.scabiei</i> KS196	27	24	30	–	27	32
<i>S. sp.</i> KS482	41	25	23	–	–	25
<i>S. sp.</i> KS487	37	15	–	–	8	18
<i>S.bottropensis</i> KS573	25	13	10	–	15	35

\*:inhibition zones were given as mm, -: no effect

As stated before, new approaching or supporting applications to control common scab disease is so important. It is thought that the results are promising. Of course it is needed that more research with different applications at different conditions. In light of these data, it is believed that essential oil and extract of *F. communis* can be used for control of *Streptomyces* species causing potato common scab disease. Additionally, according to our knowledge, essential oil and extracts of *F. communis* have firstly tested against to plant pathogenic *Streptomyces* species in this study.

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## **Phagocytic Response of Blood Mononuclear Cells as affected by Flaxseed Supplementation**

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### **ABSTRACT**

The objective of the current work was to compare the effect of feeding normal broiler chickens 15% of dietary flaxseed on phagocytic activity of monocytes and heterophils in the peripheral blood. One-day-old male Cobb-500 broiler chicks were used. Water and feed were provided *ad libitum*. Upon hatching, all chicks were given the same basal diet for 13 d. Following this, dietary supplementation of flaxseed started at 14 d of ages until the end of the cycle at 35 d of age. At slaughter, samples of blood were collected from each bird. The quantitative analysis of the phagocytic activity of peripheral blood mononuclear phagocytes in whole blood was performed using phagotest commercial kits. Results were expressed as percentage of fluorescent cells (% phagocytosing cells) and mean fluorescence intensity (MFI). Data were analysed by CellQuest<sup>TM</sup> software. The overall differences between the dietary treatments were analysed using one-way analysis of variance (ANOVA) and the general linear model procedure of Minitab was applied in all the tests. Differences between the treatment groups were considered statistically different at  $P \leq 0.05$ . When significant differences occurred ( $P \leq 0.05$ ), treatment mean differences were identified by pairwise comparison using Tukey tests. The results showed that feeding flaxseed at 15 % did not affect either the percentage of cells participating in phagocytosis, or the Mean fluorescence intensity (MFI). However, there was a trend towards a decrease in the % of monocytes involved in phagocytosis in birds fed diets containing 15% flaxseed. Also, there was a trend towards a decreased MFI ( $p=0.056$ ) for monocytes.

**Keywords:** Mean fluorescence intensity, monocytes, phagocytosis

### **INTRODUCTION**

Phagocytosis is one of the most effective innate mechanisms that protect birds from invading pathogens such as bacteria. The phagocytic system in birds, as in mammals, consists of polymorphonuclear granulocytes and monocytes (Carlson *et al.*, 1968, Wigley *et al.*, 1999, Klasing *et al.*, 2002, Terron *et al.*, 2003). These cells are capable of engulfing extracellular particles by phagocytosis, endocytosis or receptor- mediated endocytosis (Koenen *et al.*, 2002, Goldsby *et al.*, 2003). The different types of cells involved in phagocytosis are summarised below.

The effect of PUFAs on phagocytic activity of polymorphonuclear granulocytes and monocytes is considered as debating issue. Some studies reported that PUFA diminished

phagocytosis. For example, enrichment of pigs feed with high level of fish oil (5% by diet weight) significantly decrease the phagocytic activity of blood phagocytes and decreased the mean number of ingested *E.coli* in those phagocytes that were active (Thies *et al.*, 1999). Also, Eicher and McVey (1995) reported that n-3 PUFA inhibit phagocytic activity of Kupffer cells in *Salmonella typhimurium* challenged mice. In addition, the process of chemotaxis that occurs before engulfing of antigens was also reduced in humans supplemented with high levels of n-3 PUFA for 9 months (Schmidt *et al.*, 1992). In vitro studies revealed inhibitory effect of EPA and DHA addition on phagocytosis human neutrophils (Sipka *et al.*, 1996). Similarly, fish oil (rich in EPA and DHA) dispensation into neonatal rabbits negatively affected their resistance against *Staphylococcus aureus* challenge (D'Ambola *et al.*, 1991). On the other hand, there are some studies on mice which reported that PUFA in olive oil (de Pablo *et al.*, 1998) and as EPA or DHA acids (Calder *et al.*, 1990) elevated the phagocytic activity of phagocytes. Interestingly, Hubbard *et al.* (1991) reported no effect of dietary fish oil on phagocytic activity of murine peritoneal macrophages.

The phagocytosis assay allows quantitative measurement of the percentage of phagocytes and the enzymatic activity of each phagocyte (i.e. the number of ingested antigens per phagocytic cell). Bacteria such as *Escherichia coli* are commonly used as substrates for the phagocytosis assay. Immunomodulation of fatty acids in flaxseed may alter phagocytosis activity.

The objective of the current work was to compare the effect of feeding normal broiler chickens 15% of dietary flaxseed on phagocytic activity of monocytes and heterophils in the peripheral blood.

## METHODOLOGY

### ***Diet and sample collection***

One-day-old male Cobb-500 broiler chicks were used. Water and feed were provided *ad libitum*. Upon hatching, all chicks were given the same basal diet for 13 d. Following this, dietary supplementation of flaxseed started at 14 d of ages until the end of the cycle at 35 d of age. At slaughter, samples of blood were collected from each bird.

### ***Phagocytic activity of blood***

The quantitative analysis of the phagocytic activity of peripheral blood mononuclear phagocytes in whole blood was performed using phagotest commercial kits. Results were expressed as percentage of fluorescent cells (% phagocytosing cells) and mean fluorescence intensity (MFI). Data were analysed by CellQuest™ software. Discrete populations of polymorphonuclear heterophils and monocytes were gated in the software programme based on identification by forward and side scatter and its green fluorescence histogram (FL1) was analysed. The control sample was used to set a marker for fluorescence-1 (FL1) so that the events above this marker position were considered to be positive. An example of flow cytometric analysis of phagocytosis is shown in Figure 1 and Figure 2.

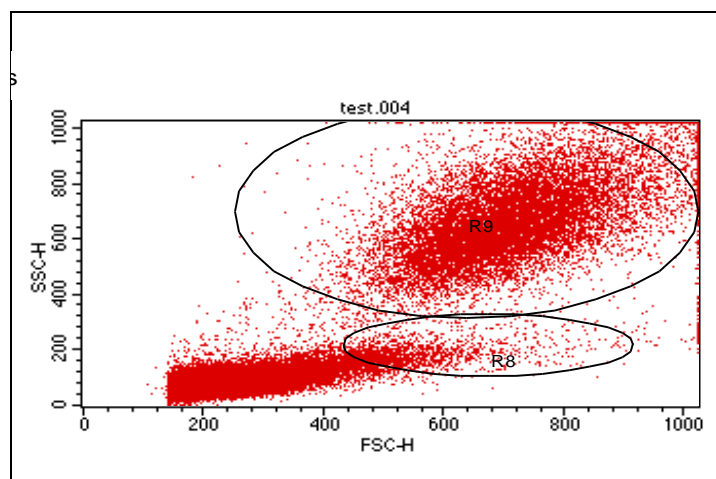


Figure 1 Dot plot FSC/SSC of the phagocytosis test, R8= gate on monocytes and R9=gate on heterophils

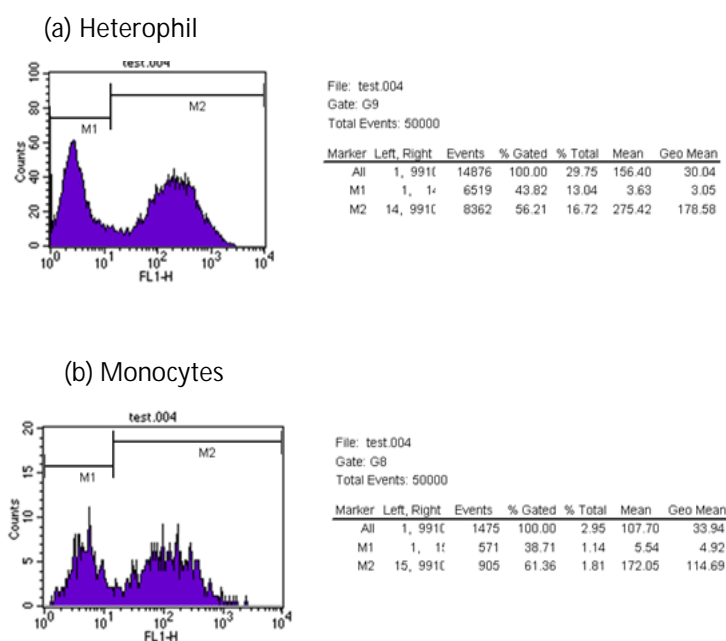


Figure 2 Green fluorescence histograms of heterophils (a) and monocytes (b). Control samples were used to set M1 marker, M2 marked all the positive events

The overall differences between the dietary treatments were analysed using one-way analysis of variance (ANOVA) and the general linear model procedure of Minitab was applied in all the tests. Differences between the treatment groups were considered statistically different at  $P \leq 0.05$ . When significant differences occurred ( $P \leq 0.05$ ), treatment mean differences were identified by pairwise comparison using Tukey tests.

## RESULTS

Feeding flaxseed at 15 % did not affect either the percentage of cells participating in phagocytosis, or the Mean fluorescence intensity (MFI). However, there was a trend towards a decrease in the % of monocytes involved in phagocytosis in birds fed diets containing 15% flaxseed. Also, there was a trend towards a decreased MFI ( $p= 0.056$ ) for monocytes (Table 1).

Table	Diet (% flaxseed)	Monocytes		Heterophils		1
		% of positive cells	MFI	% of positive cells	MFI	
	0	63.16	224.51	62.24	1157.83	
	15	55.82	111.81	73.14	313.86	
	SE Mean	5.0815	37.1965	6.431	753.658	
	P value	0.329	0.056	0.256	0.446	
-Differences between the treatment groups are statistically different at $P \leq 0.05$ , $n=12$ per treatment, SE -Mean= Standard error of the means , MFI= Mean fluorescence intensity						

### Effect of flaxseed on phagocytosis by monocytes and heterophils in broiler chickens

## CONCLUSION

Studies in the literature reported that results of the effect of n-3 PUFA on phagocytosis are controversial depending on the species under study, with studies showing enhances, decreased or even no effect. Overall, studies in mice showed that n-3 PUFA decreased phagocytosis. n-3 PUFA either increased or had no effect on phagocytosis activity in rats and human studies demonstrated little evidence of an effect of n-3 PUFA on phagocytosis of blood cells. Studies in the literature which investigated the effect of n-3 PUFA on phagocytosis in chickens are quite limited. Results of the current study showed no effect of flaxseed on phagocytosis of peripheral blood cells.

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## Effect of Phytogetic Feed Additives on Production Parameters in Broilers

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### ABSTRACT

Improving broilers nutrition by addition of phytogetic feed additive such as ginger is important to produce high quality broilers meat. The effect of feeding increasing levels of ginger powder on the productive parameters of broilers was investigated. A total of 340 broilers were fed 1 of 4 corn-soybean basal diets that contained 0, 5, 10, or 15 g/kg of ginger powder until slaughter. Growth rate, feed efficiency, feed consumption, and mortality were measured and monitored. All broilers appeared healthy and no significant mortality occurred. Overall growth of birds was not adversely affected by the addition of ginger. Body weight gain of birds supplemented with ginger was significantly different than that of control birds during weeks 1 and 3. At week1, body weight gain was significant higher when ginger was supplemented at 5 and 10 g/kg than the control, which was similar when ginger was supplemented at 15 g/kg ( $P = 0.027$ ). At week 3, body weight gain was significantly higher in the ginger-supplemented groups at all levels than the control group ( $P < 0.001$ ). No significant difference was observed between the dietary groups at week 5. There was no significant difference across the treatment means in terms of feed consumption at weeks 1 and 5. Feed consumption was significantly higher for all the ginger-supplemented groups than the control group at week 3. In conclusion, ginger inclusion did not adversely affect the palatability of the diet and did not cause anaemia for the broilers. It may enhance the growth rate of the broiler chickens.

Key words: broilers, ginger, production parameters

### INTRODUCTION

There has been interest in elevating the production performance of broiler chickens using effective nutritional additives in the feed. Medicinal plants as natural feed additives have been used in poultry diet to enhance the performance and immune response of chicken (Abaza *et al.*, 2008, Tanweer *et al.*, 2012). One of these additives is ginger powder. Ginger is the [rhizome](#) of the plant *Zingiberofficinale*. It belongs to the family *Zingibeaceae*; which includes aromatic herbs with fleshy, tuberous or non-tuberous rhizomes and often have tuber bearing roots (Ke *et al.*, 2000). It has been known as a popular culinary and traditional medicinal herb for many years. Ginger contains several effective compounds such as gingerol and gingerdione that exert strong antioxidant activity. In addition, gingerols were shown to be antibacterial and immunomodulatory in laboratory animals (Dieumou *et al.*, 2009). Several research studies reported that poultry diets supplemented with ginger powder have positive effects on production performance in addition to their ability to modulate the immune function. Ginger as a natural feed additive may be of great benefit and value in poultry



nutrition especially for broilers due to their antibacterial, anti-inflammatory, antiseptic, antiparasitic, and immunomodulatory properties (Onu, 2010). It is one of the natural plants that can be used as phytobiotics to improve broiler's performance. The improved performance may be attributed to the two types of digestive enzymes in ginger; protease and lipase, which are present as part of the plants natural protective mechanisms (Zhang *et al.*, 2009). Diets enriched with ginger may have the potential to improve the production performance and to modulate the biological properties of the blood in broiler chickens. Therefore, the aim of this study was to investigate the effects of ginger on the production performance, haematological and biochemical properties of broilers fed with ginger-enriched diets.

## MATERIALS AND METHODS

### *Birds and Diets*

One-day-old Cobb 500 broiler chicks, vaccinated against Infectious Bronchitis and Newcastle disease, were used in this study. Water and feed were provided *ad libitum*. In total, 340 birds were randomly housed in 4 multi-floor batteries, each battery had five levels. Each level contained 17 birds, making a total of 85 birds in the battery and providing a space of 0.05m<sup>2</sup>/bird. Each level was considered as a replicate (total of 5 replicates). The broiler chicks were fed, *ad libitum*, corn/soy-based diet that meets the National Research Council (NRC) requirements. The chicks received a starter diet from hatch until 7 days of age, a grower diet from 8 days to 21 days of age, and a finisher diet from 22 days to 35 days of age. All diets were prepared as needed. Diet formulation and chemical analyses of the control diet and the supplemented ginger are shown in Table 1. The experimental diets were corn- and soybean-meal based diets with additions of 5, 10, and 15 g/kg ginger in the starter, grower, and finisher diets. Every 4 batteries (i.e., a total of 85 birds in 5 replicates, 17 bird/replicate, n=5) received one of the experimental diets. The control birds received no ginger. The temperature for the broilers was kept at 30°C for 14 day and then gradually reduced to 21°C by 21 day.

### *Statistical Analysis*

The overall differences between dietary treatments were analyzed using one-way ANOVA, and the general linear model (GLM) procedure of Minitab (Minitab Inc., State College, PA) was applied. Differences between the treatment groups were considered statistically different at  $P \leq 0.05$ . When significant differences occurred, treatment mean differences were identified by pairwise comparison using the Bonferroni test.

## RESULTS

The proximate composition of ginger is shown in table 1. all broilers appeared healthy and no significant mortality occurred throughout the experimental period in weeks 1, 3 and 5 (table 2). overall growth of birds was not significantly affected by the addition of ginger. body weight gain of birds supplemented with ginger was significantly different than that of control birds during weeks 1 and 3 (table 3). at week 1, body weight gain was significantly higher when ginger was supplemented at 5 and 10 g/kg than the control, which was similar when ginger was supplemented at 15 g/kg ( $p = 0.027$ ). at week 3, body weight gain was significantly higher in the ginger-supplemented groups at all levels than the control group ( $p < 0.001$ ). no significant difference was observed between the dietary groups at week 5 (table 3). feed consumption of broilers fed 0, 5, 10 and 15 g/kg of ginger powder at weeks 1, 3, and 5 is shown in table 4. there was no significant difference across the treatment means in terms of

feed consumption at weeks 1 and 5. table 5 shows feed efficiency of broilers fed 0, 5, 10 and 15 g/kg of ginger powder at weeks 1, 3, and 5. the results of the feed efficiency showed that there were no significant differences across the treatment means. the effects of ginger powder on the blood composition of broiler chickens are shown in table 6.

## DISCUSSION

The current study was conducted to investigate the effect of feeding increasing levels of ginger powder on the production and haematological parameters of broilers. The significant increase in body weight gain in this study could be in agreement with other studies which investigated the same effect (Herawati, 2010, Onu, 2010). However, there are other studies which reported that the inclusion of ginger in the broiler diet did not improve weight gain of the birds Omage *et al.* (2007), (Javandel *et al.*, 2008, Ademola *et al.*, 2009). Zhang *et al.* (2009) investigated the effect of dried ginger root on the growth performance of broilers and stated that the supplementation with ginger powder led to a better production performance. The positive effect of phytobiotics on the production performance of broilers was also investigated by Hashemi & Davoodi (2010). Moorthy *et al.* (2009) reported that dried ginger powder increased the body weight of broilers when included in the diet at 2% level. In addition, Tekeli *et al.* (2011) stated that *Z. officinale* improved body weight gain in broiler chickens at the rate of 120, 240, and 360 ppm; however, Zhang *et al.* (2009) did not find any significant difference in the average daily weight gain in broilers by feeding ginger at the rate of 5 g/kg. Herawati (2010) found that the use of 2% red ginger in the ration of broiler chickens produced higher body weights. Onu (2010) reported that the addition of ginger (0.25%) to the basal diet of broiler chicks resulted in higher body weights. In their experiment, Kausar *et al.* (1999) showed that carminative mixture containing ginger at the dose rate of 2 and 4 ml/l of drinking water increased body weight on the 5th week of the experiment. Also, Javandel *et al.* (2008) reported that broiler chicks dosed with the aqueous extract of a mixture of plants containing ginger improved body weight gain. El-Deek *et al.* (2002) observed that a diet containing 1 g/kg of ginger did not affect growth performance, whereas Ademola *et al.* (2009) reported that the supplementation of ginger at the levels of 5, 10, or 15 g/kg slightly improved growth in broilers. In contrast, Al-Homidan (2005) observed reduced growth rate in starter broilers (1 to 4 wk) when ginger was fed at the rate of 60 g/kg body weight at the 6<sup>th</sup> week of age (Moorthy *et al.*, 2009) which may be due to the toxic effect of this compound (Zhang *et al.*, 2009). Zhang *et al.* (2009) observed that birds fed ginger produced higher carcass weights than the untreated birds. The authors of the study suggested that improved carcass quality of broilers may be associated with the antioxidant effect of ginger that enhances protein and fat metabolism. Conversely, Moorthy *et al.* (2009) reported no effect of ginger supplementation on carcass weight, abdominal fat pad, and giblet weight. Likewise, (Onu, 2010) affirmed that the addition of ginger (0.25%) in the basal diet of broiler chicks did not result in significant differences in carcass characteristics.

There was no significant difference across the treatment means in terms of feed consumption at weeks 1 and 5. This result is in line with the findings of Onu (2010) who reported no significant difference in feed consumption of the birds among ginger treatments and the control. Feed consumption was significantly higher for all the ginger-supplemented groups than the control group at week 3. This is in agreement with Ademola *et al.* (2006) who observed significantly higher feed consumption in broilers fed ginger-supplemented diet than



the control group. However, Herawati (2010) reported that broilers fed 2% ginger-supplemented diet had significantly lower feed consumption than the control group.

The results of the feed efficiency showed that there were no significant differences across the treatment means. This is in agreement with other studies which investigated the same effect (Ademola *et al.*, 2009, Zhang *et al.*, 2009, Mohammed & Yusuf, 2011). However, Onimisi *et al.* (2007); Onimisi *et al.* (2007), Moorthy *et al.* (2009), Onu (2010) reported significantly lower feed efficiency in ginger-supplemented group than the control groups. These authors suggested improved gut micro-flora which inhibit microbial fermentation and improved feed efficiency. On the other hand, Ademola *et al.* (2009) reported 5% significant increase in feed efficiency in birds supplemented with ginger relative to the control.

### CONCLUSION

The current study focused on investigating the effect of feeding different levels of ginger (5, 10, and 15 %) on the growth performance parameters of broiler chickens. The fact that both the control and the treatment diets were equally consumed indicates that ginger inclusion did not adversely affect the palatability of the diet. Results of this study indicate that ginger supplementation may enhance the growth rate.

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## Eggshell Breakage in Quail Eggs during Short Production Periods

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**Abstract:** This study was aimed at determining the localisation and distribution of eggshell breakages in eggs laid by yellow Japanese quails raised in cages with a view to provide a basis for future research.

The animal material of the study was composed of yellow Japanese quails, which were observed from 8 weeks of age to 12 weeks of age. The breeder quails were checked twice a day, in the morning and afternoon, for the availability of feed and water. The animals were provided with commercial concentrate feed, which was not supplemented with calcium. The eggs laid were collected at least twice a day. Broken eggs were separated from undamaged eggs. The broken eggs were divided into two groups, on the basis of the background colour and maculation of the eggshell. Accordingly, one of the groups included eggs with an eggshell of greyish white background colour and black maculae, while the other included eggs with an eggshell of greyish brown background colour and brown maculae. After the eggshell background colour and maculation were determined, the localisation of the eggshell breakages was detected and imaged. Images of an adequate sharpness were processed with digital image analysis. The measurement of the eggshell breakage area was performed by means of digital image analysis. Eggshell breakages were determined in 154 eggs with a greyish white background colour and black maculae and in 183 eggs with a greyish brown background colour and brown maculae. In general, the eggshell breakages were mostly localised to the blunt end of the eggs (111 eggs). The size of the breakage area was largest at the blunt end-equator combination area of the eggs (1.91 cm<sup>2</sup>), and smallest at the pointed end of the eggs (0.92 cm<sup>2</sup>). This study demonstrated that the eggshell breakages of eggs laid by yellow Japanese quails, which were monitored for a period of 4 weeks, varied with the background colour and maculation of the eggshell. Furthermore, it was observed that eggshell breakages were localised to five different regions of the eggshell. Generally, eggshell breakages localised to the blunt and pointed ends of the eggs had distinct borders and the broken pieces were observed to have caved inwardly.

**Keywords:** Yellow, maculae and background, digital image analysis

## INTRODUCTION

Poultry eggs are an important food source for humans. Based on the intended use of eggs, egg production is categorized under two types: hatching egg and table egg production. Whatever the production purpose is, it is required that the eggs produced meet the relevant

quality criteria. Egg quality criteria cover external and internal quality traits. The maintenance of external quality traits has a positive impact on internal quality traits. This is because the inner quality of the egg depends on the quality of the eggshell, which maintains the integrity of the egg (Punya Kumari et al. 2008, Alaşahan and Günlü 2012, Çelik et al. 2014, Durmuş 2014, Hrnčár et al. 2014).

The eggshell background colour and maculae colour of quail eggs vary. Maculae are generally black and blue coloured in eggs with a greyish white eggshell background colour, and are brown in eggs with a greyish brown eggshell background colour. Literature reports indicate that eggs with black and blue maculae have a thicker eggshell. On the other hand, given that brown maculae serve as filling material in thin and damaged eggshells, eggs with brown maculae are described as having a thin eggshell (Sezen and Tekelioglu 2009, Alasahan et al. 2016, Hanusová et al. 2016).

All bird eggs are considered to be at the peak of their quality when first laid. The environmental conditions the egg is exposed to, after being expelled from the cloaca, directly affect the quality of the eggshell. Commercial egg production facilities use either deep litter or cage systems for housing (Poyraz 1987). In deep litter systems, the environment the newly laid egg first encounters is the floor of the nesting box, whilst in cage systems it is the floor of the storey. Several stress factors associated with cage housing are known to affect egg quality (Walker and Hughes 1998, Ketta and Tůmová 2018). In commercial egg farms, cages are stacked in multiple storeys and are made of stainless metal. Each storey of cages has a separate egg collection unit. To ensure that the eggs laid by the animals are collected in this unit, the cage floor is designed to have a downward sloping. The angle of this sloping is important for eggshell quality, and should comply with the requirements stipulated in legislation. This angle should enable the free movement of both the animals housed in the cage and the eggs laid by the animals, and should also ensure the entry of the eggs into the collection unit at a safe speed that would not harm the eggshell. The entry of the eggs into the collection unit at a high speed bears the risk of causing damage to the eggshell.

The sloping angle of the floor of the cage storey may also cause damage to the eggshell, varying from segmental fractures to inward collapse. If the slope of the storey floor is lower than required, the time period in which the egg reaches the collection unit is prolonged. In such cases, due to the increased time period, in which the egg remains within the cage in the presence of animals, eggshell damages of varying shape and intensity occur. Therefore, large segmental fractures, inward collapse, rupture of the eggshell membrane, and exposure of the yolk can be observed in different parts of the egg. These severe damages may occur as a result of beak and feet trauma to the eggshell during the time period in which the egg remains within the cage. Inadequate sloping of the cage storey may also result in eggshell

cracks at the pointed and blunt ends and equator of the eggs that collide with the egg collection unit. Various types of eggshell damage have been reported in previous research on eggshell problems encountered in hen eggs. Soiled and blood-stained eggshells, mended eggshells, broken-contorted eggs, hairline cracks, star-shaped cracks, banded eggshells, rough eggshells, uneven eggshells, eggs with calcium deposits, calcium covered eggs, soft eggshells, soft and misshapen eggshells, shell-less eggs, wrinkled eggshells and wrinkled eggs, etc. have been described as various eggshell defects. Eggshell defects are mainly caused by stress, but may also be related to cage structure, stocking density, animal age, laying season, lighting, management and nutrition (Sezer 2007, Türkoğlu and Sarıca 2014).

Eggshell damage is not only caused by the inappropriate sloping of the floor of cage storeys. Various other factors, including among others, the age and body weight of the breeder animals, laying season, temperature, humidity and nutrition may also lead to defective eggshells. The thickness of the eggshell varies with laying age (Zita et al. 2013). The impact of the sloping of the cage storey and the intensity of this impact both vary with the degree of thinness of the eggshell. The high-speed movement of an egg with a thin eggshell would result in a high impact upon collision, and thus, in a high level of eggshell damage. Furthermore, environmental conditions related to the laying season may cause stress on breeder animals. High temperature and humidity have adverse effects on egg quality. Under such conditions, breeder animals tend to consume less feed. Reduced feed consumption leads to decrease in the body weight of the animals, which in return decreases egg weight. Decreased egg weight affects eggshell quality (Ketta and Tůmová 2018).

Given that egg production is a lengthy process, which takes place within the closed environment of a cage (in cage systems), eggshell defects are not uncommon. This study was aimed at providing background information on the identification and description of eggshell damage in quail eggs.

## **MATERIAL AND METHODS**

Eggs laid by yellow Japanese quails constituted the material of the study. Breeder animals were housed in 4-storey cages with two compartments per storey. Eggs were collected during a period from 8 weeks of age to 12 weeks of age, at least twice a day. Eggs with an intact eggshell were separated from those with a damaged eggshell. Eggs with eggshell damage were divided into two groups, according to the eggshell background colour and maculae colour. Accordingly, the first group included eggs with a greyish white background colour and black maculae, whilst the second group included eggs with a greyish brown background colour and brown maculae. In each group, the damaged parts of each egg were identified and imaged. Images with a favourable resolution were used for digital image analysis and the measurement of the fractured area. Images with poor resolution did not undergo any enhancement process and were not used for evaluation purposes. The images were analysed using the *UTHSCSA Image Tool* software.



The breeder quails were provided with *ad libitum* water and feed, and the availability of water and feed was checked twice a day, in the morning and afternoon. The animals were given a commercial feed concentrate, which was not supplemented with extra calcium. For the digital analysis of the damaged areas of the eggshell, five different regions were evaluated in each group using descriptive statistics and the SPSS 16 software.

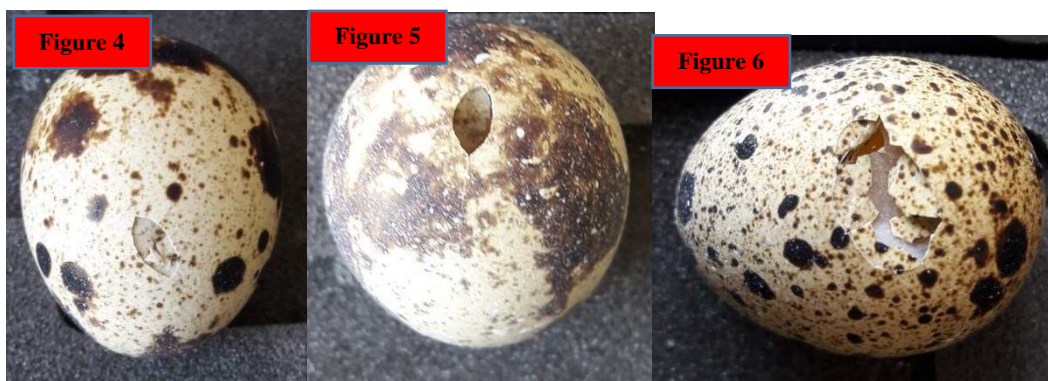
## RESULTS AND DISCUSSION

It was observed that, of eggs laid by yellow Japanese quails; those with a greyish white eggshell background colour were less damaged than those with a greyish brown eggshell background colour. In total, 154 eggs with a greyish white eggshell background colour were imaged, and among these, 111 with a satisfactory resolution were evaluated by digital image analysis. The eggshell damages detected in the eggs with a greyish white eggshell background colour are shown in Figures 1, 2 and 3.



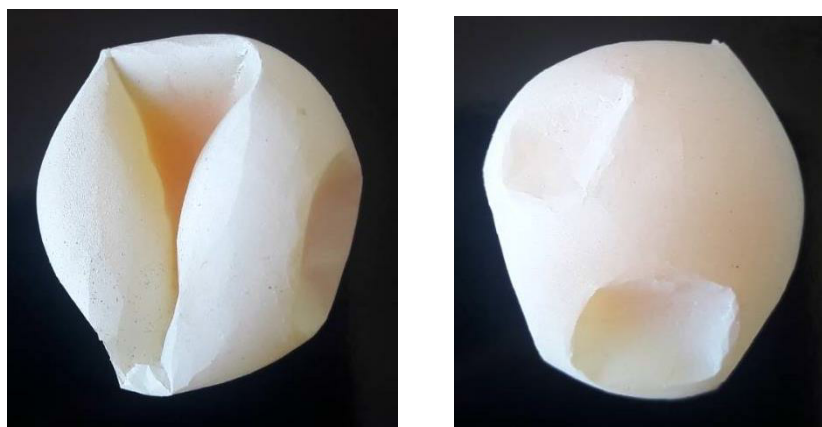
**Figure 3 and 6.** Point of fracture evident, segmented fracture displaying inward collapse and externally exposing the eggshell membrane.

In total, 183 eggs with a greyish brown eggshell background colour were imaged, and among these, 146 with a satisfactory resolution were evaluated by digital image analysis. The eggshell damages detected in the eggs with a greyish brown eggshell background colour are shown in Figures 4, 5 and 6.



The eggs of both groups collected throughout the study period did not display eggshell defects such as mended, banded, rough, and uneven eggshells or eggshells with calcium

deposits. On the other hand, although very few in number, shell-less eggs and eggs with a soft eggshell were detected in both groups (Figure 7).



**Figure 7.** Shell-less eggs.

Eggshell defects of hen eggs are reported to include among others soiled and blood-stained eggshells, fractured and cracked eggs, mended eggshells, broken-contorted eggs, hairline cracks, star-shaped cracks, banded eggshells, rough eggshells, uneven eggshells, eggs with calcium deposits, calcium covered eggs, soft eggshells, soft and misshapen eggshells, shell-less eggs, and eggs with a wrinkled eggshell.

In eggs with a greyish white eggshell background colour, the size of the damaged eggshell area was largest at the juncture of the blunt end and the equator of the egg ( $2.10 \text{ cm}^2$ ), and smallest at the pointed end of the egg ( $1.07 \text{ cm}^2$ ). On the other hand, in eggs with a greyish brown eggshell background colour, the size of the damaged eggshell area was largest at the juncture of the pointed end and equator of the egg ( $0.76 \text{ cm}^2$ ) and smallest at the pointed end of the egg ( $0.76 \text{ cm}^2$ ).

**Table 1.** Eggshell damage values of eggs with a greyish white and greyish brown eggshell background colour.

<b>Eggshell Colour</b>	<b>Background</b>	<b>Egg Parts</b>	<b>Damaged Eggshell Area (cm<sup>2</sup>)</b>
<b>Eggs with a greyish white eggshell background colour</b>		Juncture of the blunt end and equator	2.10 (0.06-6.27)
		Juncture of the pointed end and equator	1.30 (1.25-1.34)
		Blunt end	1.17 (0.05-3.58)
		Equator	1.61 (0.42-4.06)
		Pointed end	1.07 (0.16-37)
<b>Eggs with a greyish brown eggshell background colour</b>		Juncture of the blunt end and equator	1.72 (0.48-6.20)
		Juncture of the pointed end and equator	2.34 (0.62-5.04)
		Blunt end	1.33 (0.38-9.76)
		Equator	1.38 (0.32-5.10)
		Pointed end	0.76 (0.23-2.05)

In the present study, eggs with a greyish brown eggshell background colour presented with a high level of eggshell damage in various parts of the egg. In agreement with previous reports indicating a thicker eggshell for eggs with a greyish white eggshell background colour (Hulet et al. 1985, Richards and Deeming 2001, Taha 2011, Alasahan et al. 2015, Alasahan et al. 2016), the present study demonstrated a lower level of eggshell damage in eggs with a greyish white eggshell background colour. In eggs with a greyish white eggshell background colour, eggshell damage at the blunt end of the eggs presented with a clearly visible point of fracture, which showed inward collapse and was not associated with hairline cracks extending to other parts of the egg. On the other hand, in the eggs with a greyish brown eggshell background colour, hairline cracks extending from the point of fracture to other parts of the egg were clearly visible. This difference, observed between the two groups for eggshell damage at the blunt end of the egg, was attributed to the difference in eggshell thickness. For, in eggs with a thin eggshell, depending on the velocity of the eggs at the time of impact, hairline cracks form after the occurrence of fracture.

In the present study, eggshell damage was most common at the blunt end of the eggs, and was mostly localised to the juncture of the blunt end and equator in eggs with a greyish white eggshell background colour, and at the juncture of the pointed end and equator in eggs with a greyish brown eggshell background colour. The egg parts with the highest levels of



eggshell damage are characterized with different eggshell thickness. Eggshell thickness differs at the blunt and pointed ends and equator of the egg. Eggshell thickness is greatest at the pointed end and lowest at the blunt end. This is due to the internal and external shell membranes being separated at the blunt end of the egg to form the air cell (Turkoglu and Sarica 2014). While only the external shell membrane is known to contribute to eggshell thickness, both the internal and external shell membranes contribute to the thickness of the eggshell at the pointed end of the egg.

Eggshell damages with a clearly visible point of fracture but no inward collapse were more superficially located in eggs with a greyish white eggshell background colour, in comparison to eggs with a greyish brown eggshell background colour. Such damages may have occurred in cases, where the eggs remained on the cage storey floor for a longer time and hit the egg collection unit at a low speed. The damage that quails can cause to eggs with their feet is less than hens. Hens cause greater damage as they have a stronger claw and spur structure (Turkoglu and Sarica 2014).

Eggs with a thinner eggshell, remaining for a longer time within the cage, were observed to have segmented and collapsed fractures with a clearly visible breakage point and exposed shell membrane. Such damage may result from beak and feet impact. According to the daily observation notes taken during the study, some of the eggs suffered eggshell damage as a result of being pecked by the quails, while in the egg collection line.

## CONCLUSION

In result, it was determined that in caged quail egg production systems, eggshell damages occurred in different parts of the egg at different levels. It was ascertained that the eggshell background colour and maculae colour both had influence on the size of the damaged eggshell area. It is considered that the present study may provide reference data for future research on the identification and classification of eggshell defects in quail eggs.

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## Trend Analysis of Streamflow of Akkaya Stream (Turkey)

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### ABSTRACT

This paper presents trend analyses of streamflow of Akkaya Stream in Turkey. Streamflow trends of the river were monitored during 50-year period by monthly streamflow data observed from the streamflow gauging station on the river. Trend analyses were performed by annual, seasonally and monthly analyses of streamflow data. Monthly streamflow data were gathered from the station between 1966 and 2015. Non-parametric Mann-Kendall and Spearman tests, change-point analysis, and trend analysis were applied to the streamflow data for detecting the change point and for demonstrating the trend status of the streamflow. As a result, change-point was determined 1990 and a statistically significant decreasing trend was found for mean annual streamflow of Akkaya Stream for this period ( $p < 0.01$ ). Also, trend analysis results revealed that mean seasonal streamflow had significant tendencies to decrease for all seasons excluding Summer while mean monthly streamflow had statistically significant decreasing trends for the months of February, April, May, September and October. Moreover, statistically insignificant decreasing trends were found for summer and all the other months. In conclusion, decreasing trends in the streamflow of Akkaya Stream have been anticipated for this period and for the future. This could be related with decline in rainfall and snowmelt, extremely increase in temperature of water and/or air, evaporation patterns, and other reasons based on the climate change. Therefore, trends of the streamflow should be monitored to forecast the future of water resources.

**Keywords:** Akkaya Stream, Change-point analysis, Climate change, Streamflow, Trend analysis

## INTRODUCTION

Water resources are under stress and pressure as a result of some causes such as greenhouse gases, growing population, climate change, and other causes for half a century (IPCC, 2007). Water resources are vital natural resources and the temporal changes on amounts or availability of these resources are subject of the numerous researches globally. At regional scale, climate change could have effects on the river streamflow since the time-based process of streamflow is responsive to the climate change. Huge number of researchers accepted the effects of the climate change on the riverine hydrologic processes and have studied the potential impacts of the climate change on the river streamflow. Evaluation of time-based trends of the river streamflow is essential to predict the future of the rivers. Researches on the monitoring trends of river streamflow and other water resources make available significant contributions to the literature for decision-makers and water resource managers.

The trends in hydrologic and climatic parameters have been studied by many scientists (Kadioğlu, 1997; Büyükyıldız and Berktaş, 2004; Şensoy et al., 2005; Cigizoglu et al., 2005; Yıldırım et al., 2013; Saplıoğlu et al., 2014; Sütgibi, 2015; Yenigün and Ülgen, 2016; Ay and Özyıldırım, 2017; Ercan and Yüce, 2017; Tosunoğlu, 2017; Tosunoglu and Kisi, 2017). Similarly, several researches detected trends in water parameters using various methods (Sen, 1968; Hirsch et al., 1982; Helsel and Hirsch, 2002; Şen, 2012). In Turkey, İçağa (1994) firstly carried out trend analysis for water parameters. Then, various authors performed investigations to approximation of the trends in water parameters (İçağa and Harmancıoğlu, 1995; Kalayci and Kahya, 1998; Albek, 2002; Doğan Demir et al., 2016; Ejder et al., 2016a, 2016b; Kale et al., 2016a, 2016b; Kale et al., 2018). Regrettably, no study was carried out for monitoring and determining the trends of the streamflow of Akkaya Stream. Therefore, the key aim of this paper is to present a trend analysis for the streamflow of Akkaya Stream in Turkey.

## MATERIAL AND METHODS

### Study Area

Akkaya Stream arises from Hacıveli village of the Kargı district in Çorum province, Turkey. It flows through Hacıveli, Başköy, Gökbudak, Saraçlar villages of Kargı, Kayapınar, Hoca, Çiftlik, Koçanlı villages of Taşköprü district, Başören, İbrahimli, Kirenli, Bürme, Emir, Esenler villages of Merkez district, Obrucak, Celep, Ersil, Yavuç, Karnıaçık, Karşı, Bükköy villages of Taşköprü district and joint to Gökırmak Stream near Bükköy village in Kastamonu province (Figure 1). Climatic characteristics of the area is typical continental climate with warm summers in drier environments, snowy winters, usually frost and sharp cold spring and autumn.

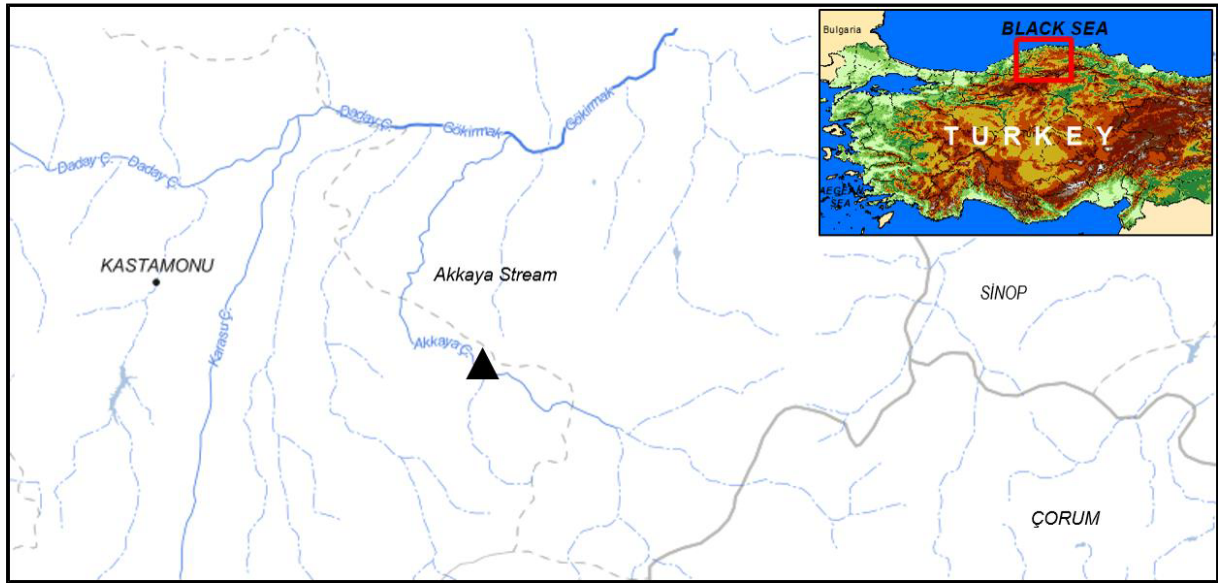


Figure 1. The location of streamflow gauging station on Akkaya Stream

Streamflow data were attained from the streamflow gauging station (D15A078) of the General Directorate of State Hydraulic Works (DSİ) at Kirenli village (Merkez district, Kastamonu). Analyses were done for each of mean annual, seasonally, and monthly data.

### Change Point Analysis

The change-point analysis of Pettitt (1979) was executed to determine the change-point time of the streamflow data. It is a non-parametric test and it was adapted from the Mann-Whitney statistic and senses important changes in the means of time series. Change-point analysis was executed in R statistical software (R Core Team, 2017). The formulae as follow:

$$U_{t,T} = \sum_{i=1}^t \sum_{j=t+1}^T \text{sgn}(x_i - x_j) \text{ for } t = 2, \dots, T$$

$$K_T = \max |U_{t,T}|$$

### Trend Analysis

In hydrologic time series, trend analysis is frequently used technique to define the tendency. Box-Jenkins technique (Box and Jenkins, 1976) and the auto regressive integrated moving average (ARIMA) model were performed to determine the trend of streamflow. In ARIMA model ( $p, d, q$ ), the number of auto regressive terms is expressed by  $p$ , the differencing order is expressed by  $d$ , and the number of moving average terms is expressed by  $q$ . The ARIMA model performed in the study as follow:

$$X_t = c + \Phi_1 X_{t-1} + \dots + \Phi_p X_{t-p} + \theta_1 e_{t-1} + \theta_q e_{t-q} + e_t$$

In this calculation,  $X_t$  is the variable that will be defined in  $t$  time,  $e_t$  is the error in  $t$  time,  $\Phi$  is coefficient of per  $p$  parameter,  $c$  is the constant, and  $\theta$  is the coefficient of per  $q$  parameter.

### Mann-Kendall Test and Spearman's Rho Test

Mann-Kendall test (Mann, 1945; Kendall, 1955) is a comprehensively practised test to discover the trend in a time series. Non-parametric Mann-Kendall test and Spearman's rho test propose further reliable consequences than parametric tests. Moreover, the data do not need to track any specific distribution. Calculations are as follows:

$$S = \sum_{i=1}^{n-1} \sum_{k=i+1}^n \text{sgn}(x_k - x_i)$$

In this calculation, the time series  $x_i$  is from  $i = 1, 2, \dots, n-1$ , and  $x_k$  from  $k = i + 1, \dots, n$ .

$$\text{sgn}(\theta) = \begin{cases} +1, & \theta > 0 \\ 0, & \theta = 0 \\ -1, & \theta < 0 \end{cases}$$

Normalized test statistic is calculated by the equation given below:

$$Z_c = \begin{cases} \frac{S - 1}{\sqrt{\text{var}(S)}}, & S > 0 \\ \frac{S}{\sqrt{\text{var}(S)}}, & S = 0 \\ \frac{S + 1}{\sqrt{\text{var}(S)}}, & S < 0 \end{cases}$$

The test statistic is  $Z_c$  and when  $|Z_c| > Z_{1-\alpha/2}$ , in which  $Z_{1-\alpha/2}$  are the standard normal variables and  $\alpha$  is the significance level for the test,  $H_0$  will be rejected. The extent of the trend is given as follow:

$$\beta = \text{Median} \left( \frac{x_i - x_j}{i - j} \right), \forall j < i, \text{ where } 1 < j < i < n.$$

A positive value of  $\beta$  displays an increasing trend, while a negative value of  $\beta$  displays a decreasing trend.

## RESULTS

The descriptive statistics of the river streamflow data containing average, coefficient of variation (CV), coefficient of skewness, minimum and maximum values, standard deviation (SD), and range are given in Table 1.

Table 1. Descriptive statistics of streamflow data

Period	Mean	SD	CV	Coefficient of skewness	Minimum	Maximum	Range
Annual	7510.39	2912.45	0.39	59140.32	2496.17	14999.17	12503.00
Spring	16028.52	7580.80	0.47	103497.84	3206.67	43933.33	40726.67
Summer	5820.00	2536.55	0.44	38650.16	938.67	11310.00	10371.33
Autumn	2758.35	1226.01	0.45	17470.18	1074.33	6676.67	5602.33
Winter	4556.80	2452.96	0.54	22208.46	637.33	10133.33	9496.00

Change point was determined as 1990 for mean annual streamflow according to the result of change point analysis. On the other hand, a decreasing trend was found for mean annual streamflow from the result of the trend analysis (Figure 2).

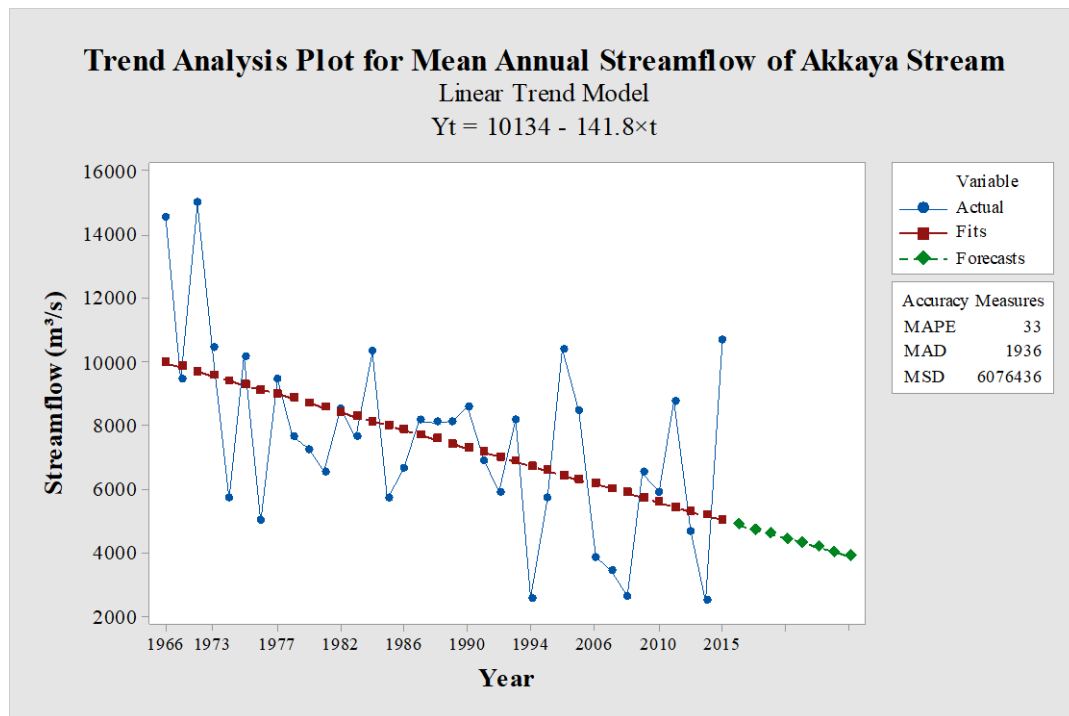


Figure 2. The results of trend analysis for mean annual streamflow

Change points were identified 1991, 1991, 1990, and 2005 for summer, autumn, winter, and spring, respectively. Besides, statistically significant decreasing trends were determined for all seasons excluding summer (Figure 3).

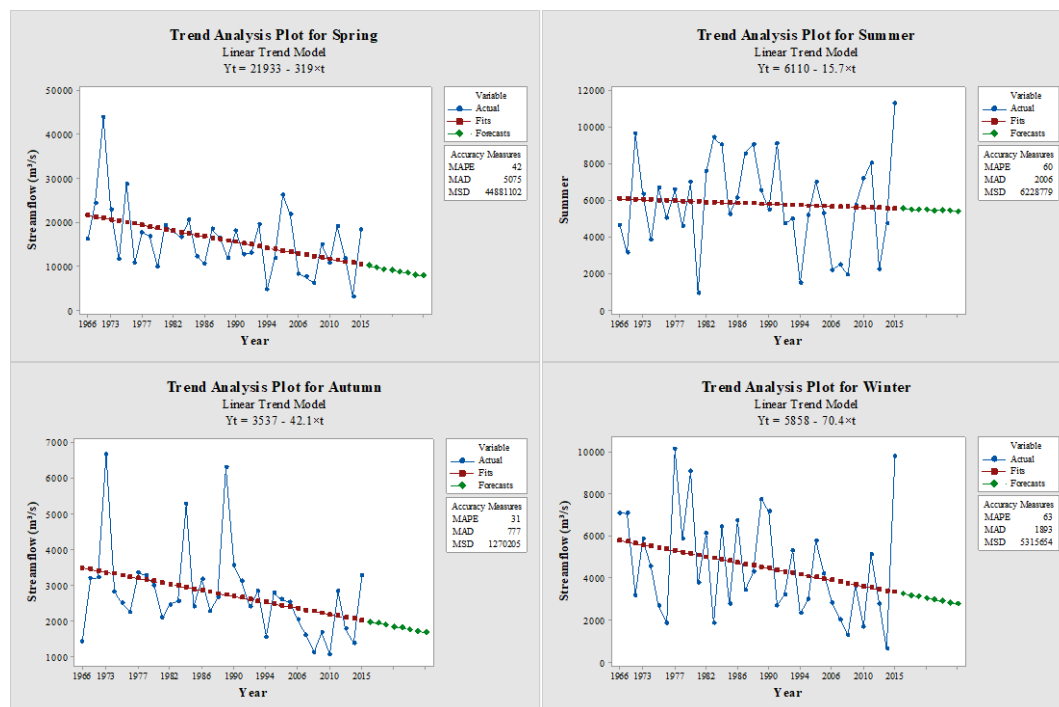


Figure 3. The results of trend analysis for mean seasonal streamflow



For mean monthly streamflow, change point years are detected as 1990, 1990, 1984, 1984, 1993, 1991, 1992, 2004, 1991, 1993, 1993, and 1993 for the months from January to December, respectively in accordance to the results of change point analysis. Trend analysis results indicated that mean monthly streamflow have tendencies to decrease for all months (Figure 4).

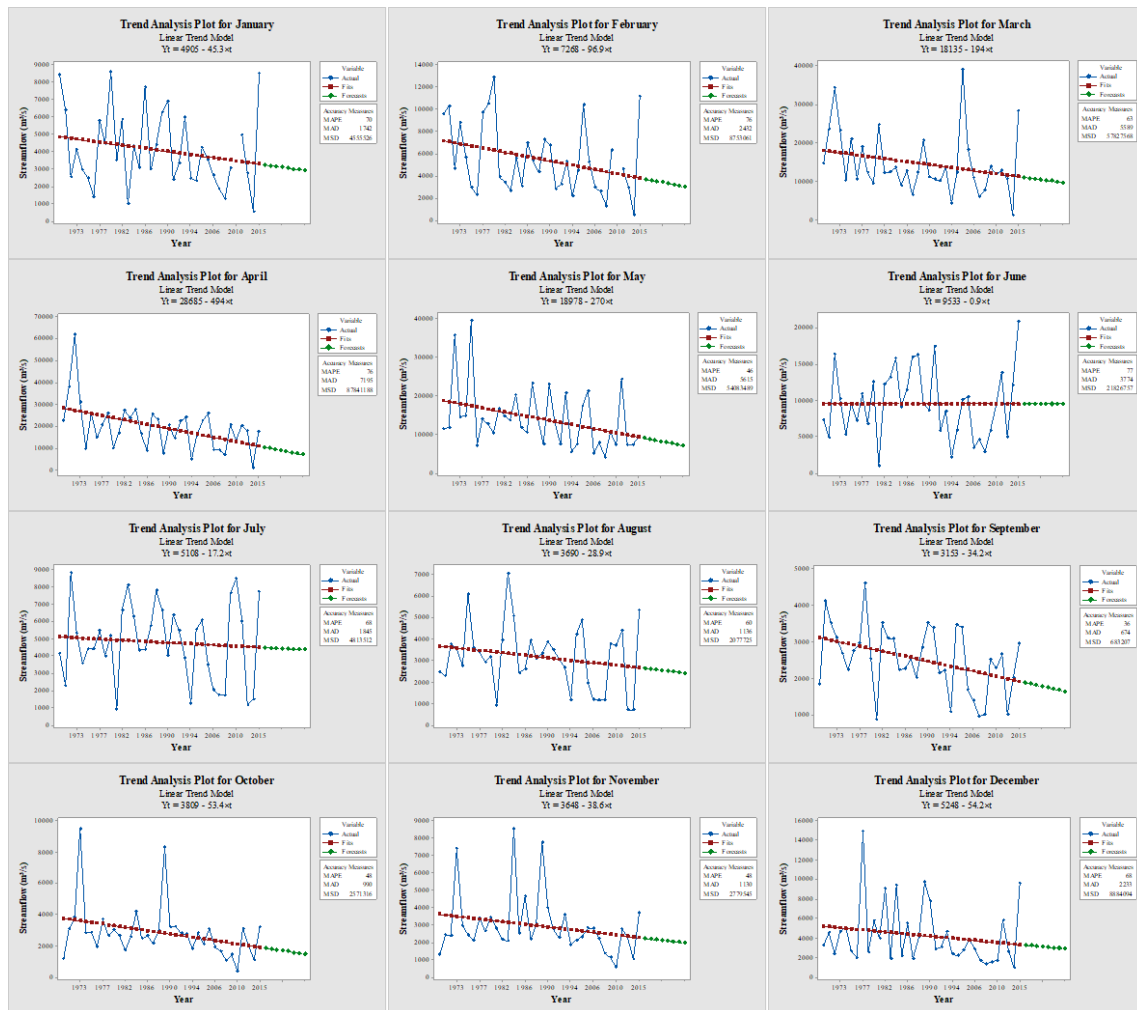


Figure 4. The results of trend analysis for mean monthly streamflow

The outcomes of Mann-Kendall trend tests called attention to a statistically significant decreasing trend for mean annual streamflow ( $p < 0.01$ ). Likewise, for mean seasonal streamflow, there were statistically significant decreasing trends for all seasons excluding summer. It tended to decrease but this tendency was not statistically significant. Furthermore, for mean monthly streamflow, statistically significant decreasing trends were found for the months of February, April, May, September and October (Table 2). Decreasing trends were also found for the other months but these trends were not statistically significant.

Table 2. Trend status and non-parametric tests values

3-7 OCTOBER, 2018

Period	Streamflow	Kendall's tau	<i>p</i>	Trend	Spearman's rho	<i>p</i>	Trend
Annual		-0.302	0.010	▼	-0.421	0.011	▼
Seasonally	Spring	-0.257	0.027	▼	-0.358	0.032	▼
	Summer	-0.025	0.827		-0.051	0.766	
	Autumn	-0.289	0.013	▼	-0.386	0.020	▼
	Winter	-0.254	0.029	▼	-0.334	0.046	▼
Monthly	January	-0.168	0.156		-0.214	0.216	
	February	-0.235	0.047	▼	-0.314	0.067	
	March	-0.221	0.058		-0.296	0.080	
	April	-0.335	0.004	▼	-0.468	0.004	▼
	May	-0.245	0.036	▼	-0.380	0.022	▼
	June	-0.022	0.849		-0.056	0.744	
	July	-0.044	0.703		-0.053	0.760	
	August	-0.094	0.422		-0.116	0.502	
	September	-0.267	0.022	▼	-0.382	0.022	▼
	October	-0.260	0.025	▼	-0.332	0.048	▼
	November	-0.149	0.200		-0.210	0.220	
	December	-0.197	0.091		-0.269	0.113	

▼ indicates statistically significant trends

## DISCUSSION

One of the most important natural resources is water resources and numerous investigations concentrated on water resources to study the characteristics or the time-based variations of water resources by various purposes. Water resources are inadequate in the worldwide and

some countries will come across thoughtful water scarcities or/and shortages on limited resources attributable to the influences of climate change and global warming (Hisar et al., 2015). For that reason, studies on the trend of rivers and water resources make available valued contributions to the literature for decision-makers and water resource managers.

Several researches have been carried out about trend analysis for climatic parameters such as temperature, evaporation and precipitation (Partal and Kahya, 2006; Bacanlı, 2017; Kale, 2017a; Kale, 2017b; Taylan and Aydın, 2018). Similarly, trend analyses were conducted to define the trends in the streamflow. Herawati et al. (2015) reported a decreasing trend in streamflow of rivers in Indonesia. Zhou et al. (2015) streamflow presented a decreasing trend in Huangfuchuan River streamflow. Pumo et al. (2016) indicated that a significantly decreasing trend was found in non-perennial small rivers in Italy. In Turkey, Ozkul (2009) and Ozkul et al. (2008) reported decreasing trends for Gediz and Büyük Menderes rivers streamflow. Durdu (2010) described a decreasing trend in Büyük Menderes River basin. Türkeş and Acar Deniz (2011) pronounced that there was a decreasing trend in the streamflow of the southern Marmara rivers. Similarly, Kahya and Kalaycı (2004), Bahadır (2011), Koçman and Sütgibi (2012) informed that rivers streamflow have decreasing trend. Likewise, decreasing trends were reported for the streamflow of Sarıçay, Kocabaş, Karamenderes, and Bakırçay rivers (Ejder et al., 2016a, b; Kale et al., 2016a, b). Lately, Kale et al. (2018) indicated that there were decreasing trends in the streamflow of Gediz, Tuzla, and Büyük Menderes rivers in western Turkey.

Present paper pointed out that there were statistically significant decreasing trends for mean annual, seasonal, and monthly (excluding February, April, May, September and October) streamflow. The outcomes of this study shares similarity with documented literature about trend analyses on river streamflow. Decreasing trends in the river streamflow could be associated with the climate change specifically temperature and rainfall. Streamflow and amounts of water resources may be influenced by alterations in the climate such as decreasing rainfall, rising temperature leading to global warming, increasing snowmelting. Alternatively, Bates et al. (2008) indicated that trends in the river streamflow were not permanently connected to the deviations in the rainfall. Several authors documented that human activities (Gao et al., 2011; Jackson et al., 2011; Zhou et al., 2015), hydraulic structures (Ozkul et al., 2008), and agricultural activities (Durdu, 2010; Dügel and Kazancı, 2004; Kaçan et al., 2007; Yercan et al., 2004) had impacts on the streamflow beside the influences of the climate change.

In conclusion, trends in streamflow of Akkaya Stream were analysed by annual, seasonal and monthly analyses. Decreasing trends were found statistically significant for mean annual, seasonal (except summer) and monthly (excluding the months of February, April, May, September and October) streamflow. This paper is the first study on determining trends of the streamflow of Akkaya Stream. Therefore, this study reveals significant facts about the past and present and predicts future trends of the streamflow of Akkaya Stream. The quantity of streamflow and water resources could be related with decline in rainfall and snowmelt,

extremely increase in temperature of water and/or air, evaporation patterns, and other reasons based on the climate change. For further periods, decreasing trend is predicted to be continue for Akkaya Stream. Therefore, trends of the streamflow should be continuously monitored to forecast the future of water resources.

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### Conflict of Interest

Authors declare that there is no conflict of interest.

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## Determination of Bacteriological Water Quality of Filyos Stream, Western Black Sea Region, Turkey

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**Abstract:** Aquatic environments are under intense pressure due to high amounts of industrial and domestic waste discharge. Thus affecting both human and animal health adversely. In this study it was aimed to determine bacteriological pollution of Filyos stream, Western Black Sea Region, Turkey. Research was conducted from December 2014 to December 2015. Water samples were taken monthly from seven different stations and 0,1 ml sample from each station was inoculated to the agar medium. Plates were incubated at the temperature of 25°C for 24 hours. After incubation colonies were counted, then selective and elective mediums were used in order to dilute cultured bacteria. Morphologically different bacteria were selected and subcultured into the broth medium. New cultures were incubated at the same temperature and duration. Gram staining, motility, oxidase and catalase tests were performed. API (Biomerieux) test kits were also used in identification of the bacteria. As a result, species of *Enterobacter sp.*, *Vibrio sp.*, *Bacillus sp.*, *Pseudomonas aeruginosa*, *Bulkholderia cepacia*, *Pseudomonas fluorescens* and *Ochrobactrum anthropi* were detected in the stream.

**Keywords:** Filyos Stream, Bacteria, Water Pollution, Water Quality, Contamination

### INTRODUCTION

Shortly before the 19th century, the world population reached 1 billion at the beginning of the industrial revolution, 2.5 billion in 1950 and 6.5 billion in 2005. Factors such as globalization, industrialization and lack of environmental awareness that have started in this period have caused the decrease of our water resources and conceived problems that are impossible to recycle (Atalık, 2006; Dağlı, 2005; Haviland, 2002; Akın ve Akın, 2007).

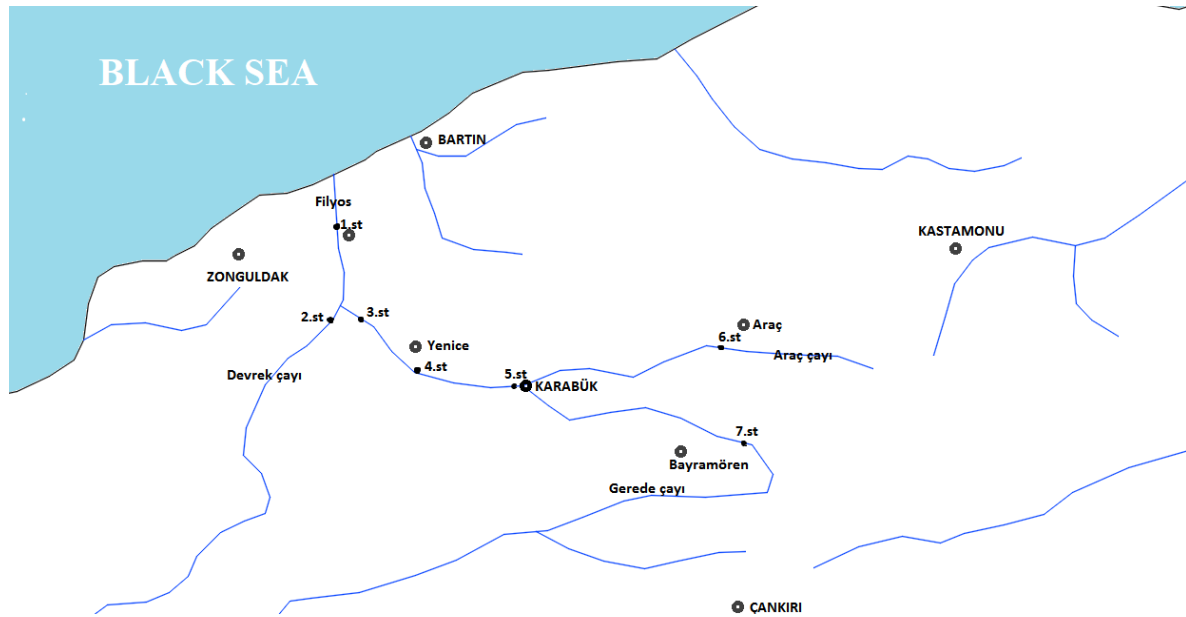
Water pollution occurs as a result of any change that alters the natural structure of water and disrupts the ecological balance (Marin and Yıldırım, 2004). One of these changes is known as bacteriological contamination. Bacteriological contamination poses risks that may threaten the health of both humans and aquatic organisms due to probable pathogenicity of bacteria.

Bacteria may enter into the water source in various ways such as sewage, industrial and domestic wastes, natural flow (wind, rain, erosion). Bacteriological water quality assessment is crucial for humans since we use water either directly for drinking and agriculture purposes or indirectly by consuming aquatic products. It is also important to determine environmental conditions which may threaten life inside or around the water source. Based on this, in this study it was aimed to determine presence of bacteria in different parts of Filyos stream.



## MATERIALS AND METHODS

Water samples were taken from seven different stations determined on Filyos stream according to national water pollution control regulations (Figure 1). During determination of stations minimum of 5 km distance was kept between stations and industrial waste and sewage discharge areas were considered.



**Figure 1.** Map Display of Sampling Stations

Sampling was conducted from December 2014 to December 2015 for 12 months. Samples were taken from all stations using sterile bottles. 0,1 ml of each sample was inoculated onto agar medium separately according to dilution plate method by using streak plate technique via drgialski spatula. Inoculated plates were incubated at 25°C for 24 hours. Bacterial count were performed from the grown culture as CFU/ml (colony forming units per milliliter). In order to diluate and obtain pure culture, grown cultures were inoculated onto seelective and elective mediums. After incubation morphologically different cultures were chosen and inoculated into broth medium. Grown cultures were incubated at 25°C for 24 hours. Then Gram staining, motility, oxidase and catalase tests were performed (Gültepe et al., 2000; Anonymous, 1996; Gürgün and Halkman, 1990; Leloğlu and Erdoğan, 1979). Identification of grown pure cultures were made using proper API test kits (BioMérieux).

## RESULTS AND DISCUSSION

As a result of identification of grown isolates, it was found that dominant bacteria obtained from same stations in different seasons were same species. API test results were confirmed through <https://apiweb.biomerieux.com> website and given in Table 1.

**Table 1. Dominant species isolated from differen stations.**

Station Number	Isolates
I	<i>Pseudomonas aeruginosa</i>
II	<i>Pseudomonas aeruginosa</i>
III	<i>Bulkholderia cepacia</i>
IV	<i>Pseudomonas aeruginosa</i>
V	<i>Pseudomonas fluorescens</i>
VI	<i>Ochrobactrum anthropi</i>
VII	<i>Ochrobactrum anthropi</i>

Çapkın et al. (2015) isolated bacteria from Turkish trout farms. Çapkın et al. reported that species of *Escherichia coli*, *Citrobacter diversus*, *Enterobacter cloacae*, *Klebsiella oxytoca*, *Serratia fonticola*, *Klebsiella pneumoniae* subsp. *ozaenae* and *Enterobacter aerogenes* were identified. In a similar study Terzi (2013) investigated bacteria in trout farms in different times and found out that species of *Escherichia coli*, *Klebsiella pneumoniae* subsp. *ozaenae*, *Citrobacter diversus*, *Klebsiella oxytoca*, *Enterobacter cloacae*, *Serratia fonticola* and *Enterobacter aerogenes* were present.

In this study, bacterial populations from 7 different stations determined in Filyos stream were investigated. Besides dominant bacteria given in Table 1, other bacteria were also present in the stream. However these bacteria were identified in genus basis. In total 7 different species (*Enterobacter sp.*, *Vibrio sp.*, *Bacillus sp.*, *Pseudomonas aeruginosa*, *Bulkholderia cepacia*, *Pseudomonas fluorescens* and *Ochrobactrum anthropi*) of bacteria were determined in Filyos stream. Different results from previous studies may be due to difference of sampling time and sampling location. After identification processes, it was evaluated that determined bacteria species may be present in the ecosystem naturally. They do not need a pollution or contamination factor nor come from one necessarily. However, possible effects of them on Filyos stream ecosystem should be investigated in further studies.

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**Determination of Bacteriological Water Quality of Filyos Stream, Western Black Sea Region, Turkey**

*Adem Yavuz SÖNMEZ and Yiğit TAŞTAN– Oral Presentation / 006*

**Present Conditions and Economical Analysis of Deep Trawling Vessels  
Registered in Kastamonu Province**

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**ABSTRACT**

In this research, present conditions and economical analyses of deep trawling vessels that registered in Kastamonu during 2016-2017 commercial fishing season efforts were evaluated. Data were gathered by surveys conducted with the boat captains after the closing time of commercial fishing season of 2017. During 2016-2017 commercial fishing season 14 vessels from Kastamonu fleet which is longer than 12 meters practiced trawling. 28,57% of trawling vessels were constructed from metal and 71,43% of them were constructed from wooden material. Average boat length and engine power were determined 14,79 m and 298.60 hp respectively. Average age of vessel owners were 45,88 years old and their fishing experience were determined as 20,32 years. Ship capital (74,62%) is the most important item among the total active capital per ship in fishing vessels. Deck hand/crew expenses are the most important cost item of ship expenses (25,04%). Daily amount of fishing per vessel was determined as 294,95 kg/day. Financial rentabilities which is profit ratios vessels' own capitals, were calculated as 5,99 % and economic rentabilities which is profit ratio of active capital, were calculated as 5,88%.

**Keywords:** Kastamonu, deep trawling, structural and economical analyse.

**INTRODUCTION**

Usage of every kind of trawling net is prohibited in most of the fishing grounds in Turkish seas. On the other hand deep trawling is maintained in middle and western region of Black Sea. Turkish Ministry of Food, Agriculture and Livestock makes regulations as declarations in order to reduce hunting pressure on fish stocks and provide a sustainable fishing. These regulations are published in every four years. Present regulations take part in fishing declaration numbered as 4/1 that regulates commercial fishing and will be in force between 2016 and 2020. Deep trawling is the most frequently regulated one among legal fishing gears in Turkey. There are far-reaching regulations related to area, time, place and mesh openness. Every kind of trawling net usage is forbidden in Dardanelles, Bosphorus and in all of Marmara Sea for many years and even prison sentence was implemented for illegal trawl fishery in some period. An adverse sense formed in public opinion about trawl fishery that becomes an issue and being discussed from time to time.

On the purpose of sustainable management of our resources, it is required to investigate the current situation of our fishing fleet and ask the question of “How to manage the fishing fleet ecosystem-based in a better way?” in our seas where an intense hunting pressure is occurred on marine stocks due to unplanned and excessive fishing.

In order to do a good planning, industry needs to be addressed in every aspect with all the stakeholders. Besides environmental and biological factors in our seas, economical and sociological conditions of our fishermen shouldn't be ruled out in decisions that will be taken. In this study, it was aimed to observe present condition and perform economic analysis of deep trawling vessels registered in Kastamonu province, Western Black Sea Region.

## MATERIALS AND METHODS

The research was carried out in the districts of Abana, Bozkurt, Cide, Çatalzeytin, Doğanyurt and İnebolu in the 170 km coastline that begins with Çatalzeytin district in the eastern part of Kastamonu and continues to the border of Bartın province in the west.

There are 17 fishing vessels (trawl, seine-trawl) that are over 12 metres and registered in Kastamonu licensed by Turkish Ministry of Food, Agriculture and Livestock for fishing. The purpose of choosing vessels that are over 12 metres is fishing vessels needs to be 12 metres or longer in order to use trawl nets according to 13<sup>th</sup> proviso of fisheries regulations in Turkey.

Since owners of two of the ships stated that they performed seine fishing and midwater trawling during 2016-2017 fishing season and an another owner stated that he was not engaged in fishing, data of mentioned 3 vessels were ignored in this study. 14 fishing vessels which performed deep trawl fishing during 2016-2017 fishing season constitutes the material of the present research (Table 1).

Table 1 *Vessel Lengths and Fishing Types*

Vessel Number	Total Length (m)	Fishing Type
Vessel 1	12,00	Deep Trawling
Vessel 2	12,06	Deep Trawling
Vessel 3	12,30	Deep Trawling
Vessel 4	12,80	Deep Trawling
Vessel 5	13,00	Deep Trawling
Vessel 6	13,38	Deep Trawling
Vessel 7	13,85	Deep Trawling
Vessel 8	14,00	Deep Trawling
Vessel 9	14,40	Deep Trawling
Vessel 10	14,65	Deep Trawling
Vessel 11	15,30	Deep Trawling
Vessel 12	17,25	Deep Trawling
Vessel 13	19,00	Deep Trawling
Vessel 14	23,00	Deep Trawling
Vessel 15	14,10	Was not engaged in fishing
Vessel 16	25,80	Seine fishing
Vessel 17	26,60	Seine fishing and midwater trawling

In order to evaluate the structural and economic conditions of 14 fishing vessels that are 12 meters or longer registered in Kastamonu province, a one-to-one interview was conducted with the owners and affreighter of fishing vessels.

In the questionnaire form, questions such as the technical characteristics of the ships, equipment, fishing gears, socio-economic status of the boat owners, fishing costs, marketing methods; species, quantity and prices of the caught fish were included.

The evaluation of present condition and income-expense of the fishing vessels that are used in the research was based on their performance in the 2016-2017 fishing season. Survey studies were started in May 2017 and completed in the same month.

## RESULTS AND DISCUSSION

### *Structural Properties of Fishing Vessels*

Structural properties of 14 deep trawling vessels registered in Kastamonu province were examined and results are given according to findings. In terms of length, values of 12 m minimum and 23 m maximum were found. The average length of the vessels was calculated as 14.79 m. 10 of the vessels were manufactured from wooden material whereas 4 of them from sheet metal. Engine powers were determined as 185 hp minimum and 485 hp maximum. The total engine power was 4180.40 hp whereas the average was calculated as 298.60 hp. The oldest one 33 years old and the newest one was 1 year old. The average age was calculated as 14. The vessels had 64 fishing gear and 38 of them were deep trawl nets. Every fishing vessel had two sets of deep trawl net. Presence of diverse fishing gears shows that fishing vessels can sometimes tend to catch different fish species with different methods.

When the ownership status of the fishing vessels evaluated within the scope of the study, it was determined that 12 fishing vessels had a single owner and 2 ships had partnered ownership. In Kastamonu province, there is no rented fishing vessel that performs deep trawling. When 2 partnered vessels investigated, it was found that both of them is owned by siblings. One of them was obtained by purchasing and the other one was by inheritance.

Since none of the owners are legal entities and the partnerships are in the family it was seen that deep trawling businesses are similar to the small family businesses in the agricultural sector.

### *Fishing Activities of Vessels*

The average number of days in the sea during the 2016-2017 fishing season was reported as 40 days minimum and 130 days maximum. The average number of days in the sea was calculated as 91.43 days. When the number of operations performed in one day is examined; there were 2 to 4 fishing operations and the average number of daily fishing operations was calculated as 3.36. During whole season the average number of deep trawling operations per vessel was 313. In previous studies; Uzmanoğlu and Soyly (2006) reported that fishing vessels in Karasu district of Sakarya province had 30-240 fishing days in sea and it was found that the average was 108 days. Ünal (1998) stated that in Foça trawling vessels had 100-226 days of fishing and the average was calculated as 136 days. Rad and Delioğlu (2008) stated that in the study conducted for Taşucu trawl vessels the average fishing days in sea was 187 days. When the reasons of less days in sea of deep trawling vessels in Kastamonu are investigated it is thought that the reason might be different weather and sea conditions or fishing ground between Foça, Taşucu and Kastamonu and compelling reasons such as engine breakdown during season.

For every vessel number of crew member (including captain) was reported as 3 minimum and 6 maximum. Average number of crew member per ship was calculated as 4,21. This result is similar to

findings of Ünal (1998) who found average number of 4 (including captain) for trawling vessels in Foça and Rad and Delioğlan (2008) who found average number of 4 (including captain) for trawling vessels in Taşucu.

### *Capital Structure of Fishing Vessels*

Table 2. *Capital structure per vessel*

CAPITAL COMPONENTS	Value (TL)	Rate (%)
A. ACTIVE CAPITAL		
I. VESSEL CAPITAL	314 911	74,62
II. BUSINESS CAPITAL		
1. Fixed Business Capital		
a) Fishing Gear Capital	77 096	18,27
2. Circulating Business Capital		
a) Money Capital	30 000	7,11
TOTAL ACTIVE CAPITAL	462 007	100,00
B. PASSIVE CAPITAL		
1. Loans	50 929	12,07
2. Own Capital	411 078	87,93
TOTAL PASSIVE CAPITAL	462 007	100,00

Table 3. *Amount of Captured Aquatic Products*

CAPTURED PRODUCTS	AMOUNT (KG)	RATE (%)	AVERAGE SALE PRICE (TL/KG)	TOTAL (TL)	RATE (%)
Haddock	265 834	70,41	5	1 329 170	61,61
Red mullet	69 598	18,43	7	487 186	22,58
Turbot	4 016	1,06	75	301 200	13,96
Shad	33 849	8,97	1	33 849	1,57
Scorpionfish	3 944	1,04	1	3 944	0,18
Bluefish	299	0,08	7	2 093	0,10
TOTAL	377 540	100,00	-	2 157 442	100,00
Amount per vessel	26 967,14			154 103	
Amount per days on sea	294,95			1 685,47	

Table 4. *Gross Proceeds Value Per Vessel*

GROSS PROCEEDS	VALUE (TL)	RATE (%)
Income from Fish Sale	154 103	100,00
<b>TOTAL GROSS PROCEEDS</b>	<b>154.103</b>	<b>100,00</b>
Gross Proceeds / Active Capital	0,33	
Gross Proceeds / Average Vessel Length	10 419,40	
Gross Proceeds / Average Engine Power	516,08	
Gross Proceeds / Average Days on Sea	1 685,47	

Table 5. *Distribution of Cost Factors of Vessels*

COST FACTORS	Value (TL)	Rate of Business Expenses (%)	Rate of Production Expenses (%)
Fuel and Oil	31 545	28,42	24,37
Labour (Crew)	32 423	29,21	25,04
Victualing	3 585	3,23	2,77
Crate/Box ve Ice	964	0,87	0,74
Marketing	-	0,00	0,00
Clothing	982	0,88	0,76
Tax, Fees etc.	1 000	0,90	0,77
<b>Total (1)</b>	<b>70 499</b>	<b>63,52</b>	<b>54,45</b>
Interest of Circulating Capital (%2) (2)	1 410	1,27	1,09
<b>TOTAL VARIABLE EXPENSES (3=1+2)</b>	<b>71 909</b>	<b>64,79</b>	<b>55,54</b>
Vessel and Fishing Gear Maintenance and Repair	23 446	21,13	18,11
Vessel and Fishing Gear Depreciation	14 636	13,19	11,31
Licence, Certificate etc.	609	0,55	0,47
Cooperative Fee	383	0,35	0,30
<b>TOTAL FIXED EXPENSES (4)</b>	<b>39 074</b>	<b>35,21</b>	<b>30,18</b>
<b>TOTAL BUSINESS EXPENSES (5=3+4)</b>	<b>110 983</b>	<b>100,00</b>	<b>85,73</b>
Interest Repayment of Active Capital (%4) (6)	18 480		14,27
<b>TOTAL PRODUCTION EXPENSES (7= 5+6)</b>	<b>129 463</b>		<b>100,00</b>



Table 6. *Gross Profit Per Vessel*

GROSS PROFIT	VALUE (TL)
Gross Proceeds (1)	154 103
Variable Expenses (2)	71 909
Gross Profit ( $3 = 1 - 2$ )	82 194
Gross Profit / Active Capitl	0,18
Gross Profit / Average Vessel Length	5 557
Gross Profit / Average Engine Power	275,26
Gross Profit / Average Days on Sea	898,98

Table 7. *Net Proceeds Per Vessel*

NET PROCEEDS	VALUE (TL)
Gross Proceeds (1)	154 103
Business Expenses (2)	110 983
Net Proceeds ( $3 = 1 - 2$ )	43 120
Net Proceeds / Active Capital	0,09
Net Proceeds / Average Vessel Length	2 915,48
Net Proceeds / Average Engine Power	144,41
Net Proceeds / Average Days on Sea	471,62

Table 8. *Net Profit Per Vessel*

NET PROFIT	VALUE (TL)
Gross Proceeds (1)	154 103
Production Expenses (2)	129 463
Net Profit ( $3 = 1 - 2$ )	24 640
Net Profit / Active Capital	0,05
Net Profit / Average Vessel Length	1665,99
Net Profit / Average Engine Power	82,52
Net Profit / Average Days on Sea	296,50

Table 9. *Economical and Financial Rantability*

RANTABILITY	VALUE (TL)
Net Profit (1)	24 640
Active Capital (2)	462 007
Own Capital (3)	411 078
Interest of Foreign Capital (4)	2 546
Financial Rantability ( $1 / 3 * 100$ )	% 5,99
Economical Rantabilite ( $(1+4) / 2 * 100$ )	% 5,88

Table 10. *Rantability Factor*

RANTABILITY FACTOR	VALUE (TL)
Gross Proceeds (1)	154 103
Net Proceeds (2)	43 120
Rantability Factor ( $3 = 2 / 1 * 100$ )	% 27,98

As a result it was concluded that structural properties of vessels which performed deep trawl fishing during 2016-2017 fishing season in Kastamonu are similar to previous findings found in the studies that were conducted in Turkey. Similarly social structure of fishermen also showed resemblance.

Considering the economic performance of the deep trawling vessels; In previous years, it has been observed that more efficient results have been achieved, but these results tend to decrease. When the reasons of this were examined, the following possible causes were thought;

Continuous increase in costs of fishin vessels and their equipments subsequent to foreign currency increase,

Increase in values of fixed and variable expenses every passing day,

Returning of investments in fishing capital to the fishermen at a different rate than expected,

Lack of development of marketing and storage facilities and presence of too many mediators,

Instability in days on sea and catch amounts between seasons,

Enhancement in hunting pressure on fish in our seas due to increase in engine power and vessel equipment of the fishing fleet.

Undoubtfully one the most important expense item of fishing vessels is the fuel expense. Continuation of SCT (Special Consumption Tax) free oil purchase implementation is essential for continuity of fishing.

Fishermen invest earnings in fishing again and think they will obtain more efficient fishing and thus earn more money in this way. However, steady increase of both business and investment expenses may provide more income but it may not ensure more profit. If one of the most important goals of fisheries management is conservation and sustainability of resources, the other one is maintainability of fishing in a more efficient and profitable way.

Fisheries management related organizations should consider that capital funds in fisheries and its return is not in the needed levels and precautions should be taken. Fisherman who can not obtain the earning he wants is going to intensify the pressure on resources (Ünal, 1998).

Since there is no wholesale fish markets in Kastamonu, it was determined that fishermen sell their catch to local buyers and the local buyers sell the fish in marketplaces. It was evaluated that marketing of captured aquatic products by cooperatives and associations and improvement of storage facilities will lead enhancement in economical performance.

Fishing operations should be planned in order to preserve sustainable fisheries and conservation of present fish stocks in our seas. When excessive hunting pressure on demersal fish stocks is considered, precautions such as quota system and recreation of fishing grounds should be taken into account.

The reasons of ongoing decrease in amount of products obtained from our seas in many years should be scrutinized promptly and all related public institutions, organizations and stakeholders should display required sensitivity on issue in question.

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## Strategies to develop novel oligosaccharides by glucansucrases from Lactic Acid Bacteria (LAB)

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### ABSTRACT

Glucansucrases (GTFs) are responsible for the production of glucan type exopolysaccharides (EPS) using sucrose as substrate. GTFs also are able to produce novel oligosaccharides by using sucrose as donor and other sugars such as maltose as acceptor molecules. Recently we have identified the whole genome of a *Lactobacillus reuteri* strain E81 isolated from Turkish sourdough. The genome of *Lactobacillus reuteri* E81 harbours a putative glucansucrase and a putative 4,6- $\alpha$ -glucanotransferase genes that can be used for the production of novel oligosaccharides. In this study, we described the similarities of these GTF coding genes with the known GTFs and their potential roles for the production of novel oligosaccharides as a promising strategy to produce different oligosaccharides.

Keywords: *Glucansucrase*, *oligosaccharides*, *Lactobacillus reuteri* E81

### INTRODUCTION

There is a growing interest for the metabolites of Lactic Acid Bacteria (LAB) that can play role for the functionalization of the food products. Exopolysaccharides (EPS) are among these metabolites that can both affect the technological and functional properties of food products. Two types of EPS are being produced by LAB in which homopolysaccharides contain only one monosaccharide whereas heteropolysaccharides contain two or more types of monosaccharides in their repeating units [1]. At genetic level only a single gene called as glucansucrase is responsible for the homopolymeric EPS whereas a gene cluster with 14-20 genes is required for the heteropolymeric EPS production. Glucansucrases (EC 2.4.1.5) use sucrose as the substrate and at first these enzymes conduct the hydrolysis of sucrose followed by the catalysis of transglycosylation that results in the formation of the  $\alpha$ -glucans as homopolymeric EPSs [2]. Among LAB, formation of glucans by the action of glucansucrases is an important characteristics to be tested and several species of *Leuconostoc*, *Streptococcus*, *Lactobacillus* and *Weissella* have been shown to use glucansucrase to synthesize glucans [3, 4, 5, 6, 7]. The structure of the glucans is determined by the action of the glucansucrases and so far four different glucan structures were determined for the glucans of LAB and these are alternans produced by the action of alternansucrases that are composed of alternating  $\alpha$ -(1,6)- and  $\alpha$ -(1,3)-linked glucose units, reuterans, which contain large numbers of  $\alpha$ -(1 $\rightarrow$ 4)-glucosidic bonds which are synthesized by reuteransucrases, dextrans, which contain predominantly  $\alpha$ -(1 $\rightarrow$ 6)-linked glucopyranosyl units in the main chain that are synthesized by dextransucrases, and finally mutans containing glucose units with mainly  $\alpha$ -(1 $\rightarrow$ 3) linkages produced by mutansucrases [2, 6]. Although the final structures of the glucans can alter, the glucansucrases share a common structure with four distinct domains consisting of an N-terminal signal peptide of 32 to 34 amino acids, followed by a highly variable stretch of 123-129 amino acids, a highly conserved catalytic domain of about 1000 amino acids and a C-

terminal glucan binding domain of about 500 amino acids [8]. These enzymes and the product of these enzymes including the *in vitro* produced glucans and oligosaccharides produced by the donor-acceptor reactions using sucrose as the donor and different sugars such as maltose as acceptor are of special interest as they can act as viscosifiers, water-binding agents and, more importantly, as prebiotics [3, 5] and several researchers tested the activity of glucansucrases after extraction from culture supernatant [3, 9] or after heterologous expression as a full length glucansucrase or an N-terminal variable region truncated glucansucrase [2, 10, 11, 12, 13]. Recently another group of enzymes, 4,6- $\alpha$ -glucanotransferases, were identified in LAB which were shown to hydrolyze the  $\alpha$ -1,4 linkages present in amylose and starch and proceed the transglycosylation by adding new  $\alpha$ -1,6 linkages to produce novel oligosaccharides and glucans. This enzyme group can modulate the modification of starch molecules and understanding the mode of action of this enzyme group is crucial.

Sourdough has a complex microbial flora and *Lactobacillus reuteri* strains can be important members of this flora which can play crucial roles especially for the formation of industrial sourdough [14]. Recently a *Lactobacillus reuteri* strain with potential functional properties was isolated from Turkish sourdough and designated as strain E81. The whole Genome of this strain was sequenced and made publicly available [15] and in this study we discussed the presence of two potential genes encoding a putative glucansucrase and a putative 4,6- $\alpha$ -glucanotransferase enzymes and their potential roles for the production of novel oligosaccharides.

## II. GTFs of *Lactobacillus reuteri* E81

As discussed above *Lactobacillus reuteri* E81 was recently fully sequenced and analysis of the genes present in the Genome of E81 using rast server revealed the presence of a glucansucrase which was 5304 bp encoding the 1766 aa putatively as a glucansucrase (Figure 1) [15].

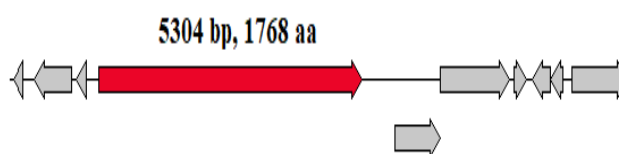


Figure 1. Schematic representation of the glucansucrase gene of *Lactobacillus reuteri* E81.

BLAST analysis of the glucansucrase gene (gtfA) from E81 revealed that it was 97% similar to the gtfA from *Lactobacillus reuteri* ZLR003 and its similarity with the *Lactobacillus reuteri* 180 was 95%. In addition to the gene structure, the translated protein of the GTFA was run through the BLAST server a high level of similarity (99%) with the previously identified glucansucrases was observed.

Another important carbohydrate active enzyme was the 4,6- $\alpha$ -glucanotransferase (gtfB) which was also encoded in the Genome of E81 [15].

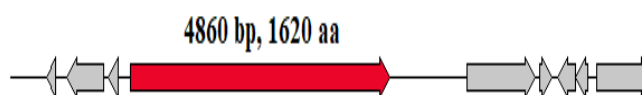


Figure 2. Schematic representation of the 4,6- $\alpha$ -glucanotransferase gene of *Lactobacillus reuteri* E81.

In addition to the *gtfA*, the *gtfB* revealed a 98% level of similarity with *Lactobacillus reuteri* ZLR003 and *Lactobacillus reuteri* 121 whereas the GTFB as a protein also showed high level of similarities with the available protein sequences uploaded to the BLAST system. But importantly as a 4,6- $\alpha$ -glucanotransferase in a LAB strain there is only few studies and we should improve our knowledge on this enzyme in order to extend the potential of this enzyme to be used in food industry especially in cereal-based food products.

Following the identification of these genes in *Lactobacillus reuteri* E81, both enzymes were successfully cloned to the expression plasmids and successfully expressed in *Escherichia coli* BL21 (Manuscript in preparation) and the production of the each proteins was confirmed by SDS-PAGE analysis and also Western-Blot analysis was also applied if required (Manuscript in preparation). Heterologous expression of each protein gave us the chance to investigate their biochemical functions under in vitro conditions.

The substrates of both enzymes are different as GTFA enzyme uses sucrose as the substrate to produce polymeric glucan and the oligosaccharide units with the donor-acceptor reactions whereas GTFB cannot utilize sucrose as the substrate as this enzyme can be active on  $\alpha$ -1,4 glucose units present mainly in amylose and starch molecules and GTFB can add the glucose units by adding the  $\alpha$ -1,6 glycosidic linkages to produce polymeric glucans or oligosaccharide units. The biochemical characterization of both enzymes were started in terms of testing the specific reaction production of both enzymes, testing the optimum T and pH values of both enzymes ext (Manuscript in preparation). Importantly both enzymes showed their catalytic activities with an important level of differences compared to current knowledge on other enzymes given in the literature (Manuscript in preparation).

In terms of production oligosaccharides both enzymes were tested with the related substrates. For instance GTFA tested with the sucrose and different acceptors such as maltose and production of new oligosaccharides were successfully shown (Manuscript in preparation). Similarly  $\alpha$ -1,4 glucose unit containing substrates such as maltotriose, maltose were the target substrate for the GTFB and new oligosaccharides were formed with these reactions (Manuscript in preparation).

## CONCLUSION

As a conference paper, in this study we noted the presence of the *gtfA* and *gtfB* genes in the genome of *Lactobacillus reuteri* E81 and discussed our current work in order to produce novel oligosaccharides to be used in food industry.

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## **A *Leuconostoc lactis* strain for the potential production of chiral secondary alcohols**

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### **ABSTRACT**

Sourdough is a fermented product produced from different cereals mainly from wheat and Lactic Acid Bacteria (LAB) are the bacterial group conducting the fermentation of sourdough together with the yeast species. In this study a LAB strain was isolated from traditional sourdough and identified as *Leuconostoc lactis* using genotypic methods. This strain was further tested for its potential to produce enantiopure chiral secondary alcohols using acetophenone as a model substrate as a whole cell approach. Under the conditions tested with *Leuconostoc lactis*, 50% yield and 48% ee values were obtained and these values will be increased following the optimization of the culture conditions such as pH, temperature, incubation period and agitation conditions.

**Keywords:** *Sourdough, Leuconostoc lactis, chiral secondary alcohols.*

### **INTRODUCTION**

Lactic acid bacteria (LAB) is one of the most important microbial group playing roles for the production of fermented food products. In addition to their crucial roles for the production of food products, LAB has a great biotechnological potential to be the source of different enzymes conducting different reactions. Recently, several studies showed the production of chiral secondary alcohols by LAB used as a whole cell (Yılmaz, Şahin and Dertli, 2017; Öksüz, Şahin and Dertli, 2018). Finding new LAB strains will improve our current knowledge for their potential to be used as whole cell biocatalyst.

Sourdough is a mixture of flour and water that is fermented with lactic acid bacteria (LAB) and yeasts (De Vuyst and Neysens, 2005, Gobbetti, 1998). Sourdough has a rich LAB microflora in which *Lactobacillus* strains are present more frequently than *Leuconostoc*, *Pediococcus* and *Weissella* species (De Vuyst and Neysens, 2005).

One of the LAB species that were shown to present in different environments including sourdough is *Leuconostoc lactis*. In this study, similar to previous findings (Palomba et al., 2012) a *Leuconostoc lactis* was isolated from traditional sourdough identified by genotypic methodology. Furthermore, the potential of this strain for the production of enantiopure chiral secondary alcohols was tested using acetophenone as a model substrate. Our findings revealed that the culture conditions should be further optimized to obtain high level of yields and ee values using this strain as a whole cell application.

## MATERIAL AND METHODS

### General

Acetophenone was obtained from Sigma– Aldrich in the highest purity available. HPLC analysis was performed on an Agilent 1260 systems equipped with a UV and chiral detector. Enantiomeric excesses were determined by chiral HPLC analysis using chiral columns OD-H, OD, and AS. Enantiomeric excess was determined directly from the areas under the curve as described previously.

### Isolation of *Leuconostoc lactis* from sourdough

For the isolation and enumeration of LAB, serial dilutions were plated onto both MRS5 agar contained 0.1 g of cycloheximide (Sigma, UK) liter-1 for the inhibition of yeast growth. Plates were incubated under anaerobic conditions at 30°C for 2 days. At the end of incubation period colonies with potential different morphologies were picked randomly from plates and propagated into same medium and incubated at 30°C for 2 days and then tested for Gram stain, cell morphology and catalase reaction. The selected strains were further characterized for genotypic identification.

### Bacterial identification by 16S rRNA gene sequencing

The 16S rRNA gene of selected LAB strain was amplified with primers AMP\_F (5'-GAGAGTTTGATYCTGGCTCAG-3') and AMP\_R (5'-AAGGAGGTGATCCARCCGCA - 3') and PCR processes were conducted as described previously (Dertli et al. 2016). The partial 16S rRNA sequences of the LAB strain was uploaded to the BLAST system and identified based on the similarity criteria of 97%.

### General Procedure for the Asymmetric Reduction Reaction

The identified strains was lyophilized and 25 mg dry bacterial strain was added to 100 ml MRS broth and stirred on an orbital shaker at 150 rpm and 30 °C. After 2 h, pH was adjusted 5.0 and shaken 2 h, then 1 mmol substrate was directly added to the medium and incubated on a shaker (150 rpm) at 30 °C for 48 h. At the end of the incubation period, the cells were separated by centrifugation at 6000 g for 5 min at 4 °C and the supernatant saturated with NaCl, then extracted with diethyl ether. Diethyl ether extracts were combined and dried over Na<sub>2</sub>SO<sub>4</sub>. After removal of the solvent under reduced pressure, the crude product was identified by NMR analysis. The crude product was purified by column chromatography on silica gel using hexane/ethyl acetate as eluents (90:10). The absolute configuration was determined by sign of specific rotation and comparison with the literature. Conversion and enantiomeric excess of the products were determined by HPLC analysis using chiral columns.

## RESULTS AND DISCUSSION

### Identification of LAB from sourdough

Sourdough is a dynamic environment that can harbor several LAB species playing roles for the formation of sourdough. In this study, a *Leuconostoc lactis* strain was isolated from traditional sourdough as a potential LAB strain for biotechnological applications. Previous studies also revealed the presence of the *Leuc. lactis* strains in different fermented products including

sourdough (Palomba et al., 2012). In this study we tested the potential of this strain for the production of chiral secondary alcohols as a whole cell approach.

### **Whole cell approach for the bioreduction of acetophenone using *Leuconostoc lactis***

As discussed in MM section the lyophilized *Leuc. lactis* cells were inoculated to the MRS broth and following the 2 h adaptation to the MRS environment and in the middle of adaptation phase we inoculated the 1 mmol substrate acetophenone to the MRS broth and pH was set to 5.0 then the strain was grown for further 48 h at 30 °C under 150 rpm agitation conditions. At this conditions the yield of the chiral secondary alcohol and the ee values were determined to be 50% and 48%, respectively. These findings revealed that the incubation conditions such as pH, temperature, agitation conditions and incubation time should be optimized in order to get high level of yield and ee values. Nevertheless with the current study we showed the potential of the *Leuc. lactis* to be used in bioreduction reactions and this strain will be further used under the optimized conditions with different substrates for the bioreduction reactions as a good example of the whole cell approach.

In conclusion a *Leuc. lactis* strain was isolated from traditional sourdough and identified using genotypic approach and this strain was further tested for its potential to produce enantiopure compounds with acetophenone as a model substrate. Under the conditions tested we found low levels of yield and ee values but the optimization of the growth parameters for this strain are currently being tested and the yield and the ee values will be increased with the optimized conditions. Our findings revealed the potential of *Leuc. lactis* strain to be used in future studies as a whole cell approach.

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## Immobilization of enzymes and industrial applications alcohols

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### ABSTRACT

Most enzymes are relatively unstable, and have high production and separation costs, displaying a disadvantage in that the recovery of active enzymes in the reaction mixture after use is technically very difficult. Immobilized enzymes have received great attention from those who wish to use the enzyme immobilization technology for specific purposes in the medical and industrial sectors. Immobilization of enzymes and biological compounds is becoming increasingly important, especially in food and drug industries and in biomedical applications. Immobilized enzymes have become the subject of considerable interest due to their excellent functional properties such as reusability, cost-effectiveness, and optimality during the past decades. Enzyme immobilization technology is not only used in industrial processes, but also a component technology of products for medical diagnostics, therapy, food industry, bio energy, and biomaterial detection. In this study, methods for enzyme immobilization are introduced, and the advantages and disadvantages of a variety of techniques in enzyme immobilization was discussed.

**Keywords:** Enzyme, Immobilization, Immobilized enzyme, Enzyme immobilization methods.

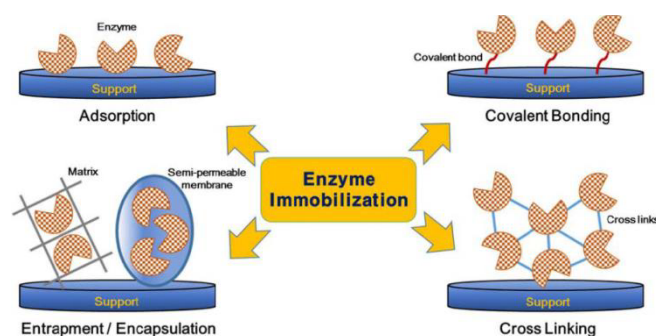
### I. INTRODUCTION

Enzymes, like other catalysts, increase the rate of reactions. Under similar conditions, the rate of reaction in the presence of the enzyme can be one or several million times higher than the rate of reaction in the absence of the catalyst [1,2]. Enzymes, which have very important metabolic functions in the cells, have entered daily life now for a variety of purposes. Isolation and purification of enzymes require high cost. Because the enzymes are not modified as a result of the reactions, the same enzyme can be used more than once, but most of the industrial, analytical and clinical processes are mixed with enzymes substrate solution. After the conversion of the substrates to the products, it is difficult to separate the enzymes from the solution with the substrate and the products, and the enzymes cannot be recovered economically [3]. In this respect, enzymes are used only once and they are expensive, which causes great costs in practice. Enzymes are immobilized on the material to make them used many times. Immobilized enzymes are economically more reasonable and allow enzymatic processes to be carried out continuously. Today, a large number of immobilized enzymes are used in the industry. In addition to industrial applications, immobilized enzymes are also used in organic synthesis, analytical and medical applications at laboratory scale [3]. When conducting a commercial process, whether a chemical catalyst or an enzyme is used, whether free enzyme or immobilized enzyme is used, economic and environmental factors as well as health and environmental factors are taken into consideration. In some cases, the processes in which immobilized enzymes are used are more economical by providing production on a larger scale than processes using a chemical catalyst or free enzyme. Immobilization methods

have different advantages and disadvantages. After immobilization, enzyme activity, optimum pH and temperature, substrate affinity and stability change. These changes in the enzyme vary according to the structure of the enzyme, the type of carrier, the method of immobilization and the conditions [1].

## II. IMMOBILIZATION OF ENZYMES

Enzymes do not change as a result of reactions. For this reason, the same enzyme can be used more than once, but the presence of the enzyme in a solution with the reactants or products makes it difficult to separate the enzyme from the solution. In such cases, it is ensured that the enzyme is held in a material, the products are taken from the medium and the enzyme becomes usable again [4-6].



**Figure 1.** Various methods of enzyme immobilization.

Enzyme immobilization is a method that inhibits the movement of the enzyme. Enzymes that allow a substrate to be transformed into products of substrates passing through it are called immobilized enzymes [7]. Enzyme immobilization is a method in which the action is significantly restricted while the catalytic activity of the enzyme continues.

### *Enzyme Immobilization Methods*

Today, immobilization technology can provide quick and effective solutions to the problems that may arise during the immobilization process, but there is no general method that is accepted separately for each enzyme [8]. When selecting the method of immobilization, the chemical structure of the enzyme used and its properties, the properties of the substrate and products, and the areas where the product formed can be used should be taken into consideration [9]. It is also very important to select a method that does not alter the chemical structure of the active groups and the chemical structure of the enzyme in the binding region of the enzyme in the immobilization process and does not cause loss of activity in the enzyme. Therefore, reaction with the groups in the binding site of the enzyme should be avoided. During immobilization, the active site of the enzyme is protected with protecting groups during coupling. After binding, the protecting groups are removed in the enzyme without causing loss of activity.

### *Physical Adsorption Method*

This method, which is used in enzyme immobilization, is based on the physical adsorption of the enzyme on the surface of a water-insoluble carrier. A reversible surface interaction occurs between the enzyme and the carrier. Adsorption is a cheap immobilization method where the simplest and most suitable carrier is used [3]. In this method hydrophobic bonding can take place and also electrostatic forces such as van der Waals forces, ionic and hydrogen bond interactions are also effective. Appropriate solvent should be used, temperature, enzyme concentration, adsorbent concentration, pH and ion concentrations should be controlled to



ensure that enzyme activity is not lost during the process and optimum adsorption conditions can be achieved. The great advantage of this immobilization method is that a reagent is generally not used and a very small number of activation steps are required. Furthermore, since the bonding is carried out with hydrogen bonds and van der Waals forces in the adsorption process, the disruptive effect of adsorption on the enzyme is much less than that of chemical bonding. That is, no chemical change takes place in the enzyme or the carrier. In addition to its advantages, the adsorption process has some disadvantages. As the bonding forces between the enzyme and the carrier are weak during the process, the adsorbed enzyme may leak from the carrier. Adsorption of the enzyme due to these weak bonds; changes in temperature, pH, ionic strength, and only substrate presence in the environment.

### ***Ionic Bonding Method***

This method, which is used in enzyme immobilization, is based on the ionic bonding of the enzyme to a carrier which is insoluble in water and contains ion exchange residue. The ease of its application is the fact that the carrier is renewable and features that increase the use of the enzyme modification method. The binding forces between the enzyme and the carrier are stronger than those with physical adsorption but weaker than with covalent bonding. For this reason, the enzyme is likely to leak from the carrier. This usually leads to substrate solutions or pH changes where the ionic strength is high [10]. Ionic binding is also heavier than that of covalent bonding of the operating conditions, with little change in the conformation and active center of the enzyme.

### ***Covalent Attachment Method***

This method is based on the covalent attachment of the enzyme to a water-insoluble carrier. Usually binding occurs between the nucleophilic group of the enzyme and the functional group of the carrier. Functional groups involved in connection; amino group (NH<sub>2</sub>), carboxyl group (CO<sub>2</sub>H), sulfhydryl group (SH), hydroxyl group (OH), imidazole group, phenolic group, thiol group and indole group. In covalent bonding, the bond between the enzyme and the carrier is stronger than in other immobilization methods. For this reason, there is no leakage between the enzyme and the carrier even in the presence of substrate or solution with high ionic strength. In addition, since the enzyme is immobilized on the carrier, the immobilized enzyme can be very easily connected to the substrate [4-6].

### ***Cross Linking Method***

Immobilization of enzymes by cross-linking is accomplished by cross-linking the protein to other protein molecules or to functional groups on an insoluble carrier. Cross-linking of an enzyme with itself is an expensive and inefficient method because in this case some of the protein acts as a carrier, resulting in a decrease in enzymatic activity. In general, cross-linking is better used with one of the other methods of immobilization [5]. When the enzyme is immobilized by covalent bonding, cross-linking is also carried out and adsorption is minimal.

### ***Arrest Method***

In immobilization by the arrest method, the enzyme is held in the polymer matrix or membrane which acts as a cage. This eclipse occurs in such a way that when the substrate is allowed to enter, the protein is retained inside. The difference between this method and covalent attachment and cross-linking is that the enzyme is free in the solution, but its movement is restricted by being held in the gel matrix or membrane [10]. For this reason, the arrest method has gained wide applicability.



### ***Advantages of Enzyme Immobilization***

The enzyme can be used many times and this reduces the cost [1,3]. Removal of the enzyme from the medium allows rapid termination of the reaction. There are no enzyme residues in the resulting products (it is very important that the enzyme does not contain contaminants, especially in the food and pharmaceutical sectors). The separation of the enzyme from the environment is facilitated. Can be worked on continuous system. Product is easily separated. The amount of waste liquid is decreasing. In some cases the activity of the enzyme is increased. Enzyme half life is long.

### **Industrial Applications of Immobilized Enzymes**

When conducting a commercial process, whether a chemical catalyst or an enzyme is used, whether free enzyme or immobilized enzyme is used, economic and environmental factors as well as health and environmental factors are taken into consideration [11, 12]. In some cases, especially in the food industry, processes using immobilized enzymes are more economical by providing large scale production compared to processes using a chemical catalyst or free enzyme [13]. Immobilized enzymes are now used in organic synthesis, analytical and medical applications in laboratory scale besides industrial applications. In analytical applications, immobilized enzymes are used in biosensors.

## **III. CONCLUSION**

Advantages that an efficient enzyme immobilization could bring about are the repetitive use of a single batch of enzymes, improved stability, abilities to stop the reaction rapidly by the removal of enzyme from the reaction solution, easy separation of the enzyme from the product and the avoidance of enzyme-product contamination. The introduction of immobilized enzyme catalysts has greatly improved the technical performance of industrial processes, thereby increasing productivity and economic efficiency.

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## **Role of alcohol dehydrogenases for the production of chiral secondary alcohols**

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### **ABSTRACT**

Production of enantiopure chiral secondary alcohols is one of the main targets in different industries including pharmaceuticals and medicine. One of the main techniques for the production of these molecules is the use of enzymes which have several advantages during these reactions such as mild reaction conditions and high level of regio- and stereoselectivity. Alcohol dehydrogenases (ADH) are such enzymes that were used for the production of bioreduction reactions to produce different chiral secondary alcohols. These enzymes can be obtained from different microbial groups such as bacteria and moulds and depending on their activities they can be used in different reactions. ADHs can be applied during the whole cell applications or they can be expressed and used as a pure protein together with the related cofactor molecules. In this study we discussed the recent developments for the use of ADHs to produce enantiopure chiral secondary alcohols.

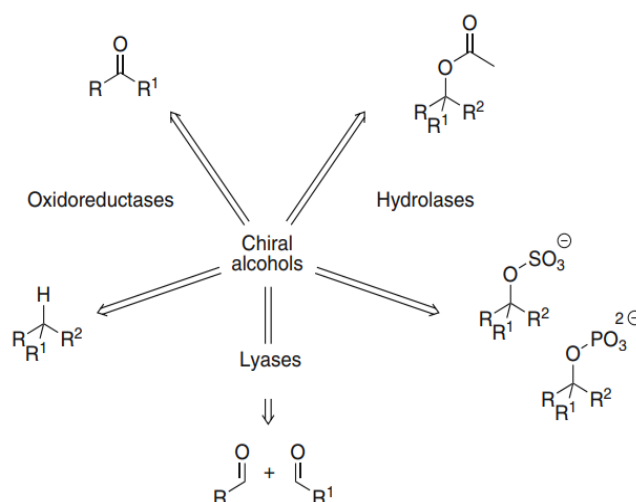
### **INTRODUCTION**

There is an increasing demand for the production of enantiopure chiral compounds as they are one of the most crucial molecules for the production of several chemical catalysts, food flavor components and more importantly several drugs used in different industries such as chemical and pharmaceutical industries (Daubmann et al., 2006). For the production of these chiral compounds several different strategies can be used such as whole cell applications which include the cultivation of the whole cells obtained from bacterial or yeast cells with the corresponding substrate to be used for the production of chiral secondary alcohols and during this application the enzymes produced by the corresponding cells intracellularly or extracellularly conduct the process for the production of the final desired chiral molecules. The use of whole cells have several advantages compared to the other applications as they do not require the cofactors which can be generally expensive that are naturally produced during the cultivation of the related microbial cell (Şahin and Dertli, 2017). Another strategy for the production of the chiral secondary alcohols is the use of expressed or isolated enzymes directly which are highly selective and recyclable catalysts especially in their immobilized forms although it should be noted that obtaining these enzymes can be generally expensive and lack of the cofactors in the reaction environment also is another drawback for the pure enzymes (Goldberg et al., 2007). Both applications rely on the use of enzymes and one of the main enzymes used for the production of the chiral secondary alcohols is alcohol dehydrogenases (ADHs) and in this study we provided the recent developments for the use of ADHs during the bioreduction processes.

### **II. ADHs AS AN IMPORTANT TOOL FOR BIOREDUCTION**

Different enzymatic groups can be used for the production of chiral secondary alcohols during bioreduction reactions including oxidoreductases which also include ADHs, hydrolases

and lyases (Figure 1) (Goldberg et al., 2007). Different enzymes from all these three groups were shown to be used for the production of the chiral compounds and in this study only ADHs was discussed.



**Figure 1.** Enzyme groups used for the asymmetric reduction reactions to produce chiral alcohols (Goldberg et al., 2007).

Alcohol dehydrogenases (ADHs) were studied during the whole cell applications as well as expressed enzymes. For the catalytic action of ADHs a crucial requirement is the presence of cofactors NADH or NADPH as the majority of the ADHs are dependent on these cofactors which should be presented in the reaction environment and approaches for the making these cofactors available in the reaction environment such as electrochemical regeneration, chemical regeneration, photochemical regeneration and enzymatic regeneration was described elsewhere (Goldberg et al., 2007).

#### ***Examples of ADHs applications with isolated enzymes and expressed enzymes***

The isolation of highly expressed enzymes from the reaction environment is a routine biotechnological approach and several studies showed the availability of this approach for the ADHs. Importantly these application has some advantages compared to the whole cells as the side reactions can be avoided by using a specific enzyme during the reactions which also makes the downstream applications easier. Another important positive role of using isolated ADHs is, they can be used safely at the high concentration of the substrates to be targeted for the chiral secondary alcohol production (Kula and Kragl 2000).

ADHs can be isolated from bacterial or fungal cells and for instance Patel et al., (1993) used the ADHs which they obtained from the cell extracts of *Acinetobacter calcoaceticus* SC 13876 to produce 6-benzyloxy- (3R,5S)-dihydroxy-hexanoic acid ethyl ester as an important chiral molecule for the production of anticholestrerol drugs and the researches produced this intermediate molecule with a yield of 92% and an enantiomeric excess (ee) of 99%. In an another study isolated ADHs from *Rhodococcus erythropolis* was successfully shown to produce chiral hydrophobic alcohols like (S)-1-phenylpropan-2-ol, (S)-4-phenylbutan-2-ol, and (S)-6-methylhept-5-en-2-ol.

Similar to use of isolated ADHs for the asymmetric reduction reactions several studies also showed the heterologous expression of the ADHs from different sources to be used in the production of chiral secondary alcohols. Importantly the production of the cofactors to be

present in the reaction environment is the target of these studies. For instance Gröger et al., (2004) revealed the asymmetric reduction of ketones with a heterologously expressed ADH together with an formate dehydrogenase as a cofactor producer enzyme in the reaction environment. The researchers cloned the ADHs from *Rhodococcus erythropolis* to *Escherichia coli* to obtain the recombinant enzyme and conducted the asymmetric biocatalytic reduction of ketones and they used the formate dehydrogenase from *Candida boidinii* to regenerate the cofactor NADPH in the reaction environment. This approach resulted in the formation of (S)-alcohols with a good conversion rates and with up to >99% ee.

### III. CONCLUSION

The examples given in this study reveals the potential of the ADHs for the production of chiral secondary alcohols with high yields and high ee values. It is also clear that one of the main drawback of the using ADHs in these reactions is the requirement of the expensive cofactors in the reaction environments and recently immobilization of the ADHs together with the GDH or FDH to be used for the regeneration process are started to be used to obtain clear reactions with cheap ways. Also as a future applications ADHs from different sources should be in silico tested if they are suitable for the production of chiral secondary alcohols at high yields and with high ee values.

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## **Production of a heteropolymeric exopolysaccharide by a *Lactobacillus plantarum* strain**

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### **ABSTRACT**

Lactic Acid Bacteria (LAB) are one of the important groups conducting the fermentation processes in different food products and are responsible for the production of different metabolites including exopolysaccharides (EPS). In this study a LAB strain was isolated from homemade Boza sample and identified as *Lactobacillus plantarum* using genotypic methods. As a slimy isolate, this strain was further tested for EPS production characteristics and the monomer composition of the EPS was determined by HPLC analysis and found to be formed by glucose and galactose as the sugar monomers. These findings are important in terms of showing a heteropolymeric EPS producer strain from a cereal-based fermented product.

**Keywords:** *Boza, Lactobacillus plantarum, exopolysaccharides (EPS)*

### **INTRODUCTION**

Boza is a cereal based fermented non-alcoholic beverage with a long history in Anatolia and Mesopotamia that spread over Balkan regions after the Ottomans and became one of the popular drinks in these areas especially in winter periods (Todorov et al. 2008). This fermentation process mainly depends on the action of Lactic Acid Bacteria (LAB) species and yeasts also have roles but not like LAB species. So far, several LAB species belonging to *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Pediococcus*, *Oenococcus* and *Weissella* spp. were shown to be isolated from Boza (Arici and Daglioglu 2002; Gotcheva et al. 2000; Hancioğlu and Karapinar 1997; Heperkan et al. 2014; Todorov and Dicks 2004; Von Mollendorff et al. 2006).

One of the most important technological and functional properties of LAB species from cereal based fermented products is determination of their exopolysaccharide (EPS) production characteristics as EPS production in cereal based LAB species is a highly common function (Gobbetti 1998). As natural biopolymers, several LAB species can produce EPS that either can encapsulate bacteria or be secreted in their environment (Dertli et al. 2016). In terms of EPS structure, LAB can produce homopolymeric or heteropolymeric EPS which can be composed of only one type of sugar monomer such as glucose, galactose or fructose and two or more types of sugar monomers, respectively.

In this study, a homemade Boza sample was collected from Bayburt province to isolate the LAB species with potential exopolysaccharide (EPS) production characteristics. A slimy colony was further selected for the determination of its EPS production characteristics and following the hydrolisation of the EPS to its monomers a HPLC analysis was further applied to determine the monomer composition of the EPS from the selected EPS producer colony.



## II. MATERIAL AND METHODS

### *Isolation of Lactobacillus plantarum from Boza*

For the isolation and enumeration of LAB, serial dilutions were plated onto both MRS5 agar contained 0.1 g of cycloheximide (Sigma, UK) liter-1 for the inhibition of yeast growth. Plates were incubated under anaerobic conditions at 30°C for 2 days. At the end of incubation period colonies with potential different morphologies were picked randomly from plates and propagated into same medium and incubated at 30°C for 2 days and then tested for Gram stain, cell morphology and catalase reaction. The selected strains were further characterized for genotypic identification.

### *Bacterial identification by 16S rRNA gene sequencing*

The 16S rRNA gene of selected LAB strain was amplified with primers AMP\_F (5'-GAGAGTTTGATYCTGGCTCAG-3') and AMP\_R (5'-AAGGAGGTGATCCARCCGCA - 3') and PCR processes were conducted as described previously (Dertli et al. 2016). The partial 16S rRNA sequences of the LAB strain was uploaded to the BLAST system and identified based on the similarity criteria of 97%.

### *Isolation of EPS and determination of monosaccharide composition by HPLC*

For the isolation of EPS, all strains were grown in a modified BHI (Brain Heart Infusion, Merck, UK) medium containing beef heart 5g/L, calf brains 12.5g/L (Sigma, UK), disodium hydrogen phosphate 2.5g/L, peptone 10g/L, sodium chloride 5g/L, glucose 10g/L, Sucrose 20g/L (Merck, TR), Tween 20 1g/L, Sodium acetate 5g/L, Peptone casein 5g/L, Peptone meat 5g/L and Magnesium Sulfate 0.2g/L (Merck, TR) to discard the potential contamination potentially originates from the yeast extract in MRS medium. All strains were grown in 100 ml final volume, inoculated at 1% (v/v) with an overnight culture then incubated at 30°C for 2 d and EPS were isolated as described previously (Dertli et al. 2016).

The monosaccharide composition of EPS was analysed by HPLC (Shimadzu) using an CARBOsep CHO-682 Pb Column and RID-10A refractive index detector with a mobile phase of H<sub>2</sub>O, flow rate 0.7 ml/min and column temperature of 25°C. Glucose, galactose, fructose, rhamnose were used as standard monosaccharides. The freeze-dried EPS were hydrolysed with 0.5 M H<sub>2</sub>SO<sub>4</sub> at 95°C for 12 h followed by neutralisation with 4 M NaOH. The hydrolysates were filtered through a 0.45 µm pore size filter and the monosaccharide compositions were determined by HPLC.

## III. RESULTS AND DISCUSSION

### *Identification of LAB from sourdough*

Boza is a good source for the LAB. In this study, a *Lactobacillus plantarum* strain EŞ1 was isolated from traditional Boza in order to test the EPS production characteristics of this strain. *L. plantarum* is one of the well known LAB species that was shown to be present in different environments. Importantly this strain showed a slimy characteristics during the isolation process which was the main reason to further identify this strain.

Determination of the EPS production characteristics of *Lactobacillus plantarum* EŞ1

As this strain showed a slimy character during the isolation we further isolated the EPS from strain EŞ1 and hydrolyzed the EPS to investigate the sugar monomer composition of this EPS using HPLC analysis. The HPLC chromatogram of the EPS EŞ1 only contained glucose and galactose nearly at equal levels showing that the this EPS formed by the glucose and galactose as the sugar monomers. Overall our findings revealed that *Lactobacillus plantarum*



ES1 a boza isolate formed a heteropolymeric EPS containing glucose and galactose as the sugar monomers.

Isolation and identification of LAB from different sources is an important issue as LAB can both act as starter cultures and produce different metabolites such as bacteriocins, vitamins and EPS that can affect the technological and physicochemical properties of food products. From this perspective in this study a LAB was isolated from Boza as a natural source of LAB and

This strain was found to be a *L. plantarum* strain and characterization of the EPS production in this strain revealed that this EPS was formed with glucose and galactose as the sugar monomers detected by HPLC analysis. This strain will be further tested for its other technological functions.

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## Are Citrus Essential Oils Lethal On Beneficial Agents?

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### ABSTRACT

We tested in this work the effect of two *Citrus* species (*Citrus sinensis* (L.) Osbeck) and *C. paradisi* Macfad) essential oils isolated from peels, on beneficial agents in laboratory conditions. The essential oils were obtained from fresh and dried zests by hydrodistillation and analyzed by gas chromatography/mass spectrometry (GC/MS). Chromatographic analysis revealed 14 compounds in the fresh zest, 17 compounds in the dry zest of *C. sinensis* and only 13 compounds in the fresh fruit pericarps of *C. paradisi*. The limonene was the major component particularly in the pomelo essential oil peels which were richer than that of the orange fruits. Alpha pinene, Beta pinene, myrcene, alpha terpineol, geraniol and limonene were common compounds to the studied essential oils. The less important was camphor represented by 2.3% in the fresh zest essential oil while linalol and citronellal are present at 7.98% and 6.24% in the dry orange zest essential oil, respectively. Biological effects have been found on the reduction of the aphidophagous arthropod *Coccinella algerica* oviposition with the use of both citrus species essential oils. Regarding antifungal activity, only the fresh *Citrus sinensis* essential oils had a significant inhibition on entomopathogenic fungi *Metarhizium anisopliae* growth but not on the antagonist *Trichoderma sp* isolate.

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### Are Citrus Essential Oils Lethal On Beneficial Agents?

Leïla ALLAL-BENFEKIH, Amira Nour El Houda HAMEL, Thoraya DAHMANE, Rachida BELGUENDOZ, Melissa BENDAR, Asma BAKARI, and Soumia SELMANI – Oral Presentation / 013

## **In Vitro Anthelmintic Efficacy TRA of *Citrullus Colocynthis* on *Haemonchus Contortus***

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### **ABSTRACT**

Gastrointestinal nematodes especially most prevalent *H. contortus* hampered livestock production throughout the world. Plant's bioactive ingredients kill parasites through multiple mechanisms and ultimately lessen emergence of anthelmintic resistance in parasites. So a simulation study on fruit extracts of *C. colocynthis* was designed to assess their anthelmintic activity against *H. contortus*. The in vitro effect of aqueous-methanol and ethyl acetate extracts of *C. colocynthis* was investigated through egg hatch and adult motility assay by administering four concentrations (25, 12.5, 6.25, 3.125 mg/ml) of each extract. Levamisole (0.55 mg/ml) and Oxfendazole (25, 12.5 6.25µg/ml) served as positive and phosphate buffered saline as negative control. Ethyl acetate and aqueous-methanol extracts paralyzed all adult worms of *H. contortus* at 4 and 8 hours post exposure at highest tested dose (25 mg/ml). In egg hatch inhibition assay, about 83.67% and 80.67% of *H. contortus* eggs failed to hatch at highest tested dose (25 mg/ml) of ethyl acetate and aqueous methanol extracts respectively. Results of present study advocate that fruit extracts of *C. colocynthis* might formulate best alternative of synthetic drugs against *H. contortus*. Further, in vivo studies are needed to investigate bioavailability of active ingredients of *C. colocynthis* to prepare less expensive ecofriendly anthelmintic and also to determine minimum non-lethal concentration needed for treatment of haemonchosis in livestock.

## **Morphophyiological and histological characterization of argan seeds**

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### **ABSTRACT**

*Argania spinosa*, a multipurpose tree species endemic to Morocco and Algeria, belong to the Sapotaceae family. In Algeria this taxon covers the extreme margins of the southeast distribution area (Tindouf), where it grows in the beds of valley, the nutritional virtues of argan oil and its vocation in cosmetology have the effect of captivate international markets. The objective of this work was to characterize the biometric argan seeds of Tindouf area and to evaluate the seed germination according to their morphological characteristics (heaviness and shape of the nuts), Thus, during this process, the endocarp structure was characterized by SEM. On average, nuts have shown the following dimensions: 1.96 cm long, 1.37 cm wide, 0.71 circularity index (width/length), 2.58 weight and 2 chamber number. The weight was a highly significant correlation with the width and index of circularity. Almost all seeds examined were found to be light with an ellipsoid shape, this form have recorded highest germination (69.52%). a relative heterogeneity of the seed germination capacity regarding the heaviness of the stones was noted, medium seeds show better germination than heavy and light seeds. The endocarp is harder and thicker, it was two-layered, the outer layer is composed of polygonal heterogeneous cells, which are not contiguous, where the intercellular spaces form small linear pits. It is composed of a few layers of cells surrounding the collateral conductive bundles, which form a characteristic reticular pattern. Radical emerged and seed opening is observed in the region delimiting the seeds (kernels) chambers, this tissue offers little mechanical strength which was required to complete germination. The results obtained in this study provide a basis for the selection of seeds for reforestation programs seedlings.

## Antimicrobial activity of *Matricaria pubescens* Desf from Bechar region South west of Algeria, and impact on butter conservation

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### ABSTRACT

In the present study, essential oil and extracts obtained from the aerial parts of *Matricaria pubescens* (Desf.) (Asteraceae), were studied for their antimicrobial activities against phytopathogenic fungal (*Aspergillus niger*, *Penicillium purpurogenum*, *A. flavus*, isolated from dates, *P. esconsum*, *P. jensinii*, isolated from Wheat. ) and bacteria (*Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* CIP 106818, *Staphylococcus aureus* ATCC 25923, *Pseudomonas aeruginosa* ATCC27853, *Bacillus cereus* ATCC 11778, *Enterococcus faecalis* ATCC 29212 and *Listeria monocytogenes* ATCC19115) . Using both disc diffusion and broth dilution methods, All fungal strains were inhibited at low concentration of 1/500. The inhibitory effect of this oil on fungal growth suggests prospects for its application in the food industry.

Besides, the influence of the addition of *Matricaria pubescens* (Desf.) powder. and/ or its essential oil on the physicochemical and microbiological quality of dates showed a decrease in humidity, the pH, peroxide index a light increase of the acidity and a reduction of the microbial flora. On the other hand, the results of the sensory analyses showed the acceptability of butter preserved with the powder of *Matricaria pubescens* (Desf.). The present results confirm the traditional use of this plant as food preservative.

**Keywords:** *Matricaria pubescens* (Desf.), butter, conservation, Antimicrobial activity, Bechar

## Anticancer effect of marine algae *Codium Geppii* extract against breast cancer cell line

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### ABSTRACT

Each year, a considerable number of drug candidates obtained from marine organisms have been identified [1]. In this aim, marine algae have emerged as alternative medicinal foods, contains the rich source of natural compounds [2]. In this research, Cytotoxic and apoptotic effect of marine algae *Codium Geppii* extracts against breast cancer cell lines investigated. Cancer cell culture conducted in the RPMI with pen-strep and penicillin, for 2 days. The MTT test and flow-cytometry used to analysis the cytotoxic and apoptotic effects of the algae extracts, respectively [3 and 4]. Best extract was more analyzed by the GC-MS-MS. Results was dose dependent. the concentration of 1000 µg/ml methanol and ethylasetate extracts showed the maximum cytotoxic effect. The maximum apoptotic activity was 4.5 and 3.5% for methanol and ethylasetate extracts, respectively. Apoptosis, first cell necrosis and final cell necrosis was seen after 48 hour treatment of the cancer cells by the methanol extract. The most compound analysed from GC-MS-MS of the metanol extract was Imidazole, 2-amino-5-[(2-carboxy)vinyl]. This compound showed the anticancer and antioxidant activity in the literatures [5]. Based on the results different extracts showed the cytotoxic and apoptotic effects, but More study in order to purification and recognition of the unknown active compounds is need.

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## New cytotoxic compound extracted from Iranian marine sponge *Spheciospongia vesparium*

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### ABSTRACT

Marine sponges are the multicellular animals and contain many bioactive and new metabolites. this research was conducted in order to recognition the cytotoxic compounds from MeOH extract of marine sponge *Spheciospongia vesparium* from Chabahar bay, Iran. Marine sponge prepared by scuba diving and freeze dried after washing. The extract of 75% methanol solvent was concentrated by rotary evaporation and the extract by distilled water, ether, ethylacetate and butanol. The ethylacetate extract showed maximum cytotoxic effect by MTT test and used to more purification by chromatography column (40×5 cm) by the gradient of acetone in trichloromethane. 8 fraction was separated by TLC and the fraction of 3 showed the maximum effect. This fraction was more purified by HPLC. 7 fraction was purified and the fraction of 2 showed maximum effect. This fraction was more purified by HPLC and 2 different fraction was extracted. The first purified fraction was dried in nitrogen atmosphere and analysed by C NMR, H NMR, IR and CHN analysing methods. Based on CHN analysis this compound involved 46.97% carbon, 8.39% hydrogen and 26.63% oxygen. H NMR analysis showed 4 resonance for methyl group, 4 aliphatic proton and one hydroxy group. C NMR showed 13 carbon signal involved 4 methyl, 2 methylene, one oxymethylene, 2 olefinic and one ketone. IR showed maximum peak in 4039, 3247, 1912, 1439, 1193, 342 cm<sup>-1</sup>. This compound showed IC<sub>50</sub> of 24.2 and 32.4 µg/ml against breast and colorectal cancer cell lines, respectively. Based on the results this compound may be an isoprenoid compound.

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## Genome – Wide Analysis and Characterization of *Eucalyptus grandis* TCP Transcription Factors

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### ABSTRACT

TCPs, a small transcription gene family, serve in developmental processes such as branching, flowering and growth of plants. In this study, TCP transcription gene family of eucalyptus, which is considered as being important for its medicinal and industrial uses was investigated. A total of 16 *Eucalyptus grandis* TCP (*Egra-TCP*) genes were found to be distributed on chromosome 1, 2, 4, 6, 7, 9, 10 and 11. While several segmentally-duplicated gene couples including *Egra-TCP-7/Egra-TCP-11*, *-13* and *-16*, *Egra-TCP-6/Egra-TCP-12* and *-15*, *Egra-TCP-12/Egra-TCP-15* and *Egra-TCP-11/Egra-TCP-13* were discovered, *Egra-TCP-3/Egra-TCP-4* gene couples were found as tandem duplicated genes. *Egra-TCPs* were divided into three main clades based on phylogenetic analysis, motif and gene structure. While *Egra-TCP-3* has the highest molecular weight with 44.98 kDa, the lowest one was *Egra-TCP-1* with 21.68 kDa. Three *Egra-TCP* genes (*Egra-TCP-4*, *-11* and *-13*) were found to have no introns. On the other hand, *Egra-TCP-7*, *-15* and *-16* genes have single intron. The orthologous relationships among *E. grandis/Arabidopsis thaliana* and *E. grandis/Vitis vinifera* were found through synteny analysis. Digital gene expression profiles of *Egra-TCP* genes in tissues such as shoot tips, young leaf and mature leaf were revealed high expression pattern. The results of this study may provide important contributions to the biotechnology area and may serve additional information for further understanding the molecular basis of the TCP gene family in eucalyptus plant.

**Keywords:** Eucalyptus, TCP transcription factors, in silico analysis, digital gene expression.

## **Linkages of Farmer's Knowledge and Sunflower Production in Sindh Province of Pakistan**

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### **ABSTRACT**

The economy of Pakistan is agrarian in nature and the backbone of the country's economy. Since, couple of year the net import bill of edible oil has increased considerably and its alarming situation and has huge extra burden on the country's reserves. In the country the Agriculture has the largest sector and has remained the mainstay of country economy as it contributes 20.9% of the GDP (Gross Domestic Product) and provides employment to 43.5 percent population and also provides inputs for agro based industry (GOP, 2015). Sunflower is an important oilseed crop of Pakistan. The main objective of this study is to demonstrate the case of crop production and protection technologies and management practices of farmers in the latest release of the different agro-climatic zones and agriculture fields. The cropped area for sunflower stood at 353 thousand hectares during 2014-15 against last year's area of 384 thousand hectares showing a decrease of 2.7 percent. Sunflower production for the year 2014-15 stood at 178 thousand tones seed and 68 thousands tones in oil production (GOP, 2015). The major oilseed crops grown in the country include Sunflower, Canola, Rapeseed/Mustard and Cotton. During 2013-14 total availability of edible oil was 3.20 million tones. Local production of edible oil contributed 0.573 million tons while import of edible oil/oilseeds was 2.627 million tones. The edible oil import bill during 2013-14 was Rs. 246.895 billion (US\$ 2.50 billion). During 2014-15, 1.789 million tones edible oil of value Rs. 139.344 (US\$ 1.377 billion) has been imported showing an increase of 4.07 percent against the same period 2013-14. Local production of edible oil during 2014-15 is estimated at 0.546 million tones. Total availability of edible oil from all sources is provisionally estimated at 2.335 million tons during 2014-15. The area and production of oilseed crops during 2013-14 and 2014-15. Due to slump in international market of edible oil and oilseeds, the local traders offering Rs. 2,050/- to Rs. 2,100/- per 40 kg for canola crop produce in 2014-15. Low prices in local market discouraged the oilseeds growers resulting decline in edible oil production. Last year average price of oilseeds (Canola/sunflower) prevailed around Rs. 2,500/- to Rs. 2,800/- per 40 kg (GOP, 2015). The major objective of the study is to identify the factors affecting on yield and timely decisions of sunflower market and its bottleneck in production practices. The results revealed that lower level of adoption of improved

agricultural technology innovation diffusion process and a key aspect for improving agricultural production at a faster rate the most important. A large number of technology developments in the agricultural sector have not been accepted by the farmers by the greatest extent possible. The use of new crop production techniques, oil crops frontline demonstrations began to show a real farm. The researchers did a careful consideration follow scientific and rational research methodology. The methodology used for the survey and the way on which necessary information has been collected from a selected area and the analytical technique applied in the study. Survey method was adopted to collect data and information from farmers. Research depends on the reliability of a great extension for the appropriate method in the study. A list of participants was obtained who were participated in demonstration. Highest number of participants was observed from Golarachi. Seventy growers were selected by random sampling technique. Out of 70 samples, 40 were participants farmers and 30 were be non-participants farmers growers were randomly selected based on highest number of respondents participated in demonstration from a particular village. Hence, this taluka was selected for the study purposes due to the more area under sunflower crop and the area most suitable or moderate weather for the sunflower production. In Pakistan, Sindh province was grown the Sunflower crop which was only 19 percent of the total Sunflower area as compared with other provinces. The sample was selected randomly 10 villages from Golarchi town/taluka, Sindh province of Pakistan for the study. All the collected data were summarized and scrutinized carefully and recorded in Statistical Package for Social Science (SPSS). Among salient findings indicates that 92.50 percent of participant farmers had knowledge regarding recommended variety, whereas 66.67 percent of non-participant farmers were not known about recommended variety. In case of seed rate 87.50 per cent of participant farmers and 43.33 percent of non-participant farmers had correct knowledge. Majority of the farmers 82.50 percent of participant farmers while more than half of (60.00%) non-participant farmers also were aware of spacing. Whereas, 80.00 and 90.00 percent of participant farmers and 80.00 and 63.33 percent of non-participant farmers had knowledge about the practices like intercultural operations and plant protection measures, respectively. It is evident that 88.33 percent of participant farmers and 63.33 percent of non-participant farmers adopted the recommended variety/hybrid. In case of spacing 52.50 percent of participant farmers and 30.00 percent of non-participant farmers fully adopted, whereas 47.50 per cent of participant farmers and 70.00 per cent of non-participant farmers partially adopted. Regarding FYM application, 47.50, 42.50 and 10.00 percent of participant farmers and 53.33, 26.67 and 20.00 percent of non-participant farmers belongs to full adoption, partial adoption and non-adoption category, respectively. Overall in the study area farmers marketed more than 80 percent of the total produce to the private agencies, and the rest was sold to local market, Waparries (Local traders/commission agents). It could be observed that the B:C (Benefit Cost) ratio of the participant farmer was 2.57:1, whereas, it was 1.32:1 in case of non-participant farmers. Almost all the farmers described a variety of marketing constraints; about one-third respondents reported the monopoly of PASSCO with a minor role of private sector. Delay payments, unfair deductions from produce and underweighting problems were recorded by

40.7, 46.2 and 42.5 percent growers, respectively. It is clear from the results that, the benefit cost ratio of the participant farmer was higher than the non-participant farmers. The contents clearly indicates that, irrespective of participant and non-participant farmers clearly expressed that non availability of seeds, high seed cost, high cost of fertilizers, non-availability of fertilizers at times and high cost of plant protection chemicals and plant protection measures are the major constraints in sunflower production and ranked accordingly. The suggested recommendation, that is information/knowledge regarding production practices has breach between farmers and it's scientifically and technically applications are often absent and completely missing. So that, related technical information about recommended production practices and its related marketing issues information should be and must be transferred to farmers' knowledge. Therefore the administrators, planners and executers must give the focal importance to execute the frontline demonstrations concept and special orientation training should be given to the departmental staff for further to train the progressive farmers and grassroots extension workers around their demonstrations. Consequently, the administrators and implementing officers should also keep in view while selecting demonstrators because the results shows the height of the sunflower production potential and similarly that potation helps to overcome and reduce in the edible oil net import bills. Therefore, these demonstrators in turn motivate non-participant farmers for full adoption of recommended technologies of Sunflower to increase the income on sustainable basis.

**Key Words:** Sunflower, Production, Development, Knowledge, and Sindh.

## Follow up of Wound Healing of the Skin by Topical Application of Platelet Rich Plasma in Sheep

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### ABSTRACT

Platelet-rich plasma offers a promising new technique for regenerative medicine. The aim of this study was to evaluate the healing activity of PRP by its topical application on the skin injured experimentally in sheep. 09 sheep aged 6 months were used in this study. After the sterile preparation of the skin, full thickness wounds (20 x 20 mm) were created on the back of each animal. Contraction measurements of the skin were performed using a digital caliper. Morphometric data obtained were subjected to statistical analysis (ANOVA: Tukey HSD test, P <0.05). In conclusion, it seems to us that the use of PRP accelerates the contraction of wounds in sheep from the first post-surgical week.

**Keywords:** Plasma rich in platelets, Morphometric, Scar, Skin, Sheep.

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## **Exogenous SNP Supply Affects Sulfate Assimilation Pathway Enzymes to Improve Drought Tolerance in Maize (*Zea mays* L.)**

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### **ABSTRACT**

Nitric oxide (NO) is a key stress signaling molecule involved in regulation of stress defense responses in plants. The present study investigated the role of exogenous NO supply (as SNP [sodium nitroprusside]) in improving drought tolerance of maize seedlings. The plants of drought tolerant (NK8711) and sensitive (P1574) maize hybrid were fertigated with different concentrations of SNP (0, 100, 200, 300 and 400  $\mu$ M) and exposed to drought stress one week after seedling emergence. A significant reduction in plant biomass was noted in seedlings under water stress conditions. Fertigation with SNP was found to be effective in improving drought tolerance of maize seedlings through reduction in lipid peroxidation, malondialdehyde and H<sub>2</sub>O<sub>2</sub> content. A significant increase in activity of antioxidant enzymes such as superoxide dismutase, catalase, guaiacol peroxidase and glutathione reductase was noted at 200  $\mu$ M however, higher doses (300 and 400  $\mu$ M) caused a marked reduction in activity of antioxidant machinery in both maize hybrids. We conclude that optimum supply of SNP (as a source of NO) is an effective approach to increase resistance in plants under water deficit conditions.

### **ACKNOWLEDGEMENT**

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**Exogenous SNP Supply Affects Sulfate Assimilation Pathway Enzymes to Improve Drought Tolerance in Maize (*Zea mays* L.)**

*Sadia MAJEED, Muhammad NAEEM and Muhammad Yasin ASHRAF – Oral Presentation /022*

## Utilization of Liquid Organic Fertilizer to Reduce Inorganic Fertilizer Usage and Increase Cane Sugar Production

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### ABSTRACT

Agricultural wastes can be processed into liquid organic fertilizer to supply nutrient to plant. Proper management of plant nutrients will improve soil productivity and increase the yield of sugar cane. The aim of this research is to study the effect of Liquid Organic Fertilizer (LOF) and boiler ash application in reducing the usage of inorganic fertilizer and increasing cane sugar production. A Split-Split-Plot field experiment was arranged in a Randomized Completely Block Design with three replicates. The main plot was inorganic N, P, K fertilizer (standard dose, 2/3 standard dose, 1/3 standard dose). The sub plot was boiler ash application (80 tons/ha boiler ash and without boiler ash). The sub-sub plot was type of Liquid Organic Fertilizer (LOF) (LOF "Bacteria", LOF "Double" and LOF "Plus", no LOF application). Field observation was conducted every two months for 1 year to observe plant height and plant population. Upon harvesting sugar cane production, sugar content and sugar production was measured.

**Keywords:** liquid organic fertilizer, sugar cane production

Utilization of liquid organic fertilizer to reduce inorganic fertilizer usage and increase cane sugar production

R.R Rukmowati Brotodjojo, Oktavia S Padmini, Saefudin Saeroji – Oral Presentation /023



## Modulation of Suppression of HIF1 $\alpha$ /VEGF/VEGFR Signaling Pathway by Isoquinoline Alkaloid Berberine in Avian Tibial Dyschondroplasia

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### ABSTRACT

**Introduction** Tibial dyschondroplasia (TD) is a long bone intractable disorder of fast growing poultry birds characterized by the appearance of non-vascularized and non-mineralized cartilage masses in tibial growth plates. This economically important disease has been reported to cause devastating effects on poultry industry in recent years. The role of angiogenic signaling pathway; hypoxia-inducible factor-1 $\alpha$  (HIF-1 $\alpha$ ), vascular endothelial growth factor (VEGFA), VEGF receptors (VEGF1 & VEGF2) and interleukin-8 (IL-8) in causing this condition has been considered very crucial. Berberine is a botanical alkaloid which is present in the barks and roots of several plants. The rhizome *Coptidis* has been reported to be its major active component. Multiple types of pharmacological effects including angiogenic agent, anti-inflammatory, anti-cancer and antibiotic have been mentioned.

**Experimental Trial** A study was designed to investigate the effects of alkaloid berberine in the modulation of suppressed angiogenic signaling pathway in tibial dyschondroplasia in chicken broilers. The birds were divided into two groups; (A) control group (n=100) with normal diet, (B) TD group (n=150) which received a normal diet with 40 mg/kg of tetramethyl thiuram disulphide (thiram) to induce TD. On day 7 post-hatch, half of birds from the TD group were separated and designated as (C) Treatment group which received alkaloid berberine (25 mg/kg/day) orally. Slaughtering was done on day 14 post hatch.

**Results** In this study, we found that, compared to normal, the down regulation of HIF-1 $\alpha$  and its clients VEGFA, VEGFR1, VEGFR2 and IL-8 hindered the tibial vascular distributions leading to the disruption in blood supply in growth plate. However, in contrary, the berberine treatment modulated the activity of HIF-1 $\alpha$  enhancing the tibial angiogenesis due to the pro-angiogenic factor up-regulation (including VEGFA, VEGFR1, VEGFR2, and IL-8). Such changes, as a result, brought the vascular channels to the TD-afflicted area and thus abrogated the lameness of the birds.

**Conclusion** The occurrence of TD, as described in previous studies, is highly associated with inhibition of tibial angiogenesis through down-regulated expressions of HIF-1 $\alpha$ , VEGFA, VEGF receptors and IL-8, which results in suppression of growth plate development. Our findings reveal that the alkaloid berberine treatment is suggestive of reverting such condition into the normal vasculature by the up-regulations of the clients of signaling pathway.

Modulation of suppression of HIF1 $\alpha$ /VEGF/VEGFR signaling pathway by isoquinoline alkaloid berberine in avian tibial dyschondroplasia

Muhammad SHAHZAD, KUN Li, JIAKUI Li – Oral Presentation /024

## **Sub Lethal Effects of Endosulfan on Hematological and Histopathological Profile of Snakehead Fish (*Channa punctatus*) during Acute Toxicity**

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### **ABSTRACT**

Present study was conducted to evaluate the sub lethal effects of commercial Endosulfan on haematological and histopathological parameters of fresh water fish *Channa punctatus*. The fishes were segregated into five groups where first group was considered as control while other groups were considered as treated. In treated groups fish were exposed to sub-lethal concentration of Endosulfan (0.25 ppb, 1.0 ppb 2.0 ppb & 3 ppb) for 96 hours. The obtained results indicated significant alteration in haematological and histopathological parameters of *Channa punctatus* due to Endosulfan intoxication. There was significantly ( $p < 0.05$ ) increased number of platelets and white blood cells (WBCs) observed in treated groups, while significantly ( $p < 0.05$ ) decreased in number of red blood cells (RBCs), haemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular haemoglobin (MCH) were observed in treated group compared to control group. In experimental groups the Histopathological alterations were observed including disturbance of cartilaginous core, atrophy, shortening of secondary gills lamellae, gills epithelial lifting, lamellar disorganization, hyperplasia and vacuolations in liver, while necrosis, haemorrhages, loss of secondary lamellae, blood congestion, secondary gills lamellae fusion, closure of cell membrane, curling, pyknosis, blood congestion and necrosis in villi, whereas excessive goblet cells formation, detachment, fusion and shortening in villi of intestine were reported. It was concluded that as the concentration of Endosulfan was increased, there was an effect of Endosulfan on increased number of haematological and histopathological parameters. This study could be useful for measuring possible environmental risk to aquatic life.

**Acknowledgment:** The author sincerely acknowledges Department of Zoology Government Postgraduate College Haripur for facilitation.

**Sub lethal Effects of Endosulfan on Hematological and Histopathological Profile of Snakehead Fish (*Channa punctatus*) during Acute Toxicity**

*Muhammad Fiaz KHAN and Shezad GAYYOUR – Oral Presentation /025*

## A New Model in the Agricultural Extension Organization: Farm Consultancy

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### ABSTRACT

With agricultural extension activities farmers can increase agricultural production income by obtaining necessary information. On the other hand, with agricultural extension, farmers become individuals, who are able to seek solutions to their problems and make their own decisions by analyzing their problems and situations. When the looking at the history of agricultural extension in Turkey, it can be seen that there are a lot of applied related projects. These are TYUAP, KÖYMER and TARGEL projects which come to mind at first. At 2016, farm consultancy began to be applied in Turkey. This model is based on a farm and free technical consultancy system. In this study, agricultural extension activities are explained from past to present and then farm consultancy model is introduced.

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## **Investigating Selenium Mediated Processes to Improve Food Quality in Wheat under Water Limited Environment**

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### **ABSTRACT**

Climate change has become one of the most important global phenomena posing serious threats to agricultural systems of climate sensitive countries like Pakistan. Development of efficient, low risk, cost-effective strategies is critical to adapt to new hazards to achieve the goals of sustainable crop production. Selenium (Se) is not considered essential for plant growth but is responsible for regulation of various metabolic processes in plant species. However, the positive effects of Se uptake and accumulation in plant systems, particularly under abiotic stresses like drought, are still unclear and need to be explored. The study aimed at investigating the effects of Se seed priming on wheat growth and Se accumulation under water deficit conditions. We report that Se ameliorates the drastic effects of water stress through maintenance of plant water status, enhanced gas exchange characteristics, improved pigments and increased activity of antioxidant machinery. The detection by ICP-OES showed that Se regulated processes facilitated the accumulation of Se in grains and ultimately improved the yield of wheat water deficit conditions. The study concludes that Se seed priming is an effective approach to increase Se content in wheat under normal and drought stress conditions.

**Investigating Selenium Mediated Processes to Improve Food Quality in Wheat under Water Limited Environment**

*Fahim NAWAZ, Rashid AHMAD, Muhammad Yasin ASHRAF and Rao Muhammad IKRAM – Oral Presentation /027*

## Bioautography and Antifusaric Activity of Three Acids from Pyrolysis of *Acacia tortilis subsp. raddiana*

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This work is interested in the study of the antifusaric activity of three acids from carbonisation wood of (*Acacia tortilis subsp. raddiana*). The activity is carried out on eight strains *Fusarium oxysporum f.sp milonis* (FOM3, FOM7), *Fusarium oxysporum f.sp albedinis* (FB1, FB2, FO36, 2DB) and *Fusarium graminearum* (S6, FG8) at different concentrations. The autobiography revealed the effects of 3 acids.

The results of antifungal activity showed that the three acids (GA1, GA2, GA3) completely inhibit the growth of fungal strains tested. For GA1 inhibition was observed with an MIC of 0.810 µg / ml for FOA (FB2) and FOM3. The MIC was 0.523 µg / ml for FOA (2DB) and FOA (FB1), for FOA (FO36) was 0.710 µg / ml, and at 0.915 µg / ml for (S2),(FG8) and FOM7. Concerning GA2 the MIC is on the order of 0.130 µg / ml for FO36, 0.280 µg / ml for *Fusarium graminearum* (S6) and FOA (FB1). The MIC of 0.710 µg / ml for FOA (2DB). While GA3 inhibits growth with MIC of 0.520 µg / ml for FG8 and *Fusarium graminearum* (S6) and FO36. the MIC of 0.094 µg / ml, for FOM3, FOM7. and the MIC of 0.020 µg / ml. for FOA (FB1) and FOA (FB2).

The valorization of the TLC plates using an autobiography technique based on Iodo-nitro tetrazolium as developer showed the presence of 3 spots of anti-FOA activity.

**Keywords:** Acids – Pyrolysis – *Acacia tortilis subsp. raddiana* – MIC - Antifungal activity - Bioautography *Fusarium oxysporum f sp albedinis*.

## Effect of Biochar and Vermicompost Applications on the Development of Wheat and Some Soil Properties

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This study was conducted in the climate of Abant İzzet Baysal University Faculty of Agriculture and Natural Sciences. The effect of biochar and vermicompost (0, 5, 10 and 20%) on the development of wheat and some soil characteristics was investigated. The experiment was set up as four replications according to the design of randomized parcels. Plant height, wet weight, dry weight, root length, root age, root dry weight, pH, salt, lime and organic matter contents were determined at the end of the study.

With increasing biochar applications, plant height, plant age weight, plant dry weight decreased compared to control. Root length, root age and root dry weight were increased by 5% and 10 biochar applications, while decreased by 20% biochar application according to control. Significant increases were achieved with increasing vermicompost practices. Both biochar and vermicompost treatments resulted in a significant increase in salt, pH and organic matter content, and a statistically significant decrease in lime content. As a result, vermicompost applications can provide significant benefits in soil fertility and plant growth, while biochar is thought to be more beneficial when supplemented with organic inorganic fertilizers.

## **Betaine supplementation during the fattening period mitigates hyperthermia in heat-stressed, gradually hypohydrated Awassi ram lambs**

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### **ABSTRACT**

We have previously demonstrated the efficacy of betaine (an osmolyte) in ameliorating hyperthermia-provoked stress in rats and broiler chicks. A similar approach on fattening male Awassi ram lambs, chronically-instrumented with thermologging devices, was carried out. Intake of dietary betaine showed a pronounced heat stress-alleviating effect.

### **ACKNOWLEDGEMENT**

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**Betaine supplementation during the fattening period mitigates hyperthermia in heat-stressed, gradually hypohydrated Awassi ram lambs**

*Hosam AL-TAMIMI, Bilal OBEIDAT, Kamel MAHMOUD and Mousa DARADKA – Oral Presentation /030*



## Cereal $\beta$ -D-glucan and its benefit for the plant and consumer

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### ABSTRACT

Plants have evolved to live in environments where they are often exposed to different stress factors. Permanently changing climatic conditions in the environment as well as biotic and abiotic forms of stress can negatively affect the life cycle of crops what can result in reduced seeds quality and loss in yield. Being sessile, plants have developed specific mechanisms that allow them to detect precise environmental changes and respond to complex stress conditions, minimizing damage while conserving valuable resources for growth and reproduction and, on the other hand, human consumption. Cereal grains have long been recognized as a superior nutritive value and their grain composition is very favorable for human nutrition and health-prevention. Currently, the demand for oat and barley raw seeds is increasing. Compared to other cereals, these seeds contain significantly higher amounts of essential amino and fatty acids, dietary fibre and its soluble fraction  $\beta$ -D-glucan as well as other beneficial phytochemicals (tocopherols, avenanthramides and others). (1-3)(1-4)-beta-D-glucan works in the plant also as a tool of plant protection. In some cereals, especially seeds of oat and barley, it is located in cell walls. Higher amounts of this polysaccharide have been detected in naked seeds compared to hulled, so there is an assumption of protecting role of the polysaccharide in the cell to resist the effect of stress factor to the intracellular space (especially the DNA). In heat stress, higher amounts of this homopolysaccharide have been accumulated in the seeds as a regulator of humidity in the plant, again, with the assumption of protecting role in heat stress conditions. In our experiments, plants with higher amount of  $\beta$ -D-glucan were more resistant to biotic stresses caused by pathogens such as *Fusarium* or leaf-rust. This cell polysaccharide is observed only in some cereals, plants growing in broad-spectrum of regions, very often of extreme inhospitable conditions. On the other hand, the physical and physiological properties of cereal beta-glucans are of commercial and nutritional importance. Increasing interests during the last two decades are largely due to their acceptance as functional, bio-active ingredient. Among grasses, mature grains of barley and oat are suitable natural sources of health beneficial  $\beta$ -D-glucans with the average amount 41.6 g.kg<sup>-1</sup> and 34.9 g.kg<sup>-1</sup>, respectively. Naked seeds dispose of the highest amount of this cell wall polysaccharide. Genotype and environment are factors influencing the amount of glucans, whereby genotype is superior. Higher temperature during grain maturation and lower precipitation increase its amount, also N and Se fertilization. On the other side, warehousing decrease the portion of soluble glucans in milled grains, but cooling can slower it. Hydrogels prepared from cereal glucans of different origin are one of possibilities to increase this component in food products and make foods healthier. According to our results, oat glucans in the amount 2% improve the total tastiness of bread and soften the acid taste of ketchup. The potential of  $\beta$ -D-glucan in cereal seeds as a natural tool of plant protection and its adaptation as well as its uses in food industry are discussed in the contribution.

### ACKNOWLEDGEMENT

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## **Pretreatment with Selenium or Zinc Regulates Physiological Processes and Antioxidant Machinery to Improve Drought Tolerance in Maize (*Zea mays* L.)**

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### **ABSTRACT**

The cumulative and long-term effects of climate change demand the development of sustainable mitigation approaches to mitigate the adverse environmental changes. Treatment of seeds is considered as a short-term, cost-effective strategy to improve growth and yield of crops exposed to various environmental stresses including drought. A wire-house study was planned to evaluate the effect of exogenous Selenium (Se) or Zinc (Zn) supply on pigments and antioxidant machinery of a maize (*Zea mays* L.) hybrid under drought stress. The seeds of an indigenous maize hybrid (cv. Neelum) were treated for 12 and 24 h using seed priming treatments of Zn (10 mM) and Se (0.1 mM), developed using zinc sulfate (ZnSO<sub>4</sub>) and sodium selenate (Na<sub>2</sub>SeO<sub>4</sub>), respectively. The plants were exposed to drought stress (60% field capacity) and normal conditions (100% field capacity). The results showed that drought negatively influenced the germination and seedling growth of maize. A significant increase in the chlorophyll content and antioxidant enzymes activity (catalase, superoxide dismutase and guaiacol peroxidase) was noted in seedlings raised from Zn or Se treated seeds that helped to maintain biomass in water stressed plants. However, the combined treatment with Zn and Se (Zn + Se) was found to be more effective than their individual treatments to improve drought tolerance in maize. The results may be utilized for improving germination, growth and yield of maize of maize in areas facing acute shortage of water.

**Key words:** Selenium; Zinc; Seed treatment; Antioxidant enzymes; Drought tolerance; Maize

**Pretreatment with Selenium or Zinc Regulates Physiological Processes and Antioxidant Machinery to Improve Drought Tolerance in Maize (*Zea mays* L.)**

*Fahim NAWAZ, Bilal ZULFIQAR, Muhammad Yasin ASHRAF and Rao Muhammad IKRAM – Oral Presentation /032*

## Analysis of growth in different feeding butchery Morkaraman lambs after weaning by linear and non-linear models

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### ABSTRACT

This research aimed to determine the mathematical model that best describes the growth curves of live weight gains of different fattening applications after weaning of Morkaraman lambs of butchery. In research; 45 male Morkaraman lambs after 75 daily age (weaning cut age) until 135 daily age, three groups with the title of 15' were randomly allocated and different feeding was applied. The first group in addition to the morning-evening ad-libitum breast-feeding in pasture grazing, the second group was fed with concentrate and clover as ad-libitum in corral after weaning, the third group was grazed on pasture after weaning. Live weights of lambs weighed in 15-day periods from birth to 135 daily age were analyzed with linear (linear, quadratic, cubic) and non-linear (Brody, Bertalanff, Logistic, Gompertz Richards, Negative Exponential) models. The model with high the coefficient of determination ( $R^2$ ) and low the mean square error (MSE) was chosen as the best model to defining growth. It is determined that the linear model which best describes the growth of the Morkaraman male lambs is Cubic and the non-linear model is Gompertz.  $R^2$  and MSE obtained with Cubic model in the second group were 0.9995 and 3.336, respectively. A, B, k,  $R^2$  and MSE estimated in the second group with Gompertz model were  $60.914 \pm 4.935$ ,  $2.589 \pm 0.0572$ ,  $0.0117 \pm 0.009/\text{day}$ , 0.9995 and 3.310 respectively. In conclusion, it was observed that the second group of lambs developed faster than the other groups and reached adult weight at an earlier age.

**Keywords:** Different feeding, Morkaraman lamb, growth curve, linear and nonlinear models

## **The Effects of enterprise income, size and breeders' certificate on the Growth Performance of Morkaraman Lambs**

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### **ABSTRACT**

This study aims to determine the effects of the enterprise's income, the number of animals in the enterprise and the breeder's certificate on the live weights of lambs at different periods. In the study, 2338 male Morkaraman lambs coming from breeding ewe flocks from 30 different enterprises who were part of a project being carried out in Ağrı, "The National Improvement Programme of Small Ruminants at the Hands of Public", were used. The enterprises were grouped according to their income, size and the breeder's certificate of education. The effect of the enterprise's income on birth weight was significant ( $P<0.05$ ) whereas the effects of other factors were found to be insignificant. The effects of the income, the size of the enterprise and the breeder's certificate of training were statistically important for 90<sup>th</sup> day and 120<sup>th</sup> day live weights of the lambs ( $P<0.05$ ). The effects of income, the size of the enterprise and breeder's certificate of training on the 90<sup>th</sup> (weaning), 120<sup>th</sup> (selecting for breeding) and 455<sup>th</sup> (before delivering) day live weights of the 558 male lambs selected for breeding were similar to the flock they came from. According to the results of this study; in Morkaraman sheep breeding, enterprises, which are entirely in animal production business and have the animal production as the only source of income, with a number of animals between 100-500 and who also give breeders certified training related to breeding, have greatly contributed ( $P<0.05$ ) to the growth of lambs, and eventually resulted an improved weight gain of the lambs.

**Keywords:** Market lamb, Morkaraman, enterprise income, enterprise size, breeder certificate

## The Determination of Ornithological Potential of Iron Marshes (Bitlis-Muş)

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### ABSTRACT

In the present study the bird species living in the Iron Marshes (Bitlis-Muş) were investigated. Dobinson's point and line transect methods were used for counting of birds. 173 bird species belonging to 40 families were identified during about a year of observation period. These species were classified as follows 29.5 % (n=51) resident, 53.17 % (n=92) migratory, 12.71 % (n=22) winter visitor and 4.62 % (n=8) transit migratory species. According to the Red Data Book, 20 species are in A.1.2, 34 species are in A.2, 48 species are in A.3, 19 species are in A.3.1, 17 species are in A.4, 23 species are in A.5, 1 species is in B.2, 6 species are in B.3, 2 species are in B.3.1, 2 species are in B4 status and 1 species is in B.5. According to the IUCN criteria, 2 species were determined to be in EN, 7 species in NT, 3 species in VU and 161 species in LC status.

### ACKNOWLEDGEMENT

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## Determination of Levels of Heavy Metals (As, Cd, Pb, Cu and Fe) in Feathers of Armenian Gull (*Larus armenicus*) Inhabiting Van Lake Basin

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### ABSTRACT

The metal concentrations of feathers of the Armenian gull (*Larus armenicus*), a resident species in the Van Lake Basin, had been observed in this study which took place between June 2016 and July 2017. These birds take place in higher trophic level; in this respect the aim of our study was to detect the heavy metal deposits in the vicinity by determining the concentrations of iron (Fe), copper (Cu), lead (Pb), cadmium (Cd) and arsenic (As). As a result of analysis made on adult, nestling and water samples; the As concentration was highest (5.17 mg / ml) in water, Fe concentration was highest (94.32 mg / kg) in adult cover feathers and the highest concentration of Cu (6.43 mg / kg), Pb (4.02 mg / kg), Cd (0.14 mg / kg) was found in nestling cover feathers. While the metal concentration in the feather was observed as Fe > Cu > Pb > As > Cd and it was Fe > As > Cu > Pb = Cd in the water samples.

### ACKNOWLEDGEMENT

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Determination of Levels of Heavy Metals (As, Cd, Pb, Cu and Fe) in Feathers of Armenian Gull (*Larus armenicus*) Inhabiting Van Lake Basin

Atilla DURMUŞ and Nurgül TAŞKIN– Oral Presentation /036

**Maturity and Biology of the Reproduction of Cartilaginous Fish:  
Lesser-Spotted Dogfish *Scyliorhinus canicula* (Linnaeus, 1758),  
from the West Coast of Algeria**

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**Abstract**

Our study of sexual maturity and biology of reproduction (laying) of the chondrichthyen, the small dogfish *Scyliorhinus canicula* (Linnaeus., 1758) was carried out during a year from January 2012 until December 2012 on specimens fished from the bay of Oran. Our sample includes a total of 570 specimens; 281 males with a total length (TL) 22,5 – 54,5cm and a total weight (TW) ranging from 26,6 – 532g while the 289 females have a total length (TL) between 27 – 49cm and a total weight (TW) ranging from 49,59 – 423,22g. We note that males are longer and heavier than females. The study of sex ratio by month and size class shows a significant predominance of large males (sub-adultes and adultes). The estimated value of the size of first sexual maturity (50% of matures) of two sexes corresponds to a total length of 37,5 cm in females and 39,5 in males respectively. We notice that the smallest specimen female mature of *S. canicula* meet during our sampling measures 37 cm with a weight 200, 61g. The laying of our species is annual without interruption with two main peaks in winter and spring and a third less important in autumn.

**Keywords:** *Scyliorhinus canicula*, chondrichthyen, maturity, reproduction, bay of Oran.



## **The role of ellagic acid against oxidative kidney damage induced by radiation in experimental animals**

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### **ABSTRACT**

In this study, it was aimed to investigate effect of ellagic acid against cornea damage induced by ionizing radiation. Twenty-four rats were used in this study. The rats were divided into 3 groups (rats in each groups). Groups were prepared as control, radiation and radiation+ ellagic acid groups. In the radiation group, the abdominal area was exposed to 12 Gy radiation. Ellagic acid was performed intraperitoneally at 100 mg/kg dose to rats in the ellagic acid for one week ellagic acid treatment group for then irradiated as used in the radiation group. In the ionizing radiation group, the malondialdehyde was significantly elevated and superoxide dismutase, catalase activities decreased compare to the control group, and observed that malondialdehyde level was decreased and superoxide dismutase, catalase activities increased in the ellagic acid treatment group. Our findings shown that ellagic acid has antioxidant effect against oxidative kidney damage in radiation-induced in experimental animals.

**KEYWORDS:** Radiation, kidney, ellagic acid.

**The role of ellagic acid against oxidative kidney damage induced  
by radiation in experimental animals**

*Hilal KIZILTUNÇ ÖZMEN – Oral Presentation /038*

## **The Role of Turkey in the World Hazelnut Export**

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### **ABSTRACT**

The aim of this study is to estimate the future of the global hazelnut sector for 2018-2025 using the data of 1961-2017. ARIMA model was used to forecast hazelnut production and export quantity. Hirschman Herfindahl Index (HHI) and Concentration Ratios (CR) have been used to determine market status. According to HHI and CR, world hazelnut market was oligopoly in 1961-2017 and the biggest player in this market was Turkey. Because Turkey was the largest manufacturer and marketer of hazelnut in the industry, 64% of the production and 68% of the exports of world hazelnut were provided by Turkey as average between 2011-2017 periods. Turkey determines the world price in hazelnut. According to concentration ratio, CR1 will be 0.67 from 0.69; this means that about 69% of the world hazelnut production will have been provided by the Turkey from 2018 to 2025. The number of countries that hazelnuts production in the world had risen from 12 to 31 in the past fifty seven years. According to the findings of this study, it was forecasted that the competition degree of Turkey's hazelnut export market will increase during the period from 2018 to 2025. The results obtained from this study will help policy makers monitor the way for hazelnut marketing in Turkey.

**Keywords:** Hazelnut Export. Turkey. ARIMA Model

## Estimation of Egg Production in Turkey for Years between 2018 and 2025 with ARIMA Model

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### ABSTRACT

This study aimed to estimate the egg production in ten leading egg-producing provinces and overall Turkey for the years between 2018 and 2025 using 1991-2017 data. ARIMA models were used for future estimations in the study. It was determined that the data in the 11 models to be employed in the study be non-stationary, therefore they were to convert to stationary series by one-year differencing. Criteria such as AIC, BIC, SSE, MSE, and MPE were taken into consideration in determining the most suitable ARIMA model in the study. The ARIMA models for the provinces and overall Turkey were identified to be Konya (1,1,3), Afyon (4,1,0), Manisa (2,1,1), Balıkesir (0,1,2), İzmir (0,1,3), Çorum (0,1,0), Bursa (3,1,0), Kayseri (3,1,2), Ankara (5,1,0), Gaziantep (1,1,1), and Turkey (5,1,0). It was estimated based on the data of years between 1991 and 2017 that the share of these ten provinces in egg production of Turkey would rise from 64.84% to 81.01% in the coming eight years. In the ARIMA models employed, a change ranging from + 0.11% to -2.37% was calculated between the estimated value and the real value. Also, according to the average population between 1991 and 2017, the estimated average change in Turkey's population for years between 2018 and 2025 was found to be +23.84%. It was estimated that given the egg production in the ten provinces and overall Turkey, only two provinces, namely Çorum (15.25%) and Balıkesir (14.94%), would make less egg production in comparison to the increase in the rate of the population growth in Turkey. Overall, it was determined that the average egg production in the coming eight years in ten province of Turkey would gain 24.94% increase compared to the average production in the last 27 years. Considering these results, it is necessary to conduct studies to inform the consumers so that the annual 203 egg consumption per capita could be increased in the coming years. In addition, these ten leading egg-producing provinces should spend efforts to get a veterinary health certificate or the like to increase Turkey's share in exporting eggs, or they should at least maintain their current market share and try to get a place in the emerging markets.

Keywords: ARIMA model, Turkey, Egg production, Time series

## **Potential Role of Silymarin and Cysteine against Hepatotoxicity Induced by Nickel in Albino (Wistar) Rats**

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### **ABSTRACT**

The present study was conducted to investigate the protective effects of silymarin and L-Cysteine on nickel-induced hepatotoxicity in albino Wistar rats. Male rats were divided into six groups of seven each: Control, silymarin (Sil), cysteine (Cys), nickel (Ni), nickel plus silymarin (Ni+Sil) and nickel plus cysteine (Ni+Cys). Nickel as nickel sulfate ( $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ ) (20 mg/kg b.wt.) was given intraperitoneally on alternate days until the tenth dose, methanolic extract of silymarin and L-Cysteine (100 mg/kg) were given orally to rats for 21 days. The administration of nickel caused a significant decrease in body weight with a significant increase in liver weight. Nickel treatment also produced oxidative liver injury characterized by an increase in serum glucose concentration, levels of hepatic markers enzymes (GPT, GOT, LDH and ALP) and bilirubin. Furthermore, the exposure to nickel significantly increased malondialdehyde level and decreased reduced glutathione concentration and superoxide dismutase, catalase and glutathione peroxidase activities. These results are substantiated with marked changes in the histopathology. However, the treatment with Sily or Cys significantly lowered the level of lipid peroxidation and enhanced the antioxidant status, and resulted a reduction of the necrotic damage caused by nickel and thereby restored the previous biochemical parameters. The results of this investigation showed that nickel induced hepatotoxicity due to the excess generation of free radicals and impairment anti-oxidant defenses, but the use of silymarin extract or cysteine countered the adverse effects of nickel to a major extent, suggesting their anti-oxidant potential.

**KEY WORDS:** nickel, silymarin, cysteine, hepatotoxicity, oxidative stress.

## **Development of iron zinc fortified pasta and its impact on physicochemical, cooking quality attributes and blood serum biomarkers**

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### **ABSTRACT**

Developing countries are consistently being challenged with the menace of malnutrition and micronutrient deficiencies. Present research was an attempt to develop iron and zinc fortified pasta to improve nutritional profile and address vulnerable population segments. Purposely, iron zinc blend pasta were developed at various levels initially to develop a product compatible for addressing the abovementioned health challenge following a rodent experimental model. From results, it was found that dough rheology results exhibited as  $47.5 \pm 1.47$ ,  $45.6 \pm 1.41$  and  $47 \pm 1.50$  for  $T_0$ ,  $T_1$  and  $T_2$ , respectively. It is evident that arrival time for  $T_0$  to  $T_2$  was 1.67 min. Peak time was  $5.07 \pm 0.19$ ,  $5.47 \pm 0.26$  and  $5.37 \pm 0.41$  for  $T_0$ ,  $T_1$  and  $T_2$  respectively. Likewise, departure time was  $10.17 \pm 0.39$  min for  $T_0$ . Mean values of mixing tolerance index (MTI) for the wheat white flour and fortified sample were as  $39.97 \pm 1.51$  and  $39.97 \pm 1.51$  B.U, respectively. On the basis of quality attributes *i.e.* physicochemical and cooking analyses, the best fortified treatment ( $T_2$ : NaFeEDTA+ZnCl<sub>2</sub> 40:30 ppm) was chosen for bioefficacy trial. Regarding organs, zinc analysis showed significant difference among the groups. The iron and zinc fed groups were observed to be acquiring higher iron and zinc status in the rats' organs (liver, kidney and heart). For liver, iron and zinc values were observed in the  $G_0$  (control) group as  $249.17 \pm 4.98$  and  $35.87 \pm 0.72$  µg/g, respectively. However, relatively higher levels of zinc were recorded in  $G_1$  (iron and zinc fed) groups as  $804.23 \pm 16.08$  and  $47.58 \pm 0.95$  µg/g, correspondingly. It was noticed that the levels of iron and zinc were elevated to about 22.33% and 32.64%, respectively as compared to  $G_0$ . From the results, it can be deduced 25.13% of iron and 48.74% of zinc was increased in iron and zinc fed group. The outcomes of current investigation revealed that introducing and developing some new flour based products like pasta is a good way of targeting the general public which are more prone towards the deficiency disorders.

### **ACKNOWLEDGEMENT**

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**Development of iron zinc fortified pasta and its impact on physicochemical, cooking quality attributes and blood serum biomarkers**

*Waqas AHMED, Azmat Ullah KHAN and Summer RASHID – Oral Presentation /042*

## Effect of *Acacia tortilis* Areal Parts Methanolic Extract on Foodborne Pathogens

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### ABSTRACT

*Acacia tortilis* (Umbrella thorn acacia) is widely distributed in the Middle East and the Great Rift. In folk medicine *A. tortilis* bark is used for skin ailment and as a cough medication. The bark was reported to possess antibacterial activity, but the efficacy of other areal parts was not reported earlier. In this study the antibacterial activity of methanolic extract of *A. tortilis* leaves, thorns and branches against Gram-positive (*Staphylococcus aureus*) and Gram-negative (*Escherichia coli* 0157:H7) foodborne pathogens were evaluated using agar diffusion test and minimal inhibitory concentration (MIC). Methanolic extract of *A. tortilis* branches possessed the highest antibacterial activity followed by the leaves methanolic extract. Whereas, thorns methanolic extract did not possess antibacterial activity at all concentrations. MIC of leaves extract was 8.1 mg for *S. aureus* and, 10.8 mg for *E. coli*. MIC of branches was 8.1mg for *S. aureus* and 5.4 mg for *E. coli*. Antibacterial activities displayed by *A. tortilis* branches and leaves signified their remarkable potential for exploration of effective natural antibacterial agents against common pathogenic bacteria

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## **A Faster Method of Estimating Groundwater Pollution Potential by Assessment of Site Environmental Conditions**

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### **ABSTRACT**

In the conditions of intensive agriculture, the soil receives a number of pesticides, slurry and fertilizers. Fertilizers contain phosphates and nitrates, which are subsequently leached away with rainwater, which results in nutrient concentration, possible water contamination, water quality decrease and water eutrophication of surface waters. Slovakia has significant reserves of groundwater, which are also used as a source of drinking water and therefore their protection is a particularly urgent issue. Monitoring of groundwater quality as well as of pollutant movement is time consuming and costly. The aim of this contribution was to assess the potential of groundwater contamination on the agricultural soil in the cadastral territory of Veľké Zálužie (Western Slovakia) by DRASTIC and PESTICIDE DRASTIC models. A partial objective was to apply these models in a GIS environment. The intention of our study was to find out whether agricultural production in the study area affects the potential of groundwater contamination and if it does, how much. According to our results, areas with up to medium potential of contamination by pollutants were identified, but during torrential rainfall the risk momentarily increases. It is recommended to pay more attention to these areas if they are used for agricultural purposes. Crop rotation for period 2013-2015 was studied on the 3 plots (total area 65.2 ha) with the highest risk of groundwater contamination potential. Maize, winter wheat, oilseed rape and sunflower were treated by 758 litres of various pesticides during the crop seasons in 2013-2015. Moreover manure dump was located at one of these plots in 2014. We concluded that the process of crop rotation planning should be done with respect to plant nutrient requirements, the need of pesticide application as well as implementation of agronomical practice. A greater consistency is recommended during planning e.g., when considering the application time and the amount of fertilizers and pesticides applied.

### **ACKNOWLEDGEMENT**

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**A Faster Method of Estimating Groundwater Pollution Potential by Assessment of Site Environmental  
Conditions**

*Elena KONDRLOVA, Jaroslav ANTAL and Alan LACA – Oral Presentation /044*



## Induction of *AHR*- and *Nrf2*-mediated responses in human intestinal Caco-2 cells by indole-3-carbinol, L-tryptophan and related plant-based foods

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### ABSTRACT

The aryl hydrocarbon receptor (*AHR*) is a ligand-activated transcription factor which has widely been studied for its role in response to dioxins and dioxin-like compounds, and potential role in immuno modulation *via* immune cells. Recent research indicated direct interaction of *AHR* with a second transcription factor, oxidative stress-protecting *Nrf2* (nuclear factor erythroid 2-related factor 2), which has been shown to be a downstream target of *AHR*. Although the biological function of these *AHR-Nrf2* mediated responses in gut epithelial cells is not fully understood yet, dietary phytochemicals have the potential to activate *AHR-Nrf2* gene battery in these cells, leading to potentially protection against xenobiotics and support of immune responses. In this study, we examined the effects of indole-3-carbinol (I3C) and I3C-rich cruciferous vegetables, including cabbage (red and white) and cauliflower, as well as L-tryptophan (L-Trp) and L-Trp-rich nuts, including sunflower seeds, cashew, pistachio, and walnut, on *AHR-Nrf2* detoxification pathway in gut epithelial cells. We made use of the *in vitro* digestion-Caco-2 cell system in which effects of the food compounds were studied based on real-time qPCR measurements of a full set of genes assumed to be active in *AHR-Nrf2* pathway. Additionally, *AHR*-activating potencies of the authentic I3C and L-Trp standards and the related food materials were evaluated using Dioxin Receptor Chemically-Activated Luciferase gene eXpression (DR CALUX<sup>®</sup>) bioassay. The authentic I3C standard and I3C-rich cabbage, especially red cabbage, exerted mostly *AHR*-related effects (activation of *CYP1A1* gene expression). L-Trp, itself, induced the *AHR*-related gene expression (*CYP1A1* and *TiPARP*); whereas L-Trp-rich nut samples, specifically sunflower seeds and pistachio, represented both *AHR* (the target gene *CYP1A1*) and *Nrf2* (the target genes *HMOX1* and *SQSTM1*) related pathway activations. We conclude that dietary bioactives are potential candidates for the stimulation of xenobiotic detoxification mechanism as being either selective *AHR* activators or mixed *AHR/Nrf2* activators.

Induction of *AHR*- and *Nrf2*-mediated responses in human intestinal Caco-2 cells by indole-3-carbinol, L-tryptophan and related plant-based foods

Gamze TOYDEMİR, P. Balaji VENKATASUBRAMANIAN, Linda M. P. LOONEN, Jerry M. Wells, Nicole de WIT and Jurriaan J. Mes – Oral Presentation /045

## Quality of White Poppy Seeds and His Application into Bakery Products in Slovak Republic

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### ABSTRACT

Poppy (*Papaver somniferum* L.) is worldwide cultivated as a basic raw material for manufacture of pharmaceutically important narcotics as well as for production of seeds. In 2012, the Czech Republic was a leading producer of poppy seeds in the world with a total production of 12,814 tons. In Slovakia, poppy is cultivated mainly for oily seeds containing 50% of oil. Seeds are used especially in the food industry as sprinklings and fillings in confectionary and bakery. In our experiment we evaluated the basic quality parameters of the seed such as oil content, fatty acids composition, micronutrients such as calcium content, phosphorus content in selected white poppy seed variety named Albin cultivated in Slovakia. This variety was selected after screening of 16 poppy varieties and was chosen for the highest calcium content. The aim of the study was application of white poppy seed into bakery products made from composite flours, where we added to wheat flour grinded white poppy seed at 0 % (control), 5 %, 8%, 10 %, 12 % level of substitution. We evaluated basic technological parameters of composite flours (sedimentation index, falling number), rheological properties of dough (water absorption, dough development time and stability, farinograph quality number), quality parameters of bakery products (loaf specific volume, ratio length/high, sensory parameters). According our results we can state, that with increasing of level of substitution significantly ( $P < 0.05$ ) decreased values of basic parameters, rheological parameters and bakery parameters, too. Value of sedimentation index of control was 46 ml, falling number 330 s, poppy seeds substitution at 12 % level of sedimentation index was 27 ml, falling number 290 s. Value of water absorption were decreased from 56,8 % near control to 50,8 % near 12 % level of poppy substitution. Specific volume of bread was reduced about 1,7 % at 5 % level and about 8,6 % at 10 % level of substitution. But sensory evaluation of bakery products was very positive, flavour and taste of bakery products with white poppy seed was better than control. Overall acceptance addition of grinded white poppy seed was at 10 % level. On the base of our results, our author collective obtained utility model which was published by Industrial Property Office of the Slovak Republic in the year 2014, with name "Composite flour for preparation bread and buns with higher content of calcium". Composite flour with 10 % level of white poppy seeds contains 183 mg/100g of calcium against wheat flour 21 mg/100g and higher content of polyunsaturated fatty acids 4,05 g/100 g against wheat flour 0,73 g/100 g. In the competition DANUBIUS GASTRO 2015 in Slovakia (bakery competition) was awarded to decree for using marking "Excellent round cake 2015" for bakery product "Potato round cake with white poppy seed".

**Key words:** white poppy, bakery quality, farinograph, bread, calcium

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Quality of White Poppy Seeds and His Application into Bakery Products in Slovak Republic

Soňa GAVURNÍKOVÁ, Michaela HAVRELETOVÁ, Darina MUCHOVÁ, Andrea LANČARIČOVÁ, Marcela GUBISOVÁ – Oral Presentation /046

## Usefulness of a Equine IgG Test, Glutaraldehyde test (GCT) duration and Brix Refractometry as Indicators of Passive Transfer Status in Neonatal Foals

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### ABSTRACT

It is known that the performance of a commercial equine IgG test (Snap foal IgG test kit) to evaluate the passive transfer status in neonatal foals. We evaluated the usefulness of colostrum Brix refractometry measurement and glutaraldehyde test (GCT) duration as indicators of FTPI. Forty (40) neonatal foals (0-1 days old) were used. Blood samples were collected 12 hours after birth from foals, and colostrum samples from mothers. In results, the percentage of colostrum Brix activity in the group A (sIgG level >800 mg/dl) (mean: 26±0,8 %) was significantly higher ( $p<0,05$ ) than the group B (sIgG level 400-800 mg /dl) (mean 21,9±1,2%). Conversely, serum GCT duration was significantly decreased in neonatal foals after the 12<sup>th</sup> hr. The serum GCT duration was significantly lower ( $p\leq 0,001$ ) than group B (2,9±0,4 min). The results of this study clearly demonstrate that measurements of sIgG, percentage colostrum Brix activity and serum GCT duration after suckling are useful to detect Failure of Passive Transport (FPT) in foals.

**Keywords:** foals, newborn, FPT, sIgG, brix, GCT

## Safety and healing efficacy of Atlas cedar (*Cedrus atlantica* M.) wood essential oil cream

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### ABSTRACT

Wound care can be traced back to early civilizations, and many of these treatments were based on the use of herbal remedies. The present investigation was undertaken to formulate a dermal cream from wood essential oil of Atlas cedar (*Cedrus atlantica* M.) and to determine its safety and efficacy on scarification wound model.

In vivo, the tolerance of the wood essential oil cream was tested on rabbit skin. On the other side, wound healing activity was evaluated by linear scarification on wound model. The healing potential was comparatively assessed with a reference ointment Madecassol®, which contains 1% of Centella asiatica extract and the vehicle alone (placebo).

The dermal cream was found to be relatively well tolerated by rabbit after iterative skin applications for 28 days. No persistent macroscopic lesions were found and no significant skin thickening was detected. The evolution of the wound healing in the three groups treated by the different dermal creams was uneven. The two groups treated with Madecassol® and the dermal cream of Atlas cedar wood essential oil showed a significant decrease in the wound size from the first days of application. On the other hand, the healing by the Placebo was only partial.

The present findings provide scientific evidence to the medicinal properties of *Cedrus atlantica* M. wood essential oil which have a positive effect on the speed and the quality of healing comparable to that of a commercial cicatrizing cream.

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Safety and Healing Efficacy of Atlas Cedar (*Cedrus atlantica* M.) Wood Essential Oil Cream

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## Factors Effective Live Weight in Anatolian Buffaloes in Birth-1 Age Period

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### ABSTRACT

This research was conducted to determine on live weight in Anatolian Buffaloes in birth-1 age period the mother age (3-4 years, 5-6 years and 7+ age group), birth year (2012, 2013 and 2014), birth season (spring and summer), enterprise size (1-3 heads, 4-6 heads and 7+ heads) and gender (male and female). The material of the research was formed by the data belong to of 110 heads of buffalo calves that were grown in Pasinler district of Erzurum born between 2012-2014. Weights at sundry age term were determined in 0-12 month age period. The effect levels and the averages of the effective factors on the weights in each period examined were calculated. According to this; weights at birth, 3, 6, 9 and 12 months weights were found  $29.30 \pm 0.614$ ,  $66.77 \pm 1.380$ ,  $87.50 \pm 1.712$ ,  $113.38 \pm 1.934$  and  $138.93 \pm 2.428$  kg respectively. In the research, the effect of the year on the weights at all ages term were found very significant ( $p < 0.01$ ), while the effect of gender not significant. The effect mother age birth and 12 months weight ( $p < 0.05$ ), the birth season 6 months weight ( $p < 0.05$ ) and 9 months weight ( $p < 0.01$ ) and enterprise size 6 months weight ( $p < 0.05$ ) was important. In conclusion, average weights determined for various age periods in Anatolian Buffaloes were generally found to be lower than the values reported in limited studies for race.

Keywords: Anatolian Buffalo, live weight, mother age, enterprise size, birth season

## Growth effect of different feeding methods in morkaraman butchery male lambs

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### ABSTRACT

This study was carried out with the aim of comparing 3 feed types made in enthalpic feed in addition to 2 feed types commonly used in Morkaraman lamb breeding in Ağrı province. Lambs were fed with milk until the 75th day after birth weights were recorded. After the lambs were cut from the column, 3 different feeding types were applied in 15 groups. 1. In the morning and evening in the group, grazing is done next to the breastfeeding, in the 2nd group the lamb is grown and the feed is fed with dry grass. In the third group, only the pasture is fed with feeding. Cuttings were shipped on all 135 days of age in all three groups.

Morkaraman in male lambs; birth weight, live weight (kg) on days 45, 90, and 135, respectively, in group 1;  $4,07 \pm 0,137$ ,  $14,43 \pm 0,613$ ,  $25,91 \pm 0,677$ ,  $33,43 \pm 0,727$ , 2nd group;  $4,40 \pm 0,132$ ,  $12,95 \pm 0,304$ ,  $25,37 \pm 0,471$ ,  $35,88 \pm 0,875$  and Group 3;  $3,65 \pm 0,151$ ,  $13,22 \pm 0,277$ ,  $23,12 \pm 0,912$ ,  $26,95 \pm 1,084$  kg. The differences between the groups after milking were significant ( $P < 0.01$ ,  $P < 0.05$ ) and the similarities were found between the differences between the first two groups. 75-90, 90-105, 105-120, 120-135, and pre-delivery periods daily live weight gains (g) in group 1; 309,33, 173,40, 159,20, 169,00, 217,40, 2nd group; 314, 80, 216, 93, 228, 93, 254, 67, 233, 33, and 3rd group; 170,27, 92,07, 93,60, 79,53 and 172,60 g, respectively. 105-120 at Kuzular. And 120-135. Day body weight gain was significant ( $P < 0.01$ ) between the groups, 45-90, 90-105 and pre-birth and pre-sale periods showed similarity in the first two groups 3. Difference between the groups was significant ( $P < 0.01$ ).

As a result, it was found that only the pasture feeding was insufficient in lamb enlargement. It was found that the intensive feeding and feeding of the mother between the first two groups were very effective in growth. It has been concluded that lamb feeding should be supported by intensive livestocking or supplemental feeding to the lamb.

**Keywords:** Morkaraman, live weight increase, lamb growth

## ***Rhizoctonia* Species from Strawberry Plants in Erzincan Provinces, Turkey: Anastomosis Groups and Pathogenicity**

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### **ABSTRACT**

*Rhizoctonia* species are soilborne pathogens and widespread host range. The pathogen reduces the production and quality of the crops, including strawberry. *Rhizoctonia* spp. has been damage in strawberry grown for at least a century and black root rot is referred. The study was conducted determination of anastomosis groups and pathogenicity of *Rhizoctonia* isolates from strawberry plants in Erzincan Province during 2009-2010. As a result of this study, 163 *Rhizoctonia* isolates were obtained. Of these, 11 isolates were *Rhizoctonia solani*, and 152 isolates were binucleate *Rhizoctonia*. Anastomosis groups of all isolates were determined. Pathogenicity trials were conducted strawberry plants (cv. Fern) with selected isolates.

**Keywords:** Strawberry, *Rhizoctonia* spp., black root rot, anastomosis group, pathogenicity.

***Rhizoctonia* Species from Strawberry Plants in Erzincan Provinces, Turkey: Anastomosis Groups and  
Pathogenicity**

*Tuba GENÇ KESİMCİ, Emre DEMİRER DURAK and Erkol DEMİRÇİ – Oral Presentation /051*



## **Vegetative Compatibility Groups and Pathogenicity of *Verticillium dahliae* Isolates from Strawberry Plants in Erzurum and Erzincan Provinces, Turkey**

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### **ABSTRACT**

*Verticillium* wilt, caused by the soil-borne fungi *Verticillium dahliae*, is an important disease in strawberry. The pathogen is lead to decreasing yield and quality in strawberry. This study was carried out to determine vegetative compatibility groups (VCGs) and pathogenicity of *V. dahliae* isolates from strawberry plants in Erzurum and Erzincan provinces during 2008-2010. Two hundred two *V. dahliae* isolates obtained, and their VCGs were identified. As a result of the test, 881 mutants obtained which using nitrate non-utilizing mutants (nit), and classified as nit1 (782 mutants) and nitM (99 mutants). Result of complementation with reference tester isolates, *V. dahliae* isolates from strawberry plants were characterized as VCG2B (73,4%), VCG4B (15,8%) and VCG2A (6,4%), whereas VCGs of 9 isolates (4,4%) were not identified. Pathogenicity tests were conducted on strawberry (cv. Fern), using a root-dip method. As a result of pathogenicity tests, VCG2A isolates were more virulent than VCG4B and VCG2B isolates, respectively. This is the first study of VCGs of *V. dahliae* isolates from strawberry plants in Turkey.

**Keywords:** Strawberry, *Verticillium dahliae*, vegetative compatibility group, nit mutant, pathogenicity

## Investigation of Usability Potentials of Some Entomopathogenic Bacteria and Fungi in Biological of Potato Beetle (*Leptinotarsa decemlineata* Say)

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### ABSTRACT

In this study; a total of seven bacterial strains (*Bacillus cereus* FD-63, *Bacillus sphaericus* FD-49, *Bacillus subtilis* EK-7, *Bacillus thuringiensis* subsp. *kurstakii* FDP-41, *Brevibacillus brevis* CP-1, *Pseudomonas chlororaphis* NEM-28 and *Pseudomonas fluorescens* KŞN-1 strains) and one fungus isolate (*Beauveria bassiana* ET-10 isolate) were tested for determining of biological control activity against on mature potato beetle (*Leptinotarsa decemlineata* Say) and on 1., 2. and 3. larvae stages in in greenhouse and field conditions. In both studies; it was used a mixture (including %30 sterile Nutrient Broth medium and %70 liquid carrier) as negative control and chemical insecticide REDSUNNY (Lambda-Cyhalothrin) as a positive control. In the greenhouse conditions, all of the bacteria and fungus were tested for effectiveness of biological control activity. After than, the most effective three bacterial strains were tested for in field conditions. Greenhouse experiments were carried out with 5 replications and field experiments with 4 replicates. According to the results of greenhouse experiments in the first period larval; *B. thuringiensis* subsp. *kurstakii* FDP-41 and *B. brevis* CP-1 strains caused 10% and 6% mortality, respectively. In the second larvae stage, both *P. fluorescens* KŞN-1 and *B. bassiana* ET-10 caused 10% mortality. However, none of them was effective in the third stage larvae. In mature insects, the most effective application was *P. fluorescens* KŞN-1 strain with the %80 percentage of death. The effectiveness of *P. chlororaphis* NEM-28, *B. bassiana* ET-10, *B. sphaericus* FD-49 and *B. thuringiensis* subsp. *kurstakii* FDP-41 stains were observed as %10. *B. brevis* CP-1, *B. thuringiensis* subsp. *kurstakii* FDP-41 and *P. fluorescens* KŞN-1 strains was determined as effective isolates in greenhouse conditions were selected for testing in field conditions. According to the results obtained from field conditions; *B. brevis* CP-1, *B. thuringiensis* subsp. *kurstakii* FDP-41 and *P. fluorescens* KŞN-1 strains caused death with the percentage of %20, %41,33, %11,33 in the first larvae stage, respectively. The effectiveness of these bacterial on the percentage of death had been %26,66, %20 and %4,66 in the second larvae stage; %24,66, %10 and %6,66 respectively. In addition, *B. brevis* CP-1 was not found to be effective in mature insects, in *B. thuringiensis* subsp. *kurstakii* FDP-41 and *P. fluorescens* KŞN-1 strains caused death with the percentage of %30 and %4, respectively. As a conclusion; we think that *B. thuringiensis* subsp. *kurstakii* FDP-41, *B. brevis* CP-1 and *P. fluorescens* KŞN-1 strains can be used for successfully in biological coltrol of potato beetle.

### ACKNOWLEDGEMENT

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Investigation of Usability Potentials of Some Entomopathogenic Bacteria and Fungi in Biological of Potato Beetle (*Leptinotarsa decemlineata* Say)

Gökhan ERARSLAN and Prof. Dr. Recep KOTAN – Oral Presentation /053

## Biological Control of *Coniella Granati* Saccardo in Pomegranate

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### ABSTRACT

*Coniella granati* Saccardo (Synonym *Pilidiella granati*) is a fungal pathogen that causes fruit brown rot, cankers on shoots and crown rot of pomegranate trees. Although cultural and chemical control is recommended against *C. granati*; cultural control is not enough and limited number of advisable fungicides used in chemical control against this pathogen. Therefore, alternative strategies are needed for this pathogen control. In this context, it was aimed to investigate the effect of some bacterial biocontrol agents against *C. granati* under *in vitro* conditions. Dual culture of eleven bacterial biocontrol agents [1 *Bacillus megaterium* (TV 3D), 3 *Bacillus subtilis* (TV 6F, TV 17C, CP1), 1 *Bacillus cereus* (TV 85D), 1 *Paenibacillus polymxa* (TV 12E), 2 *Pseudomonas fluorescens* (MF 3, AR 9), 1 *Burkholderia cepacia* (BA 7) and 1 *Bacillus thuringiensis* (BAB 420)] were tested for antagonistic properties against *C. granati*. Percent inhibition rate values changed from 11.90 % to 66.67 % in dual culture. *B. cereus* (TV 85D, 66.67 %) was the most effective strains against *C. granati* respectively by *B. subtilis* (TV 17C, 64,29 %; TV 6F, 60,71 %) in *in vitro*. As a result of, promising results were obtained from these isolates in *in vitro* conditions. These isolates should be tested in vivo conditions for controlling the post-harvest decay of pomegranate fruits caused by *C. granati*.

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## Assessment of Erythrocyte Membrane Durableness, Hematological Parameters and TOS/TAS Index Effects of Oleander (*Nerium oleander* L. ) Plant Flower Lyophilized Extract on Streptozotocin-Induced Diabetes in Rats

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### ABSTRACT

The present study has been focused on the erythrocyte fragility, hematological parameters, total antioxidant status (TAS), total oxidant status (TOS) and TOS/TAS index of flower lyophilized extract obtained from *N.oleander* plant on Streptozotocin (50 mg/kg, single dose)-induced diabetes in rats. The extract at doses of 25, 75, 225 mg/kg body weight (BW) were orally administered to the test animals for 21 days. Forty nine rats were separated into seven experimental groups: Control, Nole (50 mg/kg), DM, DM+Gly (3 mg/kg), DM+Nole (25 mg/kg), DM+Nole (75 mg/kg) and DM+Nole (225 mg/kg).

In the obtained results, it was observed that erythrocyte hemolysis of DM group was increased (at 0.2 and 0.3 NaCl concentrations) about 2 times compared to other groups whereas treatment groups significantly inhibited erythrocyte hemolysis, especially in DM + NO-225 dose group. Hematological parameters showed some fluctuations in the groups, but DM + Gly group showed significant increase in red blood cells (RBCs), hemoglobin (HGB), hematocrit (HCT) levels compared to all other groups. In addition, DM group white blood cells (WBC), red cell distribution width (RDWs) and mean corpuscular volume (MCV) values increased with respect to the control groups whereas mean cell corpuscular hemoglobin concentration (MCHC) value decreased significantly. DM group when compared with the control and treatments groups, a remarkably lower total antioxidant status (TAS), but higher total oxidant status (TOS), and oxidative stress index (OSI) were seen in blood plasma. As a result, *N.oleander* flower lyophilized extract showed that the extract possessed inhibiting/delaying erythrocyte hemolysis, antihemototoxic and antioxidant properties against STZ-induced diabetes in rats.

**Key words:** Diabetes mellitus, TOS/TAS index, Erythrocyte fragility, *N.oleander* flower.

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Assessment of Erythrocyte Membrane Durableness, Hematological Parameters and TOS/TAS Index Effects of Oleander (*Nerium oleander* L. ) Plant Flower Lyophilized Extract on Streptozotocin-Induced Diabetes in Rats

Abdulahad DOGAN – Oral Presentation /055

## Lettuce Growth, Nutrient Uptake and Enzyme Activity Response to Excess Copper

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### ABSTRACT

Copper is an essential element for plants, but its higher concentration can make disruption in plant growth. This study was planned to determine the impact of excess copper (Control 0.2, 200 and 400  $\mu$ M of copper sulfate) on growth, chlorophyll content, nutrient absorption and enzyme activity in lettuce. The results of this study highlighted that chlorophyll content, superoxide dismutase (SOD) and ascorbate peroxidase (APX) activity was higher in the plants exposed to copper treatments. The peroxidase activity (POD) showed a different behavior depending upon the metal concentration and a little activity of catalase (CAT) was observed under the excess copper. Copper application causes a decrease in leaf area (leaf expansion), root and shoot dry weight. Copper sulfate clearly decreased N, K, P, Si, Zn and Mg content in leaves and roots, whereas it increased B content in roots. According to the results of this study, we can conclude that lettuce showed a tolerance to copper toxicity by alteration in mineral nutrition uptake, enzyme activity, chlorophyll content and leaf expansion.

### ACKNOWLEDGMENT

We are very grateful to Atatürk University for its generous financial support.

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Lettuce Growth, Nutrient Uptake and Enzyme Activity Response to Excess Copper

Mostafakamal SHAMS, Melek EKINCI, Metin TURAN, Atilla DURSUN, Raziye KUL, Ertan YILDIRIM – Oral Presentation /056

## Status of the tissue antioxidant system in *Alburnus tarichi* during anadromous migration

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### ABSTRACT

Migration is a energy demanding activity that animals allocate their energy reserves to growth, reproduction and survival [1, 2]. The endemic, anadromous *Alburnus tarichi* (Cyprinidae) migrates to freshwater inlets pouring into the Lake Van. Lake Van is the largest soda lake on the Earth which possesses highly alkaline and brakish water. During anadromous migration from the lake to the freshwater, *A. tarichi* encounters many challenges such as acclimation to freshwater, swimming activity, reproduction cost and avoiding predators. The aim of the present study is to investigate antioxidant defense system status in the tissues (liver, gill, white muscle, trunk kidney and anterior intestine) of *A. tarichi* during migration. For this purpose, the fish were sampled from three different sampling points at two different periods through migration route including Lake Van (prespawning) and enterance or upstream of a freshwater stream (Karasu) (spawning). Then, antioxidant system indicators were studied in the tissues. Our results showed elevated levels of malodialdehyde in liver, white muscle and anterior intestine, indicating oxidative stress, and tissue-specific antioxidant responses in the freswater stream. This study reports firstly in the anadromous cyprinid fish that oxidative stress takes place in the spawning migration. On the other hand, the existence of antioxidant system responses may reflect an important role during migration and provide finally an accomplished reproductive activity

### ACKNOWLEDGEMENT

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## **The protective role of jervine in gastrointestinal toxicity induced during radiotherapy**

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### **ABSTRACT**

In this study, we investigated whether Jervine (J) could prevent gastrointestinal side effects of abdominal and pelvic radiotherapy (RT) on Wistar albino rats. Rats were divided into five groups as control (group I), J 5 mg/kg/days for 7 days (group II), RT only (group III), J administration for 7 days before RT (group IV) and J both before and after RT for 3 days (group V). The weights of rats were measured on the 1, 7 and 10<sup>th</sup> days of the study. After all these applications, rats were sacrificed to obtain the liver, kidney, and small intestine following taking blood samples intracardiacally. The small intestine samples were evaluated histopathologically. In addition, pyruvate dehydrogenase kinase (PDK) levels in the liver, kidney and small intestine were measured immunohistochemically. Serum total protein concentration, serum albumin, globulin, albumin/globulin levels, ALT, AST and GGT activities were determined. All histopathologic examinations showed that J administration (group IV) had significant improvement compared to group III ( $p < 0.05$ ); however the improvement was not significant when group V was compared to group IV. There was no weight difference between the groups on days 1 and 7 of the experiment ( $p > 0.05$ ). However, rats in the RT receiving groups (group III, IV and V) were lighter than the control group on the 10<sup>th</sup> day of the experiment. PDK levels significantly decreased in the liver, kidney and small intestine in group IV and group V ( $p < 0.05$ ). There was no significant difference in serum total protein concentration, serum albumin, globulin, albumin/globulin levels and gamma glutamyl transferase (GGT) activities among groups. While RT treatment increased ALT and AST activities ( $p < 0.001$  and  $p < 0.05$ , respectively), J administration especially both before and after RT (group IV) decreased ALT ( $p < 0.001$ ) activity relative to group III. In conclusion, our histopathological, immunohistochemical and biochemical results suggest that jervine had a protective effect on gastrointestinal toxicity following RT.

**The protective role of jervine in gastrointestinal toxicity induced during radiotherapy**

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## **Determination of the Some Quality Criteria and Content of the Nutrient Elements in the Local Black Chickpea Genotypes Grown in Different Locations**

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### **ABSTRACT**

Experiment, Turkey in 7 different locations (Diyarbakır / Dicle, İstanbul, Mardin, Elazığ Elazığ / Gezin, Iğdır and Hatay) grown hydration capacity of the black chickpea genotypes seed ratio with a hard seed coat hundred weight, protein content of the grain, the grain fat ratio was carried out with three replications according to the 2015 Coincidence Pays Trial Plan in order to determine the contents of N (%), P (%), K (%), Ca (%), Mo, Fe, Zn, Cu and Mn (mg / kg). The values obtained at the end of the experiment were subjected to analysis of variance and the differences between the averages were tested according to the Duncan multiple comparison method. The difference between genotypes in terms of hydration capacity is statistically significant at 1% level. The hydration capacities of the genotypes ranged from 0.9826 to 1.0856. While the hydration capacity was the highest genotype Hatay genotype, the navigation genotype was the variant with the lowest hydration capacity. In the study no seeds with hard seed shells (no water seeds) were detected in any genotype. All seeds are swollen with water. The highest weight of black chickpeas was determined at the weight ratio of 12.40 g in the Iğdır genotype, the fat ratio in the yolk genotype and the protein ratio in the Elazığ genotype. Elazığ genotype appears to be dominant in terms of phosphorus, potassium, molybdenum, zinc and copper contents.

**Determination of the Some Quality Criteria and Content of the Nutrient Elements in the Local Black Chickpea Genotypes Grown in Different Locations**

*Yeşim TOĞAY, Necat TOĞAY, Fatih ÇİĞ and Gülbahar AKKOÇ – Oral Presentation /059*

## Identification and Characterisation of Soft Rot is Caused by *Chryseobacterium indologenes* in Turkey

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### ABSTRACT

In this study, it is aimed to be determined make a definitive diagnosis of *Chryseobacterium indologenes*, which are the agent of Soft Rot for some vegetables. For this purpose, initially microbial diagnostic systems (MIS) are defined using, causing soft rot strains in different vegetables, and 8 different strains of *C.indologenes* were obtained. Also identified using the system of BIOLOG and it was observed that the results are the same as the results obtained in the MIS system. According to hypersensitive reaction (HR), pathogenicity and pectolytic activity tests results it was determined that all of the pathogenic strains. Several biochemical and molecular tests (16S rDNA PCR and spesific PCR) for the diagnosis and characterization of certain strains were made identified as pathogen. The diagnosis of bacterial species conducted using the 16S rDNA PCR and all of the strains given band of approximately 1500 bp in length was determined. Sequence analysis of 16S rDNA sequences of the isolates was performed and it was determined that these isolates were *C. indologenes* according to the obtained definite diagnosis results and the sequence results were entered into the GenBank and accepted. *C.indologenes* strains of identified as pathogen, 4 of them in cucumber, 2 of them in tomato, one of them in pepper and one of them also in pumpkin, it has been found to cause soft rot disease. According to literature survey; was first detected by this study in the world and in Turkey, eight strains of *C. indologenes* as soft rot in the above mentioned hosts.

**Key words:** MIS, Molecular identification, *Chryseobacterium indologenes*, Soft rot

## Pepper Growth, Biochemical and Physiological Response to Interactive Salinity and Drought Stress

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### ABSTRACT

This study was carried out to determine pepper growth, biochemical and physiological response to interactive salinity and drought stress. There were three different salinity levels (0, 75, 150 mM NaCl) and three different irrigation levels (100%, 75% and 50% field capacity water content). Salinity and irrigation treatments were used individually and combined. In the experiment, Yalova carliston and Maraş pepper (*Capsicum annum* L.) varieties were used as vegetable material. According to the findings of the study, significant differences were observed between the applications and the doses. Plant growth (fresh, dry weight, etc.), some plant physiological and biochemical parameters (tissue electrical conductivity, stoma conductivity, tissue proportional water content, amino acid, antioxidants etc.) and plant nutrient element content were significantly affected by treatments. Both salinity and drought stress conditions had a negative effect on some properties such as plant growth, photosynthetic activity, chlorophyll content, and this effect increased more in the applications where two stress factors were used together. In the tolerance of stress conditions, pepper seedlings tried to adapt to the stress conditions by changing the parameters of antioxidant enzyme activity, nutrient uptake or proline or sugar content. In addition, it was revealed that the negative effect of combined salinity and drought conditions on pepper plants was more than the negative effect of the individual stress conditions.

### ACKNOWLEDGMENT

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Pepper Growth, Biochemical and Physiological Response to Interactive Salinity and Drought Stress

Ertan YILDIRIM, Melek EKINCI, Güleray AĞAR, Metin TURAN, Atilla DURSUN, Raziye KUL, Gökçe AKGÜL – Oral Presentation /061

## Genetic Variations Between Some Plant Pathogenic *Streptomyces* Strains From Turkey

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### ABSTRACT

This study was conducted for defining genetic variations between 15 scab-causing *Streptomyces* species included in *S. scabiei*, *S. europaeiscabiei*, *S. stelliscabiei*, *S. bottropensis*, and other 11 *Streptomyces* sp.. All strains originally isolated from symptomatic potato in Erzurum Province, Eastern Anatolia Region of Turkey. Some morphological and biochemical properties of strains were defined and 16s rRNA region of the strains were sequenced. The sequence data were assembled and phylogenetic analyzes were performed. As a result of phylogenetic analyzes, Turkish strains used in this study were found to be involved in same major groups. Additionally, some subgroups are also recorded. According to our knowledge, this is the first study on genetic variations between scab-causing *Streptomyces* species in Turkey. However, most of the pathogenic strains remain to be identified at the species level.

### ACKNOWLEDGEMENTS

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## **The Possible Beneficial Effect of Rosmarinic Acid on Testicular Torsion/Detorsion Model; An Experimental Study**

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### **ABSTRACT**

**Aim:** In this study was aimed to evaluate the possible beneficial effect of rosmarinic acid on testicular torsion/detorsion model in experimental animals. **Material and Methods:** In this study, Wistar type eighteen rats were used and grouped. Groups were planned as sham, ischemia/reperfusion (I/R; 60 min; 24 hours), I/R+rosmarinic acid (40 mg/kg) groups. After the reperfusion period, 24 hours was completed, all rats were sacrificed by high-dose anaesthesia agent, and testes were taken for malondialdehyde (MDA), catalase (CAT), superoxide dismutase (SOD) activities glutathione (GSH) and analyzes. **Results:** The MDA level was increased, GSH level, SOD and CAT activity decreased in the I/R group according to the sham group. However, in the rosmarinic acid+I/R group, MDA the level was decreased and the level of SOD, CAT activities and GSH level was increased. **Conclusion:** These results show that the rosmarinic acid has the beneficial effect on testes.

**Keywords:** Rosmarinic acid, Rats, Testes, Ischemia/reperfusion.

**The Possible Beneficial Effect of Rosmarinic Acid on Testicular Torsion/Detorsion Model; An Experimental Study**

*Fazile Nur EKİNCİ AKDEMİR, Ayhan TANYELİ, Yasin BAYIR – Oral Presentation /063*

## The Fraxin Protects against Acute Organ Damage by Cecal Ligation and Puncture-Induced in Rats with Sepsis

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### ABSTRACT

**Aim:** In this paper, it was presented the antioxidant effect of fraxin against acute organ damage by induced cecal ligation and puncture model in rats. **Material and Methods:** For this purpose in this study, all experimental animals were randomly grouped. These groups were stated as sham, CLP, CLP+fraksin groups. TAS, TOS, OSI, MDA levels, MPO and SOD activities were evaluated in kidney and lung tissues of all rats. **Results:** TOS, OSI, MDA levels and MPO activity of kidney and lung tissues were higher in the CLP group than in the sham group, but TAS level and SOD activity were lower. However, these results were significantly changed in the fraxin treatment group. **Conclusion:** In light of these results, it can be stated that fraxin shows a positive effect by raising the level of SOD and TAS by decreasing TOS, MPO and MDA levels on kidney and lung tissue in the model of sepsis caused by CLP.

**Keywords:** Cecal ligation and puncture, fraxin, sepsis, rat.

The Fraxin Protects against Acute Organ Damage by Cecal Ligation and Puncture-Induced in Rats with Sepsis

Fazile Nur EKİNCİ AKDEMİR and Ayhan TANYELİ– Oral Presentation /064

## **Naringin as an Antioxidant in Alleviating of the Oxidative Ovarian Tissue Damage in Experimental Ovarian Torsion-Detorsion Model in Rats**

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### **ABSTRACT**

**Aim:** This study was planned to determine effect of naringin in alleviating of the oxidative ovarian tissue damage in experimental ovarian torsion-detorsion model. **Material and Methods:** In this study, it was created an ovarian torsion-detorsion model based on previous studies to produce oxidative ovarian damage. In addition, naringin treatment was applied in order to alleviate oxidative ovarian damage to naringin+ovarian torsion-detorsion group. All experimental procedures were performed under anaesthetic conditions. **Results:** It was found that the lipid peroxidation indicator reflecting oxidative ovarian tissue damage was increased in the torsion-detorsion group but decreased due to naringin treatment. Whereas superoxide dismutase activity was significantly elevated by naringin treatment compared to the torsion-detorsion group. **Conclusion:** It can be seen that naringin alleviates oxidative ovarian tissue damage when looked at lipid peroxidation marker and superoxide dismutase.

**Keywords:** Naringin, Oxidative ovarian damage, lipid peroxidation, superoxide dismutase, rat.

**Naringin as an Antioxidant in Alleviating of the Oxidative Ovarian Tissue Damage in Experimental Ovarian Torsion-Detorsion Model in Rats**

*Fazile Nur EKİNCİ AKDEMİR– Oral Presentation /065*



## Rapid Detection of Phosphate-Solubilizing Bacteria From Agricultural Area in Erzurum

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### ABSTRACT

With the discovery of Plant Growth Promoting Rhizobacteria (PGPR), which has brought great benefits in the soil fertility and crop growth, eco-friendly biotechnological applications in agriculture has accelerated. Among various PGPR mechanisms, especially phosphate solubilization play central role in detection of PGPR strains. A wide-range of successful applications for the detection of phosphate-solubilizing bacteria has been done by the conventional methods. Moreover, from molecular perspective, *pqq* gene region has been used as a potential gene marker for the detection. In this regard, our present study was conducted to testing the newly designed *pqq* gene specific primer set for determination of phosphate-solubilizing capabilities of bacterial isolates from the agricultural regions of Erzurum. The specificity of newly designed primer pqqB-F/pqqB-R were tested against 10 isolates, whose phosphate-solubilizing activities were initially proved by the conventional methods. Non-phosphate solubilizing bacteria were also chosen as negative controls. According to the results; 5 of 10 phosphate solubilizing bacteria were successfully amplified and none of the non-phosphate solubilizing bacteria was amplified. Then, the molecular characterization of the active phosphate solubilizing strains was done based on the partial 16S ribosomal RNA gene region sequence analysis method. 2 isolates of *Enterobacter* sp., 1 *Rhizobium* sp., 1 *Enterococcus* sp., 1 *Bacillus cereus*, 1 *Bacillus atrophaeus*, 1 *Bacillus aryabhatai*, 1 *Acinetobacter* sp., 1 *Pseudomonas japonica*, 1 *Enterobacter cloacae* were identified as active phosphate-solubilizing strains. Consequently, the results showed that this specific primer set could be used as an economic, rapid and useful tool for the detection of phosphate-solubilizing strains in the agricultural research.

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Rapid Detection of Phosphate-Solubilizing Bacteria From Agricultural Area in Erzurum

Burak ALAYLAR, Medine GÜLLÜCE, Mehmet KARADAYI and Mine İSAOĞLU – Oral Presentation /066

## Isolation and Molecular Identification of Bacteria with Magnesite Enrichment Potential from Turanocak and Ortaocak Quarries in Kütahya-Turkey

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### ABSTRACT

In this study, bacteria were isolated from two different magnesite quarries in Turanocak and Ortaocak mine in Kütahya-Eskişehir region, which has the largest processed magnesite reserves in Turkey. The obtained isolates have a potential to solve important magnesite pollutant CaCO<sub>3</sub> but incapable to solve magnesium that has the most crucial role in the industry. Thus, potential bacteria were identified to be used for magnesite enrichment studies. The obtained isolates were identified and characterized according to the morphological, physiological, biochemical and molecular techniques (16S rDNA PCR). According to the gene sequencing analysis *Bacillus* genus bacteria have the ability to solve CaCO<sub>3</sub>. The data of the 16S rDNA gene sequence showed that there were 13 active strains grouped in *Bacillus*. These active strains; *Bacillus* sp (3), *Bacillus atrophaeus* (2), *Bacillus thuringiensis* (1), *Bacillus circulans* (1), *Bacillus simplex* (3), *Bacillus endophyticus* (1) *Bacillus drentensis* (1) and *Bacillus idriensis* (1).

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Isolation and Molecular Identification of Bacteria with Magnesite Enrichment Potential from Turanocak and Ortaocak Quarries in Kütahya-Turkey

Selin DOĞAN, Medine GÜLLÜCE, Burak ALAYLAR and Mehmet KARADAYI – Oral Presentation /067

## Detection of the *nifH* gene in Nitrogen Fixing Bacteria from Agricultural Area in Erzurum

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### ABSTRACT

Plant Growth Promoting Rhizospheric Bacteria (PGPR) are one of the most potential biofertilizer agents in agricultural applications. Biofertilizers have been used for instead of chemical fertilizers last a few decades in the all over world because of their beneficial effects and crucial role in plant growth and health. There are many well know mechanisms are using for identification of active PGPR strains. Nitrogen-fixation is one of the most important mechanism among them. To date, the detection of nitrogen-fixing bacteria have been realized by the many various conventional methods. Recently, from molecular perspective, *nifH* gene has been widely used as a marker gene for microbial N<sub>2</sub> fixation. In this context, the aim of the present study was to evaluate the usability of the newly designed *nifH* gene specific primer sets for the selection of local nitrogen-fixing PGPR strains from agricultural areas in Erzurum. In this regard, our present study was conducted to testing the presence and newly designed *nifH* gene specific primer sets for determination of nitrogen-fixing capabilities of bacterial isolates from the agricultural regions of Erzurum. Consequently, the designed primer sets in the literature (nifH1/nifH2, Kadino/Emino and F2/R6) and newly designed primer set (nifA1F/nifA1R) were used for detection of *nifH* gene. According to the PCR results; 5 bacteria with nifH1/nifH2 primer set, 2 bacteria with F2/R6 primer set, 1 bacteria with Kadino/Emino primer set and 2 bacteria with nifA1F/nifA1R were succesfully amplified.

### ACKNOWLEDGEMENT

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## **The Effects of *Trichoderma* Species on Some Parameters of the Tulip (*Tulipa gesneriana* cv. "Golden Parade")**

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### **ABSTRACT**

Among the applications that affect some features, especially flowering, in ornamental plants; are the physical growing environment, nutrient or chemical applications, irrigation, light and temperature regimes and organic-inorganic fertilizer applications. With these applications the plant, flower quality and flowering period may change. In this study, effects of some *Trichoderma* species (*Trichoderma virens* KB31, *T. gamsii* VG47, *T. harzianum* LO52, *T. asperellum* ÖT1 and *T. hamatum* ÖT16), on some parameters (plant sprouting rate, flowering time, number of leaves, leaf length, leaf width, plant height, petal length, flower width and stalk thickness) of tulip plant (*Tulipa gesneriana* cv. "Golden Parade") are investigated under field conditions. The study was carried out between the years of 2017-2018 in the Application Garden of the Faculty of Agriculture of Siirt University. At the end of the study, the differences between the average values obtained from all the parameters except for the number of leaves, were found to be statistically significant ( $p<0.05$ ). The earliest flowering time is 80.56 days and the maximum leaf number is 4.01 in *T. harzianum* LO52 application; application of *Trichoderma virens* KB31 has the maximum flower width of 55.66 mm; the highest plant height is 272.21 mm, the length of the petal is 61.22 mm and the stalk thickness is 7.13 mm are obtained in *T. asperellum* ÖT1 application; while the highest leaf length is 88.58 mm and the leaf width is 44.24 mm and they are detected in *T. gamsii* VG47 application. In parcels control and *T. hamatum* ÖT16 applications are conducted, the flowering rate of tulip plants are found to be lower than other applications.

**The Effects of *Trichoderma* Species on Some Parameters of the Tulip (*Tulipa gesneriana* cv. "Golden Parade")**

Arzu ÇİĞ and M. Hadi AYDIN – Oral Presentation /069

## Diversity and Ecology of the Aquatic Avifauna of the Wetland of Sebkhet Bazer Sakhra (South of Setif, Algérie)

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### ABSTRACT:

In order to estimate the evolution of the numbers of the aquatic avifauna and their seasonal variations in Sebkhet of Bazer-Sakhra (Site of the eco-complex wetlands of Setif) a monitoring realized during the period from September 2012 to August 2013 allowed to inventory 54 species are spread over 08 orders, 15 families. Of all the species recorded, the order of Charadriiformes is best represented with 3 families and 22 species, whose most important are white-backed stilt (*Himantopus himantopus*) (167 individuals) and the Elegant Avocet (*Recurvirostra avosetta*) (226 ind.), followed by the order Anseriformes with one family and 10 species are represented by the Shelduck (*Tadornatadorna*) (more than 1000 ind.), Ruddy shelduck (*Tadorna ferruginea*), Green winged teal (*Anas crecca*), Northern Shoveler (*Anas sclypeata*). To follow the global dynamics and the seasonal distribution of species inventoried at Sebkhet Bazer, an analysis of the variation of the total number has been established by ecological index. The autumn season brings together the largest amount of birds, it totals 3639 individuals. Accidental species are well represented during the autumn and the spring season denotes the interest of the site with the regard to the migratory passages of the aquatic birds. During the autumn and the spring the Flamingo and the Shelduck are the most abundant with respectively (500, 883) and (560, 1296) individuals. These species are also the most constant species in time. The ecological analysis of this population has shown that the highest species richness is recorded in spring (45 species) and the lowest value is obtained in summer it is 20 species. But the best balanced interspecies distribution is recorded in autumn ( $H' = 3.97$  bits,  $E = 0.7\%$ ). While the lowest values are noted in winter ( $H' = 2.7$  bits,  $E = 0.5\%$ ).

**KEYWORDS:** The Sebkhet of Bazer Sakra, Ecology, aquatic avifauna, biodiversity, Seasonal evolution, wetland

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## Growth Regulators in Improvement of okra seeds to the salt stress (*Abelmoschus esculentus*. L)

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### ABSTRACT

How to improve plant tolerance to salt stress, without modifying its genome? An important question that is the subject of several research. Nowadays the problems related to salinity are increasing, that's why this experiment study the impact of growth regulators on okra germination under salt stress. Two types of growth regulators was applied (Kinetin 500 µl, and salicylic acid 100 µl) and two different concentration of salt solution (100 and 200 meq.L<sup>-1</sup> of NaCl). The hormonal combination has a positive effect on seeds germination on the length of the roots, and the fresh and dry weight of the seedlings, on the water content of the seedlings. Witness does not germinate at 100 and 200 meq.L<sup>-1</sup> of NaCl.

### ACKNOWLEDGEMENT

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## A Molecular Analysis of the Patterns of Genetic Diversity in Local Chickens from Western Algeria

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### ABSTRACT

The objectives of this study were to characterize the genetic variability of village chickens from three agro-ecological regions of western Algeria: coastal (CT), inland plains (IP) and highlands (HL), to reveal any underlying population structure, and to evaluate potential genetic introgression from commercial lines into local populations. A set of 233 chickens was genotyped with a panel of 23 microsatellite markers. Geographical coordinates were individually recorded. A genetic diversity analysis was conducted both within and between populations. Multivariate redundancy analyses were performed to assess the relative influence of geographical location among Algerian ecotypes. The results showed a high genetic variability within the Algerian population, with 184 alleles and a mean number of 8.09 alleles per locus. The values of heterozygosity ( $H_e$  and  $H_o$ ) ranged from 0.55 to 0.62 in Algerian ecotypes. Although the structuring analysis of genotypes did not reveal clear subpopulations within Algerian ecotypes, the supervised approach using geographical data showed a significant ( $p < 0.01$ ) differentiation between the three ecotypes which was mainly due to altitude. Thus, the genetic diversity of Algerian ecotypes may be under the influence of two factors with contradictory effects: the geographical location and climatic conditions may induce some differentiation, whereas the high level of exchanges and gene flow may suppress it.

**Keywords:** local chickens, genetic diversity, molecular characterization, microsatellites.



## **The Impact of Sand Enchraochment in the South-West of Algeria: Case of the Region of Gourara (Wilaya of Adrar)**

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### **ABSTRACT**

Sand encroachment is the most degrading aspect of desertisation in arid and hyper-arid regions. In the region of Gourara (wilaya of Adrar, Algeria), it represents a real challenge against all forms of socio-economic activities (agriculture, transport ... etc). Our work consists of studying the phenomenon of Sand encroachment to know the causes, the consequences and the techniques of fighting against this scourge through an investigation carried out on ground in five communes (Aougrou, Timimoun, Ksar kaddour, Ouled Said and Tinerkouk).

Like the natural factors (climate, soil, vegetation cover), the results obtained from the investigation showed that the unreasonable exploitation of biological resources (mechanized uprooting of *Aristida pungens*, *Cornulaca monaonhta*, *Acacia raddiana*, *Zella sp*, *Retama retam*, *Caligonoum azel* ... etc.), has aggravated this problem where the socio-economic impact is fatal. Losses of productive land, sand encroachment of houses and roads have inevitably led to rural-urban migration. The set of data is collected and organized into a GIS database to help authorities take the best measures in a short period of time to combat this problem. In addition, techniques such as the fences and installation of the clay walls that have been practiced by man in Gourara since antiquity to deal with sand encroachment are limited. In the present era and with the development of irrigation techniques, the installation of green bands is becoming a more effective method for protection against sand encroachment for a large-scale. The green band of the village of Ouadjda in Timimoun is a typical example of effective protection of an oasis agroecosystem against this phenomenon with a resistant stability of the sand.

**Key words:** Sand encroachment; Desertisation; GIS; Green band; Gourara; Adrar.

### **ACKNOWLEDGEMENT**

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## **Diachronic Study of the Phenomenon of Sand Encroachment in the Ouled Saïd Wetland, Region of Gourara, Wilaya of Adrar**

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### **ABSTRACT**

Becoming very fragile and exposed to the phenomenon of desertisation, the arid and hyper-arid regions in Algeria are now witnessing a strong tendency towards sand encroachment which remains a real challenge against all forms of socio-economic activities (agriculture, transport...etc).

In the region of Gourara (wilaya of Adrar, Algeria), the Ouled Saïd wetland (classified by Ramsar), an oasis ecosystem which is remarkable of international importance, is created by the human being thanks to the traditional irrigation system "the foggara ". This ecosystem serves as a shelter to several species of fauna and flora (including date palm cultivars). In addition, it is a crossing point for migratory birds. In the last years, this zone has undergone an intense degradation under the action of the sand encroachment phenomenon. Our investigation consists of a diachronic study of landscape changes during the period [1995-2017]. To do so, a nonsupervised classification (ISODATA algorithm) was performed under Erdass Imagine and Arcgis, using the satellite imagery of Landsat 5 (1995) and Landsat 8 (2017).

The results show that healthy oasis vegetation is decreasing, while sandy farmland, sand dunes and urbanization are increasing per unit of surface. As a result, the Remote Sensing tool has allowed us to follow in a practical way the landscape changes that occurred in the Ouled Saïd wetland during the last few years.

**Keywords:** Saharan ecosystem; Sand encroachment; Remote sensing. Ouled Saïd; Gourara, Adrar

### **ACKNOWLEDGEMENT**

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## **Profile of the Desirable Fatty Acids in Meat of Cattle Fed With Different Levels of Lipid-Based Diets**

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### **ABSTRACT**

Fats are considered as an important component of the system meat production, the use of oil supplies in feed increases the energy density of the diet and has the potential to enhance both animal performance and meat quality. Whole cottonseed (CS) is an oilseed that has a high concentration of oil and is especially rich in unsaturated fatty acids such as linoleic acid. CS is considered as an excellent alternative addition to ruminant feed. Protected lipids are composed of industry-based fatty acids. In the feedlot, protected lipids are used in conjunction with calcium and, in certain cases, their addition has been seen to augment meat quality in terms of essential fatty acid concentrations [1]. The CS and or protected lipids are viable feedlot alternatives for use in feedlot when it is desired to reduce the amount of starch in animal diet without compromising the performance. The addition of the whole cottonseed or protected lipid in diet is not affect pH values in meat [2]. Research has stimulated animal production studies on solutions to decrease the level of saturated fatty acids and increase unsaturated in foods of animal origin. CS and calcium salts of fatty acids (CSFA) are options in cattle diets, once there are reports in the literature that a fraction of the fat in these ingredients goes through the rumen without being attacked by the microorganisms, is later on degraded and absorbed in the small intestines, producing meat of better quality [3,4]. When it occurs degradation of lipids in the rumen, the unsaturated fatty acids to be chemically unstable (with a lower melting point), no pass through the membrane of the bacteria, then the unsaturated fatty acids are hydrogenated by hydrogenases enzymes in a process known by the name of biohydrogenation [5]. This is the reason the fatty acid profile of beef meat is more saturated, even if the cattle are fed with feeds rich in unsaturated fat. However, that oil contained in the seeds are protected from ruminal degradation, such as CS. Another form of protection is by supplying insoluble lipid in the ruminal fluid, as salts of calcium bound fatty acids (Ca soap). Despite the hydrogenation of unsaturated fatty acids by rumen microorganisms. Ruminants and monogastric are demanding in essential fatty acids (EFAs) of dietary origin (linoleic and linolenic acid), which animals do not synthesize, in addition arachidonic acid is derived from linoleic acid. The initial step in biohydrogenation is an isomerization reaction that converts the cis-12 double bond in unsaturated fatty acids to a

trans-11 isomer. The isomerase is not functional unless the fatty acid has a free carboxyl group, and in the case of polyunsaturated fatty acids such as C18:2, a cis-9, cis-12 diene double bond configuration is present. The hydrogenation of C18:1 trans 11 appears to be a limitation step in the sequence of biohydrogenation and, consequently, the penultimate intermediate accumulates in the rumen and becomes available for absorption [6]. This process is important for other endogenous form of CLA synthesis, and involves delta-9 desaturase enzyme and trans-11 C18:1 as a substrate [7]. This enzyme acts attaching an unsaturation at the carbon 9 of vaccenic acid to form the cis-9, trans-11 CLA. The CLA in the fat of ruminants meat may be from two sources: the partial biohydrogenation of linoleic acid in the rumen and endogenous synthesis in adipose tissue (Figure 1).

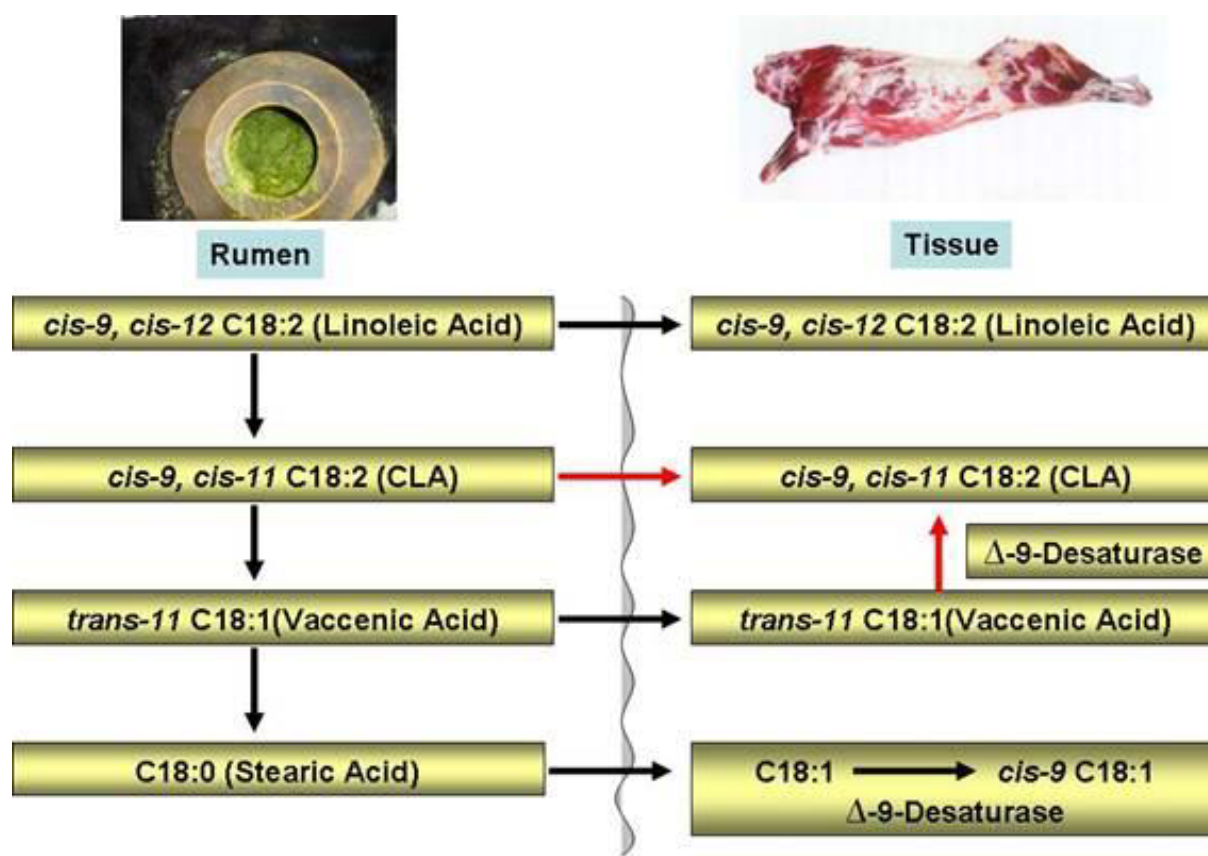


Figure 1. Formation of CLA in the rumen and tissues

The objective of this study was to determine the effect of the dietary inclusion of lipid-based diets on the fatty acid profiles from finishing cattle. **Materials and Methods:** The study was carried out in the Chapéu de Couro Farm in Aguai/SP, Brazil. A group of 39 uncastrated Nellore cattle. Mean age of the animals was 36 months and initial mean live weight was 494.1  $\pm$  10.1. Animals were randomly assigned to one of three treatments, based on dry matter: feed with control diet 2.50% whole cottonseed (CS), feed with 11.50% whole cottonseed (CS), and feed with 3.13% whole cottonseed (CS) added of 1.77% protected lipid (PL). Forage:concentrate ratio was 50:50 on a dry matter basis. Sugar cane chopped was used as forage. After 63 days mean final live weight was 577.01 kg  $\pm$  11.34. After slaughter, carcasses were identified and divided into two halves that were kept in a cold chamber for 24

hours at 2°C. Then, part of the *M. longissimus thoracis* of each animal was removed between the 12<sup>th</sup> and 13<sup>th</sup> rib of the left half carcass. The samples steaks were 2.5 cm thick and were identified and stored frozen in a freezer at -18°C [8]. The analysis of methyl esters of fatty acids was carried out in a gas chromatograph. Desirable fatty acids (FADes) were determined by the sum of unsaturated fatty acids and stearic acid (C18:0). **Results and Discussion:** No differences ( $P>0.05$ ) between the diets for the proportion of FADes in the meat of the animals in this study, according to the lipid sources used. The inclusion of PL or CS in the diet did not change the proportion of FADes in the meat. The proportion mean of FADes in meat in the present study were: as pentadecenoic acid (C15:1 = 0.29%), palmitoleic acid (C16:1 = 4.26%), heptadecenoic acid (C17:1 = 0.07%), oleic acid (C18:1n9c = 37.32%),  $\gamma$ -linolenic acid (0.94%) and  $\alpha$ -linolenic acid (1.04%), elaidic acid (C18:1n9t = 0.50%), eicosatrienoic acid (C20:3n3 = 0.03%), eicosapentaenoic acid (C20:5n3 = 0.04%), erucic acid (C22:1n9 = 0.89%), docosadienoic acid (C22:2 = 0.04%) and stearic acid (C18:0 = 21.53%).

Table 01. Means and standard errors (SE) of the fatty acid profile (in% total fatty acid relative area) of the meat for the different treatments

Fatty acid profile	Diets			Mean	SE
	2.50% CS	11.50%	3.13% CS		
	(control)	CS	+ PL		
C8:0 - (Caprylic)	0.03	0.03	0.00	0.02	0.02
C11:0 - (Undecanoic)	0.29	0.46	0.25	0.34	0.09
C12:0 - (Lauric)	0.11	0.14	0.07	0.11	0.04
C14:0 - (Myristic)	5.09	5.24	4.91	5.08	0.41
C15:0 - (Pentadecanoic)	0.46	0.49	0.45	0.47	0.10
C15:1 - (Pentadecenoic)	0.32	0.25	0.31	0.29	0.06
C16:0 - (Palmitic)	28.40	29.47	28.81	28.90	0.90
C16:1 - (Palmitoleic)	4.65	3.33	4.80	4.26	0.71
C17:0 - (Margaric)	1.51	1.21	1.48	1.40	0.33

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C17:1 - (Heptadecenoic)	0.09	0.00	0.12	0.07	0.05
C18:0 - (Stearic)	22.73	20.70	21.17	21.53	1.93
C18:1n9c - (Oleic)	35.87	37.76	38.33	37.32	1.70
C18:1n9t - (Elaidic)	0.57	0.49	0.43	0.50	0.10
C20:0 - (Araquídic)	0.48	0.36	0.23	0.35	0.13
C20:2 - (Eicosadienoic)	0.35	0.42	0.36	0.38	0.08
C20:3n3 - (Eicosatrienoic)	0.05	0.02	0.01	0.03	0.02
C20:5n3 - (Eicosapentaenoic)	0.07	0.04	0.00	0.04	0.03
C22:1n9 - (Erucic)	0.92	0.80	0.95	0.89	0.20
C22:2 - (Docosadienoic)	0.08	0.03	0.02	0.04	0.03
Non-identifiable	2.13	2.07	2.53	2.24	0.43

*Note.* t - trans; c – cis; n = position of the double bonds; CS = cottonseed; PL = protected lipid

The oleic acid (C18:1n9c), was found in the greatest proportion, whose mean content was 37.32%, followed by palmitic acid (C16:0), with 28.90%, and stearic acid (C18:0), with 21.53%. The lipid sources in the diet did not change most of the FA in cattle meat, similar results [9], when ruminants are fed high concentrations of fat, either partially or completely protected from the microbial action of the rumen, there may be an increase in percent intramuscular fat and changes in the fatty acid profile. However, the same authors mentioned that these are small changes, which may explain the absence of difference of FA profile in the PL treatment compared with the other lipid sources. The observed higher values of C18:0 in the meat of the animals that were fed 11.50% CS in the diet were closer to those reported by [4], who used 14.35% CS in the feed of the animals. Stearic acid, when consumed by humans, is absorbed in the intestines and transported to the liver by chylomicrons. In the liver, it is transformed in oleic acid (monounsaturated), going back to the circulation without cardiovascular risks [10].

*Conclusions:* The add the cottonseed or protected lipid in diet is not affected fatty acids profiles the desirable fatty acids in meat.

**Keywords**— beef quality, cottonseed, protected fat, unsaturated fatty acids.



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**Profile of the Desirable Fatty Acids in Meat of Cattle Fed With Different Levels of Lipid-Based Diets**

*Tiago Neves Pereira VALENTE, Erico da Silva LIMA and Roberto de Oliveira ROÇA – Poster Presentation /006*

## **Physiological Responses of Cereals Species under Lead Stress**

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## ABSTRACT

Lead (Pb) is one of the most used metals by man but also one of the most toxic. For several centuries, its content has steadily increased because of anthropogenic activities causing several environmental and health problems.

The objective of this work is to study the effect of metal stress on four varieties of cereals. For this we carried out a comparative study of the physiological responses through some parameters on the germination between four different cereals previously grown on a nutrient solution for 10 days undergoing treatment with lead acetate with three concentrations (0.15 g / l, 0.3g / l and 0.6g / l) in order to assess the action of different concentrations of lead on the speciation of these species. The results obtained show a stressful effect of lead on the four studied varieties from 0.3g/l and 0.6g /l. We found variable results from significant to very highly significant in all studied parameters. In fact, we recorded a very highly significant reduction in early germination in durum wheat, soft wheat, barley and maize, a highly significant and very highly significant decrease in germination rates in durum wheat and soft wheat and maize. The barley variety was more tolerant with a germination rate of 92% under the most severe stress conditions (0.6 g / l). With regard to the germination rate, the decrease is very highly significant in soft wheat and barley, highly significant for maize, only for the high dose of lead. This study concludes that the varieties studied can be grouped into two categories: varieties tolerant to lead exposure (durum wheat, barley and maize), and stress-sensitive variety (soft wheat).

## ACKNOWLEDGEMENT

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## Nutritional Value of Coloured Wheat Grains

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### ABSTRACT

Coloured wheats are due to their special composition important and promising materials in the food industry and offer many nutritional benefits compared to conventional raw and food products. There is also suitable to use them as a feed supplements for livestock. The aim of the thesis was to determine the content of total anthocyanins in genotypes of coloured seeds of wheat, compare the genotypes in yield forming elements and determine the content of proteins, lipids and other nutritionally valuable substances in wheat seeds and also review the quality of Slovak newly bred purple variety PS Karkulka. The field experiment was established as the randomized blocks in two replications in RIPP in Piešťany in 2013/2014. Statistically significant highest content of total anthocyanins in bran was observed in the blue variety 930/1 and K 3575 699/3 and in the purple variety 994/3. The lowest content of anthocyanins was in the purple variety PS 57. In terms of plant height, the highest were blue wheats and the lowest were wheats with yellow endosperm. The highest number and weight of grains per spike had genotypes with yellow endosperm and the lowest with blue color. Statistically significant highest protein content was observed in the purple variety PS Karkulka and in the blue varieties Barevná 25 and Barevná 9. The lowest protein content was in the blue variety K3575 699/3 and in the yellow variety Citronova. Statistically significant highest lipid content was in the blue varieties (Barevná 25; 930/1) and in the purple variety Indigo. The highest content of  $\beta$ -D-glucan was observed in blue varieties 930/1 and K 3575 699/3. The highest starch content was observed in the variety Citronova with yellow seeds and in the purple variety Indigo. The highest content of dietary fiber was observed in purple varieties PS 57 and PS Karkulka and the lowest content was in varieties Zernofialovetaja and K 3517 with purple grains. In the Slovak purple variety PS Karkulka, middle heading stage and significantly higher value of anthocyanins, proteins, and dietary fiber compared to the control variety was confirmed, while the starch and  $\beta$ -D-glucan contents were comparable to conventional red variety.

### ACKNOWLEDGEMENT

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## The Effects of Replacing Barley Grain with *Atriplex halimus* L. or Olive Cake on Growth Performance and Carcass Characteristics of Awassi Lambs

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### ABSTRACT

Barley grain is widely used as the major source of energy for ruminants. Although, with the increased global demand, the price of barley grains has increased portentously, exerting pressure on sheep producers especially in arid and semi-arid regions where feed supplementation is essential. Hence, researchers are interested in the possibility of adding alternative feeds in livestock diets. Olive cake (OC; Awawdeh and Obeidat, 2011; Obeidat, 2017) and *Atriplex halimus* L. (ATR; Obeidat et al., 2016) are great feed alternatives that can be fed to livestock to decrease the cost of production, thereby improving profitability. In the current study, however, OC and ATR are used to replace part of the barley grain. Therefore, the objectives of the study were to evaluate the effects of dietary inclusion of olive cake and *Atriplex halimus* L. on growth performance, nutrient intake, digestibility, carcass characteristics as well as the cost of production in growing Awassi lambs. Thirty newly weaned male lambs (initial body weight; BW = 18.0 ± 0.46 kg) were randomly assigned to 1 of 3 treatment diets. Diets were: 1) control (CON), 2) 200 g/kg OC (OC) or 3) 200 g/kg ATR (ATR) of dietary dry matter (DM). The experiment lasted for 87 days (10 days for adaptation and 77 days for data collection). Nutrient intakes were measured daily. Body weight of lambs was measured at the beginning of the study and biweekly thereafter. On day 56, 6 lambs from each group were housed in metabolic cages to evaluate nutrient digestibility and N balance. Total fecal and urine output was collected, weighed, and sampled (10% feces and 5% urine) daily for 5 days. At the end of the study, all lambs were slaughtered to evaluate carcass characteristics and meat quality. Intakes of DM, crude protein (CP), neutral detergent fiber (NDF) and acid detergent fiber (ADF) were comparable among diets. Ether extract (EE) intake was greater ( $P < 0.001$ ) in OC diet compared with the CON and ATR diets (25, 55 and 24 g/d for CON, OC and ATR, respectively). Average daily gain (ADG) and feed efficiency (DM intake:ADG) did not differ among groups. Cost of gain was reduced ( $P < 0.001$ ) in OC and ATR diets compared with the CON diet (2.45, 1.64 and 1.56 US\$/kg for CON, OC and ATR, respectively). Dry matter digestibility was lower ( $P < 0.05$ ) in ATR diet compared with the CON, whereas the OC diet was intermediate (77, 73 and 70% for CON, OC and ATR, respectively). Digestibility of NDF was lower ( $P < 0.05$ ) in the OC diet compared with the CON diet, while the ATR diet was intermediate. Digestibility of CP and ADF and N balance were not different ( $P = 0.08$ ) among diets. Results of this study indicate the possibility of olive cake and *Atriplex halimus* L. inclusion at 200 g/kg of dietary dry matter without

affecting growth performance and carcass characteristics. Additionally, results showed the economic value of using such products as it reduced the cost of gain compared with the control diet.

#### ACKNOWLEDGEMENT

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## **Growth Performance and Slaughter Traits of Baladi and Shami-Baladi Kids Raised during Summer in Jordan**

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### **ABSTRACT**

In developing countries such as Jordan, sheep and goats play a major role in household economic through meat and milk production (Steinfeld et al. 2006). Due to some health considerations and consumer preferences, the demand for goat meat has increased during the past several years. Lee et al., (2008) reported that goat meat had lower levels of hypercholesteremic fatty acids and higher levels of unsaturated fatty acids which make it healthier compared to lamb meat. However, meat production of local goat breeds is not adequate to meet the high demand. As a result, some exotic breeds with noticeable meat and milk production have been imported to the country and raised as pure breeds or crossed with local goats. During the last decade, the most famous exotic breed that has been widely used in Jordan is Shami goat. A total of thirty newly weaned kids (15 Baladi (BB) kids and 15 Shami-Baladi (SB) kids) were evaluated for growth performance and slaughter traits. The trial lasted for 77 days (7 days for adaptation and 70 days for data collection). Feed intakes were measured on daily basis. Body weight of kids was measured at the beginning of the study and biweekly thereafter. At the end of the trial kids were slaughtered to examine carcass traits. Data were analysed using the MIXED procedures of SAS (SAS Inst., Inc., Cary, NC). Fixed effect of growth performance traits included only treatment, while for carcass traits the model included cold carcass weight as a covariate. Kids were modelled as a random effect. Initial weight, final weight, and ADG were not affected ( $p > .05$ ) by kid's genotype. In addition, Genotype of kid showed no significant effect on feed to gain ratio. Hot and cold carcass weight, dressing percentage were also not affected by kid's genotype ( $p > .05$ ). Offal formed about 13% of the carcass, with no difference between both genotypes. Kid genotype had no significant effect on shoulder, rack and legs percentages. However, SB kids had higher loin cut percentage compared to BB kids ( $p < .05$ ). Results of this study indicate that crossing Shami and Baladi goat breeds did not have a significant effect on either growth performance or slaughter traits. This could be due to the high temperatures during summer season. Future studies on different seasons may merit further investigation.

### **ACKNOWLEDGEMENT**

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## User Management Grassland in Semi-Arid Area in Sétif

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### ABSTRACT

In this work we described an analysis of the knowledge of the place and the role of prairie in livestock feed at some exploitation systems in the semi-arid area of Sétif. This study is based on a one year follow up of seven representative agricultural exploitation of aridity gradient and size of production units. Analysis of herd / resource complex has allowed us to represent the alimentation systems on farms studied through the linking between the needs of animals and feed offer. Thus the practical adjustments in the various forage systems and practical implemented have allowed us to build a functional typology and characterization of grassland that allowed the identification of three types of management: grassland strict pasture, prairie strict mowing, and grassland mixed farming (mowing/grazing). These three types of management are linked with some of determining factors their management: bioclimatic stage, patch size, practices carried out on patches (deferred grazing, irrigation, fertilization and pasture) and removals the headquarters of the exploitation. The distribution of these three types of management on all surveyed farms showed that both types pasturage and strict mowing) are present north of the study area, Prairie strict pasture are used by cattle in the case of small and medium-sized farms or both species in large farms, this one is with small size (2-4 ha), usually near the headquarters of the exploitation with no one setting a grazing, fertilization and irrigation periodic. The period of use of this type of prairie is at the beginning of spring with another in full and end of spring. While the second type (grassland with strict mowing), is reserved only for mowing. Patches are small and far from headquarters of Operating. Grassland mixed farming (grazing / mowing) is the most common type, present in the North and the South, for all types of farms (small, medium and large) generally close to the production units and used by both species (cattle-sheep) with a grazing setting (Winter-spring Start) fertilization (mineral or organic and continuous irrigation during deferred grazing. The period of use of this type of grassland is specialized for two periods: Winter-Spring and Summer-Autumn.

**Keywords :** Semi- arid- Grassland – Management mode.



## Free Radical Scavenging, Reducing Power and Lipid Peroxidation Inhibition of Butanolic Extract of *Plantago lanceolata*

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### ABSTRACT

This study aims to evaluate the in-vitro antioxidant capacity of the butanolic extract of the aerial part of *Plantago lanceolata*; an Algerian traditional plant medicinal, and to estimate its phenolic and flavonoid content. Total phenolic and flavonoid content was estimated by Folin-Ciocalteu's reagent and Aluminium chloride colorimetric method, respectively. The antioxidant activity was determined by using DPPH, linoleic acid peroxidation and reducing power assays. The total polyphenol, flavonoid content of the butanolic extract was found to be  $189,04 \pm 19,69$   $\mu\text{g}/\text{mg}$  gallic acid equivalent,  $10,50 \pm 0,67$   $\mu\text{g}/\text{mg}$  quercetin equivalent, respectively. Results showed that the butanolic extract exhibited high antiradical activity against the free radical DPPH with IC<sub>50</sub> of  $29,07 \pm 1,48$   $\mu\text{g}/\text{ml}$ . while the IC<sub>50</sub> value of the butylated hydroxyl toluene (BHT), used as standard antioxidant was  $8,21 \pm 0,12$   $\mu\text{g}/\text{ml}$ . Moreover, the extract at 50 $\mu\text{g}/\text{ml}$  inhibited strongly (83%) linoleic acid peroxidation. In addition, the extract exerted a good concentration-dependent reducing power with IC<sub>50</sub> of  $31,43 \pm 0,94$   $\mu\text{g}/\text{ml}$ . These findings suggest that butanolic extract of *Plantago lanceolata* possess a strong antioxidant activity and may be considered as an interesting source of effective antioxidant compounds, justifying its use in folklore medicine.

**Keywords:** Antioxidant activity, *Plantago lanceolata*, plant extract, phenolic content.

## **Growth Performance and Carcass Characteristics of Broiler Chicks Fed Graded Levels of Carob Pod (*Ceratonia siliqua*)**

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### **ABSTRACT**

This study was conducted to evaluate the nutritional value of carob *Ceratonia siliqua* pods (CP) as a corn substitute, and to find the optimal inclusion rates on growth performance, carcass and meat properties of broiler chicks. A total of 600 day-old mixed sex Hubbard chicks were used and randomly distributed into 6 dietary treatments: 0% CP without (T1) or with (T2) enzyme, 5% CP without (T3) or with (T4) enzyme and 10% CP without (T5) or with (T6) enzyme. Each dietary treatment was divided into 5 replicates with 20 chicks each. All diets were isonitrogenous and isocaloric. Body weight and growth performance parameters were recorded weekly from 0 to 42 days of age for each pen to determine body weight gain (BWG) and feed conversion ratio (FCR). At the end of the experiment, all broilers were slaughtered to carry out carcass characteristics and meat quality tests. Data were analyzed by analysis of variance using SAS general linear models. No significant effects of corn substitution of CP or enzyme supplementation were observed on average feed intake and FCR during all weeks and the overall rearing period (FCR; 1.62, 1.57, 1.66, 1.64, 1.74 and 1.70 for T1 to T6, respectively). Body weight and BWG for week 1, 4 and the entire rearing period decreased (BWG; 2006, 1898, 1800, 1850, 1610 and 1720g for T1 to T6, respectively) as the CP inclusion level increased ( $P < 0.001$ ). No effects of enzyme supplementation were observed. No significant effects of CP inclusion or enzyme supplementation on carcasses cuts, dressing percentages, intestine length and ether extract % were detected. Carcass weight (1418, 1432, 1273, 1207, 1100 and 1270g for T1 to T6, respectively) and fat pad % (2.1, 1.9, 1.5, 2.0, 1.5 and 1.3% for T1 to T6, respectively) were significantly affected ( $P < 0.001$ ) by the substitution levels being higher for T1 and T2 and lower for T5 and T6. There were significant differences ( $P < 0.0001$ ) between treatments in meat quality parameters. In general, pH, cooking loss, and lightness were higher while tenderness was lower in T6 compared with T1 and T2. In conclusion, results of the present study show no beneficial effects of carob pod inclusion on growth performance and meat properties of broiler chicks.

### **Acknowledgements**

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**Growth Performance and Carcass Characteristics of Broiler Chicks Fed Graded Levels of Carob Pod (*Ceratonia siliqua*)**

*A.Y. Abdullah, K. Z. Mahmoud – Poster Presentation /013*

## Anti-Inflammatory Effects of Algerian *Cistus salvifolius* Methanolic Extract

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### ABSTRACT

*Cistus salvifolius* are wide spread in the north western Africa, used as general remedies in folk medicine for treatment of various skin diseases and inflammation disorders [1]. The aim of this study is to evaluate the anti-inflammatory activity of methanolic extract from the leaves of *Cistus salvifolius* using carrageenan-induced paw edema in *Wistar albino* rats [2] and air pouch model in *Swiss albino* mice [3]. Moreover the release of IL-1 $\beta$  and TNF- $\alpha$  from concanavalin A-stimulated monocytes was examined [4]. Results showed that *Cistus salvifolius* methanolic extract, at 200 and 400 mg/Kg, exerted significant anti-inflammatory activity. Both doses reduced the paw edema by 67% and 86%, respectively. Similarly, the treatment of mice with 1 mg/pouch of the extract decreased the number of leucocytes migrated in the air pouch by 48.42%. This inhibition is statistically comparable to that of indomethacin, used as standard anti-inflammatory agent. Indeed, IL-1 $\beta$  release was reduced by 95% by the treatment with different concentrations (1, 10, 50 and 100  $\mu$ g/ml) of the extract, while TNF- $\alpha$  release was reduced by 62% and 100% with 50 and 100  $\mu$ g/ml of extract, respectively. The results obtained in this study revealed the anti-inflammatory activity of methanolic *Cistus salvifolius* extract justifying its use in folk medicine.

Key words: *Cistus salvifolius*, anti-inflammatory, Paw edema, Pouch air, Cytokines.

### ACKNOWLEDGEMENT

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## Studies on Flowability, Compressibility and In-vitro Release of mixed Fruit Powder Tablets

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### ABSTRACT

The present study aimed to elaborate matrix tablets from powder mixture (2:1 ratio) of Algerian date (*Phoenix dactylifera* L.) fruit and lyophilized berries (LB) (*Arbutus unedo* L.), using the direct compression technique. In a first part, the physicochemical properties, including the X-ray diffraction, of individual powders and their mixture were determined. In the second step, the swelling, erosion and in vitro release rate characteristics of tablets were studied. Taking into account the nutritional and physiological potentials of the basic components of the analyzed powder, the obtained tablets may be successfully used as dietary supplement and/or as excipient in the pharmaceutical industry.

**Keywords:** Arbutus berries, date fruit, tablet, dissolution, swelling, erosion.

## **Vitamin E and Selenium Injection as a Potential to Manage Repeat-Breeding Syndrome in Dairy Cows**

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### **ABSTRACT**

The objective of this study was to investigate a modification of a common hormonal-synchronization program used to solve repeat breeding syndrome (RBS) in dairy cows. The modification was including injections of vitamin E and selenium (Se) at two occasions. Thirty nine repeat-breeder cows were assigned to one of two treatments (Control or E/Se) according to the completely randomized design. The control group (n = 12) received the regular hormonal synchronization program (Ovsynch) to solve RBS which consisted of the following steps: 1) giving GnRH (gonadotropin releasing hormone) injection 10 days before the scheduled artificial insemination, 2) giving PGF<sub>2α</sub> (prostaglandin F<sub>2α</sub>) injection 3 days before insemination, 3) giving a second GnRH injection one day before insemination, and 4) the scheduled artificial insemination. The E/Se group (n = 27) received the regular program (Ovysynch) plus giving vitamin E/selenium injections (15 ml/cow) at two occasions (at the time of giving the first GnRH injection and at insemination). Pregnancy was ultrasonically diagnosed at about 30-40 days after mating. Data for pregnancy rate was analyzed by Chi-square test. Milk data was analyzed using the Mixed procedure of SAS. Milk yield was not affected (P = 0.49) by vitamin E/Se injections and averaged 24.0 and 23.5 kg/d for the control and E/Se groups, respectively. Pregnancy rate for the E/Se group (56%) was numerically higher than the control group (50%), but not statistically different (P = 0.75). To the best of our knowledge, our study is the first that used vitamin E/Se injection in conjunction with ovysynch program to manage RBS in dairy cows. Based on the current results, our technique did not improve pregnancy rates of repeat breeder dairy cows. However, modifications of our proposed technique could be investigated and might give promising results in solving RBS in dairy cows. The modification could include: 1) larger dose of injection to sufficiently increase vitamin E and Se in follicle and oviduct, 2) additional injections during early embryonic growth, and 3) repeating injections during the second service.

### **ACKNOWLEDGEMENT**

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## **Spring Wheat Genotypes Reaction on the Yellow Rust *Puccinia striiformis*, Wes.**

### **Infection degree**

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### **ABSTRACT**

In recent years yellow rust has been showed a worldwide distribution and have caused significant yield losses in winter and spring wheat. Partly it has been associated with the high rates of mutation. Since 2011 in Europe has been showed distinct new lineages – Warrior, Kranich, Warrior (-) that have caused wide epidemics on different cultivars of wheat. Cool and damp weather conditions are conducive the rise of Yellow (stripe) rust *Puccinia striiformis*, Wes. which is one of the most dangerous wheat leaf disease in the last years in Latvia. Yellow rust can reduced yield by 50% in untreated crops. Grain yield losses can be prevented using a combination of varietal resistance and fungicides. Information on spring wheat varieties diversification can help to reduce the risk of spread in high disease pressure situations.

The aim of the study was to investigate reaction of different spring wheat genotypes to the local YR population during vegetation period and effect of fungicide treatment on yield and quality traits. Field trials with seven most popular and perspective spring wheat varieties in Latvia were establish in Stende autumn 2016. The trial was designed as two randomized complete blocks (treated and untreated) with three replications. Application of fungicide (Ascra Xpro 1.5 l ha<sup>-1</sup>; BBCH 40-60 GS) was used to control yellow rust. The grain yield, and grain quality such as thousand-kernel weight (TGW), protein and gluten content, volume weight were recorded and determinate. Preliminary results indicate that there are difference between genotypes resistance to yellow rust. Grain yield and thousand-kernel weight (TGW) of all tested varieties was significantly lower ( $P>0.001$ ) in untreated block.

**Keywords:** yellow rust, wheat, yield, quality

**Spring Wheat Genotypes Reaction on the Yellow Rust *Puccinia striiformis*, Wes.  
Infection degree**

*Vija STRAZDINA and Valentina FETERE – Poster Presentation /017*



**Investigation of the inhibitory activity in methanolic extract of *Allium sativum* L. on Metallo- $\beta$ -lactamase extracted from a clinical isolate *Pseudomonas aeruginosa***

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**ABSTRACT**

beta-Lactamases, are a diverse group of bacterial enzymes that hydrolyse beta-lactam antibiotics, opening the beta-lactam ring and rendering them clinically ineffective[1]. This study was conducted to investigate *in vitro* the inhibitory effect of methanolic extract (ME) of *Allium sativum* L. on metallo- $\beta$ -lactamase extracted from a clinical isolate *P.aeruginosa*. The kinetics studies showed that the michaelis constant ( $K_M$ ) and maximum rate ( $V_m$ ) are  $10.38 \pm 0.082 \mu M$  and  $204.09 \pm 4.96 UI$ , respectively. These results reflect affinity and high efficiency of MBL on nitrocefin. The  $IC_{50}$  value that determined by linear computerized regression analysis after logit/log transformation, of EDTA is 1.02 mM; while, of *A.sativum* L. ME is  $43.18 \mu g/ml$ . The comparison of the  $IC_{50}$  of this extract and the original inhibitor, EDTA, reflect a good inhibitory effect, which caused by competitive inhibition. The extract of *A.sativum* L. was also screened for its antimicrobial activity against *P.aeruginosa* strain; The result showed that the sensitivity of the bacteria was gradually increased with the increasing of extract concentrations. In conclusion, *A.sativum* L. ME has a good MBLs inhibitory effect likewise are potentially a rich source of antimicrobial agents (polyphenols=  $51.12 \pm 0.022 \mu g$  GAE/mg) that confer a good antibacterial activity against the clinical isolate *P.aeruginosa*.

**ACKNOWLEDGEMENT**

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**Investigation of the inhibitory activity in methanolic extract of *Allium sativum* L. on Metallo- $\beta$ -lactamase extracted from a clinical isolate *Pseudomonas aeruginosa***

*Selma HOUCHI and Rachid MAHDADI – Poster Presentation /018*

## Hepatoprotective Activity of *Asphodeline lutea* On the Rat's Liver

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### ABSTRACT

Hepatoprotective activity of *Asphodeline lutea* methanolic extracts was assessed using paracetamol as a hepatotoxin. *A. lutea*, is a perennial wild edible plant that grows in the Mediterranean region, is occasionally consumed by Jordanians during spring. The hepatoprotective activity of different parts of *A. lutea* methanolic extracts was assessed by giving Wister Albino rats via gavage for 5 days. On the 6th day, a single dose of 3 g/kg body weight of paracetamol was given to the rats via gavage, and 48 hours later, blood samples were collected and liver function was evaluated by measuring total bilirubin and the activities of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) in addition to liver/body weight ratio. Methanolic extracts of *A. lutea* flowers and fruits were found to possess hepatoprotective activity against paracetamol intoxication. These treatments were able to significantly decrease serum total bilirubin when compared to the positive control group (from  $0.855 \pm 0.0085$  mg/dL to  $0.1692 \pm 0.0748$  mg/dL and from  $0.855 \pm 0.0085$  mg/dL to  $0.387 \pm 0.0587$  mg/dL respectively). The extracts were also able to decrease serum AST activity significantly ( $p < 0.05$ ) in comparison with the positive control group (from  $241.336 \pm 32.0338$  mg/dL to  $61.304 \pm 7.9582$  mg/dL and from  $241.336 \pm 32.0338$  mg/dL to  $61.013 \pm 11.6316$  mg/dL respectively). And decreased serum ALT activity significantly ( $p < 0.05$ ) in comparison with the positive control group (from  $187.9441 \pm 20.2482$  mg/dL to  $76.4738 \pm 14.5407$  mg/dL and from  $187.9441 \pm 20.2482$  mg/dL to  $82.0288 \pm 9.614$  mg/dL respectively).

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## **Biodiversity of Metazoan Parasites on Rajid Fishes (Elasmobranchii) from the Algerian Coasts: a First Annotated Inventory**

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### **ABSTRACT**

Parasites were recognized as significant components of the global biodiversity. Their essential role occurs in providing precious information on host populations and comprehension of the natural ecosystems' functioning. Although, knowledge about these organisms diversity has enlarged in recent decades, there are still many species to be identified and more investigations to be performed.

Elasmobranch fishes represent an interesting biological resource for the Mediterranean population. However, the data on their parasitic fauna, particularly in Algeria, still incomplete. Therefore, the aim of this study is to survey and provide information on the biodiversity of parasites belonging to this chondrichthyans group.

Between 2000 and 2018, a total of 955 Rajid fishes belonging to 8 species were carried out in four sites situated near Algiers and examined for their parasites. 19 taxa belonging to Monogenea, Cestoda and Copepoda were identified. Class Cestoda presented the highest richness (12 taxa), and 3 new species: 2 species of *Acanthobothrium* sp. and 1 species of *Echinobothrium* sp. Class Monogenea is representing by 4 taxa and Copepoda with 3 taxa. This study allowed us to establish for the first time in Algeria an inventory of Metazoan parasites of this group of fish Selachii, as well was an important contribution to the knowledge about the parasitic fauna of Algerian and Mediterranean Rajid fishes.

### **ACKNOWLEDGMENT**

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***Echeneibothrium algeriensis* n. sp. (Cestoda: Echeneibothriidae) from *Dipturus batis*  
(Elasmobranchii: Rajidae) of the Algerian coast**

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**ABSTRACT**

Examination of rajid skates off the Algerian coast in the Mediterranean Sea revealed that three of the 33 *Dipturus batis* Linnaeus, 1758 examined harboured a new tapeworm species: *Echeneibothrium algeriensis* n. sp. This new species, collected from the anterior half of the spiral valves, is described on the basis of morphological data from light and scanning electron microscopy. The new species differs from previously described *Echeneibothrium* species by total length, and details of the scolex and loculi. Additionally, it differs by the length of the myzorhynchus, the number of proglottids, and the number of testes.

**ACKNOWLEDGEMENT**

This work was supported by the Laboratory of Biodiversity and Environment: Interactions-Genomes.

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***Echeneibothrium algeriensis* n. sp. (Cestoda: Echeneibothriidae) from *Dipturus batis* (Elasmobranchii: Rajidae) of the Algerian coast**

*Karima BENMESLEM, Haseeb S RANDHAWA & Fadila TAZEROUTI – Poster Presentation /021*

## **Fodder Beans for Dairy and Meat Goat Nutrition**

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### **ABSTRACT**

Not only imported soy, but also home grown protein crops - beans - are excellent fodder, due to their high protein content. Adding of fodder beans in dairy and meat goat daily ration can increase intake of protein and have positive impact to goat production and milk and meat quality indices. A study on dairy goat feeding was carried out on a farm whose main activity is the production and processing of goat milk products. The goats were divided into 3 groups, offering to each group a feed ration consisting of grass fodder (basic feed) and different concentrated feed. In addition to the basic feed goats received 0.5kg oats or 0.4kg oats and 0.1kg beans, or 0.3kg of oats and 0.2kg of beans. The aim of the study was to investigate the effect of feeding of fodder beans on the quality and quantity of goat milk. Including fodder beans in high productivity goat's can increase the milk yield of goats by as much as 16%. Fodder beans ration can lead to the production of milk with higher milk protein content (by 8.5 - 10.1% more). The feeding of fodder beans increases the content of milk casein, which is an important factor for cheese producers. By including self-produced fodder beans in goat ration it is the potential to reduce feed costs by for milk production by up to 14.5%. Experiment on the effective using of the fodder beans to Boer mother goats was carried out in goat farm, which main activity is goat meat production. At present goat farms in Latvia is not paying much attention to optimizing of feed ratio, which leads to unprofitable farming. The fodder beans were included in feed ration in addition to basic feedstuffs for Boer mother goats. The obtained data were compared with the same performance of goats in the previous year (control group), when goats used only hay and oats in the main feed. Goat productivity was analyzed according to the birth weight of goat kids and kids live weight at 50 days, as well as the average live weight gain of kids per day up to 50 days old. Experimental activities had shown that by including of field beans in feed ratio of goat's mothers, the average increase in live weight of kids up to 50 days old was by 63.6% higher ( $P < 0.05$ ) than that of kids which goats' mothers received only oats as concentrated feed. By optimizing of feed ratio, it is possible to achieve a higher milk productivity of goat mothers and hence larger live weight gain for kids, which reduces the feed costs by up to 9% for 1kg of live weight.

### **ACKNOWLEDGEMENT**

Experiments were carried out within the framework of the Ministry of Agriculture project "Pulses - an Alternative to Soybeans for the Production of Protein Bulk Fodder: Agricultural and Economic Justification of Farming in Latvia" and "Zootechnical and economic efficiency of feeding of fodder pulses to ruminant's meat production".

## **Epidemiological Study of Monogenea (Platyhelminthes) Parasites of Some Chondrichthyans Fish from Algerian Coast**

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### **ABSTRACT**

Unfortunately, to date, information on the population dynamics of the parasites of Chondrichthyans in Algeria is not available, so this paper evaluates some aspects of the population dynamics of Monogenea parasites of some cartilaginous fish.

During 2013 to 2018, a total of 345 fishes divided into 3 species *Chimaera monstrosa* Linnaeus, 1758 (Chimaeridae), *Rhinobatos rhinobatos* (Linnaeus, 1758) (Rhinobatidae) and *Aetomylaeus bovinus* (Geoffroy St. Hilaire, 1817) (Myliobatidae) were examined for monogenean parasites.

Six species of Monogenea were found with the following prevalence of infection, abundance and mean intensity: five species of Monopisthocotylea: *Neoheterocotylektarii* (100%; 2,8 and 2,8), *Empruthotremachisholmae* (50%; 1,3 and 2,6), *Empruthotrema* sp. (30%; 1,5 and 5), *Myliocotylepteromyiaei* (20%; 1,9 and 9,5) and *Monocotylemyliobatis* (30%; 1,2 and 4) and one species of Polyopisthocotylea: *Chimaericolaleptogaster* (5,2%; 0,1 and 1). The results of the calculation of parasitic indices reveal a strong predominance of the species *Neoheterocotylektarii* with a prevalence of 100%. However, *Chimaericolaleptogaster* with the lowest prevalence (5,2%) is considered a satellite species. In addition, *Myliocotylepteromyiaei* has the highest mean intensity with a value of 9,5.

This study, undertaken for the first time in Algeria, made it possible to assess the epidemiological aspect of the parasites belonging to these three cartilaginous fish species.

### **ACKNOWLEDGEMENT**

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## Comparison of the Technological and Nutrition Quality of Wheat, Spelt and Their Crossbreed (PS Lubica)

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### SUMMARY

Crosbreed PS Lubica was registered in Slovak Republic in the year 2014. Pedigree of this crossbreed is: *Triticum aestivum* (winter type) × *Triticum spelta* (winter type) Estica × Renval. Regarding the nutritional quality cultivar retains spelt quality while achieving high grain yield (90% in comparison to standard cultivar), the grain is not necessary to hull. PS Lubica is late cultivar, ear is long, sparse, coloured, 1000-kernel weight is 50 g. Cultivar is less resistant to lodging. The aim of our study was to evaluate, to describe and to compare the technological, nutrition and bakery quality of the crossbreed – wheat genotype PS Lubica, registered in the Slovak Republic in 2014, compared with winter wheat (Josef) and spelt (Öko 10). We determined qualitative parameters such as volume weight, extraction of the flour, ash content, wet gluten, gluten index, swelling of gluten, extension of gluten, elasticity of gluten, falling number, sedimentation index, rheological properties of dough (farinograph evaluations) and the final quality of bakery products. From nutrition parameters we determined protein content, total dietary fiber content, total starch and resistant starch content and oil content. PS Lubica was characterized by low the volume weight (706 g/l), high the protein content (16,2 %) and high the water absorption (61,7 %) compared with the winter wheat and spelt. PS Lubica and spelt were characterized by high wet gluten content (37,8 %) in comparison with winter wheat (25,9 %). PS Lubica (332 ml) and spelt (341 ml) had higher volume of bread in comparison with winter wheat (285 ml), but had low chambering of bread – ratio length/high (PS Lubica and spelt had value 0,35 and winter wheat 0,65). PS Lubica was characterised by higher dietary fiber content (7,01 %) and higher resistant starch (0,42 %) content with comparison to winter wheat. Oil content of PS Lubica was equal to spelt and winter wheat (1,00 %). The

practical aim of our study was give more detail data for breeders and for farmers and bakeries too, if they would like to decide for genotype PS Lubica. Therefore we determined wide spectrum of the qualitative parameters for the better identification of the technological, nutrition and bakery quality of these genotype, whereas PS Lubica is more similar to spelt from the qualitative point of view, but more similar to winter wheat from the morphological point of view.

**Key words:** wheat, spelt, technological quality, nutrition quality, bakery quality

The work was supported by the projects PESYSTRU (Research and development project of the Ministry of Agriculture and Rural Development of the Slovak Republic).

## **Prosopis Juliflora Feed as New Feed Supplement Used in Sheep Fattening in A Community Based Integration Trial**

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### **ABSTRACT**

Thirty newly weaned Awassi lambs (initial Body weight=11.5±0.5Kg) were randomly allocated to one of the two treatments (15 lambs / treatment). They were then used to evaluate the effects of the inclusion of Prosopis juliflora pods in complete diets on the growth performance and carcass characteristics of Awassi ram lambs from weaning up to a marketable age. The lambs were fed two different rations for a period of 5 months. The two complete diets were formulated to contain 0 (control) and 20% Prosopis juliflora pods. These rations were formulated to contain the same percentage of crude protein and metabolizable energy. Lambs were placed in two adjusted blocks and fed twice daily. The initial body weight was taken and lambs were weighed on monthly bases. All lambs were given a starter ration for two weeks and then all lambs were put on control and Prosopis feed ration. Two animals were slaughtered and dressed at the end of the fattening period and each carcass was dissected for examination of differences in muscularity and carcass composition. There was a linear increase in the average feed intake through the entire fattening periods. The increase in body weight was well noticed. The mean body weight reached up to 22.84 kg and 18.86 kg in the control and the Prosopis rations, respectively after almost one month under the ration treatments. Means of final live weight, average live weight gain, average daily gain, average daily feed intake, total feed intake and average feed efficiency were all higher in lambs fed the control groups ration compared with the lambs fed the Prosopis ration. The lambs fed the control ration had higher feed conversion ratio which is equal to 6.79 kg feed/kg gain (every one kg gain need 6.79 kg feed) compared with lambs fed the Prosopis ration which is equal to 5.40 kg feed/kg gain. This mean that the cost of one kilogram body weight gain in each lamb fed the control ration was almost doubled. The calculated cost was equal to 1.47 JD/kg which is 60% higher than the cost of one kilogram body weight gain in each lamb fed the Prosopis ration which cost 0.891 JD/kg. This increase was well noticed from the second weight in both treatments till the end of the experiment.

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## **Drying and Fryzing Could Influence Antioxydant Activity and Phenolic Coumpounds Chemical Composition of Citrus Fruits**

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### **ABSTRACT**

We investigated the contribution of physical state influence (freezing and drying effect) of citrus fruits on the total polyphenols and flavonoids contents and their antioxidant activity. The residual quantities of phenolic substances from variety “Thomson” orange peel were evaluated undergoing various physical treatments. Peel samples were air-dried in the dark for 21 days, or frozen at -4 ° C for two months, or underwent both treatments. The total polyphenol and flavonoid assay was performed by the colorimetric method using Folin ciocalteu and Aluminum trichloride, the antioxidant activity was measured by the DDPH method. The results showed that the yield of polyphenols and flavonoids, as well as their antioxidant activity, vary according to drying and freezing factors. Some types of flavonoids are degradable despite conservation, only by drying, then by freezing, but the polyphenols are well preserved by both treatments. Optimal results are noted when both treatments are applied at the same time, with maximum antioxidant activity and a polyphenol content equal to 31. 228mg. Eq gallic acid/100g of vegetable matter. The chromatograms established for the different phenolic extracts are discussed.

### **ACKNOWLEDGEMENT**

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**Drying and Fryzing Could Influence Antioxydant Activity and Phenolic Coumpounds Chemical Composition of Citrus Fruits**

*Amira Noue El Houda HAMEL, Soumya KHERBOUCHE, Leïla ALLAL BENFEKIH, Karima ARAR, Nada CHEBATA and Thoraya DAHMANE – Poster Presentation /026*

## Antimycoplasmal Activity of Jordanian Medicinal Plants against Three Mycoplasma Species

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### ABSTRACT

Mycoplasmas are the smallest free-living microorganisms lacking a cell wall. The in vitro effect of six Jordanian traditional medicine plant methanolic extracts were tested against 32 isolates of Mycoplasma species; Mycoplasma mycoides subsp. mycoides LC (6), Mycoplasma capricolum subsp. capricolum (8) and M. putrefaciens (18), all isolated from either nasal swabs or milk, from sheep and goats in different regions in Jordan. All Mycoplasma species showed susceptibility to Artemisia herba alba and Artemisia arborescens with MIC ranges from 3.125–12.5 mg/ml. Allium sativum and Punica granatum showed limited activity against some Mycoplasma isolates. Olea europea and Citrullus colocynthis showed no in vitro activity against any of the Mycoplasma species tested. Artemisia herba-alba and Artemisia arborescens may therefore be useful for the treatment of mycoplasma infections.

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## Batch Adsorption of Basic Dye FROM Aqueous Solutions by Modified Apricot Stone - kinetics Studies and Isotherms Modeling

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### ABSTRACT

The preparation of activated carbon from apricot stone (ASAC) with H<sub>3</sub>PO<sub>4</sub> and its ability to remove the Methylene Blue (MB) used in the textile industry from aqueous solutions are reported in this study. The FTIR spectroscopy is used to get information on interactions between the adsorbent and MB. A series of contact time experiments were undertaken in stirred batch adsorber to assess the effect of the system variables. The results were discussed and showed that ASAC can be successfully used in the wastewater treatment. A comparison of two models on the overall adsorption rate showed that the kinetic of adsorption was better described by the pseudo-second order model. The adsorption isotherms of MB onto ASAC are determined and correlated with common isotherms equations. The smaller RMSE values obtained for the Langmuir and Elovich models indicate the better curves fitting, the monolayer adsorption capacity of MB is found to be 46.03 mg.g<sup>-1</sup> at 25 oC and 142.42 mg g<sup>-1</sup> at 70 oC and pH 10. The thermodynamic parameters indicate spontaneous and endothermic nature of the adsorption process. The positive entropy ( $\Delta S^\circ$ ) shows that the randomness indecreases at the solid-solution interface during the MB adsorption onto ASAC, indicating that some structural exchange may occur among the active sites of the adsorbent and MB ions

**Keywords:** Apricot stone, Methylene Blue, Kinetic, Isotherm, Adsorption, Thermodynamic

This study has shown that the activated carbon prepared from apricot stone [1] can be employed as effective adsorbent for the removal of MB from aqueous solution. The Elovich and Langmuir isotherms model provided a better fit of the equilibrium adsorption data one. They gave a maximum adsorption capacity of 46.03 mg.g<sup>-1</sup> at 25 oC which increased to 142.8 mg.g<sup>-1</sup> at 70 oC at pH 10. The pseudo-second order model [2] proved the best description of the kinetic data. The negative value of  $\Delta G^\circ$  and positive value of  $\Delta H^\circ$  indicate that the adsorption of MB onto ASAC is spontaneous and endothermic over the studied range of temperatures. The positive value of  $\Delta S^\circ$  states clearly that the randomness increases at the solid-solution interface during the MB adsorption onto ASAC, indicating that some structural exchange may occur among the active sites of the adsorbent and the ions. The adsorption of MB ions by ASAC follows a pseudo-second order kinetic model, which relies on the assumption that chemisorptions may be the rate-limiting step. In chemisorption, the MB ions are attached to the adsorbent surface by forming a chemical bond and tend to find sites that maximize their coordination number with the surface.



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## The Field Peas in Beef Cattle Feeding

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### ABSTRACT

In our research we estimated the field peas feeding effect in beef cattle rations. In moderate climate field peas grow well and its can grown in Latvia with good success. In our research we used field peas, which harvested as grain, with chemical content: crude protein 25.87%, acid detergent fiber 9.03%, neutral detergent fiber 17.97%, starch 48.16%, calcium 0.09%, phosphorus 0.57% in dry matter. The field peas (15%) we mixed together with barley (27.5%), wheat (27.5%) and oats (30%). This concentrate feed received trial beef cattle group (10 calves in growing period), but control group only mixed grains barley (27.5%), oats (45%) and wheat (27.5%). Control and trial groups animals received mixed feed with chemical content, respectively, crude protein 13.48% and 14.29%, starch 55.9% and 54.4%, acid detergent fiber 7.45% and 8.19%, neutral detergent fiber 20.5% and 18.1%, the energy content 8.02 and 7.96 NE, MJ in dry matter. The basic feed was grazing grass with crude protein 10.27% for both beef cattle groups. The animals were 70 days old with average liveweight 118±25.6 kg at the start of the experiment. Beef cattle calves, consuming field peas, had greater liveweight after 60 days eating, control and trial animal group, respectively 179±23.5 kg and 203 ±22.0 kg ( $p<0.05$ ). Average daily liveweight gain were in control and trial groups, respectively  $1.1 \pm 0.04$  kg and  $1.3 \pm 0.55$  kg without significantly differences. The experiment will continue till animals reached fattening weight. In literature the researcher Lindberg (1981) found the disappearance rate of field peas within the rumen was slower during the first six hours after consumption than for soybean meal, but increased there later. Lindberg concluded slower degradability protein of peas might be beneficial for rumen microbial growth and have a positive influence on rumen pH and feed efficiency. Additionally, starch is degradable in the rumen: however, starch degrades much more slowly in the rumen than wheat or barley (Walhain *et.al.*, 1992). This suggests that field peas are good for ruminants. Our data also indicate that field peas (15%) can be used to increase the diet of crude protein for beef cattle calves, for faster growing and greater calf performance.

### ACKNOWLEDGEMENT

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## **Biodiversity of Metazoan Parasites on Rajid Fishes (Elasmobranchii) from the Algerian Coasts: a First Annotated Inventory**

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Parasites were recognized as significant components of the global biodiversity. Their essential role occurs in providing precious information on host populations and comprehension of the natural ecosystems' functioning. Although, knowledge about these organisms diversity has enlarged in recent decades, there are still many species to be identified and more investigations to be performed.

Elasmobranch fishes represent an interesting biological resource for the Mediterranean population. However, the data on their parasitic fauna, particularly in Algeria, still incomplete. Therefore, the aim of this study is to survey and provide information on the biodiversity of parasites belonging to this chondrichthyans group.

Between 2000 and 2018, a total of 955 Rajid fishes belonging to 8 species were carried out in four sites situated near Algiers and examined for their parasites. 19 taxa belonging to Monogenea, Cestoda and Copepoda were identified. Class Cestoda presented the highest richness (12 taxa), and 3 new species: 2 species of *Acanthobothrium* sp. and 1 species of *Echinobothrium* sp. Class Monogenea is representing by 4 taxa and Copepoda with 3 taxa. This study allowed us to establish for the first time in Algeria an inventory of Metazoan parasites of this group of fish Selachii, as well was an important contribution to the knowledge about the parasitic fauna of Algerian and Mediterranean Rajid fishes.

**Key words:** Metazoan Parasites, Biodiversity, Fish, Rajid, Algerian Coasts, Monogenea, Cestoda, Copepoda, Inventory.

**Biodiversity of Metazoan Parasites on Rajid Fishes (Elasmobranchii) from the Algerian Coasts: a First Annotated Inventory**

*Fadila TAZEROUTI & Karima BENMESLEM – Poster Presentation /030*

## **Biodiversity of Monogenean (Platyhelminthes), gill parasites of *Trachurus mediterraneus* (Teleostei, Carangidae) in Algeria**

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### **ABSTRACT**

Monogenean are an integral part of the dynamic and complex fish parasite assemblage. Few recent contribution on the occurrence of Monogenean in *Trachurus mediterraneus* Steindachner, 1863 have been realized. The aim of the present study is to contribute to the knowledge of the diversity of monogenean of *T. mediterraneus* off the Algerian coast.

Between October 2017 and April 2018, 235 *T. mediterraneus* were collected from Bouharoun (36° 37' 24" North, 2° 39' 17" East) and Cap Djenet (36° 52' 37" North, 3° 43' 23" East) near Algiers.

4 species of monogeneas belonging to 2 families were collected:

Gastrocotylidae Price, 1943 with 3 species: *Gastrocotyle trachuri* Van Beneden et Hesse, 1863, *Pseudaxine trachuri* Parona et Perugia, 1890, *Allogastrocotyle bivaginalis* Nasir et Fuentes, 1984 and Heteraxinidae Unnithan, 1957 with 1 species: *Cemocotyle trachuri* Dillon et Hargis, 1965.

The present study provides a new host record for *Allogastrocotyle bivaginalis* and a new locality record for this species as well.

**Key-words:** Monogenea, *Trachurus mediterraneus*, Algeria, *Gastrocotyle*, *Pseudaxine*, Biodiversity.

### **ACKNOWLEDGEMENT**

This work was supported by LBEIG (Laboratory of Biodiversity and Environment: Genomes, Interaction).

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**Biodiversity of Microcotylidae (Platyhelminthes; Monogenea) off the Algerian coast:  
Morphology and molecular characterization of *Microcotyle erythrini* from *Pagrus  
pagrus* (Teleostei; Sparidae)**

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Microcotylidae Taschenberg, 1879 is a polyopisthocotylidan family that has received most attention by taxonomist (Unnithan 1971; Mamaev 1986; Tripathi 1954). In recent years, new genera *Omanicotyle* (Mamaev & Parukhin, 1974) by Yoon et al. (2013), *Paranella* by Kohn et al. (2000) and species *Microcotyle algeriensis* by Ayadi et al. (2016) have been added to this family .

The discovery of a parasite identified as *Microcotyle* sp. on the gills of a new host, *Pagrus pagrus* (Linnaeus, 1758) in Algeria prompted the need of a molecular study and a redescription of the parasite along with a careful comparison with the other host records.

They were severe differences between *Microcotyle erythrini* Van Beneden & Hesse, 1863 from its type host *Pagellus erythrinus* (Linnaeus, 1758), and *Microcotyle erythrini* that was described upon a material recovered from *Pagrus pagrus*: 1) total length; 2) clamps number and testes number; 3) buccal organ length. However, the molecular study revealed that *Microcotyle erythrini* recovered on *Pagrus pagrus* and those recovered on *Pagellus erythrinus* were identical, confirming the occurrence of this species and the genus, on a second genus among Sparid host in the Mediterranean Sea.

Given the high host specificity of Monogenean (Rhode 1984; Whittington et al. 2000), we suggest that precautions should be taken when considering new host records. In such cases, identification should not be made based only on morphology, but also on molecular data taking in consideration geographic localities and especially host.

**Key words:** *Microcotyle erythrini*, *Pagrus pagrus*, morphological, molecular, Algeria.

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**Biodiversity of Microcotylidae (Platyhelminthes; Monogenea) off the Algerian coast: Morphology and molecular characterization of Microcotyle erythrin from Pagrus pagrus (Teleostei; Sparidae)**

Chahinez BOUGUERCHÉ, Jean-Lou JUSTINE, Wahida TRABELSI and Fadila TAZEROUTI – Poster Presentation  
/032



## First Characterisation of *Blastocystis* Subtypes in Different Animal Stool Samples in Algeria

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### ABSTRACT

*Blastocystis* is one of the most common enteric protozoa in humans<sup>1</sup> and different groups of animals<sup>2</sup>, classified in the group of Stramenopiles<sup>3</sup> living in anaerobiosis<sup>4</sup> and remains intriguing to this day. We first performed a parasitological examination of feces on a total of 70 stool samples, 29 were found to be positive, of which 12 were randomly selected and submitted to molecular analysis which revealed a positivity of 7 samples using standard polymerase chain reaction (PCR), 2 samples of them were sequenced and revealed the presence of two subtypes: ST3 (KY019153.1) isolated from a fecal sample belonging to a cat and ST7 isolated from a stool sample belonging to a hen. The sequence has 23 single nucleotide polymorphisms (SNPs) compared to the ST7 (KP233730.1) referred in the GENBANK with a 94% similarity percentage suggesting the discovery of a new subtype in Algeria.

### KEYWORDS

*Blastocystis*; protozoa ; parasitology ; PCR ; sequencing ; genotype ; animal parasitology.

### ACKNOWLEDGEMENT

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First Characterisation of *Blastocystis* Subtypes in Different Animal Stool Samples in Algeria

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DRALI R3– Poster Presentation /033

## **Biodiversity and Ecology of Spiders in Tikjda (Djurdjura National Park)**

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### **ABSTRACT**

Spiders are an important group of invertebrates in all terrestrial ecosystems. They are the most abundant with very high species richness. They are known to lodge various ecological niches. In order to study the biodiversity of the Aranéides, twelve plots were chosen in Tikjda region, a south slope of Djurdjura National Park. They differ by dominant vegetal specie and other abiotic factors. To collect spiders, pitfall traps were used. They are filled third with a formaldehyde solution (4%) as fixative. The traps were emptied monthly during 9 months between 2015-2016.

A total of 880 individuals belonging to 18 families were collected, Linyphiidae is the most abundant family (24%) followed by Gnaphosidae (19%) and Dysderidae (19%), they are present in all biotopes. the black pin forest is the most abundant plot (150 individuals) and the oak cork forest is the richest one. The abundance is different between the vegetal abundant specie plots, the cedar forest contain the high number.

Our study showed many ecological preferences for the different families collected relationship with some abiotic factors as altitude and recovery rate of vegetation.

**Keywords:** *Spiders, Abundance, Ecology, Biodiversity, Tikjda.*

## **Modulatory Effect of *Capparis spinosa* Flower Bud Aqueous Extract on Edema and Cytokines prodUced by Peripheral Blood Mononuclear Cells**

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### **ABSTRACT**

In the present study, the anti-inflammatory activity of the aqueous extract of *Capparis spinosa* buds was evaluated *in vivo* by using paw edema inflammatory model. Moreover, the ability of the extract to modulate the release of TNF- $\alpha$ , IL-1 $\beta$ , IFN- $\gamma$  from peripheral blood mononuclear cells stimulated by concanavalin A was evaluated *in vitro*. Results showed that the oral administration of 200 and 400 mg/Kg of the extract decreased significantly ( $p < 0.05$ ) carrageenan-induced paw edema. After 2 h, the inhibitions values were 47.62 % and 38.40 %, respectively. On the other hand, the treatment of the mononuclear cells with different concentrations (1, 10, 50 and 100  $\mu\text{g/mL}$ ) of the extract showed a significant ( $p < 0.001$ ) inhibitory effect on the release on IFN- $\gamma$ . At 50 and 100  $\mu\text{g/ml}$ , the inhibitions values were 32% and 53%, respectively. In contract, the treatment of cells with the same concentrations of the extract induced in dose dependant-manner the production of the TNF- $\alpha$  and IL-1 $\beta$ . Indeed, at 100  $\mu\text{g/ml}$  the amounts of these cytokines were elevated by 4 and 3 fold, respectively. Taken together, we suggest that the aqueous extract of *Capparis spinosa* buds is effective as an anti-inflammatory agent by inhibiting edema and its action can be correlated with the inhibition of some inflammatory mediators including IFN- $\gamma$ .

**Key words:** *Capparis spinosa*, inflammation, cytokines, TNF- $\alpha$ , IL-1 $\beta$ , IFN- $\gamma$

**Modulatory Effect of *Capparis spinosa* Flower Bud Aqueous Extract on Edema and Cytokines prodUced by Peripheral Blood Mononuclear Cells**

*Nassima Kernouf, Hamama Bouriche, Dalila Messaoudi, Seoussen Kada, Areej M. Assaf and Abderrahmane Senator – Poster Presentation /035*

## Effectiveness of Plants Fiber Impregnated with Green Nanoparticles for Water Disinfection

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### ABSTRACT

It is well known that safe water is essential to human health and the development of the country. More than one billion in the world do not have access to safe drinking water. In order to improve the quality of water that meet communal needs, a reliable and adequate safe water supply in a cost-effective way is a vital need. In this study, TiO<sub>2</sub> nanoparticles were mixed with plant extract (pristine pomegranate peel extract (PPP) to develop the PPP-TiO<sub>2</sub>. Throughout the research, green chemistry was applied to minimize the use or generation of potentially harmful compounds during the manufacture, application and disposal. The media were fully characterized by Scanning Electron Microscope (SEM), Dynamic Light scattering (DLS) and X-ray powder diffraction (XRD). (PPP-TiO<sub>2</sub>) nanofillers showed a randomly oriented grains with various shapes and sizes and sharp grain boundaries. Grain size ranges from 1 to 5 µm. SEM micrographs also clearly showed the damaged bacterial cells of treated cells with PPP-TiO<sub>2</sub>. Furthermore, the biological activity has been evaluated by well diffusion method, Microbial Inhibition Concentration (MIC), Minimum Bactericidal Concentration (MBC) and live/dead cell assay. Testing has been performed at different concentrations and for three types of bacteria (staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli). Higher inhibition effects have been found for PPP-TiO<sub>2</sub> against Gram-positive than gram-negative strains which have lowest MIC 90, MIC50, and maximum inhibition zone was observed. Antimicrobial activity of PPP-TiO<sub>2</sub> was higher by 1.5 time compared to PPP or TiO<sub>2</sub> NP against same pathogenic bacteria. Furthermore, Biological Oxygen Demand (BOD<sub>5</sub>) was used to indicate the microbial communities and organic matter in the real water samples. Lower values were found for samples containing PPP-TiO<sub>2</sub> indicated that the sample has lower organic matter and indirectly indicated lower microbial community. Therefore, our developed media has a potential to be used as water disinfectant.

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## **The Effect of Different Drying Methods on Antioxidant Activity and Phenolic Contents of Wild-Sour Apple (*Malus sylvestris* MILLER) Naturally Found in Bayburt City**

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### **ABSTRACT**

The wild sour apple is white color, fleshed, nice smelled and aromatic a fruit type which is consumed by the local people of Bayburt City. The fruit includes the phytochemicals which have strong antioxidant activity and a major part of these phytochemicals are composed phenolic components. The aim of this study was to determine the most suitable method with regards to antioxidant activity and phenolic content among different drying methods for wild apple samples. The total phenolic content of samples varied between 34,92 mgGAE/g DW (room temperature-drying) and 41,18 mgGAE/g DW (oven-drying) when considered different drying methods. According to the DPPH method, the highest antioxidant activity was determined in the oven-dried samples. As for FRAP method, the highest antioxidant activity was found in freeze-dried samples, followed by oven-dried, infrared-dried and room temperature-dried samples, respectively. In terms of CUPRAC method, while the highest antioxidant activity was determined in oven-dried samples, followed by freeze-dried, infrared-dried and room temperature-dried samples, respectively. According to the results of the  $\beta$ -carotene method, the best drying method was freeze-drying, followed by oven-drying, room temperature-drying and infrared drying, respectively. Experimental results showed that oven-drying was the most suitable method for wild-sour apple (*Malus sylvestris* MILLER) in terms of total phenolic content and antioxidant activity. A high correlation was established between CUPRAC and FRAP according to statistical analysis.

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## Prebiotic Carbohydrates in Lentil and Effects on the Human Microbiome

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### ABSTRACT

Lentil (*Lens culinaris*) provides important amounts of essential nutrients for healthy living. It is low in fat (< 1%) and includes significant quantities of protein (20–30%), essential minerals such as Fe, Zn and Se, carotenoids, and dietary folates. Unlike other grains, lentil is very low in phytic acid (2.5–4.4 mg/g), which binds iron and zinc and thus renders these nutrients poorly bioavailable. Recent studies indicate that lentil is a rich dietary source of low-digestible carbohydrates also known as prebiotic that stimulate growth and activity of hind gut bacteria. These low-digestible carbohydrates are fermentable carbohydrates such as sugar alcohols (SA, also known as alditols, polyols, and polyalcohols), raffinose-family oligosaccharides (RFO), fructooligosaccharides (FOS), and resistant starch (RS). Its are fermented in the large intestine by hindgut bacteria, then used as a substrate for their growth and activity. Thus, a diet rich in prebiotic carbohydrates can significant play in promoting human gastrointestinal health by increasing beneficial bacteria and reducing pathogenic bacteria.

The objective of this review is to provide an overview of available data on lentil prebiotic carbohydrates and at the same time the effect of prebiotic carbohydrates on the human microbiome is to discuss.

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## Invitro and Invivo Evaluation of the Anti-Inflammatory Activity of *Genista Saharae* (Coss. & Dur.)

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### ABSTRACT

In Algeria, the therapeutic power of plants was known to our ancestors and our parents empirically. Thus, we did not know the chemical composition of drugs used by many people every day for health care. Saharan plants are known for their resistance to several stressors. In extreme climatic conditions, Saharan plants could constitute a reservoir of new natural biomolecules, safe and effective, potentially useful as anti-inflammatories.

In our work, we are interested in a Saharan plant : *Genista Saharae*. The aerial parts of *Genista saharae* are traditionally used for the treatment of respiratory diseases and possess a diuretic property. In Morocco in the region of Tafilalet, *Genista saharae* is recommended in digestive disorders. In addition, this plant is appreciated by dromedaries for its retention properties.

The purpose of this work is to study the invitro anti-inflammatory activity by inhibition of protein denaturation method and invivo by the inhibition test of the xylene-induced ear edema in mice. The comparison is made with respect to Sodium Diclofenac and Indomethacin, used as reference anti-inflammatory drugs, respectively.

The results obtained show an inhibitory effect of denaturation of bovine serum albumin relative to Sodium Diclofenac. In contrast, the same topically administered extract at a dose of 20mg / ear reveals an inhibitory activity of the ear edema near to that of indomethacin, namely, 34% and 55%, respectively.

To conclude, *Genista Saharae* shows a significant invitro and invivo anti-inflammatory activity that justifies its use in traditional medicine.

**Key words:** *Genista Saharae*, anti-inflammatory activity, ear edema, protein denaturation.