Abstracts Book

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العلوم الأساسية

Sustainable and Profitable Aquaculture of Giant Clam (Tridacna Spp.) in the Jordanian Sector of the Gulf of Aqaba (Red Sea)

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Abstract:

This study attempted to address the role of heterotrophic and autotrophic nutrition on the development growth and survival of tridacna maxima calms from larval, to post metamorphic to visible 2-3 month old juveniles. Two experiments were carried out on different levels of algae and dissolved inorganic nitrogen (DIN) to determine optimum rates to supplement the two modes of feeding of calm-symbiont association. In the first run, 4-day old larval calms were stocked at 3 veligers /ml and placed in 1.5 L bins. There were 4 replicate bins per treatment. For each treatment, 2 replicate bins were stocked with calms and the other 2 without calms as controls. Higher stocking density at 10 villagers / ml was also used to examine the effect of density on nitrogen assimilation. Water samples (20 ml) were taken at 4-hour intervals from feeding /spiking, for both ammonium concentration was observed between the spiked treatments ranging from 2.37-6.27 µM and non-spiked treatments at 0.22-0.62 µM. There was a fast uptake in veligers and post metamorphosis in the first 4 hours upon spiking for all spiked treatments. In the veligers, the spiked bins without clams showed relatively same ammonium concentration over time. In comparison to the bins with clams, the concentrations were lower and there was a continuous decrease of ammonium over time. These differences in ranges at both stages suggested that the uptake of ammonium was influenced by the stocking density. This study has practical important in the culture rearing protocol of giant clams in Jordan, Red Sea.

Keywords: Giant clams; Tridacnidae; Environmentally friendly; Mariculture; Gulf of Aqaba; Jordan's fishery; Red sea; Gulf of Aden; Bivalves; Oligotrophic; Coral reef.

Development of Drought Tolerant Wheat Transgenic Lines by the Overexpression of Drought Responsive Transcription Factors from the Model Plant Arabidopsis

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Abstract:

Plant breeding and plant transgenics are the two main approaches for crop improvement under stressful conditions such as drought. In this study, the approach of plant transgenics was taken. Two transcriptional factors from the model plant Arabidopsis that showed enhanced expression under drought stress were amplified and cloned. The cloned genes were transformed into wheat callus and whole wheat grains by Agrobacterium-mediated transformation. Both callus and grain transformation showed high transformational efficiency when the presence of hygromycin resistance, HB and MYB genes were tested by PCR. The first wheat transformant (T0) was grown and the second transformant (T1) grains were harvested. The performance of different transgenic lines of T1 plants and the non-transgenic wheat plants were tested under osmotic stress using 15% PEG as osmoticum. All transgenic lines showed no change in shoot length compared to control and the PEG-treated plants compared with the significant decrease in shoot length in non-transgenic wheat plants under osmotic stress.

Keywords: Drought; Transcription factors; Arabidopsis; Durum; Wheat; Transgenic lines; Cloning; Cultivar; MYB; HB.

Innovative Approach of Bioremediation of the Oil Spills Contaminating Gulf of Aqaba and the Surrounding Region Using Naturally Isolated Oil Degrading Bacterial Consortiums

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Abstract:

One of the most important hazards jeopardizing land and marine environments is represented by oil contaminations. Wide scale production, use and transport of petroleum lead to the global contamination in the environment. The marine oil spills have received a great attention due to catastrophic damage that it cause to the environment and the massive amounts of petroleum released in each accident that has an enormous impact on marine life. The Gulf of Aqaba receives oil contamination at a regular basis due to the handling of millions of tons each year by the ports of Aqaba and Eilat. The semi-enclosed nature of the Gulf exaggerates the effects of those contaminants and therefore, if not treated, might lead to major damage to the delicate marine life in the Gulf, and will lead to drastic effects on the livelihood and health of the Aqaba people and in the neighboring cities and countries.

Various physical and chemical techniques were suggested and used to get rid of the oil spills from contaminated regions especially that are related to water spills, but had little efficiency or is very expensive to get, especially for countries with limited resources such as Jordan. Therefore, the bioremediation methods became more and more recognized as an effective and cheap way for getting rid of the oil spills. The bioremediation is considered as major route for the breakdown of oil in the natural environment in which microorganisms, especially bacteria, have degradative enzymes that are involved in the breakdown of oil hydrocarbon components, thereby cleanup the environment from oil and therefore prevent accumulation of metabolites. In this three years project, we have put to ourselves a number of objectives, going into phases over the period of the project, that will lead to enhancement of our knowledge about bioremediation and a final overall goal of using the bioremediation techniques to clean-up oil spills in land and marine environments.

During the first phase of the project, we have prepared an oil-based cocktail mixture containing a consortium of some selective highly efficient strains of oil-degrading bacteria for the production of inocula (consisting mainly of nutrient suspension containing the selected bacterial strains and the necessary components of carbon, nitrogen, phosphorous and oxygen sources for bioremediation). The inocula were applied and tested for cleaning up of crude oil under laboratory conditions as a first stage of testing preceding their testing in field experiments. In this part, 6 bacterial consortia were prepared and tested at various crude oil concentrations used as a sole source of energy for them. The results obtained proved that those consortia were capable of oil degradation at reasonable rates and can be further developed for filed study. This part of the project resulted in one published paper in a peer reviewed international journal (Malkawi, H. I., Jahmani, M. Y., Hussein, E. H., Al-Horani, F. A., Al-Deeb, T. M. (2009). Investigation on the ability of soil bacterial isolates to degrade petroleum hydrocarbons. *Int. J. Integ. Biol*. 7; 93-99).

In the second phase of the project, intensive field campaigns were conducted in the Aqaba area in order to collect further samples of contaminated soil and seawater samples. This part of the study

has resulted in isolation of about 180 bacterial strains that can live in the presence of crude oil as the only source of carbon and energy. Those strains were identified using classical and molecular techniques to the species level. The results were compiled into a second publication.

At a third phase of the project, we have tested the new bacterial strains for their capabilities to degrade hydrocarbons under laboratory conditions before the construction of bacterial consortia for the *in situ* testing. This part resulted in a third publication of the project that is to be submitted for publication in an international journal soon. To further test the oil degrading bacteria in marine environment, we have designed an experimental set-up for the acclimatization of those bacteria for living and functioning under marine conditions, where oil-polluted soil was incubated in the field set-up and extra oil was added to it. This set-up has further lead to isolation of about 30 bacterial strains that are capable of oil degradation in seawater. A publication of the results is in preparation for this part.

For the *in situ* at site testing, we have designed a large scale experimental set-up consisting of 8 tanks (2000L each) in Aqaba (at the Marine Science Station). This was constructed to conduct field testing of the potential for the bacterial consortia to carryout bioremediation of oil contamination under the conditions prevailing in Aqaba (the final target site of the project). The set-up was made to overcome the problem of adding crude oil to the natural marine environment that is prohibited by law and may lead to pollution of the area to be tested. The set-up is large enough to achieve the goals of the project for testing the degradation capabilities of oil in the field. Very interesting results were obtained, where the added oil was cleaned at a fast rate and high efficiency by the bacterial consortia that we've added. This part of the project is expected to result in two publications that will be prepared soon after submitting the previous parts. All-in-all, this project was a real success and is expected to find promising future applications in the clean-up processes of oil contaminated water and soil environments.

Keywords: Bioremediation; Oil spills; Gulf of Aqaba; Jordan; Innovative approach.

Structural and Mineralogical Uniqueness of Jabal Waqf as Suwwan Metoric Impact

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Abstract:

A complex, impact structure was recently discovered at Jebel Waqf as Suwwan, in the central part of the eastern region of Jordan. Shatter cones and cataclasis of sandstone and limestone from the outer side of the inner central uplift area confirm the impact origin of the Waqf as Suwwan structure. Cataclased and deformed chert fragments, nodules and concretions from the surface regolith layer of the outer inner ring were investigated. The microstructures of the collected samples were investigated using XRD (X-ray diffraction), XRF (X-ray Fluorescence) and ESM-EDX (energy Dispersive X-ray analysis) techniques. Brecciation, dislocation, recrystallization processes, and subplanar jointing and fractures of the chert are among the most important aspects. Additionally, feather features are common planar microstructures in the quartzite breccia. Some of the observations have previously been interpreted as sedimentary features, but since Waqf as Suwwan represents a confirmed impact structure, it is debatable as to whether some of the observed deformation effects are the result of the impact event.

Keywords: Meteorite impact crater; Shock metamorphism; Chert; cataclasis; Recrystallization; Jebel Waqf as Suwwan.

Development of Fouling Resistant Membranes for Application in Water Treatment

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Abstract:

Membrane processes are widely used in water purification, their use is expected to continue to grow, depending on the impurities present and the level of purification required. Reverse osmosis (RO), nanofiltaration (NF), or ultrafiltaraion (UF) membranes can be used. However, membrane fouling is a considerable barrier to its advancement. In this project, membranes surface modification has been carried out in order to reduce membrane fouling tendency. Two modification approaches were applied to render membrane surface hydrophilicity. Membrane characterization in terms of SEM, salt rejection, and flux has been carried out. Filtration experiments were used to determine the fouling resistance of modified membranes, and compare their performance to that of unmodified commercial membranes. Modification is shown to be efficient in producing membranes with improved fouling resistance. Characterization of commercial membrane performance was a necessary first step before undertaking surface modification studies. Membrane performance was found to be sensitive to cross flow testing conditions.

Keywords: Membrane; Modification; Fouling; Desalination; Water treatment; (Bio) fouling; Atomic force microscopy.

Environmental Magnetism: Urban Environmental Pollution Monitoring and Assessment Using the Magnetic Proxies

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Abstract:

A total of 115 soil samples collected on grid bases from al-Karak City, central Jordan, were investigated for their magnetic material content using portable magnetic susceptibility system (MS) with two probes (MS2B and MS2D). The study area is dominated by arid climate. The magnetic proxy that was used in this study is the magnetic susceptibility (χ). In addition, the heavy metal contents in soil were determined using the Atomic Absorption Spectrometer-Graphite Furnace (AAS). The dual frequency magnetic susceptibility meter (MS2B) measurements showed that upper soils have higher values of χ than lower soils. Moreover, the large grain size particles have more magnetic materials than smaller grain size particles, which might be attributed to the lack of pedogensis due to arid climate. The field magnetic susceptibility measurements were observed by using the portable susceptibility meter (MS2D), the readings were positively correlated to MS2B results.

Selected samples that have anomalous magnetic values were analyzed for their heavy metal content. The results showed a positively significant correlation between total heavy metal content and χ. This was evident from the high degree of fitness between the distribution maps of χ and total heavy metals in the study area. These results indicate the applicability of this parameter as pollution indicator, and showed that the higher χ is associated with traffic areas more than industrial and residential areas. Moreover, the hysteresis loops, SEM investigations, thermo magnetic heating curves and XRD charts revealed the presence of magnetite as the main magnetic mineral phase. This would confirm the anthropogenic source of pollution mainly from the vehicles emissions beside frame and brakes corroded materials. The positive correlation between heavy metal and magnetic parameters was evident by using the index of pollution (IP) method, where the samples of high IP of χ are nearly the same samples that have high IP of total heavy metal content. Recently, this finding has an important implication in monitoring the urban and roadside soil heavy metal pollution, which was developed into a new concept called the environmental magnetism.

Keywords: Environmental magnetism; Pedogensis; Heavy metals; Magnetite; magnetic susceptibility (χ); Index of pollution.

The Dead Sea Ecosystem as Influenced by Red Sea - Dead Sea Conduit Project (Peace Conduit)

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Abstract:

The Dead Sea presents fascinating challenges to the biologist who attempts to understand the biological processes and the limits of life in one of the most extreme environments on Earth. The Dead Sea is a terminal desert lake, its waters contain around 340 g/l of salts, and the brine has a pH of about 6. During the 20th century, the Dead Sea level has dropped by more than 20 m, and during the past decade, the level has dropped approximately one meter per year on the average (Gavrieli & Oren, 2004, Gavrieli et al., 2002). This drop in water level is causing severe problems to local infrastructure, tourism, and industrial activities.

A thorough understanding of the biological phenomena in the Dead Sea and the factors that determine the nature and extent of biological blooms in the lake is of great importance when planning human interference in the properties of the lake. Since the peace treaty between Israel and Jordan was established in 1994, a proposal for the construction of a ''Peace Conduit'' between the Gulf of Aqaba (Red Sea) and the Dead Sea is being investigated. This planned water carrier is intended to counteract the drop in Dead Sea water level and the drying out of the lake and to restore the water level to a desired elevation. Thereafter, inflow will be controlled so that it will compensate for evaporation. The difference in elevation between the Red Sea and the Dead Sea (current surface level: -419 m) may be exploited for energy generation and seawater desalination (Gavrieli et al., 2005; Oren et al., 2004; Oren et al., 2005). Future implementation of the plans to construct the ''Peace Conduit'' requires careful planning based on an in-depth understanding of all possible positive and negative effects. Biological phenomena are among the factors to be taken into account. This project is intended to provide answer to the basic question: does the transport of seawater affect the Dead Sea ecosystem?

Keywords: Red Sea; Dead Sea; Ecosystem; Conduit Mixing; Halophilic Archaea; Hypersaline; Biological blooms; Nutrients; Environmental impact.

Utilization of Lipase Enzyme Produced by Bacillus Sp. as a Biocatalyst in the Production of Biodiesel

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Abstract:

Biodiesel can be produced by transesterification of oils using methanolysis in the presence of chemical or biological catalyst. Lipase enzyme produced by Bacillus sp. isolated from a raw petrol sample was evaluated for its efficiency as a catalyst in the production of biodiesel. The Bacillus spp. was identified by morphological, biochemical and physiological characteristics as Geobacillus stearothermophilus (G. stearothermophilus). The production of lipase enzyme by G. stearothermophilus was investigated and its properties were evaluated. The enzyme showed good stability and tolerance for various parameters studied. The enzyme exhibited moderate stability in organic solvents and seemed to be activated by isopropanol at a concentration of 25% and 100%. The enzyme retained more than 94% of its activity in a buffer system supplied with ethylenediaminetetraacetic acid (EDTA) compared to other metal ions investigated. These results show the potential for the use of this enzyme in industry and other applications. The extracellular lipase enzyme from G. stearothermophilus was purified by ammonium sulfate precipitation by bringing it to 40% saturation, followed by diethylaminoethyl (DEAE)-cellulose ion exchange chromatography. This purification resulted in a 9.53 fold purification of lipase enzyme with 2.49% recovery yield. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of the purified fraction showed two bands having a molecular mass of 35 and 50 kDa. The LC MS/MS analysis of the two bands searched against the NCBRI database suggests that the lipase we isolated is a novel protein. The lipase gene was amplified using specific primers by PCR and the active site of the enzyme was sequenced.

The lipase enzyme produced was used in the transesterification experiments to evaluate its efficiency as a biocatalyst for the production of biodiesel. Four lipase preparations were used for the esterification of palm oil: crude lipase, pure lipase, free enzyme from immobilized G. stearothermophilus cells, and pure lipase immobilized in sodium alginate beads. Compared to chemical transesterification, the free and pure form of lipase showed moderate efficiency to convert palm oil into biodiesel. The maximum yield of biodiesel obtained was 70% when lipase from immobilized cells was employed which is considered valuable as it affects the cost of the production process throughout the direct production of biodiesel.

Keywords: Lipase; Bacillus stearothermophilus; Optimization; Enzyme characterization.

The Clinical Impact of the Human Y-Chromosome's Sequence-Tag-Sites on Human Fertility

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Abstract:

The long arm of the Y chromosome contains non-overlapping regions termed azoospermia factor (AZF) with great influence on male fertility. Microdeletions at these regions minimize the males' ability to father offsprings. In this preliminary study, we attempted to screen the presence or absence of twenty Y-chromosome's sequence-tagged-sites (STS) associated with fertility in infertile males. Genomic DNA from 100 fertile and 100 infertile males was extracted and amplified by multiplex PCR containing 0 primer pairs which amplify Y-specific STS that cover functional regions associated with AZF and spermatogenesis-related genes. Our results indicated the integrity of the Y-chromosome at the 20 fertility marked for the fertile males. However, the results of five infertile males showed the presence of microdeletions at these Y-specific STS. Three samples showed Y-chromosome microdeletion when blood and seminal fluid genomic DNA were assayed, while two samples showed microdeletion only when seminal fluid genomic DNA was assayed. The current study demonstrates that the molecular genetic aspect of our results indicate the importance of genetic counseling in managing infertility cases.

Keywords : Molecular; Medical; Genetics; fertility; Infertility; Y-chromosome; sequence-tag-sites; Polymerization; Inheritance; Counseling.

Structural and Magnetic Properties of Nanohexaferrite

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Abstract:

High purityM-type hexaferrites were synthesized by appropriate sintering of the precursor powders prepared by the conventional ball milling, and soft chemical mixing routes. The effects of experimental conditions, including chemical stoichiometry of the samples and heat treatment, on the quality and properties of the hexaferrites were investigated. In an attempt to synthesize hexaferrites with improved properties for specific industrial and technological applications, Fe^{3+} ions were substituted by suitable choices of trivalent ions such as Al^{3+} and Ga^{3+}, or by combinations of divalent and tetravalent ions such as Ti^{2+}-Ru^{4+} and Zn^{2+}-Mo^{4+} ions.

Ball milling method was adopted for the synthesis of Ti-Ru substituted SrM ($SrFe_{12}O_{19}$) hexaferrites. This substitution was found to reduce the coercivity, allowing the possibility of synthesizing materials with relatively high saturation magnetization and coercivity values suitable for high density magnetic recording applications. In addition, Ti-Ru substituted SrM nano-ferrites were prepared by excessive milling of the prepared hexaferrites samples, and their properties were investigated by XRD and magnetization measurements.

Soft chemical mixing method was used to synthesize Zn-Mo substituted BaM ($BaFe_{12}O_{19}$) hexaferrites. This method was found to reduce the coercivity of the hard BaM hexaferrite from 4 kOe for samples prepared by conventional solid state reaction method, down to about 2 kOe. The low Zn-Mo substitution for Fe was found to improve the magnetization. The magnetic properties of these hexaferrites demonstrated potential for data storage application in high density magnetic recording. The substitution of Fe^{3+} ions by a trivalent ion such as Al^{3+} and Ga^{3+} was found to enhance the coercivity of the hexaferrites. Such a substitution resulted in minor reduction of the saturation magnetization of the hexaferrites. Thus, such substituted hexaferrites demonstrated potential for permanent magnet applications.

Keywords : Nanoparticles; Ball milling; Strontium hexaferrite; X-Ray Diffraction; Barium hexaferrite; Hyperfine Interactions; Magnetic properties.

Mixed-Ligand Metal Complexes towards a Molecular Photochemical Device

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Abstract:

In our project we proposed to design and prepare mixed-ligand metal complexes having the general formula Ru (dithiolate)$_2$ (diamine) (where diamine = bipyridine orphenenthroline derivatives), and investigate their physical and spectroscopic features in order to study the possibility of using these compounds as photosensitizers and catalysts for splitting of water using solar energy radiation. In addition, we synthesized ruthenium complexes with phenenthroline derivatives as ligand in order to expand the features of these complexes and study their applications as photosensitizers and catalysts for splitting of water using solar energy radiation for the sake of comparison. A variety of complexes have been synthesized using different bipyridine-derevatives mixed ligands with ruthenium. A set of Ru complexes (10 Complexes) has been synthesized and investigated, which have the general formula of: cis-[L_2Ru (dpte)] (PF_6)$_2$ {dpte= 1,2-bis (phenylthio) ethane, $C_6H_5SCH_2CH_2SC_6H_5$, L= Bidentate N-ligands}.

keywords: Mixed-ligand metal complexes; Electron-transfer reaction; Photosensitizers; Solar energy conversion, Photochemical devices; Chromophores; Photochromic; Photogalvanic behavior of complexes; Quenching; Photophysical behavior of complexes.

Hydrocatalytic Reduction of Nitrate in Aqueous Solution over Palladium, Rhodium and Gold Catalysts

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Abstract:

I) A series of palladium and/or gold catalysts supported on titanium (IV) oxide and aluminum oxide were prepared by impregnation and incipient wetness methods. The series include 3%Pd/TiO2, 3%Au/TiO2, 1.5%TiO2, 1.5%Pd1.5%Au/TiO2, 1.5%Pd3%Au/TiO2, 0.2%Pd6%Au/TiO2, 0.2%Pd2%Au/TiO2, 0.15%Pd1.2%Au/Al2O3 and 1.2%Au/Al2O3. The catalysts were thereby characterized with respect to their structure by means of x-ray diffraction and transmission electron microscopy. The Au and Pd-Au particles were found to be around 40-50 nm large. Pd supported on titania showed in TEM particles to be in the range 10-20 nm, but no quantitative particle size distribution was determined. XRD provides evidence for Pd-Au alloy formation and an average estimation of the alloy composition could be given. Pd-Au alloy formation is also supported by hydrogen chemisorptions measurements.

The prepared catalysts were tested with respect to their activity and selectivity in the reduction of nitrate in aqueous solution at 25oC. Titania supported catalysts were found to be more active than the corresponding alumina supported ones, in agreement with literature reports. On the other hand, titanium (IV) oxide was found to be able, to some extent, to convert produced nitrogen back into nitrate (also called nitrogen fixation). In the case of having rather large initial concentrations of nitrate (500 ppm), the Pd catalysts showed higher activity to fixate nitrogen than the corresponding gold containing catalysts, whereas in the case of having low initial concentrations of nitrate (100 ppm), the Au catalysts were found to show a higher activity in the process of nitrogen fixation.

All catalysts were highly selective to nitrogen formation, and no significant amounts of NH4+ could be detected. Although gold particles were rather large (40-50 nm), the prepared gold catalysts were both active and selective in the hydrogenation reaction of nitrate, however their activity was lower than the corresponding Pd catalysts. Adding some gold to Pd was found to improve the catalytic activity of Pd a little bit. This improvement was attributed to alloying effects. The importance of these catalysts rises not only from the fact that they show almost 100%-selectivity to nitrogen, but also from the fact that they require no special strict regulation of the pH.

II) A series of Rhodium and/or gold catalysts supported on titanium (IV) oxide and aluminum oxide were prepared by three different methods: Adsorption (A), incipient wetness (IW) and precipitation deposition (PD). The series includes 0.51%Rh/TiO2/IW, 0.82%Rh/Al2O3/IW, 0.8%Au/ Al2O3/IW, 0.81%Rh/0.86%Au/ Al2O3/IW, 1.65%Rh/Al2O3/A, 1.65%Rh/TiO2/A, 0.85%Rh/0.80%Au/Al2O3/A, 1%Au/TiO2/A and Au/TiO2/PD. The catalysts were thereby characterized with respect to their structure by means of x-ray diffraction (XRD) and transmission electron microscopy (TEM). In XRD, only the Au particles were observed to show diffraction. Their mean particle size was determined from the diffraction line broadening and was found to be around 39-46 nm. This value seems, however, to be overestimated because XRD overlooks the

presence of very small particles. On contrary, Rh shows no diffraction lines in XRD which is attributed to their small size. TEM showed the particle size of Rh in 0.51%Rh/TiO2/IW to be in general below 10 nm with an average size of about 5 nm. In 1.65%Rh/TiO2/A, the Rh particles were found by TEM to be smaller than in 0.51%Rh/TiO2/IW (in general the particles are smaller than 6 nm) but no statistical analysis was performed. XRD provides no indication for alloying between rhodium and gold.

The prepared catalysts were tested with respect to their activity and selectivity in the reduction of nitrate in aqueous solution at 25oC. Titania supported catalysts were found to be in general more active than the corresponding alumina supported ones. Added gold was also found to have a positive effect in enhancing the catalytic properties of Rh supported catalysts. Also gold alone, prepared by the precipitation deposition method with very small particle size below 5 nm, was also found to be active in the nitrate reduction, however, with much lower activity. In all cases, the reduction of nitrate was highly selective towards nitrogen formation; no significant amounts of ammonium ions could be detected throughout the reaction period which extended 4 hours. Maximum conversion (removal) of nitrate could be achieved in 30-120 minutes of reaction with values varying from one catalyst to the other and the maximum conversion observed in this work was 87% achieved by using 0.81%Rh/0.86%Au/ Al2O3/IW as a catalyst. After the maximum conversion has been achieved, the nitrate concentration was found to increase again, probably due to nitrogen fixation, i.e., its conversion back to nitrate. Future work is planned to investigate this phenomenon in detail.

Few experiments were also carried out to test the activity of selected catalysts in the nitrite reduction. 0.82%Rh/0.86%Au/Al2O3 prepared by incipient wetness was found to be more active than 0.82%Rh/Al2O3 prepared by the same method indicating the importance of adding gold to the catalyst. However, gold alone (0.8% Au/Al2O3/IW) was inactive in the nitrite reduction. The nitrite concentration was also found to run through a minimum in a way similar to the case of nitrate reduction supporting the speculation of having produced nitrogen being fixated.

III) Jordanian bentonite was used in this work as a support for Rh catalysts. The prepared catalysts were characterized by means of XRD, TEM and SEM and tested with respect to their catalytic properties in the nitrate reduction. No difference in the catalytic behavior between Rh/bentonite and Rh/Fe/bentonite could be detected indicating the absence of enhancing effects of Fe additives to the system. Bentonite has been found to leach with time into solution in small amounts limiting thus its recyclability as well as its use in producing drinking water. Reaction intermediates were monitored in-situ by means of IR spectroscopy. N2O can be clearly identified from the absorption just below 2000 cm-1.

Keywords : Nitrate, Nitrite, Reduction, Heterogeneous catalysis, Palladium, Gold, Rhodium, Titanium oxide, Fixation, Bentonite.

Synthesis and Characterization of Kevlar-Like Polymer and Low Molecular Weight Models for Industrial Applications

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Abstract:

This project focused on the synthesis of monomers containing five-membered aromatic heterocyclic rings with nitrogen and sulfur heteroatoms. These monomers were used to synthesize novel amide model compounds and Kevlar-like polyamides. The synthesis of model compounds was carried out by the reaction of diamine monomers with acid chlorides, while the synthesis of polyamides was carried out by the reaction of diamine monomers with acid dichloride. The prepared samples were investigated and identified using several methods such as elemental analysis, fourier transform infra-red (FT-IR), melting point, nuclear magnetic resonance (NMR), mass spectrometry (MS) and polarized microscopy. The liquid crystalline properties of models and their polyamides were also investigated. These polyamides melt at reasonable temperatures less than 350° C, and dissolve in common organic solvents such as dimethylformamide (DMF) and dimethylacetamide (DMAC), thus they could be suitable for transformation into filaments and films having good mechanical properties.

Keywords: Industrial; Polymers; Synthesis; Polyethers; Kevlar-like; Flame retardant.

Theoretical Investigation of the Thermal, Electronic, and Magnetic Properties of Transition Metal Based Alloys and Their Low-Dimensional Systems

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Abstract:

We studied the effect of changing the composition on the electronic and magnetic properties of Huesler alloys. For this stage we performed a detailed study using WIEN2k to investigate the properties of Heusler alloys, namely $Fe_{3-x}Mn_xZ$ (Z = Al, Ge, Sb), where (x = 0,1, 2, 3). Alloys with $x < 2$ are found to exhibit a ferromagnetic phase, whereas the rest have shown ferrimagnetic phase. The total spin magnetic moment shows a trend consistent with Slater half metallic with indirect band gaps along Γ-X symmetry line. We found that Mn rich composition of stoichiometric Fe3-xMnxZ alloys have high spin polarization. This work is under a peer reviewing process in Journal of Magnetism and Magnetic Materials. We also studied the effect of alloying on the half-metallicity and magnetism of $Co_2Cr_{1-x}Mn_xSi$ alloys (x = 0 – 1). The calculations indicated that $Co_2Cr_{1-x}Mn_xSi$ alloys are half-metallic within the whole studied range. The replacement of Cr by Mn keeps the energy gap in the minority-spin band. With increasing Mn content, the total spin moment increases from 16 to 20 μ_B/cell, which obeys the Slater-Pauling rule. In addition, we preformed calculations to investigate the effect of defects on the electronic and magnetic properties of Co_2VSn full Huesler alloy; the formation energies are calculated for antisite, swap and vacancy defects. The VSn antisite, and V, Co and Sn vacancies have relatively low formation energies with high probability to occur. The half metallicity is maintained in all structures with band gaps smaller than that of the perfect alloy except for CoSn, SnCo antisite and CoSn swap, which exhibit a metallic behavior.

Keywords: Electronic; Magnetic; Heusler alloys; Transition metal; Thermal; ab-initio; Hydrogen storage; Memory alloys; Low dimensionality; phonons.

Organic Nanocrystalline Titanium Dioxide (nc-TiO2) – Dye Sensitized Solar Cells

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Abstract:

The performance of a dye-sensitized solar cell (DSSC) that is based on the host-guest encapsulation of 5-[4-diphenylamino) phenyl] thiophene-2-cyanoacrylic acid (TPA dye) inside β-cyclodextrin hosts had been tested. The formation of the complex in the solid state and when adsorbed on TiO_2 was characterized using steady and picosecond timeresolved emission techniques, as well as time dependent DFT calculations. The molecular-level insulation led to a small enhancement in the energy-conversion performance of the fabricated DSSC with the best results being an increase in the open circuit voltage (V_{oc}) from 0.7 to 0.8 V. The importance of the present investigation lies in the unique spectroscopic characterizations of the examined materials in the solid state. In addition, we have studied the effect of cis-Bis-isothiocyanato-2-2--bipyridyl-4-4-dicarboxylate-4-4--dinonyl-2--bipyridyl-ruthenium-II (Z907 dye) on the performance of nanocrystalline titanium dioxide/poly (3-hexylhyphened), nc-TiO_2/P3HT, and heterojunction solar cells. Under illumination, the solar cells employing Z907 dye layer increased the short circuit current, J_{sc} from 0.17 mA/cm^2 to 0.3 mA/cm^2 and open circuit voltage, V_{oc} from 0.45 V to 0.7 V when compared with devices without Z907 dye, resulting in enhancement of power conversion efficiency. Analysis results indicate that Z907 dye layer improve light absorption and charge transfer at the junction between P3HT and nc-TiO_2. That has been confirmed by studying the optical properties and admittance characteristics of solar cells. After encapsulating Z907 dye with Cucurbit (CB7), the performance of solar cells has been improved four times.

Keywords: Tianium oxide; Porphyrin dyes; Polymer; Organic materials; Solar cells; Morphology; Gratzel cell; Cyclodextrins; Solar energy; Thiophenes.

Speciation analysis of organometallic compounds of mercury in water, fish, and sediments of Gulf of Aqaba, Red Sea

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Abstract:

In this study, concentrations of mercury and methyl mercury in various fish species sediments and water samples from the Jordanian coast of the Gulf of Aqaba were investigated. Mercury has a concentration range of 18-321 ng/g wet weight in fish muscles, methyl mercury (MeHg) contributes to 38-98% of total mercury in fish muscles. Seawater and sediments have a very low content of mercury compounds. The concentration of total mercury (HgT) in water has a narrow range of 5-21 ng/L, while it has a wide range of 15-190 ng/g dry weight in sediments. Methyl mercury is only below 2% of total mercury in sediments.

Keywords: Total organic carbon; Total nitrogen; Mercury; Sediment; Gulf of Aqaba-Jordan.

Solidification of Hazardous Wastes and Industrial Water Treatment Using Inorganic Polymerization Techniques

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Abstract:

The inorganic polymer materials (geopoylmers) studied in the present report was formulated from natural Jordanian zeolite, kaolinite and a solution of sodium hydroxide. The inorganic polymeric materials were prepared in two forms: powder and discs of two dimensions (diameter 2.5 cm, 5 mm height, mass = 10 g and diameter 1 cm, 2 mm height, mass = 1 g). The mechanical properties of these inorganic polymers were tested. The adsorption behavior (adsorption isotherms and kinetics studies) of the powder inorganic polymers toward Pb(II), Cd(II) and Cu(II) was studied. Furthermore, the adsorption behavior of the inorganic polymeric discs of different dimensions was tested toward Pb(II), Cu(II), Cu(II), Cr(III), Th(IV), U(VI) and dyes using in batch and column methods. Breakthrough tests using influent of highly polluted acidic solutions containing mixed metal ions (200 ppm of each of Pb(II), Cd(II), Cu(II), Cr(III)) with pH = 3.0 and ionic strength of 0.1 M NaCl) have been performed. More than one liter of the influent was filtered through a glass column (50 cm height and 5 cm diameter) filled with 43 inorganic polymeric discs. The desorption of metals from inorganic polymeric discs loaded with metals was also studied. Characterization of the inorganic polymeric discs was carried out using XRD, XRF and SEM. The aim was to formulate inorganic polymeric material with good mechanical strength, high adsorption capacity toward pollutants and low desorption properties.

In the second part of this study, inorganic polymeric discs containing Jordanian zeolite and kaolinite and solidified metals (Pb(II), Cu(II), Cd(II), Th(IV), U(VI)) and dyes were prepared; two concentrations of metal ions were solidified, 200 and 1000 ppm. Leaching tests were carried out by shaking discs containing solidified metals with one of the following leaching solutions: deionized water, 0.1M HCl, 0.1M NaOH, 0.1M NaCl, and 1.0M NaCl. The leaching of metal ions from the inorganic polymer matrix was studied using atomic absorption spectroscopy and conductivity measurements. The mechanical strength of these discs was determined and the characteristics of these discs were studied using XRD, XRF and SEM. Fly ash was obtained as a waste from the iron industry, and it was characterized by high iron and carbon contents. Metakaolin prepared from local Jordanian kaolin, with 60% purity, was used as a source of Si and Al. A series of inorganic polymers' specimens were prepared from mix containing metakaolin, fly ash and solutions of Na_2SiO_3 and NaOH.

Keywords : Industrial water; Hazardous wastes; Water treatment; Inorganic polymerization; Solidification; Zeolite; Kaolin; Low-cost adsorbents; Fly ash; Adsorption.

Synthesis and Characterization of Novel Nanomaterials

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Abstract:

Iron-Nickel ($Fe_{100-x}Ni_x$) nanoparticle systems in the invar region (x = 29, 32, 37) were prepared by chemical co-precipitation method. X-ray diffraction (XRD) patterns confirmed the co-existence of both bcc and fcc phases for x = 29 and 32, and the existence of a single fcc phase for x = 37. Scanning Electron Microscope (SEM) imaging indicated that the particles are almost spherical in shape and the particle size for all prepared systems is independent of x, having diameters ranging between 120 nm and 250 nm. Mössbauer spectroscopy (MS) indicated the development of a paramagnetic phase characteristic of the low-spin (antitaenite) fcc phase, in addition to the magnetic components characteristic of the bcc and the high-spin fcc phases. Since it is not possible to resolve the low-spin and high-spin fcc phases in XRD patterns, Mössbauer spectroscopy had demonstrated effectiveness in characterizing the prepared nanoparticles.

Y-type barium hexaferrites $Ba_2Co_{2-x}Zn_xFe_{12}O_{22}$ (x = 0.0, 1.0, 2.0) were prepared using sol-gel method and then sintering the dried powders at temperatures between 900 °C and 1100 °C. The properties of the prepared samples were investigated using x-ray diffraction and Mössbauer spectroscopy. XRD patterns revealed that the samples sintered at 1000 °C and 1100 °C consisted of single Y-type hexaferrite phase. This phase started developing at lower temperatures through intermediate spinel and M-type phases, and was completed at sintering temperature of 1000 °C or higher. The crystallite size of the ferrite is in the range of 51–60 nm, as calculated from XRD data. Mössbauer data had shown that Co ions occupy $18h_{VI}$ sites at the boundaries between the T and S blocks of the structural unit cell, whereas Zn ions occupy tetrahedral sites preferentially. This trend for cationic distribution results in a weakening of the super-exchange (SE) interactions between spin-up and spin-down sublattices with increasing Zn content, and a consequent reduction in the planar magnetocrystalline anisotropy in Zn rich compounds. The dielectric measurements on the prepared samples indicated that the real part of the impedance Z´ at room temperature increased with increasing x at the same frequency, and the same frequency behavior was observed for the imaginary part of the impedance Z". The real and imaginary components of the impedance were independent of frequency at high frequencies for all samples, but they increased in the low frequency region due to space charge polarization. A single relaxation peak at high frequency was observed in most of the samples. Barium hexaferrite (Y-type) showed a very high dielectric constant in the low-frequency region.

The capacitive component of the equivalent RC circuit for all samples was dominant in the frequency range of 104 Hz to 106 Hz. Both Z' and Z" increased with increasing the bias voltage. In addition, the bulk resistance increased with applied DC voltage. The relative dielectric permittivity (ε´ and ε´´) increased with the increase of the frequency. For all samples there was an

increase of the ac value with increasing of frequency. Portions of the prepared Y-type hexaferrites were ball-milled for different time periods to reduce the particle size to below the single domain critical size of about 500 nm. The milled powders were subsequently characterized by x-ray diffraction and Mössbauer spectroscopy. The structural analysis, based on x-ray diffraction, indicated that the Y-type hexaferrite ($Ba_2Zn_xCo_{2-x}Fe_{12}O_{22}$) phase retains its structure with milling up to 4 h, while the particle size decreased by an order of magnitude and the particle shape changed from hexagonal platelets to almost spherical. Room temperature Mössbauer spectra of the milled $Ba_2Zn_xCo_{2-x}Fe_{12}O_{22}$ powders showed that the hyperfine field (B_{hf}) associated with each component decreased almost exponentially with increasing the milling time. The reduction in hyperfine field is associated with the size effects and the increase in relative abundance of iron surface to bulk ions.

$Ba_2Zn_xCo_{2-x}Fe_{12}O_{22}$ Y-type hexaferrites wit x = 0.0, 1.0 and 2.0 were also prepared by ball- milling method. The high energy ball milling at 300 rpm was conducted in two stages: in the first stage, the precursors were milled for 16 h and the resulting powders were sintered at 1100° C. In the second stage, the sintered powders were re-milled for 16 h, and the resulting powders were pelletized under 4 kN force and sintered at 1100° C. XRD patterns of the powders prepared in the first stage indicated that all structural peaks of the Y-type structure were present with no other phases. However, the relative intensities of the different peaks were different from those for the standard. This could be an indication that cation ordering in the Y-type unit cell is not completed under the experimental conditions and procedures of fabrication. Thus, a second stage of milling and sintering was performed on the samples, which were then characterized by XRD, and their hyperfine properties were investigated by Mössbauer spectroscopy. The XRD patterns for samples prepared in the second stage indicated that the peak locations and relative intensities were consist with the standard patterns [JCPDS 00-044-0207] and [JCPDS 00-044-0206] for Co2-Y and Zn2-Y phases, indicating the attainment of single-phase Y-type hexaferrite in the second stage of the milling and sintering processes. Mössbauer spectra for the samples were similar to those for the samples prepared by sol-gel method, and were consistent with Co^{2+} ions occupying octahedral sites $3b_{VI}$ and $18h_{VI}$. When Zn^{+2} ions were substituted for Co^{2+} they occupy tetrahedral sites with preference to $6c_{IV}$*. This leads to a decrease in the relative intensity of the third component, and an increase in the relative intensity of the first and second components. This is a consequence of the replacement of Co^{+2} ions by Fe^{3+} ions at octahedral sites. The preferential site occupation of the Zn and Co ions in Y-type hexaferrites had a significant influence on the hyperfine magnetic fields of the various components. The significant drop in hyperfine field with Zn substitution is a result of the weakening of antiferromagnetic interactions between $6c_{IV}$* sublattice and the nearby spin-up octahedral sublattices, which leads to non-collinear spin structure in these spin-up sublattices.

A series of ferrite samples of $BaSrNi_xCo_{2-x}Fe_{12}O_{22}$ were prepared using the citrate sol-gel auto combustion method, and sintering the resulting powders at 1100° C. Phase evolution was characterized by XRD technique in the angular range $20^o \leq 2\theta \leq 105^o$ using monochromatic Fe-K_α radiation (λ= 1.9373 Å). XRD patterns with the 2θ scaled to Cu-K_α radiation (λ=1.5418Å) were then reproduced. The XRD patterns showed single-phase consistent with the $Ba_2Co_2Fe_{12}O_{22}$ Y-type ferrite standard (JCPDS 00-044-0207) for all samples with the exception of that with x = 1.5 which showed traces of an impurity phase. The appearance of the peak at about 28.8^o in XRD pattern for this sample and the absence of an additional component in Mössbauer spectrum could indicate that this impurity phase could be associated with Sr-Ni oxide species. The average

crystallite size for all samples ranged from 43 nm to about 70 nm. Mössbauer spectra for the samples were consistent with Co^{2+} ions occupying $3b_{VI}$ and $18h_{VI}$ octahedral sites. The variations of the relative intensities of the magnetic components of the spectrum were consistent with the substitution of nickel ions at octahedral sites. This leads to a decrease in the relative intensity of the second and third components, and an increase in the relative intensity of the first component. The hyperfine field did not change appreciably with Ni substitution. This is due to the fact that replacement of magnetic Co^{2+} ions by Ni^{2+} ions or Fe^{3+} ions did not change the magnetizations of the sublattices appreciably, and consequently the antiferromagnetic coupling between these sublattices was not weakened appreciably by the substitution.

Keywords: Chemical co-precipitation; Mössbauer Spectroscopy; Superparamagnetic relaxations; Antitaenite phase.

Selective Adsorption of Sulphur Compounds in Diesel Fuel Using Novel Jordanian Natural Adsorbents

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Abstract:

The removal of organosulphur compounds (ORS) from diesel fuel is an important aspect of Jordan's effort to reduce air pollution by sulphur oxides. The results of this work revealed that activated carbon (AC) has an excellent adsorption for the ORS from non-aqueous diesel medium. Experimental data revealed that the percentage removal of the ORS was slightly affected by the particle size of the adsorbent, which indicates that elimination of the ORS mainly occurred at the external surface area and the adsorption into the pores of the adsorbent has a small effect on the entire elimination process. Removal of the ORS by the AC has an endothermic nature where the percentage removal values were increased by temperature.

The maximum percentage removal value was 72% which was reported at: 2.0 g, 300–500m, 25 ◦C, and 3 days shaking. The experimental results were plotted and treated with Langmuir isotherm, uncommon isotherm shapes were obtained. Therefore, it was not fitted to the experimental results which might reflect a complex nature of adsorbing the ORS onto the AC. However, this behavior gives an indication on the complex adsorption mechanisms. Finally, the mode of interaction between the ORS and the AC was characterized by comparing the changes in the position and intensity of the surface functional groups using FTIR technique.

Keywords: Waste treatment; Metals recovery; Nano-materials; Fluorescent lamps.

Studying the Chemical Development and its Indicators in the Drinking Water from the Source to the Consumer in Zarqa and Mafraq

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Abstract:

Through the phases of the drinking water supply in Jordan to the houses, its quality is exposed for pollution. Some examples of sudden and sever pollution cases in the water supply had been registered in the villages of Manshiat Bani Hassan in Mafraq and Sakib in Jerash, which led to infections between the population. The pipes of the water supply in many areas in Jordan suffer corrosion. At the time of drinking water pumping from the wells to the houses, the pipes may leak water into the surrounding soil and sediments. When the supply stops, the leaked water which got mixed with the soil pollutants can enter the pipes. When the supply starts again, the mixtures of pollutants can reach the houses, and then may be harmful to the consumer. The project aims at identifying and quantifying the mentioned types of pollutants, and on the other hand it aims at reaching to some chemical indicators related to this type of pollution, to allow good water monitoring plans to prevent the frequent taking place disasters like in the mentioned villages.

Keywords: Hydrogeology; Chemistry; Water quality; Groundwater pollution sensitivity; Modeling hydrochemical; Explore water sources; Environmental pollution; Geology environment.

Conductive Polymer Nanocomposites for Electromagnetic Interference Shielding Applications

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Abstract:

This project aimed at formulating, characterizing and optimizing Nano-structured materials for electromagnetic interference shielding applications (EMI). Nanocomposites based on carbon nanotubes (CNT), carbon nanofibers (CNF) and carbon black nanoparticles (CB) have been formulated and tested. Hybrid materials based on CNT/CB, CNT/CNF, CNT/graphene, CNT/stainless fibers and CNT/clay Nano platelets were prepared by solution processing and melt mixing. Several attempts for selective localization of conductive Nano filler at the interface of immiscible polymer blends were conducted. In addition, influence of CNT functionalization on the electrical and mechanical properties of CNT was investigated. Huge number of experiments were conducted (more than 400 melt mixing experiments using the machine purchased from this research project budget, and 80 solution processing experiments and 60 dry mixing experiments) to achieve the above mentioned objectives. The results of this project are expected to be published in 9 peer-reviewed journal papers (3 have already been published and 6 to be sent for publication very soon). In brief, the major findings of this project are: (1) CNT is the most promising Nano filler to formulate nanocomposites with high levels of EMI shielding effectiveness. (2) Hybrids of carbon Nano fillers can lead to synergistic microstructures. Thus, more investigations are recommended to formulate hybrid nanocomposites with commercial potential. (3) Selective localization at the interface has significant influence on the EMI shielding mechanisms. This finding means that radar absorbing material can be formulated by tuning the nanocomposite microstructure. (4) Addition of clay Nano platelets failed in driving CNT particles to the interface of Polypropylene/polyethylene polymer blend. Thus, chemical modifications of CNT are needed to adjust its thermodynamic affinity. (5) Unprecedented improvement in the mechanical properties of polypropylene and acrylonitrile-styrene-butadiene were obtained. (6) Functionalization of CNT with different types of functional groups was detrimental to the electrical properties. Thus, selective chemical modifications are recommended.

Keywords: Processing conditions; Nanocomposite; Mechanical properties; Electrical properties; Carbon nanotube.

Encapsulated Sol-Gel Glass Materials for Use as Filters for Water Purification and in Optical Display

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Abstract:

The room temperature sol–gel glass synthesis method was employed to prepare a porous, optically transparent, and inert host matrix for a variety of applications. In summary:

1. The doping or encapsulation method was demonstrated to trap ligands (that have a high affinity to bind metals) in sol-gel glass and the synthesized products were used as filters to capture toxic and poisonous metals present in polluted water samples. The ligand 5-methyl-4-(2-thiazolylazo) resorcinol was encapsulated and the synthesized composite (resin) was used as a solid extracting phase to remove (as a filter) zinc and copper ions from water samples. A solution of the ligand in ethanol was mixed with selected alkoxysilanes in the presence of water to produce a homogeneous mixture. By hydrolysis and condensation of the alkoxysilanes, a solid glass forms around the dopant. The ligand molecule is entrapped inside the glass pores while small Zn(II) and Cu(II) metal ions can diffuse into the pores where they are complexed by the ligand and retained inside the pores. Absorption and fluorescence spectroscopy were used to characterize 5-Me-TAR ligand and 5-Me-TAR-Zn complex both in solution and sol-gel glass. The sol–gel glass precursors were carefully selected to produce a glass composite material doped with the ligand with no leaching especially when the glass is soaked in solution. Complexation using the batch method was employed, in which a known weight of the sorbent resin is mixed with a known concentration of Zn(II)/Cu(II) ions. In order to attain the maximum metal ion complexation capacity, the filter was optimized to the optimum separation/pre-concentration conditions of analytes, including effect of pH, capacity of the solid, equilibration time and coexisting ions; afterwards, the solution was filtered. The amount of zinc/copper metal ions complexed/adsorbed was determined by the difference between the initial concentration in aqueous solution and that found in the supernatant using flame AA.

2. Covalently attaching the ligand of choice (organic) to the sol–gel glass precursor was employe to prepare a novel organically modified silica material (new silylating agent) that is then subjected to hydrolysis and condensation and one ends up with a solid glass with a specific ligand covalently linked to the silica matrix that is then used to complex metal ions. The produced sol-gel glass is porous and almost all the covalently linked organic substituents are active in the pore space and can now be used as sites to complex poisonous metal ions. The ligand L was covalently attached to silicon alkoxide precursor, namely GPTMS = R'-Si(OR)3: R= CH3, R'= The product L-Si(OR)3 which was characterized by FTIR, NMR, UV-Vis absorption and elemental analysis was then anchored into the sol–gel matrix by coupling with other monomers 3-(diethoxymethylsilyl) propylamine (DEMPA) and (3-aminopropyl)triethoxysilane (APTES) where we started with a solution that undergoes a series of reactions that started with hydrolysis followed by condensation and finally drying to end up with a solid glass (resin sorbent) synthesized via the solid sol–gel glass. In the synthesized product, the ligand L which is now covalently bounded to the resin sorbent with three nitrogen atoms that have lone pairs of electrons, the GPTMS ring opening that

produces an OH group and the nitrogen atoms contributed by DEMPA and APTES all contribute as high affinity sites to trap cationic heavy metals. The covalently bonded monomers eliminate any possible leaching of the desired sorbent sites into solution even the sorbent is soaked for a very long time or the sorbent is reused for many times in the extraction process. The porous nature of the glass enables heavy metal cations to penetrate into the binding sites of the resin and stay inside the glass. The produced glass sorbent can be thought of as a filter to sequestrate heavy metals from water or one can say for the solid phase extraction of heavy metals. The synthesized sol−gel material (resin) was used as a filter to remove metal cations (Pb^{2+} and Cd^{2+}) from water. To study complexation/adsorption; the batch method was also employed. In order to attain the maximum metal ion complexation/adsorption capacity; these organically modified silica filters were optimized to the optimum separation/pre-concentration conditions of analytes, including effect of pH, shaking time (equilibration time), resin particle size, capacity of the solid resin and effect of coexisting ions; afterwards, the solution is filtered. The amount of metal ion complexed/adsorbed was determined by the difference between the initial concentration in aqueous solution and that found in the supernatant, suing a flame Atomic Absorption. In all cases, application to reference materials and to real environmental samples was investigated.

3. Luminescent materials which are based on antenna effect and composed of an organo-rare earth complex (luminescent center) encapsulated in an optically transparent sol−gel glass were prepared, to alleviate quenching by deactivating groups (hydroxyl groups and water) coordinated to the rare earth both in the short range and the long range. The short range effect is controlled by choosing a bulky chelating ligand (organic) to bind the rare earth and in the long range by doping the prepared rare earth –organic complex in sol−gel glass fabricated in such a way that gives the highest possible emission. Emission of the prepared materials occurs by the antenna effect which is a light conversion process via an absorption-energy transfer-emission sequence involving distinct absorption by a ligand (light collector) and emitting by the rare earth ion.

This idea was applied to the emission of Sm(III) and Pr(III) using different ligands. Two Sm(III) complexes and two Pr(III) complexes were synthesized. For Sm (III): Sm(III) dithiocarbamate-Sm(L1)3B [L1 = (C2H5)2NCS2, B = 1,10-phenanthroline] and Sm(III) complex with the polytonic ligand L2 = N',N''-bis[(1E)-1-(2-pyridyl)ethylidene]ethanedihydrazide {Sm2-L2-CH3COO)2 ; L2 = C16H16N6O2} while for Pr(III): 2-6-pyridinedicarboxylate (ligand 1) and the polytonic diazine (N-N) ligand L2 (C22H16N12O2) were used. The prepared complexes were further encapsulated in an optically transparent sol−gel glass. The synthesized ligands and complexes were characterized by FTIR and 1H-NMR spectroscopy. Room temperature luminescence of the complexes (in solution and in sol-gel glass) was investigated using a spectrofluorometer. Compared to the emission in solution, a dramatic emission enhancement was observed by chelation and encapsulation of the complexes in the inert sol-gel glass.

Keywords: Absorption; Complex; Emission; Filter; Ligand; Sol-gel; Solid-phase; Extraction; Zn(II); 5-methyl-4-(2-thiazolylazo) resorcinol.

Studying the Atomic Structure of Ions by Photoionization

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Abstract:

Absolute cross sections for the single and double K-shell photoionization of carbonlike O^{2+} and nitrogenlike O^{+} ions were measured in the 526–620-eV photon energy range by employing the ion-photon merged-beamtechnique at the SOLEIL synchrotron radiation facility. High-resolution spectroscopy up to $E/E \approx 5300$ was achieved. The rich resonance structures observed in the experimental spectra are analyzed and identified with the aid of R-matrix and multiconfiguration Dirac-Fock (MCDF) methods. For these two atomic oxygen ionsof particular astrophysical interest, we characterized the strong $1s \rightarrow 2p$ and the weaker $1s \rightarrow np$ $(n > 2)$ observed resonances. A detailed comparison of the energies of the $1s \rightarrow 2p$ resonances in the first members of the oxygen isonuclear sequence measured by synchrotron based experiments and the Chandra and XMM-Newtonx-ray satellites is presented.

Keywords: Atomic physics; Molecular physics; Synchrotron applications; Ions, Plasma physics; Astrophysics; Fusion energy research; X-ray lasers; Light lithography; Material science.

Pesticides Residues in Some Medicinal Plants and Their Products, Jordan

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Abstract:

The medicinal plants are widely used in Jordan and worldwide in herbal medicines, food, beverages and pharmaceuticals industries. Therefore, the safety and quality of medicinal plant materials and herbal products have become a major concern worldwide for health authorities, industry and public. The present work lead for validation of pesticides multiresidues analytical method for analysis of organochlorine and nitrogen-phosphorus pesticides in some medicinal plants and their essential oil extracts in Jordan. This method was used to conduct a pesticides degradation rate follow up experiment in the field and a survey study on some herbal plant and oil samples collected from local market in Jordan.

The degradation rates and half life of eight pesticides widely applied in Jordan were investigated on the following herbal medicinal plants namely: thymus capitatus, salvia trilob, organim syriacum, foeniculum vulgare, ocimum basilicum, menthae piperittae, and allium sativum. It was found that some residues of targeted pesticides might be detected after degradation time intervals with higher amount than the allowable maximum residue levels (MRL_S) defined by European commission (EC) regulation No.396/2005. Some of these pesticides also were detected in low concentration levels in the oil extract of the herbal pants showing that limited translocation of pesticides from plants to oil extract.

Additionally, a survey study was conducted on one hundred herbal plants purchased from local market in Jordan. The analysis results showed that fourteen samples out of one hundred contained detectable residues of organochlorine pesticides and seven out of fourteen showed commission (EC) regulation No.396/2005. While, eighteen samples contained detectable concentration of nitrogen-phosphrus pesticides were not transferred from plants into oil extracts as the detected pesticides in survey samples immobilized into herbal oil extracts. It was concluded that results obtained can be used as preliminary database for establishing Jordanian guidelines for pesticides residues in medicinal herbal plants.

Keywords: Medicinal plants; Gas chromatography; Organochlorine pesticides maximum residue limit; Multiresidue analysis method; Pesticide residue analysis; Aromatic oil extract; Organophosphorus; Pesticides; Quality control; Clean up.

Investigation into the Flow Conditions of the Hydrocyclone

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Abstract:

The geometry and movement of the air core are sensitive indicators of the operational state of hydrocyclone. Therefore, an increased knowledge of the air core behavior is desirable. Measurements of the air core diameter in transparent 50-mm cyclone operated with a suspension of glass spheres are presented. The experiments indicate the dependencies between feed solids content, air core diameter, and spray angle of the underflow. Monitoring hydrocyclone efficiency in minerals beneficiation plant is very important due the dependency of all separation processes on particle size distribution. Using image analysis to monitor hydrocyclone efficiency by finding correlation between hydrocyclone operating parameters such as inlet pressure, solids concentration and hydrocyclone performance parameters such as underflow spray angle or air core diameter has gained potential in recent years.

In the current work, we used high speed digital camera to capture the hydrocyclone underflow profile. Image analysis was then conducted in order to measure the hydrocyclone underflow spray angle which then correlated with hydrocyclone inlet pressure and feed solids concentration. It was found that the spray angle decrease rapidly with increasing inlet pressure which means that underflow becomes more rope-like shape. The same trend was observed for all solids concentration but it was clearly apparent at higher solids concentration (20%). No clear trend was obtained for the overflow and overflow on d50. Nevertheless, it can be said that the feed pressure has negligible effect on the d50 of the overflow with the exception of the case when du is the highest (22mm) and 15% solids. Additionally, it can be said that increasing the du at do=12.1 decreases the d50 of overflow. With regards to the percent solids, it seems that there is an optimum value of % solids (15%) at which the d50 of over flow is minimal. Modeling of hydrocyclone reveals the pressure and velocity distributions. Simulations show the relationships between operating conditions and hydrocyclone. Due to centrifugal forces, air core is formed by sucking the air into the channel.

Keywords: Hydrocyclone; Classification; Fine particle processing; Modelling.

قطاع
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Investigation of Best Stem Cell Source on a Scaffold to Create Full Thickness Human Skin in an Efficient, Fast, Reliable and Cost-Effective Method

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Abstract:

In this work, our main aim was to produce partial thickness (epidermis) and full thickness (epidermis and dermis) as human skin substitutes, using human stem cells, that could be used in future clinical applications. As a result of two and half years of continuous work on optimizing methodology for the isolation and culturing of huaman Mesenchymal Stem Cells (MSCs) from different tissues, bone marrow aspirate, adipose tissue and cord blood, as well as on optimizing a procedure for rapid isolation and expansion of skin stem cells from skin biopsies. We were successfully able to isolate and culture human MSCs from bone marrow aspirate and adipose tissue samples. The isolated MSCs were able to differentiate into osteocytes, adipocytes and chondrocytes, which indicate their multi-lineage differentiation potential. Performed flow cytometric analysis revealed that CD44, CD106, CD90, and CD105 were expressed on cell surface, with no expression of hematopoietic surface marker (CD34). Adipose tissue derived mesenchymal stem cells did not differ from cells isolated from bone marrow by the main parameters; morphology, expression of surface markers, and differentiation potential. We were not able to isolate human MSCs in large quantities from umbilical cord blood. In addition, we found that adipose tissue, not the umbilical cord blood, is an excellent source of MSCs for cell therapies. A protocol for optimal large scale production of human mesenchymal stem cells that is capable in maintaining their multi-lineage and immunosuppressive capacities was established.

In this work we also successfully able to isolate and culture human skin stem cells (Keratinocytes) from small skin biopsies and we were also successfully able to isolate and culture fibroblast (main cell type in the dermis). The isolated keratinocytes were used to produce epidermal sheets that could be used for clinical applications. Production of biological dermal substitutes was achieved using fibrin gel and long term culture of dermal fibroblasts in the fibrin gel under specified culture conditions. Obtained preliminary results were encouraging, further investigation is required to confirm its applicability in clinical applications. As for polymers and scaffolds, new polymers for utilization in regenerative medicine work with variable physical properties were produced. One being a solid polymer and the other is viscous liquid. The materials made are still under testing to better characterize their different properties in order to be able to use them in the future in biomedical applications.

Keywords: Synthetic biomaterials; Skin tissue engineering; Artificial skin; Biomaterials; Skin substitutes

Nanoparticle-mediated Combination of Photodynamic Therapy and Chemotherapy to Overcome Multidrug Resistant Tumors

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Abstract:

The efficacy of most anticancer drugs is highly limited in vivo due mainly to poor pharmacokinetics behavior of the drug especially inability of the drug to effectively reach the target tumor site. In addition, many of anticancer drugs have poor bioavailability after extravascular administration. We have developed novel chitosan-modified polymeric nanoparticles for oral as well as i.v. administration. Nanoparticles were developed utilizing the double emulsion solvent evaporation technique for sustained delivery of various anticancer drugs. Chitosan diacetate (CDA) and chitosan triacetate (CTA) were previously modified in our laboratory and used as novel matrix. Nanoparticles, loaded with various anticancer drugs, were characterized for particle size dynamic light scattering as well as transmission electron microscopy and net surface charge using dynamic light scattering. Particles size was below 100 nm in diameter and zeta potential ranged –(25-30). Encapsulation efficiency of anticancer drugs varied considerably and was dependent on the physicochemical characteristics of the encapsulated drug. In addition, chitosan triacetate nanoparticles showed relatively higher encapsulation efficiency than chitosan diacetate nanoparticles. In vitro release of encapsulated drugs was sustained over 14 days. Nanoparticles enhanced cellular accumulation of encapsulated drugs, compared to the free drugs, in vitro in MCF-7 and Caco-II tumor cell lines. In conclusion, diacetate and triacetate chitosan are novel polymers that can be used to formulate nanoparticles which efficiently encapsulated anticancer drugs, and sustained the release and enhanced tumor cellular uptake of these drugs. Further, chitosan triacetate nanoparticles enhanced oral bioavailability of doxorubicin. CDA and CTA nanoparticles can be used to efficiently deliver anticancer drugs and enhance their in vivo profile.

Keywords: Nanoparticles; Nanotechnology; Photodynamic therapy; Cancer; Drug - resistance; Chemotherapy; Photosensitizer

Developing a model for Molecular Pharmacogenetic Studies in Jordan

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Abstract:

Individualized medicine through molecular pharmacogenetics is one of the major future goals in clinical medicine. In Jordan, molecular pharmacogenetics is still in its pre-infancy stage. Starting such studies requires cooperation between geneticist and other medical specialists. This study aimed to establish a model for molecular pharmacogenetic studies in Jordan. The multi-drugresistance gene (MDR1) variants and the anti hyperlipidemic drug atorvastatin, and theantihistamine fexofenadine were investigated. The effect of variants in MDR1 gene on the drug response of atorvastain and fexofenadine was studied in Jordanian population. The project consists of the following sequence of steps:

First step, screening: 100 Jordanian subjects were screened for variants in MDR1 gene utilizing direct sequencing of exons and promoter regions of MDR1 gene. Fifty eight different variants were assayed. Six rare variants in MDR1 were detected, including a new variant, T3075A. The observed distribution of the common variants was within the range detected in other populations. Second step, selection variants: The most common MDR1 variants were tested for their impact on MDR1 activity. The results showed that the presence of the T allele in the C8385Tpolymorphism slightly decreased the MDR1 activity, whereas presence of the T allele in theC3435T and C1236T polymorphisms increased the MDR1 activity.

Third, the effect of common variants of MDR1 gene on the model drug response in Jordanian subjects, and fourth steps, the use of proper statistics to evaluate correlations: Participants (n=201) were randomly recruited into the study. The most common polymorphisms in the MDR1 gene (G2677T, C3435T, and C1236T), were tested for their association with drug response (the lipid lowering effect of atorvastatin). Both the GG genotype ofG2677T and the CC genotype of the C3435T polymorphisms were associated with higher levels of low-density lipoproteins (LDL) after atorvasatin treatment. The C1236Tpolymorphism was not associated with the lipid lowering effect of atorvastatin. The MDR1gene polymorphisms G2677T, and C3435T, but not C1236T were associated with the lipid lowering effect of atorvastatin.

Fifth step, instrument development: A simple assay for common C1236T,G2677T/A, and C3435T polymorphisms of MDR1 gene using Allele specific Refractory system were developed. This system is based on PCR technique without the need for sequencing or the use of restriction enzymes. Last step, model validation: Our work was validated by testing modulation of drug response off exofenadine by variants in MDR1 gene. Results showed that strong association betweenC3435T SNP and severity of Itchy nose, palate, throat, and total allergic rhinitis symptoms score after fexofenadine treatment ($P < 0.05$). Patients with the CC genotype had lower severity of Itchy nose, palate, throat, and total allergic rhinitis symptoms score after fexofenadine treatment than those with CT genotypes. The TT genotype of *MDR1* G2677T SNP was associated with significantly less reduction in severity of Itchy, watery, red eyes due to fexofenadine treatment. Finally, the GG genotype of G2677T SNP was associated with lower total score for allergic rhinitis

after fexofenadine treatment. In conclusion, the study results showed the usefulness and simplicity of this model for molecular pharmacogenetic in Jordanian population. Results of this study will very useful for future molecular pharmacogenetic studies in Jordan.

Keywords: Atorvastatin; Fexofenadine; MDR1; SNP; Drug response; Jordan

Investigating the Biological Relationship between the Infection of T. Gondii and Violent Actions among Prisoners in Jordan

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Abstract:

The study was conducted in the light of the fact that latent toxoplasmosis has been associated with certain neurological conditions including encephalitis as well as behavioral disturbances including physical violent actions among which is suicidal behaviors. The objectives of the study were to investigate the prevalence level of IgG and IgM against T. gondii, and to explore if violence is significantly associated with T. Gondii. A cross-sectional study was conducted among a sample of inmates in the Correctional and Rehabilitation Centers in Jordan. The study was conducted in the Correctional Rehabilitation Centers CRC in Jordan. Currently there are fourteen CRC in Jordan distributed in 7 governorates.

The Sample consisted of 1000 inmates was recruited to participate in the study. Blood samples were collected from participants to detect the presence of IgM and IgG againstToxoplasma T. gondii using ELISA technique. A total of 200 participants were selected as a control group from normal population. SPSS version 20 was used to analyze data. The study results showed that the prevalence of IgG for T. gondii was 26.9% among study participants, and 9% among control group. The prevalence of IgM was 3.6% among study participants and 1.5% among control group. Results indicated that a significant association was found between the level of IgG between study and control group (p=0.000). The study results showed that violent actions could have a biological origin. The infection of T.gondii should be taken seriously in any program targeting violence and aggression.

Keywords: Latent stage;Tyrosine hydroxylase enzyme; Toxoplasma gondii; Road traffic accidents; Neurological reactions; Direct aggressive behavior; Jordan

Development of a Spray Congealing - Based Process/Formulation Platform for the Improvement of Pharmaceutical and Biopharmaceutical Properties of Poorly-Soluble Drugs

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Abstract:

The work examined the influence of Gelucires and Pluronics (Gel. and PI.) on the dissolution and the solubility of a poorly water-soluble drug Carvedilol, CRV, in comparison with that of pure drug. A melting method was selected to prepare dispersions of CRV in different ratios with Gelucires and Pluronics (GPC). Investigations demonstrated a significant improvement in the dissolution rate when the combination was used instead of individual surfactants, and this may have been due to effects such as increased wettability of the solid drug. Another aim of the work was evaluate the role of two surface active carriers, Gelucire® 44/14 and Lutrol® F127, for improvement of solubility and dissolution of the high-dose, poorly water –soluble drug ,albendazole, using solid dispersion. The solubility of albendazole in solution of the studied carriers and binary mixtures showed improvement, with solutions containing higher percentages of Lutrol®F127 as best solvents. Albendazole was then incorporated in matrices made of either carrier alone or mixtures of the two carriers at different ratios using a melting procedure. The resulting particles were compressed into tablets. *In vitro* dissolution of particles and tablets showed fast dissolution .Increased wettability of albendazole by the carriers and formation of partial solid solution of it in the carrier system were shown to be the mechanisms of the improvement in its dissolution.

In a third part of the work, spray congealing technology was used in preparing lipid based particles containing Tadalafil as an example of a poorly soluble drug ,the characterization of the particle properties and their potential in preparing tablets with acceptable physical and release properties. The drug containing lipid based particles were prepared using Lutrol F127, Gelucire 44/14 and combinations of the two lipid excipients in different proportions. The particles were characterized in terms of their particle size, drug content flow properties and drug release. The particles were then formulated into compressed tablets using direct compression and the tablets were evaluated in terms of their physical parameters and drug release.

Spray congealing was successful in producing particles with good yield and improved tadalafil's dissolution. The compaction into tablets slowed the drug release as the lipid carriers resulted in strong binding effect that slowed disintegration which prompted us to incorporate colloidal silicon dioxide in selected spray – congealed formulations coupled with increased disintegrant levels to

improve the disintegration properties of the tablets. The last part of the study involved the development and validation of a stability indicating assay in order to be used in the stability study of the prepared tadalafil tablets. The seventh part of the study evaluated the effect of drug candidates for lipid delivery on the rate on the in vitro Lipolysis of gelucire 44/14.

Keywords: Albendazole, Gelucire®; Lutrol®; Solid dispersions; Dissolution enhancement; Pharmaceutical tablets

Design and Synthesis of Phosphodiesterase 2 Inhibitors for Treatment of Alzheimer Disease

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Abstract:

Molecular modeling is considered as one of the important methods in targeting drugs to receptors and enzymes. Phosphodiesterase (PDE) enzymes, a group of enzymes which are responsible for the hydrolysis of cAMP and cGMP in our bodies, are considered good drug targets. Some PDE families, including PDE2, contain two domains, an N-terminal regulatory GAF domain and a C-terminal catalytic domain. Human PDE2 family hydrolyzes both cAMP and cGMP and its activity is enhanced many folds by the binding of cGMP to the regulatory domain. The inhibition of PDE2 enzyme was beneficial in improving perception and memory in mice, which gave promise to many old people with Alzheimer disease. Most of the drugs known as PDE2 inhibitors are targeted to the catalytic domain of the enzyme and usually associated with side effects due to cross inhibition of the other families. Targeting drugs to the GAF regulatory domain will be a good step in this line because it affects the activated form of the enzyme but has no effect on its basal activity. GOLD genetic algorithm was used for docking thousands of compounds from three libraries; Zinc database, Maybridge and KoLigand libraries. The compounds of best fit were purchased, and those not available were synthesized. Prednisolone-21-hemisuccinate had the best inhibitory effect on the PDE2 GAF domain, in addition to hydrocortisone-21-hemisuccinate, alizarine red, Donepezil, papaverine and E4 from the synthesized compounds.

Keywords: PDE2 inhibitors; Adenylyl cyclase assay; Chimera; Molecular modeling; GAF

Compliance of Jordanian Registered Nurses with Infection Control Guidelines: A National Population-Based Study

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Abstract:

This national study aims to evaluate compliance of Jordanian staff nurses with infection control guidelines. Cross-sectional, descriptive design was used. Proportional-multistage, probability sampling was used to obtain a sample of 10% of all staff nurses working in Jordanian hospitals. Standardized self reported instruments were used to evaluate the compliance. The total sample consisted of 22 hospitals, of which 8 were governmental, 7 military, 5 private, and 2 university-affiliated hospitals. Of the total 889 participating nurses, 52.6% were females, 81.9% holding a bachelor degree. The mean age was 29.0 years (standard deviation [SD] ¼ 5.9) with a mean of experience of 6.9 years (SD ¼ 5.8). According to the scale categories, 65.0% of participants demonstrated "high compliance," 32.3% "weak compliance," and 2.7% "unsafe compliance." Nurses who received infection control training in the hospital demonstrated higher compliance (mean ¼ 120.2, SD ¼ 13.6); than those who never received such training (mean ¼ 115.8, SD ¼ 15.2), $P < 0.001$. Nurses who work in university affiliated hospitals demonstrated higher compliance than other types of hospital ($P < 0.001$). This study provides information about infection control practices in various health care sectors in Jordan. Results from this study expected to guide efforts to develop educational tools, programs, and curricula to improve infection control practices in Jordan.

Keywords: Infection prevention; Standard precautions; Infection control practices; Adherence

Design and Synthesis of a New Lead Targeting DPP-IV Enzyme to Control High Blood Glucose Levels

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Abstract:

DPP-IV enzyme has been considered an evolving target to design suitable inhibitors to control elevated glucose levels. Within this project two main series of compounds have been designed and synthesized namely thiazole based scaffold and N-amino benzamide derivatives. The later has showed a better activity against the DPP-IV enzyme with a group of lead compounds that could be potential candidate for DPP-IV inhibiton. In addition a unique and first time designed pharmacophore for the active site of DPP-IV that is selectively choose the ligands that inhibit the enzyme covalently and another one for non-covalent inhibition. Promising inhibition of the enzymes with good toxicity profile has been found with this project.

Keywords: Diabetes mellitus; Dipeptidyl peptidase-IV; Aminobenzamide derivatives; Hypoglycemic activity; CDOCKER software

Characterization of Calcium Salts as Delivery Vehicles for Insulin in Osseous Repair

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Abstract:

To find an optimal carrier, we investigated calcium salts (Calcium sulfate (CaSO4) or β-tricalcium phosphate (TCP)) as possible delivery vehicles for insulin in osseous repair. The hypothesis is that these bone-biocompatible carriers will cause prolonged insulin release that will normalize not only early but also late parameters of impaired osseous repair. Human insulin mixed with either CaSO4 or TCP was placed in a conical tube filled with saline placed in 37°C water path. Released kinetics were determined by measuring Insulin concentrations using a specific insulin ELISA Kits. The data showed that CaSO4 caused a big burst of insulin after its placement in the solution, and continues to release the insulin for 5 hours. However, TCP gradually released insulin to the solution in smaller quantities for approximately 12 hours.

The results suggest that Insulin therapy via CaSO4 can cause short term normalization in the diabetic fracture callus, whereas, Insulin therapy via TCP can cause a prolonged and sustainable normalization compared to the Insulin therapy via CaSO4. When investigating the in vivo release kinetics of insulin release from calcium salts, the results showed that insulin delivered via a calcium sulfate carrier provided sustained release of the exogenous insulin for seven days after fracture as compared to the tri-calcium phosphate carrier.

Keywords: Insulin; Osseous Repair; Local Delivery; Calcium Salts; Release Kinetics

Neurodevelopmental outcomes among Jordanian newborns born using invasive delivery methods: An epidemiological Study

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Abstract:

Background: Neurodevelopmental outcomes associated with using different delivery methods is a serious concern for clinicians. No data are available about newborn neurodevelopmental outcomes after different delivery methods in Jordan.

Purpose: To determine the incidence and determinants of neurodevelopmental deficits among infants born by invasive delivery procedures.

Methods: This study utilized the prospective case-control cohort design to investigate possible factors, which may affect newborn neurodevelopmental outcomes. Newborn candidates (and mothers) were conveniently recruited from king Abdulla university Hospital during a full year period. Information from the mothers and their newborns were collected via mothers' prenatal checklist, newborn neurological examination and auditory screening, as well as thorough chart review for both mothers and the newborns.

Results: The study included 817 newborns; 149 were delivered normally (NVD), while 668 were delivered via other invasive procedures (0.9%, 0.15%and 98.9%)for vacuum, forceps and Cesarean Section procedures respectively. For women who delivered via CS, only 83.6% were performed out of medical necessity, while the rest (16.3%) were electively chosen by the mothers themselves. The total number of newborns who presented with any type of congenital deformity (n=22) represented 2.7% of the whole sample, where as the total number of newborns who presented with an impaired neurological status (n=16) represented 2% of the whole sample. Regarding auditory screening of the newborns, only 569 newborns were screened. 435 of them (76.4%) passed the test in the two ears, 72(12.6%) on one ear only while, 62 newborns (10.8%) did not pass the test in either of the two ears and were referred for further detailed audiological testing. There was no significant association between the results of the auditory screening and the gestational age or mode of delivery. Chi square analysis revealed that mode of delivery was not associated with the incidence of congenital deformities ($x2=4.163, p=.123$) nor the neurological status of the newborn ($X2=1.488, P=.829$). However, Newborn weight and mode of delivery were related ($p=0.001$), so was newborn weight and gestational age (0.04). Newborns delivered via CS performed for medical necessity were more likely to have lower birth weight than newborns via elective CS and NVD. Besides, newborns with lower gestational age were more likely to have lower weight.

Conclusion: A wide range of epidemiological statistics including incidence of normal versus complicated deliveries, neonatal outcomes such as neurodevelopmental deficits, congenital anomalies and auditory deficits were reported. Relationship between maternal pre- and perinatal factors and neonatal outcomes were also reported.

Keywords: Caesarian delivery; Forceps delivery; Vacuum delivery, Neurodevelopmental deficits; Early intervention; Congenital anomalies; auditory screening; Obstetrics & Gynecology

Palatal Lift Prosthesis Effect on Speech Clarity among Jordanians with Flaccid Dysarthrics

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Abstract:

The study aimed to investigate the effect of Palatal Lift Prosthesis (PLP) on speech clarity in patients with Flaccid Dysarthria. Five speech measures were used: nasalance scores, diadchokinetic (DDK), vowel duration, airflow, and sound intensity. Thirty native speakers of Arabic (17 males and 13 females) with Flaccid Dysarthria following stroke, traumatic brain injury, and amyotrophic lateral sclerosis were chosen as a sample for the study. The age of the participants ranged from 8 – 65 years with an average of 31.75 years. Nasalance scores, diadchokinetic rate, vowel duration, and sound intensity were obtained using the Nasometer II, Model 6450 in three conditions. The first condition included obtaining the four measures without wearing the customized Palatal Lift Prosthesis while the second and third conditions included obtaining the four measures with the Palatal Lift Prosthesis immediately and three months later. Results revealed that the use of Palatal lift Prosthesis was effective in individuals with flaccid dysarthria. Results also showed decrease in the Nasalance scores for the syllable repetition and vowel prolongation tasks when comparing the means in the pre PLP with the post PLP at $p \leq 0.001$ except for the /m/ prolongation task. Moreover, results showed an increase in DDK repetition task, airflow amount, and sound intensity, in addition to a decrease in vowel length at $p \leq 0.001$.

Keywords: Flaccid Dysarthria; Nasalance Scores; Speech Clarity; Hypernasality; Palatal Lift Prosthesis; Flaccid Dysarthria

ADF/cofilin signaling pathway involved in establishing polarized migration in metastatic breast tumor cells

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Abstract:

Tumor cell motility is the hallmark of invasion and an essential step in metastasis. Cellular changes that occur during the progression of cancer affect proteins that drive actin dynamics; these changes modulate cell cycle progression and lead to more invasive cancers. Actin depolymerizing factor (ADF)/cofilins and their regulatory proteins are involved in the initiation of early steps in cell motility. ADF/cofilins play important roles in various stages of cancer progression and metastasis. ADF and cofilin have many qualitatively similar biochemical properties; they differ quantitatively in actin interaction and in some types of regulation and, thus, are not functionally identical. In the current research, we focused on the roles of ADF and cofilin-1 individually in the development of polarized migration of rat mammary adenocarcinoma (MTLn3) cells, which express nearly equal amounts of each protein. Small interference RNA (siRNA) technology was used to knockdown (KD) the expression of ADF and cofilin-1 independently. We found that either ADF KD or cofilin KD caused cell elongation, a reduction in cell area, a decreased ability to form invadopodia, and a decreased percentage of polarized cells. Moreover, ADF KD or cofilin KD increased the rate of cell migration and the time of lamellipodia protrusion but through different mechanisms.

ADF KD cells showed a significant increase in F-actin aggregates, whereas cofilin KD cells showed a significant increase in prominent F-actin bundles and increased cell adhesion. Focal adhesion area and cell adhesion in cofilin KD cells were returned to control levels by expressing exogenous cofilin but not ADF. Return to control rates of cell migration in ADF KD cells was achieved by expression of exogenous ADF but not cofilin, whereas in cofilin KD cells, expression of cofilin efficiently rescued control migration rates. In conclusion, although ADF and cofilin have many redundant functions, each of these isoforms has functional differences that affect F-actin structures, cell adhesion and lamellipodial dynamics, all of which are important determinants of cell migration.

Keywords: F-actin; Oxidative stress; Metastasis; Focal adhesion; Glutathione; ADF; Cofilin; Metastasis; Invadopodia; Lamellipodia

Molecular Categorization, Epidemiological Surveillance and Virulence Determinants of Methicillin Resistant Staphylococcus Aureus (MRSA) and Coagulase-Negative Staphylococci (Co NS) In Jordanian Community

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Abstract:

The prevalence of natural carriage and molecular epidemiology of methicillin-resistant Staphylococcus aureus (MRSA) and methicillin-resistant coagulase-negative staphylococci (MR-Co NS) isolates in a Jordanian community were investigated. The MRSA nasal carriage rate in 227 healthy volunteers was 7.5% and the majority (81%) of MRSA harbored the resistance element SCCmec type IV and were of a novel spa-type t9519 (76%); other significant spa gene types were t223 (14.7%) and t044 (5.9%). All MRSA isolates were susceptible to other classes of antibiotics, and tested positive for at least three virulence factor encoding genes, but only two harbored the pvl gene. MR-Co NS carriage was 54.2% and these isolates were characterized by single, double and un type SCCmec elements, with Staphylococcus epidermis SCCmec type IVa predominating. Of eight subjects with nasal co-colonization of MR-CoNS + MRSA, three shared SCCmec type IV in both groups of organisms. This is the first report of methicillin-resistant staphylococci carriage in a Jordanian community and its findings are important for epidemiological study and infection control measures of these organisms.

Keywords: MR-Co NS; MRSA; SCC mec; Spa

Assessment of Current Situation of Home Health Care Services bad users perception of Quality of Home health Care in Jordan

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Abstract:

Jordan is witnessing an epidemiological and demographic transition, which ischaracterized by the increasing percentage of aging population and highprevalence of chronic diseases. Aquantitative and qualitative study design was utilized. The study aimed at describing the home health care in Jordan and the perception of users and providers of these services. Quantitative data was collectedthrough a 40-item questionnaire constructed by researchers, thequestionnaire was used to assess the type and level of services, usersprofile and health conditions, staffing, staff qualifications ,referrals, payment scheme, pattern of utilization and barriers toutilization. Qualitative data was collected through a series of focusgroups with health providers and users of the services, and a structuredinterview with medical consultants. The sample for the quantitativepart of the study included all Forty six home health care agencies inJordan and, sixteen medical consultants, forty five managers from homehealth care services and seventy two users and families of the variousservices representing the geographical distribution of services. Quantitativedata was analyzed using descriptive and correlation statistics. Qualitative data was analyzed using content analysis. The results of the study were compared to bench marks and available standards to identifyfurther the gaps and areas of need for development. The findings of thestudy provided base line data on the profiles of home care services andusers. The findings of the study were used to formulate the preliminarydirections to policy and legislative development. A committee was formulated to write the regulations to organize this sector .

Keywords: Home; Health care; Situation; Qualitative; Quantitative; Jordan

Combination of an Immunomodulator Eriobotrya Japonica Hydrophilic Extract with Dichloroacetate for Treatment of Urothelial Carcinoma

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Abstract:

Dichloroacetate (DCA) is one of the new, promising anticancer drugs. DCA restores normal mitochondrial function and enables cancer cells to undergo apoptosis. In addition, DCA was found to modulate certain signaling pathways involving some transcription factors. The latter encouraged us to study DCA immunomodulatory activity on cytokines and their association with increasing DCA cancer cell cytotoxicity. Cell viability assay was used to determine the effect of different concentrations of DCA on the survival of 3-methylcholanthrene (MCA) fibrosarcoma cell line. DCA decreased the percent survival of MCA fibrosarcoma in a dose-dependent manner (P,0.01). Furthermore, this percent survival was further reduced when MCA fibrosarcoma cells were cocultured with mouse splenocytes. The latter was observed at 10 mM DCA (P,0.01), and the inhibitory concentration at 50% dropped from 23 mM to 15.6 mM DCA (P,0.05). In addition, DCA significantly enhanced interferon (IFN)-γ but not interleukin (IL)-17 production levels in unstimulated and stimulated mouse spleen cells.

To investigate the mechanism of DCA on IFN-γ production, DCA cytokine modulatory effect was tested on unstimulated macrophages, T-cells, and natural killer cells. DCA significantly increased IL-12 production from macrophages but did not modulate the production of IFN-γ from either T-cells or natural killer cells. Moreover, the DCA-enhancing effect on IFN-γ production was reversed by anti-IL-12 antibody. Also, the DCA cytokine modulatory effect was tested in vivo after inducing mouse skin inflammation using phorbol 12-myristate 13-acetate (PMA). DCA restored PMA-lowered IFN-γ and IL-12 levels and normalized PMA-increased transforming growth factor-β level, but it inhibited IL-10 levels even further (P, 0.05). DCA has immunomodulatory activity, mainly via activation of the IL-12–IFN-γ pathway and is able to modulate cytokines toward T helper 1 lymphocyte function. These DCA immunomodulatory effects are promising and further investigations are required to develop protocols for its use in cancer treatment.

Keywords: Dichloroacetate; Fibrosarcoma; Cytokines; IL-12, IFN-γ; Inflammation

Cosmeceutical Properties of Dead Sea Mud

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Abstract:

In this project we intended to evaluate the cosmeceutical effects of Dead Sea Mud using non-invasive techniques by measuring the biophysical properties of human skin (Trasepidermal Water Loss, skin hydration, skin elasticity, pH, color, dermal/epidermal thickness, collagen content, skin blood flow and skin temperature) pre, during, and post Mud treatment. In addition, the therapeutic effects of Dead Sea Mud were assessed non-invasively by monitoring the improvement of EMG of leg muscles pre, during, and post mud treatments. All clinical study protocols were designed according to specific published guidelines in order to exclude many external factors that can affect the measurements and are carefully designed to substantiate many claims that are written on the label of Dead-Sea Mud preparations and are also used for marketing advertisements.

All types of mud were considered mild and were well tolerated by the skin after short term exposure. No significant changes in skin hydration were noticed in all types of Dead Sea Mud over the 4 weeks of treatment as compared to their baseline values as well as to untreated control forearms at each tested time points. Every other day usage of all types of Mud caused no significant changes in melanin level compared to baseline values as well as untreated forearms at all tested time points. In addition, similar to the short term finding, every other day usage of all types of mud for 4weeks were considered mild and were well tolerated by the skin. Results of skin blood flow assessments showed that all types of Dead Sea Mud did not enhance blood flow during as well as post application.

We also investigated whether the external use of the Dead Sea mud would substantially improve the abnormal muscular activities (EMG) of the lower extremities during ambulation for patients with bilateral knee osteoarthritis (OA). Fifty three participants with OA from Albashir hospitals participated in this part of the study. Subjects were assigned to four groups. Group A received Dead Sea Mud and hot pack, Group B received Dead Sea Mud alone, Group C received hot pack alone, and Group D received only therapeutic exercises for their affected knees. Dead Sea Mud treated groups (A &B) as well as hot pack treated group (C) showed a decrease in pain after two weeks of treatment that continued up to 4 weeks time points. In addition Dead Sea Mud treated group (A&B) showed a significant decrease in WOMAC index after 2 weeks of treatment and at the 4th weeks compared to baseline values.

Dead Sea Mud treated group (A&B) enhanced muscle electricity significantly compared to their baseline values. The groups' comparison showed that the increase in EMG was superior for the Dead Sea Mud and hot pack treated knees. In addition skin blood flow were significantly higher for the knees treated with Dead Sea Mud and hot pack (Group A) or hot pack alone (Group C) which support our previous findings and conclusion regarding the role of accompanied heat in

enhancing blood flow. Thus Dead Sea Mud accompanied by hot pack can be considered one of the unconventional methods for alleviating symptoms of OA that is shown in our study to enhance muscle electricity, knee blood flow, as well as alleviate knee pain.

Keywords: Skin Pharmaceutics; Dead Sea Mud; Knee Arthritis; Skin Hydration; Skin Elasticity; Skin Micro circulation; Collagen Content; Trace Elements; Skin Erythema; Skin Temperature

Targeted-Delivery of Macromolecular Drugs (Aptamers) to Cancer Cells

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Abstract:

This project aims at the development of cancer specific drugs that are capable of eradicating these cancer cells without affecting normal cells. We proposed using aptamers (which are synthetic single-stranded nucleic acids that have the ability to bind with high affinity and specificity to a wide range of targets) as costumed designed drugs to target cancer cells. Aptamers are strongly emerging as new recognition molecules that can rival antibodies in various fields and applications. In this work, several aptamers sequences targeting the tyrosine kinas abl were generated using systematic evolution of ligands by exponential enrichment (SELEX). These aptamers were screened for their activity against k562 cell line (leukemia cell line) which contains this protein inside the cell. The aptamers were fully studied regarding their encapsulation in cationic liposomes, and their activity was studied. Various formulations for liposome preparation were investigated regarding mole ratio lipidto aptamers and the size of the liposomes to reach optimum effect.

Keyword: Drug delivery; Liposomes; Nanoparticles; Cobalt nanoparticles; Gold nanoparticles; Anticancer; SELEX.

Association Of Chlamydia Pneumoniae Infection With Coronary Heart Disease In Jordan

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Abstract:

The correlation of *Chlamydia pneumoniae* to coronary heart disease was investigated in the present study. Anti-*C. pneumoniae* specific IgG antibodies levels were measured by the microimmunofluorescence assay (MIF) and the presence of bacterial DNA was tested by polymerase chain reaction (PCR) in the blood of 361 atherosclerotic patients and 392 control subjects. When both genders were combined, a slightly insignificant higher prevalence of IgG antibodies estimated at titers ≥1/16 was found in patients (75.9%) in comparison to controls (71.7%). About 78.1% of patients demonstrated seropositivity at titers ≤1/256, which are suggestive of chronic (persistent) or 'presumed' past infection, whereas 75.4% of controls were seropositive at these titers (p>0.05). Analysis of seroprevalence data obtained for each gender among controls and patients revealed no obvious relation between *C. pneumoniae* and atherosclerosis in males (78.9% and 77.9% in atherosclerotic and control males, respectively; p>0.05). However, a significantly elevated seropositivity was detected in atherosclerotic females (71.7%) than control females (64.2%). In contrast to IgG prevalence, the PCR-based detection of *C. pneumoniae* DNA did not in any way correlate the bacterium with atherosclerosis.

In conclusion, this study is the first report in our area on the possible association of *C. pneumoniae* IgG seropositivity and cardiovascular diseases. Our seroprevalence findings suggest a poor association between *C. pneumoniae* infection and atherosclerosis in Jordanian population, when both genders were combined. However, a significant potential link of *C. pneumoniae* infection to atherosclerosis was observed among females. Contrary to IgG seropositivity, demonstration of chlamydial DNA in the whole blood is most likely unreliable method in predicting *C. pneumoniae* as a risk factor for cardiovascular diseases.

Keywords: Atherosclerosis; *Chlamydia pneumonia*; Prevalence; Seropositivity; Polymerase chain reaction

Isolation, Identification, and Cytotoxicity Determination of Local Streptomyces, Bacillus, and Extremophilic Species against Cancer Cells

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Abstract:

This study was conducted to isolate and identify *Streptomyces* and *Bacillusthuringiensis* from soil, thermophilic bacteria from Jordanian hot springs, and halophilic bacteria from Dead Sea based on their phenotypic and molecular characteristics. Moreover, the hemolytic and anticancer activities were determined for the isolates. A total of 44 bacterial isolates were recovered from water samples of five main hot springs in Jordan. Thirty-three of the isolated colonies were light yellow and circular to rhizoid on nutrient agar; cells were Gram positive, endospore-forming, and rod-shaped. Eleven isolates were Gram-negative non-spore forming rods. It was found that 20 isolates met the criteria of moderate thermophiles. Most of these isolates reacted positively with catalase and oxidase. The remaining 24 isolates were thermotolerant. 19 of the thermophilic isolates have 90-100% sequence homology to the genus *Bacillus*; six isolates were closely related to the thermophilic genus *Geobacillus* showing 97-100% homology to the reference strain *G. stearothermophilus* ATCC 7953. Phylogenetic analysis using 16S rDNA, revealed that three *Geobacillus* isolates (JA1, JH1, and JM1) could be allocated into the species *stearothermophilus* with 100% homology. Remarkably, it was found that the 16S rDNA sequence of Zara isolate JZ9 were highly similar (96% identity) to the thermophilic bacterium *Caldimonashydrothermale*. In this study eleven non-hemolytic bacterial isolates were screened for their cytotoxicity against normal Vero cells and two cancer cell lines (leukemic K562 cells and breast cancer MCF7 cells). Results indicated that only three thermophilic *Bacillus* isolates (JA2, JM11, and JM12) showed selective *in vitro* cytotoxicity against human leukemia cell line K562. The current study demonstrated that Jordan thermal vents are rich sources of thermophilic bacterial species producing anticancer agents.

A total of 12 halophilic bacterial isolates were isolated from the Dead Sea. Out of them, four isolates (BMN1, BMM1, BMS1, and BMS2) were obtained from black mud samples. Whereas, the remaining eight isolates were obtained from water samples. Based on morphological, physiological, and some biochemical properties, the 12 bacterial isolates obtained from Dead Sea water and black mud were met the criteria of moderate halophilic bacteria. All isolates were aerobic, oxidase-negative, and catalase-positive. DNA sequence analysis showed the affiliation of six halophilic isolates (DSN3, DSM1, DSM2, DSS1, BMM1, and BMS1) with the genus *Halomonas* and appeared closely related to the reference strain (*Halomonashalmophila* ATCC 19717) with 94-99% homology. The crudes of halophilic bacterial isolates were tested for their hemolytic activity against human erythrocytes; 7 isolates were found non-hemolytic. Non-hemolytic isolates were screened for their *in vitro* cytotoxicity against normal Vero cells, leukemic K562 cell line, and breast cancer MCF7 cells. Unfortunately, none of the tested isolates exhibited selective cytotoxicity against cancer cells.

Diverse 65 *Streptomyces* isolates were obtained and classified based on the developed mass color of aerial mycelium into nine color series. It was observed that the white color series followed by the green color series were the most common. The majority of *Streptomyces* isolates produced substrate and soluble pigments. The sporophores shape of the local *Streptomyces* isolates was grouped into rectus-flexous (RF), monoverticillate (MV), biverticillate (BIV), and spiral (S). The RF sporophores among local isolates were the most common. The phenotypic characterization of local *Streptomyces* isolates was confirmed by 16S rRNA gene sequence analysis. Maximal identity of all tested isolates to genus *Streptomyces* was observed. The non-hemolytic *Streptomyces* isolates (48 isolates) were screened for their cytotoxicity against normal Vero cells, leukemic K562 cell line, and the adherent breast cancer MCF7 cell line. Results indicated that only seven isolates (S7, S9, S17, S20, S44, S46, and S61) showed selective *in vitro* cytotoxicity against K562 and MCF7 cells. In addition, two isolates (S10 and S47) exhibited *in vitro* cytotoxicity against MCF7 cells but not against K562 cells. It was found that only crudes of three *Streptomyces* isolates (S7, S17, and S61) were significantly induced *in vivo* inhibition of breast cancer tumor in experimental animals.

A total of 81 local *Bacillus thuringiensis* ***(Bt)*** strains representing 14 serovars along with 14 reference strains representing 12 serovars was used in this study. Alkali-solubilized, proteinase K-activated parasporal inclusion proteins (PIPs) from Bt strains were screened for their hemolytic activity against human erythrocytes. It was found that activated PIPs from 34 Bt strains were non-hemolytic. It was observed that non-hemolytic PIPs of only two Bt strains (J18 (*B. t. sooncheon*) and J72 (*B. t. tohokuensis*)) exhibited selective *in vitro* cytotoxicity against MCF7 cancer cells. It was also observed that proteinase-K activated PIPs of both strains were significantly induced inhibition of breast cancer tumors in the experimental animals. These findings may lead to the use of Bt PIPs for pharmaceutical and medical purposes.

Keywords: Thermophile; Streptomyces; BtAnticancer; Isolation; Metabolite; Cytotoxicity; Archaea; Halophile

The Endoplasmic Reticulum (ER) Stress in Human Colorectal Cancer

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Abstract:

This study was carried out to investigate the activation status of unfolded protein response (UPR) in colorectal cancer (CRC) and its contribution to CRC resistance to chemotherapy-induced apoptosis. Chemotherapy-inducedapoptosis was assessed by the propidium iodide method. Activation of UPR was evaluated in CRC cell lines using immunoblotting technique and in CRC tissues using immunohistochemistry. Findings of the present study revealed that the UPR is constitutively activated in CRC cell lines and CRC tissues isolated from patients, as evidenced by relatively high levels of the 78-kDa glucose-regulated (GRP78) protein and spliced X-Box-Binding protein 1 (XBP1) mRNA in tissue samples. In addition, CRC cell lines differentially responded to clinically relevant chemotherapy. Moreover, levels of GRP78 were inversely associated with sensitivity of CRC cells to chemotherapy-induced apoptosis. Inhibition of GRP78 by siRNA resulted in increased sensitivity of CRC cells to chemotherapeutic agents. Collectively, current results appear to provide novel insights into the role of the UPR in determining sensitivity of CRC cells to chemotherapeutic agents and might have important implications for personalized CRC treatment

Keywords: UPR; Apoptosis; GRP78; 5-FU; Cisplatin

Production of Human Non-Immunogenic Camel Anti-Ige Nanobodies for Asthma Treatment Purposes

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Abstract:

Camels were immunized with native human IgE (huIgE) and a synthetic loop peptide (SLP) that resembles FcεRI binding site to basophils and other effector cells mediating immediate hypersensitivity response. SLP was conjugated with either multiple antigen peptide system (MAPS) forming SLP-MAPS immunogen or with tetanus toxoid (TT) forming SLP-TT immunogen. Polyclonal camel antibodies, both conventional and heavy chain (HCAbs) isotypes were produced, purified and characterized using Protein A, Protein G, ELISA, SDS-PAGE and Immunoblot techniques. Conventional IgG1as well as IgG2 and IgG3 HCAbs were detected and successfully purified from camel sera immunized with native huIgE and SLP-MAPS but not SLP-TT. These camel isotypes were tested for their potency to block passive sensitization on human basophils was measured by flow cytometry and by inhibition of histamine release. Both methods were closely correlated and indicated that camel conventional (IgG1) and HCAbs (IgG2 and IgG3) had a high blocking potency with the HCAbs being much superior. Furthermore, the blocking potency of the HCAbs purified from SLP immunized camel was greater than that of HCAbs purified from the huIgE immunized camel.

The camel immunized with SLP-MAPS was additionally used for the production of recombinant camel HCAb. One Shot TOP10 expression system was used. Sequence analysis of positive transformants revealed the expression of camel IgG2 heavy chain antibody. Recombinant antibody was purified and tested by immunobloting with anti-camel antibodies. This HCAb construct constitute a scaffold for the generation of anti-human IgE specific antibodies by CDR grafting. Moreover, 3 different protocols were used to generate a camel myeloma cells that can serve as fusion partner for hybridoma generation and monoclonal antibody production. Transformation of camel lymphocyte by hTert or EBV did not result in the development of stable immortal cells. In contrast, the fusion of camel lymphocytes and murine myeloma cells resulted in the generation of a stable immortal sell line that can serve as fusion partner. Preliminary trial confirmed this possibility. Finally, the implication of the usefulness of prepared camel HCAbs and anti IgE antibodies as components of novel treatment strategies in immediate hypersensitivity reactions including severe allergic asthma can be inferred from the present investigation.

Keywords: Camels; Antibodies; Blocking; Immunoglobulin E; Anti-IgE antibodies; Asthma; Histamine release

Screening of Selected Jordanian Medicinal Plants for Acetylcholinesterase Inhibitory Activity and Anti-oxidant Capacity for Neurological Diseases

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Abstract:

Numerous medicinal plants have been described in traditional medicine for treatment of dementias, including Alzheimer disease (AD). In this study, some of these plants were evaluated in three different types of pharmacological bioassays related to AD pathology to explore the possible mechanisms underpinning their traditional use. Six selected plants were extracted with ethanol and screened *in vitro* for acetylcholinesterase (ACHE) and cyclooxygenase-1 (COX-1) enzyme inhibitory activities; in addition, a range of anti-oxidant activities were evaluated. Of the tested plant extracts, *Aloysia citrodora*and *Peganum harmala* root and seeds showed inhibitory effect on ACHE (IC_{50} 68, 100 and 93Mg/ml, respectively). Moreover, *A. citrodora* appeared to interact reversibly with the enzyme, while *P. harmala* appeared to show irreversible inhibition. *Asphodelus microcarpus*, *Inula viscosa* and *A. citrodora* displayed COX-1 enzyme inhibitory activity (IC_{50} 34.9, 3.4 and 3.2 Mg/ml, respectively). The modest reversible interaction of *A. citrodora* with ACHE, potent COX-1 Inhibitory and antioxidant activity, and strong metal chelating ability made this plant a promising candidate for future development in the treatment of AD, either as awhole extract or as individual bioactive constituents. *A. andrachne* and *A. microcarspus* extracts should be further evaluated since they exhibited promising NO scavenging activities.

Keyword: Jordanian Medicinal Plants; Alzheimer's disease; Anti-inflammatory; Anti-acetylcholinesterasa; Anti-inflammatory; Anti-oxidant; Metal chelating ability

Towards HIV Protease (HIVP) Inhibitors: [60] Fullerene Complexes with Calix[4]arene Derivatives

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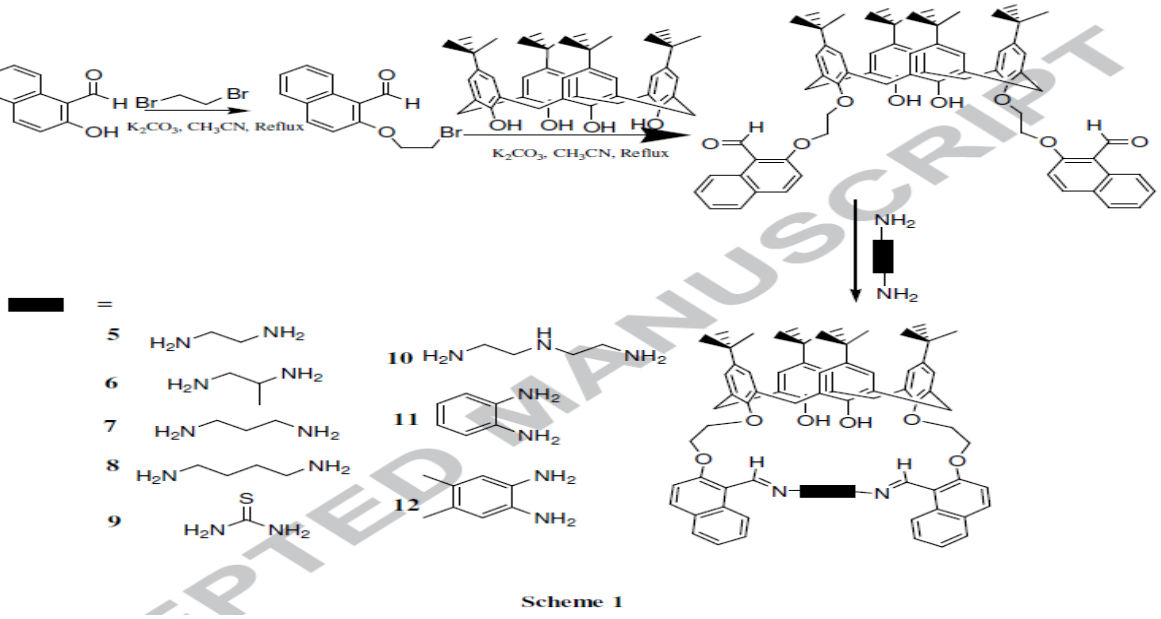
Abstract

Some *p-tert*-butylcalix[4]arene Schiff base crown ethers were synthesized, characterized using ^{1}H,^{13}C-NMR, DEPT 135 and Mass spectrometry. Their complexes with C_{60} were isolated and characterized. The inhibition effect of these complexes on HIVP was studied and found that complexes of **9** and **10** have comparable Ki values to Pepstatine which is known as HIVP inhibitor and used as a control. The synthesis of the ligands, complexes and the inhibition behavior are discussed in this article.



Scheme 1

Keywords: 2,3,4,5-Tetrahydro-1,4-benzoxazepines, 1,2,3,5,6,11b Hexahydroimidazo[1,2-*d*][1,4]benzoxazepines

Natural Iron Chelating Agent for Thalassemic Patients Alternative to Deferoxamine: Development of Novel Medicaments

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Abstract:

In thalassemic patients acute iron poisoning is one of the main problems which in a good number of cases results in morbidity and mortality. The treatment of this type of poisoning mostly focus on providing supportive care and on administration of deferoxamine parenterally. In addition, individuals with red myelodysplasia usually developed transfusion associated chronic iron overload which also should be treated. Historically, deferoxamine was the only iron chelator agent available to treat this condition. The use of deferoxamine as therapeutic agent is inconvenient, time-consuming, and associated with undesirable adverse effects resulting in non-compliance. Over the last years, significant evidence has emerged supporting the use of the oral iron chelators deferiprone and deferairox. Although both are effective at decreasing iron burden, practice showed that deferasirox is more convenient and effective. In addition, it showed that deferasirox the oral chelator of choice in pediatric patients with transfusion-associated chronic iron overload. ikt also has a favorable adverse effect profile when compared to deferiprone, which requires frequent blood count monitoring.

Beta thalassemia is the most common hereditary disease in Jordan. Almost all patients with thalassemia major are registered by the regional health care centers. According to Jordanian health ministry data, the majority of the cases are concentrated in Amman, north of Jordan and Jordan valley. The medical and economic burdens of thalassemia as a major health problem in thalassemia belt countries are introduced with great emphasis on prenatal diagnosis to prevent the disease as the “economic” solution from a health care policy viewpoint. The alternative method of screening is to test couples before marriage and find the carries of the disease and their referral to genetic counseling.

Keyword: Betta-thalassemia major; Desferrioxamine; Iron overloa

New 4-pyridone Annelated – Oxindole Derivatives as Antitumor and Antibacterial Agents

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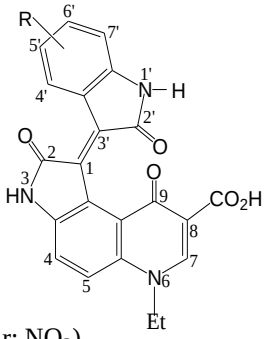
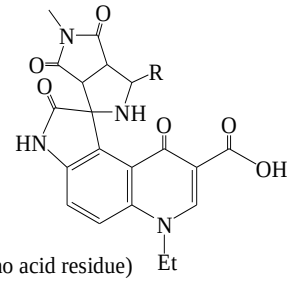
Abstract:

A selected set of substituted pyridone annelated isoindigos (**1**) has been synthesized *via* interaction of substituted oxindoles with trioxopyrrolo[3,2-*f*]quinoline-3-carboxylic acid in AcOH at reflux. The 5′-Cl and 5′-Br isoindigos showed strong and selective antiproliferative activities against a panel of human hematological and solid-tumor cell-lines, but not against noncancerous cells, suggesting their potential use as antitumor agents. The 5′-Cl remarkably arrested cell cycle in HL-60 at the G0/G1 phase in a dose and time-dependent manner, while the 5′-Br significantly inhibited proliferation by inducing Caspase-dependent apoptosis.



(R: H; Cl; Br; NO_2) **(1)**



(R: α–amino acid residue) **(2)**

Another series of pyridone-annelated spirooxindole-3,2′-pyrrolidines (**2**) was prepared *via* 1,3-cycloaddition reaction involving *N*-methylmaleimide and the appropriate azomethine ylide. Among these, compounds with R = CH_2Ph and $CH_2CH_2CO_2H$ display the highest antitumor activity.

Keyword: Pyridone-annelated; Isoindigos; Isoindigo; Antiproliferative activity; Apoptosis; 5'-halogeno derivatives.

قطاع العلوم الهندسية والتكنولوجيا النانوية والحيوية

A Microfluidic Platform for the Detection and Treatment Monitoring of Hepatocellular Carcinoma

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Abstract:

Microfluidic devices (lab-on-chip devices) have been tested as a prime candidate for replacing popular biomarker detection techniques such as Enzyme-Linked- Immunoassays (ELISA). They provide many advantages such as reduction of reagent, sample consumption, and reduction of time and costs. In addition, microfluidic devices provide the potential of incorporating more than one process on the same device. One of which is filtration of biofluids before analyte detection. This work presents the optimal design process of a lab-on-chip device for the detection of Alphafetoprotein (a liver cancer biomarker) from blood. It has been found that the presence of blood reduces the fluorescence signal of the detected protein. Also favored a blood filtration technique that is dependent on red blood sedimentation rather than on flow differences. Finally detection AFP at a limit of detection of 0.03 ng/ml has been reached.

Keywords: Breast Cancer; Microfluidic; Device; Detection; Microfabrication; Soft Lithography

Palm Tree Climbing Robot

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Abstract:

Palm trees have a significant economical value as source of income for the countries that have them. It is dangerous to climb those high trees to perform some operations, therefore, a robot has been designed to climb the tree and carry out some tasks such as spraying insecticides or picking up dates. The mechanism adopted for this climbing robot consists of three pneumatic actuators; one main actuator and two auxiliary ones, two encircling arms, springs and pneumatic valves. The arms embrace the trunk of the tree and both springs and the two auxiliary actuators will keep the arms in suitable positions either to allow the arm to move up or to carry the weight of the robot. The motion that comes from the main actuator is applied to the upper arm and the lower one to raise the robot up the tree trunk and is controlled by the valves. Air pressure used does not exceed six bars. The movement of the robot to climb up and down is controlled by an Arduino controller. The pneumatic circuit uses three solenoid actuated 4-2 way pneumatic valves with spring return. These valves are powered with a 12Volt DC signal coming from a double H-bridge. The microcontroller and the solenoids share the same power source, a 12V rechargeable battery, with a 9V voltage regulator on the microcontroller side.

Keywords: Climbing robots; Palm trees; Pneumatic actuators; Autonomous systems

Local Butter Churning Process Automation

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Tafila Technical University

Abstract:

Traditionally, Jordanian butter has always been made from yogurt. When a sufficient amount of milk has been collected, it is fermented then churned by mechanical shaking until butter granules are formed. In making butter from yogurt, the objective of churning is to extract the maximum amount of fat by transferring the emulsion from oil in water to water in oil. The liquid that remains after extracting butter - buttermilk - is used to produce a type of dry yogurt called *Jameed*, a local dairy product in Jordan. This traditional method of churning is time-consuming, perhaps taking more than two hours. Observations made of traditional butter-making by smallholders have indicated that the process should be improved by increasing the efficiency of fat extraction from the yogurt and reducing the processing time, thereby improving the economic return. Toward this end, this research has achieved tow objectives, first is designing a one unit to process and automate the butter churning process, and the second one is improving the churning process efficiency. The ultimate goal of this project is achieved by building a one machine for the local organic butter, fat and *jameed* manufacturing. We developed a device that rapidly and consistently agitates milk to churn butter. This device has passed through several phases of development over the last years. Many experiments made to design and select churn parameters like rotor velocity, churn temperature. And also many experiments designed to select the best sensors that can be used to control the whole process which includes heating, cooling, fermentation and churning.

Keywords: Butter Churning; Automation; Acoustic Signal; Feature Extraction; Classification

Design and Evaluation of a Multi Frequency Ultrasound System for Transdermal Ultrasound/Mediated Noninvasive Insulin Delivery

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[b] Jordan University of Science and Technology

Abstract:

Noninvasive trans-dermal delivery of insulin is investigated utilizing ultrasound transducers. This method is proposed to improve the quality of life of diabetic patients by reducing regular pain, suffering, and the risk of infection, and to replace the long-term dependence on the traditional invasive and painful subcutaneous insulin delivery using needle injections. Utilizing piston-shaped PZT ultrasound transducers, a noninvasive transdermal delivery of insulin was suggested and different piston-shaped ultrasound transducers operating in the frequency range 100-1000 kHz were housed using silicone adhesive which included a reservoir to hold insulin during *in vivo* transdermal delivery. Animal experiments were designed to have non-diabetic or temporarily diabetic animal models. Anesthetic drugs xylazine in combination with ketamine were introduced to rabbits, mice, and rates to create temporarily diabetic models during the *in-vivo* delivery of insulin. Local anesthetic drug lidocaine in combination with ketamine was tested for non-diabetic animal model experiments. Animals were divided into different groups including control and exposure groups driving frequencies of ultrasound, exposed group were varied linearly to relate insulin delivery effectiveness as a function of frequency.

Results of non-diabetic rabbit models showed that over the recording period of 60 minutes, blood glucose levels in the control group remained around 125 mg/dl; while for the exposure group decreased from initial starting point by 33.85% after 60 minutes. For diabetic rabbit model blood glucose level of rabbits (n=25) was 157.2 ±17.4 (mg/dl) and increased to 302.4± 78.1 mg/dl in one-hour period for the control group. Exposure groups showed variable behaviors of glucose level reductions depending on driving frequencies with lowest value of 100.6±17.9 (mg/dl) after one-hour from the starting of the ten minute exposure period. Results of diabetic albino BALB/c mice showed initial blood glucose level (n=20) of 260.1± 38.7 (mg/dl) and increased to 386.9± 96.9 mg/dl in one-hour period for the control group. Exposure groups showed variable behaviors of glucose level reduction depending on driving frequencies with lowest value was 118.5± 60.0 (mg/dl) after one-hour from the starting of the five-minute exposure period. Piston transducers in the mid-range frequency were found feasible in transdermal insulin delivery *in vivo* using local rabbits, mice, and rats.

Keywords: Noninvasive; Transdermal; Insulin Delivery; In-Vivo; Therapeutic Ultrasound

PE/Clay Nanocomposites Blown Films: Structure-Property Relationships

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University of Jordan

Abstract:

Polyethylene/clay nanocomposites were prepared as blown films using different formulas (clay contents (4 and 6 wt%) and compatibilizer/clay ratio (1/2, 1.0, 2.0)). Structure, thermal and mechanical behavior were tested. It was found that blown film extrusion process decreased the tactoids size and consequently enhanced the exfoliation degree of the clay layers inside the polymer matrix, which is due to the elongational stress during extrusion. Addition of clay had some effect on crystallization behavior. It caused change in crystalline thickness, in addition to some delay in melting and crystallization process due to confinement of polymer chains by clay layers. Regarding their effects on mechanical behavior, there was an increase of yield strength (around 30%). Yield strength is related to the interfacial interaction between the polymer and the clay layers in the nanocomposites, which would be enhanced by enhanceing the compatibility between polymer and clay layers. At 90% confidence interval, the yield strength was positively correlated with compatibilizer/clay ratio, aspect ratio and exfolition number and negatively correlated with interparticle distance between clay tactoids. Modeling of yield strength showed that the interfacial stress transfer parameter (τ) is 32 at clay loading of 4wt%, while it was found to be 15 at clay loading of 6wt%. This means that the systems of this study have some strong interactions specially at low clay content (4wt%).

Keywords: Nanocomposites; Compatibilizer/clay ratio; Interfacial interactions

Reducing the Manufacturing Cost of PVC Products Using Appropriate Fillers, Plasticizers, and Recycled PVC Pellets

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[b] The Hashemite University

Abstract:

This study described the use of a statistical experiment to investigate effects of different parameters on mechanical properties of PVC composites intended for use in electrical wire insulation. Four components forming mixture, namely; virgin PVC, recycled PVC, $CaCO_3$, and plasticizer, as well as two process variables; type of plasticizer and filler particle size, were all examined in this study. The mixture was optimized to achieve required strength and ductility, while minimizing cost. An optimal mixture was achieved consisting of 20.6 wt% virgin PVC, 21.3 wt% recycled PVC, 48.1 wt% $CaCO_3$ with 5 μm particle size, 8.0 wt% DOP and 2.0 wt% CPW plasticizers. Optimum properties involved tensile strength of 22 MPa and 332% ductility. The estimated cost of the mixture was 0.58 JD/kg in in local market.

Keywords: PVC composites; Mechanical properties; Recycled PVC; Mixture design experiments; Response surface optimization

Failure Modes in Biomechanical Ceramic-Based Layer Structures: In Dry and Wet Conditions Relevance to Failure of Dental Restorations

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Abstract:

Several research studies had been done to investigate zirconia based all ceramic restorations, but there is still a need for additional work in order to continue providing a unique and innovative contribution to the studies assessing various factors affecting the life time of all ceramic restorations. This work is an In-vitro study aiming to investigate the fracture resistance of veneered zirconia molar crowns under various loading conditions. Initial pilot study investigated the influences of pre-existing cracks to simulate defects in structures using curved bi-layer system consisting of glass coating on a polymeric support layer, the samples were fabricated prior to getting the fund from SRF, tested on universal testing machine at the material laboratories. The failure of these samples was investigated under single-cycle axial loading tests using soft indenter of low elastic modulus. Margin cracks were observed to propagate from pre-existing cracks near the margins, while the pre-existing cracks in the compression zone under the soft indenter were arrested. Experimental trends suggested that critical loads were increased with specimens having no defects (pre-existing cracks).

Flat porcelain/Y-TZP ceramic crowns were fabricated following general dental practice and were supported with dentine-like composite to simulate actual dental restorations. Specimens were subjected to eccentric forces in a Willytic chewing simulator with loads of 5, 7 and 8 Kg delivered by means of steel stylus of 4 mm diameter in wet condition. The damage evolution was observed at stepwise increase in cycles of 100,000 cycles each. Force measurements were taken using a 3D force sensor during dynamic loading of simultaneous axial-lateral movements. Localized surface damage which was observed at early stages was halted later after 500,000 cycles with distinctive damage patterns. Unlike mono loading, radial cracks were observed in several areas - three locations. At porcelain under layer under the indentation area and at the marginal extremists similar to lunar cracks observed previously using soft indenters. More interestingly at mesiobuccal area between the occlusal and the axial side of the crown which explains the chipping damage of dental crowns.

The study is aboutb the failure of worn tooth under complex cyclic loading in aqueous environments. All ceramic dental crowns having zirconia cores of 0.5mm thickness veneered with a layering ceramic with a thickness of 1.5mm, 1.0mm, 0.5mm and 0.0 mm. The samples subjected to 1,250,000 cycles (equivalent to 5 years chewing with food) in dual axis chewing simulator (Willytec chewing simulator). Fracture modes were observed at intervals of 250,000 cycles. Samples that survived were subjected to mono-loading using universal testing machine to estimate the fracture loads and behavior of the specimens after cyclic loading. Specimens with 0.0 veneering fractured at early stages of testing while 1.5mm veneering thickness survived over one million cycles. More interesting, not all 0.0mm veneering thickness samples started fracturing at the same cyclic rate. To this end more samples of the same thicknesses were subjected to testing to do statistical analysis, which will be a must because of the fluctuation of the results.

Margin failure was observed in several specimens during testing in all samples at high cyclic rate over one million cycles and in mono loading of the same specimens, only using flat indenters which spread the load over large contact area. No margin failure observed using hard spherical indenter, as a consequence of these initial finding, extra care will be chosen on selecting the testing parameter to focus more on margin failure. As can be seen, the cracks interaction and locations vary to large extent all over the veneering layer. This will be explained in details in the next section of the detailed report.

Prosthetic molar crowns in service are subjected to chewing load which can produce axial, laterals and rotational forces. These forces cause shift or dislodgment of prosthetic crowns in bruxers patients. Grooves are added to the mesial and distal surfaces of the crown to resist the crown movement. In this study, resistance grooves added to all ceramic zirconia cored crowns were subjected to cyclic axial and lateral forces for 1,250,000 cycles in aqueous conditions to simulate five years of chewing and compared with similar crowns without grooves. In addition, crown samples were tested in a mono-loading fashion and a mono-loading combined with a cyclic loading to cover all loading scenarios that crowns might be subjected to during service. The results confirmed that the grooves addition has no effect on critical conditions to initiate failure in the case of mono-loading only. In cyclic loading, grooves addition increased the critical loads in the order of two. Failure patterns and location were obtained.

Keywords: Surface damage; Radial cracks; Cyclic loading; Layered structures; Hard indenter.

Introducing New Technologies and Advanced Methodologies for Asphalt Mixtures of Highway Pavements in Jordan

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Abstract:

Asphalt-surfaced pavements in Jordan experience severe distresses particularly in areas subjected to heavy traffic loadings. These distresses include fatigue cracking, thermal cracking, rutting, depressions, swelling, raveling, polished aggregate, bleeding, and potholes. The major causes behind the occurrence of these distresses include heavily repeated traffic loadings, improper mixture design, improper pavement construction, weak subgrade, poor quality materials, and aging of asphalt materials. The Marshall Mix design method, an ASTM standard, is commonly used to design asphalt mixtures in Jordan. However, due to its drawbacks, it was dropped from the standard test methods in 1998, and currently SUPERPAVE™ is used for the design of asphalt pavement mixtures in the United States of America and other neighboring countries in the region. This research study aimed at achieving several objectives including the evaluation of the suitability of local materials to the Superpave mix design procedure, comparison between Marshall and Superpave mix designs, and comparison between Marshall and Superpave asphalt mixtures in terms of performance, design, and durability.

The Superpave technology and methods introduced into the Highway Laboratory at Jordan University of Science and Technology throughout this research project was utilized to conduct the experimental work of this project. A comprehensive experimental phase was accomplished for the different asphalt mixtures including mix designs using the Marshall and the Superpave mix design methods, and laboratory testing for fatigue, rutting, and simple performance testing of both Marshall mixtures as well as Superpave mixtures. The asphalt mixtures used in the project were produced using local materials: 60/70 asphalt binder and two aggregate types (limestone and basalt), and by employing two aggregate gradations.

Dynamic fatigue tests were conducted in the stress-controlled mode at test temperatures of 20 to 30C at which fatigue cracking may occur. Several stress/strain levels were used. On the other hand, rutting performance testing was conducted using the dynamic creep test, which was performed using two different equipment and configurations: a Universal Testing Machine (UTM) and the Simple Performance Tester (SPT) or what so called the Asphalt Mixture Performance Tester (AMPT). In the AMPT, dynamic creep was done through repeated load flow number tests performed on specimens fabricated from Superpave Gyratory-compacted samples at test temperatures: 40, 50, 55, and 60C. The repeated load flow number test is a dynamic creep test in which a haversine type of loading is applied to the specimen with rest periods between loadings.

The major findings of this research project showed that Superpave asphalt mixtures in general performed better than Marshall Asphalt mixtures and Superpave basalt asphalt mixtures showed better performance than Superpave limestone asphalt mixtures in terms of rutting but performed worse in fatigue. Superpave mix design procedure provided less design asphalt binder content than that obtained using the Marshall mix design method; and therefore, the Superpave method could be considered more economic than the Marshall procedure for the materials used in this

research project. Asphalt mixtures with aggregate gradations above the Superpave restricted zone (ARZ) exhibited higher flow number values that those with gradations below restricted zone (BRZ). However, the accumulated axial strain at flow number or any number of loading cycles was found to be higher in the ARZ mixtures than that in the BRZ mixtures. The outcome of this research project led to a strategic change in pavement technology that yielded performance-based mix design procedures for the maintenance of present roads and construction of future planned road networks.

Keywords: Superpave; Aggregate; Limestone; Basalt; Consensus Properties; Source Properties; Construction

Developing a Solid Recycling System to Recover Valuable Materials from Electric and Electronic Waste (E-Waste) Using Vibration

Feras Fraige, Hani Al-Nawafleh, Laila Al-Khatib, Mohammed Duerg

Al-Hussein Bin Talal University

Abstract:

This research tackled the problem of e-waste at three interrelated phases, namely: managerial and economic phase, where e-waste generation and management in Jordan were assessed. The actual current and expected future quantities of e-waste were estimated. This will help developing appropriate recycling infrastructures. Also, a law for governing the different aspects of e-waste was suggested. The other two phases involved investigating, experimentally and numerically, e-waste recycling system using vibration. The experiments showed that vibration could be used for separation of different materials (metals and non-metals) from each other efficiently. Different experiments were set up to measure the effectiveness of separation. It is found that separation depends on vibration parameters as shown in more details in the full scientific report.

Keywords: Mixing; Environment; Separation; Simulation vibration

Strengthening, Repair, and Rehabilitation of New and Existing Reinforced Concrete Structures Using Nano Composites

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Abstract:

This project aimed at investigating the viability of using nanocomposites for strengthening of new reinforced concrete (RC) structures and as well as for repair and rehabilitation of existing RC structures. The project is divided into three main parts: nanocomposites fabrication and characterization, strengthening new RC structures, and repair and rehabilitation of damaged RC structures. During the first part, comprehensive literature review was conducted in order to identify the proper polymer and nanofiller for our application. In addition, nanocomposites were prepared and tested to characterize their mechanical properties as well as to understand their morphology. After that, the ability of using nano modified composites to strengthening new RC beams and columns were investigated in the second part. Finally, the capability of these materials to repair and rehabilitate heat-damaged RC beams and columns were explored in the last part. The literature survey showed that carbon nanotubes (CNTs) are the most promising nanofiller because of their extraordinary multifunctional properties, and epoxies are of the most widely used polymeric materials in civil engineering applications owing to their good mechanical strength, high thermal and dimensional stabilities, remarkable resistance to solvents, excellent corrosion resistance, outstanding adhesion characteristics, durability, compatibility with many additives, and can be cured at room conditions. Our results showed that using carbon fiber (CF) sheet embedded in CNTs-modified epoxy resin is a promising technique to strengthening RC concrete beams and columns. Significant enhancement in flexural load capacity of RC beams and axial load capacity of RC columns were achieved. In addition, modifying the epoxy resin with CNTs helped the heat-damaged RC beams and columns to retain their ultimate load capacity. Finally, scanning electron microscopy (SEM) imaging was used to investigate the microstructure of nanocomposites and the wrapped RC structures. SEM results showed that CNTs addition has a major role in enhancement the bond between carbon fiber, epoxy, and concrete which explain the achieved results.

Keywords: Carbon nanotube; Epoxy; Dispersion; Mechanical properties

Incorporation of Jordanian Oil Shale in the Formulation of Modified Asphalt Pavement Mixtures

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Jordan University of Science and Technology

Abstract:

The cost of energy and its scarcity are driving many R&D work worldwide. Oil shale is getting much more attention recently as one of the future sources of energy. Jordan is believed to have considerable reserves of oil shale. Many projects utilizing oil shale for power generation and shale oil extraction are being investigated, developed, or built. It is expected that this evolving industry will produce large quantities of waste fine oil shale particles which are considered both harmful to the environment and a loss of a valuable resource. This investigation is considering to influence both of these two negative expectations by incorporating the above fine oil shale particles into hot mix asphalt pavement formulations. Different compositions of oil shale in the new asphalt pavement mixtures were investigated in terms of both local and international highway regulations. The results of this work are very promising. For example, Marshall stability was improved by 10-20%. All required properties by Jordanian highway regulations, such as flow, voids in mineral aggregates and air voids have been either satisfied or even improved. Fatigue resistance was improved by around 20%. Based on results of this investigation, savings in the overall costs of roads including maintenance is expected to be around 9%.

Keywords: Oil shale; Hot mix asphalt; Pavement; Superpave; Creep; Fatigue

Strengthening Disaster Risk Reduction Capacity in Jordan through Evacuation Modeling for Regional Emergencies

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Abstract:

This study developed transportation evacuation models to assist different stakeholders in making informed decisions regarding emergency evacuation of Al-Abdali area as a case study. These models support effective decision making and testing different emergency scenarios while taking into account various factors and their effect on public safety. In addition, this study developed local human behavior data needed for evacuation modeling. For the purposes of this study, the local human behavior data in response to regional emergency events (a major earthquake) was developed using local surveys. The survey was performed by interviewing 703 peoples who are living or working in the boundaries of the case study area. The survey questions were selected to provide information about the evacuees' behavior. The data obtained from the survey was used to develop evacuation trip generation rates, evacuation trip distribution patterns, and evacuation trip loading rates. In addition, the data obtained will be used to identify the population compliance rates with evacuation orders and the factors affecting the evacuation trip making behavior. The data, obtained by the survey, was used to develop three mobilization time curves; for the general population, for people who had previous experience with emergency evacuations and others who had no such experience.

The results of the survey indicated that 67% of people in the affected area will comply with the orders to evacuate. Also, the results of the survey were the main part of data used to develop the evacuation model. Based on the collected data, a model that was developed has the capability to predict the measures of effectiveness including the average speeds, and evacuation time estimates (ETE's) associated with different traffic management options for an emergency evacuation scenario. The model, for the selected case study area, was developed using DYNASMART-P software. It can be applied at the different stages of the emergency response and preparedness; disaster scenario analysis, and mitigation preparedness. The output measures of effectiveness are used to identify the effects of traffic management options implemented for that scenario.

The developed model was used to evaluate two traffic scenarios (no road closures, and with road closures) and three traffic operation measures. The traffic operation measures were; replacing all the operating traffic signals within the study area by traffic police and directing the traffic out of effected area only, applying the contra-flow concept by using all the lanes for the streets of major street as one-way streets, and directing the traffic out of the evacuation zone, and a combination of the two previous measures. Evaluation of different traffic measures indicated that the best operation measure was the third measure was the best one for both evaluated scenarios. The results, also, indicated that, when the third traffic operation measure was considered, the evacuation time estimate and average travel speed were 3.7 hours, and 20.8 km/hr, respectively, for the no closure scenario. While, for the road closure scenario, the evacuation time estimate and average travel speed were 6.3 hours, and 11.1 km/hr, respectively. The results obtained in this

study are essential for different governmental and non-governmental establishments, such as Civil Defense Directorate, Emergency Management Unit, Puplic security Directorate, Ministry of Interiors, and many other establishments dealing with evacuations related to emergencies such as natural disasters, hazardous material spillage, terrorist threats, and sport games activities.

Keywords: Disaster management; Emergency evacuation; Evacuation demand; Trip loading curve; Genetic Algorithm

Surface Modifications for Commercial and Laboratory Synthesized Membranes for Water Treatment Applications

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Abstract:

The aim of this project was to study the fouling phenomenon in water treatment operations using pressure-driven membrane technology. The research performed during this project was intended to provide a practical and fundamental understanding of the fouling process. Research work was divided into three phases. The first results from this research were to provide a working and theoretical understanding of the well-known compaction effect experienced by membranes during operation. It was found that membrane samples can suffer from large variations in performance due to the non-uniformity of the membrane surface. Compaction, which is the reduction in flux due to compressive pressure, is also affected by sample non-uniformity. We proposed a theoretical model that can give a good prediction of the membrane compaction based on its characteristic time.

In the second phase, the use of modifying agents on commercial membranes was studied. The studies involved different aspects including: parametric study with acrylic acid as a modifying molecule, using extremely hydrophilic modifications to reduce fouling, filtration-enhanced surface modifications, and using modifying agents with different sizes. It was found that the more hydrophilic surface produced the better fouling resistant is obtained. However, produced highly hydrophilic surfaces can mean coverage of the membrane surface and, thus, negative effect on its flux. Therefore, the process needs to be optimized to operate at the optimum conditions. These conditions were found to be: moderate pressures and modifying agent concentrations. Using neutralization of the acrylate to produce extremely hydrophilic surface was also found to give good results.

The third phase of the project involved studying the in-situ modification of membranes synthesized in our laboratory. The idea was to add the modifying agent in the water bath used to produce the Polysulfone membranes. Synthesis process showed good UF membranes as revealed by flux, rejection, and imaging analysis. In general, the membrane flux with the modifying agent used was higher than that when no modifying agent is used. Finally, a new technique to study the fouling mechanism was developed. The technique is based on the quartz crystal microbalance (QCM), which allows real-time measurements of the foulant absorption on the membrane surface. The technique also allows real-time measurements of the surface modification process on commercial membranes.

Keywords: Nanofiltration; Thin film composite; Active layer; Compaction

Novel and Modified Mixtures of Concrete and Mortar Using Jordanian Bentonite as Waterproofing and Low Cost Construction

Ayoup M.Ghrair, Naela Al Daoud, Ahmed Gharaibeh, Adi J. Said, Bassel Hanayneh, Ahmad Mhanna

Royal Scientific Society, Knowledge Sector, Scientific Research Center

Abstract:

The construction industry is suffering from exponential increase in cement cost. As well as, a leaky foundation which is a common problem facing concrete structures in building. Therefore, this study aims to produce low cost and waterproofing concrete by using natural Jordanian bentonite. Raw bentonite samples were collected from Q'a Al Azraq, Ein Al Bayda- Al Azraq and Al Yamaniyya – Aqaba in Jordan for investigation purposes. The water-cement ratio was fixed. The cement in the mortar and concrete was replaced by four types of bentonite (Natural, Treated at 250 °C, Treated at 550 °C, Treated at 750 °C) in proportions of (0%, 10%, 20%, 30%, 40%, and 50%) by mass. Compressive, flexure and tensile strength tests as well as shrinkage and permeability test were performed. Furthermore, the results of mortar were used as the base for preparation of the industrial application. Tile adhesive was prepared by 10% replacement by heat treated bentonite at 750 °C.

The study showed that mortar and concrete mixes containing heated bentonite at 750 °C achieved good results and closed to those results achieved by pure OPC as well as promising results in terms of tensile adhesion strength. Addition of natural and Ca-treated bentonite increased fresh concrete viscosity and as results increased its cohesion. Furthermore, both raw bentonite and Ca treated bentonite reduce concrete shrinkage at early age due to its expansion nature. Ca bentonite behavior was slightly better than natural bentonite at the early ages of concrete. Concrete permeability was highly reduced by using bentonite, especially Ca treated where permeability was reduced by 60% addition of raw bentonite lead to decrease mortar strength in comparison with control mix without bentonite due to the increase in water need, but it still can be used for producing low strength products with lower cost. In conclusion, Jordanian bentonite has the potential to become an alternative for producing more durable concrete structures or concrete components. More investigations shall be conducted on dry mortar products and applications using treated bentonite other than tile adhesive like cement plaster, grout and repair mortar.

Keywords: Technology Applications; Materials; Natural Resources; Concrete; Mortar

قطاع
علـوم الطاقــة
والمياه والبيئـة

Powertrain and Control Design for Hybrid Fuel-Cell/Battery Vehicle

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Abstract:

The main pollutant source in urban areas is emissions from internal combustion engine (ICE) driven vehicles. Hybrid electrical vehicles (HEVs) that combine the advantages of two power sources (e.g., combustion engine with an electric motor) have been the focus of attention. ICE/electrical hybrid vehicles are available commercially and are becoming increasingly popular due to high fuel prices and increased concerns over the environment. Fuel cell (FC) hybrid vehicles are another promising alternative technology. When evaluating a vehicle's performance (emission and fuel economy), it is essential to use a driving cycle that represents the actual driving pattern. Thus, a driving cycle for Amman city is developed. When Amman driving cycle is compared with other standard cycles, it is found that the developed Amman cycle is unlike any of the other cycles. Using powertrain system analysis toolkits (PSAT) software, four vehicle models with different configurations are built: (1) ICE vehicle model, (2) Hybrid FC/battery vehicle model, (3) Hybrid series ICE/electrical vehicle model and (4) Hybrid parallel ICE/electrical vehicle model. The four vehicle models are tested and evaluated with Amman driving cycle. The performance in terms of fuel economy, emission and drivability are present. It is found that the hybrid FC/battery vehicle has the best performance.

The Effects of power management control strategies on the performance of a hybrid FC/battery vehicle model is investigated. Simulation tests with four control strategies were conducted and it is found that best performance is obtained by the load following control strategy. Hybrid FC/battery test bench is designed and constructed at the Hashemite University – Jordan, which is considered to be the first test bench built in a Jordanian academic institution. The performance of the test bench is investigated experimentally to explore the modes of operation for system components under various road conditions**.** The concepts that are learned from such test bench are certainly essential for any future implementation on real full size vehicles.

A feasibility study on the conversion of an ICE powertrain vehicle into a hybrid FC/battery powertrain is conducted using commercially available components in order to satisfy certain performance requirements. It is found that the FC module and the DC-DC converter are most expensive components in hybrid FC vehicle. It also concluded that relaxing slightly some of the vehicle performance requirements (i.e. maximum acceleration), can significantly reduce the power requirement of the FC module and thus reduce significantly the capital cost of the hybrid FC vehicle. It is also found that the current capital and fuel costs for hybrid FC vehicle are very high which makes the hybrid FC vehicle not economically competitive.

Keywords: Hybrid vehicles; Fuel cell; Fuel economy; Driving cycle; Emissions modeling; Simulation.

Concentrated Solar Energy Concept for Tri-Generation (Electricity, Cooling, and Desalination)

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Abstract:

A project was built on the roof of Faculty of Engineering at Mu'tah University in Jordan to investigate the utilization of the Concentrated Solar Power (CSP) for tri-generation. The system was designed, built and tested to supply electricity, distilled water, cooling in summer and heating in winter using the CSP and the Tri-Generation concepts. With only one concentrated solar thermal matrix, steam was generated and utilized through an innovative energy cascading and reusing sequence to generate electricity, distilled water, and cooling in summer or heating in winter. An innovative thermal storage system using phase change material was built and tested to allow the generation to be continued even after sunset. The system consists of a parabolic trough solar matrix installed on the roof of 6000 m^2 building with total aperture area of 240 m^2. The trough matrix heats oil up to 260 ^oC and the oil is used to generate superheated steam at 13.7 bar, and 210 ^oC. The measured peak outcome from this matrix was 130 kWh. The generated steam powers a 20 hp steam engine which drives a 15 kWe generator. The steam is leaving the engine at 120 ^oC and then utilized to evaporate brackish water while it condensates to complete the power cycle.

The distillation process is then completed to generate distilled water at a peak rate of 150 liters/hr. The rejected heat from the distillation process is then stored in a thermally insolated hydraulic storage tank. This rejected heat will to be used in space heating in winter or space cooling in summer. For the space cooling mode, the rejected heat will drive the generator of an adsorption refrigeration cycle. The adsorption cooling system consists of an innovative two-stage air cooled adsorption chiller at a capacity of 20 kW cooling load. With yearlong measurements the system produced 236,000 kWhth, 31,000 kWhe of direct electricity, 346 m^3 of distilled water, 46,000 kWhth of cooling in summer, and 93,000 kWhth of heating in winter. In general it offset 382,000 kWhe of electricity to generate all of that and 850 tons of CO_2 per year. In addition, an innovative thermal storage system using Phase Change Material (PCM) was designed, built and tested. The system was proven to be very effective in storing thermal energy at temperature range between 190-220 ^oC. It can store thermal energy and supply it back at constant temperature by using much less size than hydroid thermal storage systems. The system was theoretically modeled and comprehensively tested.

Keywords: Concentrated solar power; Tri-generation system; Cooling; Heating, Desalination; Thermal energy storage; Phase change material.

Development of a Biogas Plant as an Alternative Source of Energy in Southern Part of Jordan

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Abstract:

Agricultural solid wastes in the southern part of Jordan were investigated and classified. For this purpose anaerobic digestion (AD) process was tested with different combinations of agricultural solid wastes and found to be a suitable unit method to treat a wide variety of such wastes. The study was carried out through three phases: (i) Study variable parameters that affect the biogas production efficiency; (ii) set up of anaerobic digester experimental; and (iii) evaluating the expected energy output from this biogas. The results indicate that the potential methane is estimated to be produced at 22.8 million of tonnes oil equivalent (Mtoe), whereas the energy content of animal waste can be estimated of about 0.34 Mtoe of methane. Anaerobic processing of different agricultural solid waste was studied under different retention times ranging between 8 hours to 3 days. The results were promising. The digestion was carried out under mesophilic conditions operating temperature ranging from 35° to 38°C. The effluents of anaerobic digestion (AD) were further investigated to study fertilizer value. The results indicate that these effluents can be used as fertilizers since they contain the essential nutrient required by plant within the recommended value.

The effect of ozone in excess sludge degradation was also evaluated. The chemical oxygen demand (COD), total suspended solids (TSS) and retention time of ozonated sludge solution were investigated in single and series (ozone and biological) processes. A significant influence of ozone dose on sludge degradation was observed. Ozone was utilized to degrade the soluble organic matter and to destroy cell surfaces and release the cell liquids. For a single ozonation step, an optimum ozone dose was in the range of 0.008 to 0.013 g O3/g. TSS was found to give the best COD and TSS removal efficiency.

Degradation sludge was treated in sequential process consisting of consecutive ozonation and bioaeration (i.e. O3 + biological treatment). The tendency was dependent on accumulated O3, treatment time and operational conditions. An accumulated O3 dose of 0.055 g O3/g TSS in two separate ozonation processes followed by biological treatments led to COD and TSS removal efficiency of 53 and 46.6%, respectively. The removal efficiency was improved by increasing anaerobic treatment time and/or by mixing ozonated sludge with non-ozonated sludge. The settling of ozonated sludge was found to be fast at very low specific ozone doses. The use of sequential processes improved the settling tendency of sludge. Two values of volatile solid / total solid (VS/TS) ratios were tested of about 45% and 86.1%. It was found that the higher the volatile solid content in substrate the higher the biogas production.

Biogas yields of different substrate were studied. Results indicated that substrate with C/N ratio around 25 had the highest biogas yield, compared with substrate with C/N ratio of more than 30.

Cumulative biogas yield was calculated to be 50, 35 and 15 l/kg. Volatile solid for different substrate of different % TS, C/N ratios and loading rates. The anaerobic digestion as operated with different mixtures of manure; the operating conditions of the anaerobic with temperature of 35°C, OLR of 3.4 kg VS/m3 day, while the influent solid concentration of 5%, pH of 7.0 and HRT of 3.6 day. Based on these operating conditions the gas output was 1.2 m3 biogas/ kg VS. The biogas methane content was found to be 77%. The percent of COD removal efficiency was found to be 73%.

Keywords: Anaerobic digestion; Solid wastes; Degradation sludge; Methane.

Using the Electrochemical Reaction Engineering, Biotechnology and Solar Cells Technology to Produce Hydrogen and Desalinate Sea Water

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Abstract:

Two routes were adopted to produce hydrogen gas, in the first route, a single compartment electrochemical reactor (ECR) connected to a flow system was utilized to produce hydrogen from sea water obtained from Gulf of Aqaba at ambient and turbulent flow conditions. The results show an obvious relationship between the nature of the environment and the parameters of the voltage balance equation of the ECR. Time as a factor played also an important role in pushing the polarization curves several volts towards the cathodic region. The system performance was monitored online using a special network connected to a PC. Measurements included current and voltage obtained from the PV cells, batteries, needed current and voltage to run the ECR, solar irradiance, temperature at PV cells and the temperature of the ambient. The dependence of hydrogen production on the given variables (ECR current, solar irradiance and temperature at PV cells) was also correlated using multiple regressions with reference to ANOVA statistical analysis. Results revealed also that increasing power of the ECR will increase the production rate of hydrogen. It is worth to mention that Gas chromatography (GC) analysis showed that the purity of hydrogen in the produced gas deviated between 99.4-99.913%.

In the second route of production, the research team efforts were exerted on the isolation and identification of algae obtained from Gulf of Aqaba and to investigate the influence of various environmental factors (light, dark, temperature, intensity of illumination and pH) on hydrogen production. Three types of algae were identified using microscopical examination, these were: *Chaetomorpha linum*, *Oscillatoria and Anabena*. The green alga *Chaetomorpha linum* (*C. linum*) was found dominant. Therefore, the research team concentrated on the biohydrogen production by green alga *C. linum* culture in sea water using a sealed bioreactor. The obtained results showed an interesting response of biohydrogen production to artificial and natural light, dark and temperature of incubation. Biohydrogen production was mainly produced in dark and associated with critical effect of pH values on biohydrogen production during light and dark periods.

The other level in this research project concentrated on the separation and purification of the produced hydrogen gas (i.e. increasing the purity to 99.9999%) using a special setup designed and fabricated to separate hydrogen using commercially-obtained metallic Pd-Cu based on solute diffusion/solution transport mechanism. The effectiveness of membrane operation for hydrogen purification was studied by feeding simulated binary gas mixtures of N_2 and H_2 at different fractions. The results revealed that the membrane was able to separate and purify hydrogen from the feed mixture with infinite selectivity in the studied range of variables. On the other hand, the results revealed also that percentage of hydrogen recovery from the feed mixture can vary

depending on the conditions from roughly 15 to 95%. The last level of this project concentrated on the utilization of hydrogen gas as source of energy.

Keywords: Biohydrogen; Hydrogen; Sea water; Electrolyzers; Fuel cells; Biotechnology; PV cells technology; Metallic membranes.

Utilization Methods of Oil Shale as a Source of Energy in Jordan

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Abstract:

Jordan has significant oil shale deposits occurring in 26 known locations. Geological surveys indicate that the existing deposits underlie more than 60% of Jordan's territory. The resource consists of 40 to 70 billion tones of oil shale, which may be equivalent to more than 5 million tones of oil. Since the 1960s, Jordan has been investigating economical and environmental methods for utilizing oil shale. Due to its high organic content, it is considered a suitable source of energy. For this purpose three methods for utilizing oil shale were used in this research. The first method is using by a circulating fluidized bed combustor that simulates the behavior of full scale municipal oil shale combustors. The second method is by using organic solvents, while the third method by using a microwave extraction. The circulating fluidized bed combustor with a diameter of 50 cm and height of 30 cm. The main parameters which affect the combustion process are investigated. The size of the laboratory scale fluidized bed reactor is 3 kW, which corresponds to a fuel feeding rate of approximately 1.5 kg/h.

Oil shale extraction using organic solvents has been used and the influence of many factors on the extraction process has been taken into consideration. The purpose of this method is to find the optimum condition that produces the highest percentage of extracted oil shale. The study found that Jordanian oil shale contains more than 17% organic matter. This content is a good indicator for the quality of the oil shale. Using the test of size distribution of the parent rock, it is found that 75% of the size is less than 270 microns which is a good indicator for consumption of less energy during the extraction from the raw materials in the future. The study concluded that the particle size has a little effect on the operations of extraction by organic solvents and the best solvent obtained through high productivity is denied. The difference in extraction is linked to the diversity of the physical and chemical extraction process conditions such as temperature and pressure. The results indicated that the size of particles has low effect on the processing of the extraction using organic solvent. Tetrahydrofuran (THF) was the best solvent that had high productivity. It can be concluded that the method of solvent extraction will be one of the most promising methods in the field of oil shale processing. This depends on providing the appropriate condition of heat, pressure and type of solvent.

The microwave method was used as a supportive method to chemical solvents, whether organic or non-organic solvent. Microwave method stimulates the speed and effectiveness of the granules penetration of the oil shale with the aim of extracting organic compounds. The results indicated the effectiveness of this method compared to other conventional methods. About 48% of oil has been extracted from the total samples of the rocks. The effect of the time extraction on the recovery percentage has been taken into consideration, but it did not increase significantly. It was noticed that there is no change in the size of granulated shale. It can be concluded that the processing of

oil shale by hydrochloric acid extraction may rise up to 100% by breaking down the acid material surrounding the organic matter. This process accelerates the methanol solvent to extract the full amount of oil, so there is no need to use high acid concentration. The results of this method indicate that the hydrochloric acid with 3.6 Mole/Litter gives an extraction of 100% oil.

Keywords: Oil shale; Direct burning; Thermal extraction; Microwave; Combustion.

Development and Utilization of Solar Driven Water Pumping and Desalination Units for Application in Remote Areas of Jordan

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Abstract:

Distributed desalination plants in remote areas are part of a solution to meet water shortage problems in Jordan, especially in the Jordan valley. As not all areas have reliable access to the electrical grid, stand-alone energy supply systems are required. In this project we describe the use of photovoltaic cells to power water pumps and reverse osmosis desalination in a stand-alone desalination plant for agricultural use. The system design and sizing, simulation and measurement results as well as an economic analysis are described. We could prove that the system is feasible and cost efficient and thus we recommend using photovoltaic systems for distributed small size desalination plants.

Keywords: Photovoltaic system; Solar energy; Water desalination; System design; System sizing.

Decision Support System for the Management of Zarqa River

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Abstract:

The project developed an integrated hydrologic and water quality models for Zarqa River basin (ZRB). In order to apply and calibrate the models, different data were collected and layers of GIS maps were generated for the ZRB. The hydrologic model used rainfall data, soil and land use maps to simulate water flow in the Zarqa River. The quality model, on the other hand, was based on data collected by ground surveys and on GIS layers of land use and on point and non-point sources of layers. Results of the hydrologic model showed a good agreement between measured and modeled flow after calibration of the model with ground data. However, during peak flood large differences between measured and simulated flow were observed. The quality model predicted water temperature at reasonable accuracy, while inconsistent results for COD and TDS were obtained, indicating the complexity of the ZRB and the contribution of many interrelated sources of pollution in this basin.

Keywords: Zarqa River basin; Hydrologic modeling; Water quality; GIS; Integrated watershed management.

Reusability of Sewage Sludge "Bio-solids" at Al-Ekeder Dumping Site inClay Bricks Production

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Abstract:

An environmentally safe disposal of sewage sludge is an ongoing problem in many countries including Jordan. Therefore, practical disposal options of sewage sludge and sewage sludge ash involve some reuse as raw material in the fired clay brick making process. The biological, physical, chemical and mineralogical characterization of the dried sewage sludge, sewage sludge ash and clay materials were carried out, in order to identify the major technological constraints. The characteristics of the used materials indicate that no additional pretreatment is required. In addition, the effects on processing conditions and/or changes of typical final characteristics are also studied and evaluated.

Incorporation of raw sewage sludge in an up to 30% or incinerated sewage sludge ash in an up to 50% proportions was utilized as an amendments to normal clay. The physical and chemical properties of the produced bricks with dried sewage sludge content of up to 30 % vol. Were found to meet the relevant national and international technical standards for insulation, whereas, incorporation of sewage sludge ash of up to 50% vol. were found to meet the relevant national and international technical standards as load bearing bricks. It is found, however, that bricks with more than 30% of dried sewage sludge addition are not usable as they were brittle, and this could be attributed to the poor texture and surface finishing before firing.

Heavy metals leaching from the bricks were found to be almost stabilized and chemically fixed in the produced bricks compared to that found in dried sewage sludge and sewage sludge ash. Thus, the hazardous metal leach has been chemically fixed in all forms of bricks and this prevents any harm to the environment. As a result, bricks can be beneficially introduced into the brick making industries for the conservation of both energy and raw clay minerals. Also, the attained chemical fixation makes the disposal of these bricks and their remains in municipal landfills environmentally safe.

Key Words : Chemical fixation; Leachability; Sewage sludge; Incinerated sewage sludge ash; Brickmaking; Clay replacements; Al-Ekeder.

Pre-Treatment of Pharmaceutical Wastewater Using Low-Cost Clay Minerals

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Abstract:

The current research project aims at evaluating the efficiency of non-metallic raw materials which are available in Jordan (such as Azraq bentonite, kaolinite and zeolite) in removing or reducing carbazepine (CBZ) as one of the pharmaceutical contaminants in the pharmaceutical industrial wastewater and other pollutants which are not removed by conventional wastewater treatment processes.Pharmaceutical wastewater samples were collected from a pharmaceutical factory, which contains CBZ as one of the main pollutants. These samples were collected during the production of medicines containing CBZ, since the production line of CBZ medicines is operated intermittent during the year.

Different tests were conducted to identify the chemical and physical characteristics of the collected raw pharmaceutical wastewater and treated wastewater samples, such as: carbamazepine concentration, pH, biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), phosphate ($PO4^{-3}$), turbidity, heavy metals, total suspended solids (TSS), phenols, chloride, fluoride, total kjeldahl nitrogen (T.kj.N), sulphate($SO4^{-2}$) and total dissolved solids (TDS).Optimum condition of treatment of pharmaceutical wastewater was conducted by using a jar-test model and a filter medium column. the optimal operation conditions of the jar-test model were investigated, such as: type and dosage of the non-metallic raw materials. The sedimentation time and the contact time using the filter medium column for treating the wastewater was started in the second year of the project and the work will be continued in order to determine the optimal operation conditions, such as: bed depth of the filter media, flow rate of wastewater and the contact time.

Keywords : Carbamazepine; Conventional; Wastewater; Treatment plants; Pharmaceutical wastewater; Low-cost; Treatment; Clay Minerals; Effluent; Activation of clay minerals; Sorption process; Filter column model; Jar-Test model.

Toward Site Selection of Permanent Geological Disposal for High-Level Nuclear Waste in Jordan

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Abstract:

A preliminary investigation of geological conditions were carried out to locate potential sites for repositories for high and medium level radioactive wastes. The site should have potentially being able to provide satisfactory conditions for radioactive waste disposal. Review of foreign experience in this field was made.The worldwide general regulation for the safety of a disposal facility for radioactive waste relating to geological disposal operation into rock cavern was reviewed.In this preliminarily study, large number of available geological data were collected, reviewed and analyzed. In order to characterize the properties of the host rock, extensive laboratory investigations were performed using various physical and mechanical tests. Two dimentional and numerical modelling were used to simulate thermal-mechanical coupled processes in rock using geomechanical computer code.

Based on the international criterion, it was concluded that the regions possessing favorable characteristics for HLW in Jordan are concentrated mainly in the northeast and middle east and southeast parts of the country. Granite in the south, Basalt in the north and Marley limestone in the middles were considered as candidate host rocks.A representative rock blocks were collected from the outcrop of the three regions mentioned above. Extensive laboratory tests were conducted using various physical and mechanical laboratory tests. Numerical analysis conducted using UDEC code showed the ability of the code to predict the heat transfer processes in fractured rock mass, it can also provide accepted predictions for stress and displacement of fractured rocks in terms of magnitudes and direction with reasonable confidence.

Keywords : Nuclear waste; Numerical Modeling; Thermal Conductivity; Repository Design.

Utilization of Jordanian Volcanic Tuff in Different Engineering Applications

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Abstract:

This paper examines how Jordanian volcanic tuff aggregates affect the characteristics of cement mortar. Five mortar mixes were prepared by replacing normal aggregate (standard sand) with volcanic tuff aggregate in ratios of 0, 25, 50, 75, and 100% (M1 to M5, respectively). Compressive strength, flexural strength, and unit weight were tested at mortar ages of 3, 7, 28, and 56 days. The results revealed improved compressive and flexural strength, which were maximal for M3. Unit weight decreased as the ratio of volcanic tuff increased. Based on these results, adding Jordanian volcanic tuff in the appropriate ratio will improve these mortar characteristics.

Keywords: Compression; Flexure Compression; Flexure Strength Strength; Cement; Cement Mortar; Mortar; Volcanic Tuff; Volcanic; Jordan.

Groundwater Management in Irrigated Highlands/Amman-Zarqa and Azraq Basins

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Abstract:

Water scarcity in Jordan is considered as a major constraint for further irrigated agricultural development. Groundwater is considered to be the major source of water in Jordan. Most of aquifers in Jordan suffer from over-exploitation. The effects of the over-exploitation of groundwater basins led to the aquifer dewatering, salinization, groundwater contamination.Most of the private well based irrigation has been developed over (140000 dunum) in the last 30 years, and is located in two basins of major importance; the Amman-Zarqa Basin (AZB) that accommodates more than half of Jordan's population, and the Azraq Basin (AB) .

The objectives of the project are implementing practical options (models) to reduce groundwater use in irrigation, and developing implementation plan, improving the efficient use of water for irrigation, soil and water study based on optimal approach of land use in the highland, maintaining water quality, ground water level, and sustainability of groundwater.The project activities were conducted on three farming sites using a total area of 40 donums. One site was selected in Azraq (5 donums demonstration and 5 donums comparison), two sites in Mafraq (10 donums for demonstration and 10 donums for comparison), the crop types were Olive, Tomato, and Cabbage in the study areas.

The implementation stages of the project are data collection and field survey, setting the hydrological parameters and developing the groundwater model for Qa'a Azraq area using MODFLOW 2005 + GMS 6.5, sampling program of Soil and Water including (chemical, physical, and environmental isotopic, soil and plant analysis for the selected farms.The conclusions of the study indicated that the amount of irrigation water used in the control site of the farm was 4863.5 cubic meters which was 1984.6 cubic meters higher than the demonstration site, improving irrigation efficiency at farm level (water saving ranged between 15% to 40%), reduction of over-pumping of ground water and deterioration of water quality, increasing the productivity of irrigated agricultural crops, raising the efficiency use of energy and amounts of fertilizers, in addition to reforming the water rights (e.g. introducing water tariffs for groundwater abstraction from private wells).

Keywords: Groundwater management; Irrigated highlands; Amman-Zarqa basin; Azraq basin; soil/water relationship; Hydrochemical characterization; Groundwater modeling; Groundwater monitoring;Geotechnical and geochemical investigation.

Role of Fungi in Treatment of Water-Polluted by Surfactants

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Abstract:

The target of this research is to upgrade the biological treatment of grey water by testing the potential of fungi in treatment of water polluted by surfactants. To achieve this objective the research is conducted into two stages; theoretical and empirical. The theoretical stage aims at reviewing the literature to determine fungi and surfactants to be used in this study. The empirical stage aims to examine the potentials of the selected options, in stage one, in achieving the target of the research; by testing the surfactant toxicity to fungi and surfactant biodegradability by fungi.

The results of reviewing the literature on fungi, wastewater, and surfactants recommend examining the potential of, the fungi species, Aspergillus Niger in removal of dodecylbenzene sulfonate (DBS), Tween 80, Triton X-100, Cetyltrimethylammonium bromide (CTAB) and Tetra-n-butylammonium bromide (TBAB) from polluted water. The toxicity results approve the tolerance of Aspergillus Niger to the surfactants of the study up to high levels, and the potential of Aspergillus Niger in removal of surfactants in polluted water. Thus integrating Aspergillus Niger in grey water biological treatment processes to improve their performance is promising.

Keywords: Bio-remediation; Surfactant; Fungi; Polluted water; Treatment.

Sol-Gel Synthesis of WaterDesalination Inorganic Membranesfrom Natural Clays

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Abstract:

Inorganic membranes are a wide category of membranes used for separation under severe conditions intolerable by polymeric counterparts. Reducing the elevated cost of fabrication is a key target for inorganic membranes. The focus of this project is to employ low cost Jordanian natural clays for making a composite inorganic membrane in attempt to reduce the production cost and provide a functional membrane. This area was previously unstudied in Jordan. The composite membrane is composed of a micro/mesoporous zeolite thin layer coated on a macro porous kaolin support. Analyses show that the starting natural kaolin clay is composed primarily of kaolin (48-72%) along with quartz (1-22%) and calcite (1-12%) minerals having proportions variable with the mining source.

Disc shaped supports prepared by compacting and firing washed kaolin powder have porous structure with size defined by interspaces between fused particles. The supports are mechanically strong (compressive strength > 200 MPa) as a result fusing and bonding of particles by molten quartz. Heating rate in the firing step was found to develop new phases like primary mullite. Average pore size of the support varied between 0.6-12.9 μm based on kaolin content and can be also altered by adjusting the heating rate. All supports have gas permeance in the 10^{-6} to 10^{-5} mol/s.m^2.Pa order of magnitude and combination of viscous and Knudsen transport mechanisms. Minerals like calcite is a potential source of support long term crack by the effloresce phenomenon.

Starting natural zeolitic tuff contains Chabazite and Phillipsite zeolitic content. The zeolitic proportion was extracted, grinded into 750 nm particles and compacted as a 70-200 μm layer on top of kaolin support by sol-gel dip coating. Gas permeance in the zeolite layer reduces to 10-7 mol/s.m^2.Pa order of magnitude yielding an average pore size of 0.36 μm. Linear thermal cracks and bubble defects contribute to increasing the average pore size. Desalination tests on 0.3% brackish water at 6 bar feed pressure proved that the kaolin support and zeolite membrane can reject salts by 5% and 12% respectively within a short period of time.

Keywords: Macroporous support; Kaolin clay; Gas permeation; Efflorescence.

Treatment of Effluent Water fromPhosphate-Containing Fertilizer Industry for Reuse and Production of Useful Compounds- Phase I

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Abstract:

About half million cubic meter of wastewater effluent were produced annually from phosphate industry in Jordan and stored in evaporation pond without any use. The effluent in this pond contains valuable components such as P_2O_5, fluorine and flousilicic acid. The objectives of this work are to investigate a chemical precipitation method to recover (P_2O_5) and to produce valuable by-products including CaF_2, $CaSiF_6$ and phosphorous compounds, as well as to treat the wastewater and recycle it to the plant or use it for irrigation purposes and other applications.

This project was divided into two stages: chemical precipitation stage and nanofiltration stage. This division was based on suggestions from SRF and only the first stage was funded. Water samples from effluent pond as well as from various discharge point were collected. The pHs of the samples were found to be about 0.8 due to its high content of HF, $H2SiF_6$ and H_3PO_4. Potentiometric titration, chloride and fluoride ion selective electrodes and other acid base titration methods were employed to determine the content of the above acids. AAS was also used to determine the content of heavy metals in this waste water.

Potentiometric titration curves were produced to determine the optimum neutralization conditions for several synthetic mixtures made from the above acids, and for real effluent water. XRD and XRF and SEM analyses were employed for analysis of the products of calcium hydroxide neutralizations. Based on a comprehensive experimental, promising results are obtained and a flowsheet is suggested for the neutralization treatment of effluent wastewater. It was found that fluorine is present in effluent pond water in two forms: HF and H_2SiF_6. Precipitation experiments revealed that reaction of H_2SiF_6 with $Ca(OH)_2$ yielded on CaF_2 with no $CaSiF_6$. Furthermore, it was found that it is possible to separate sulphate in an initial precipitation stage. Additionally, it was possible to remove almost all fluoride in the form of CaF_2 leaving at least 60% of H_3PO_4 in water. Amorphous silica could be removed by aging the solution after fluoride removal.

Keywords: Phosphoric acid; Industrial wastewater; Calcium fluoride; Flousilicic acid.

Study the Impact of Global Warming on the Kingdom of Jordan Using GIS

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Abstract:

The meteorological data such as rainfall and temperatures, covering the period between 1979 and 2008, has been analyzed. The data were simulated using the geographic information systems (GIS) and computer software "MATLAB". The output results were converted into geographical maps. Three parameters were analyzed: annual mean maximum temperature, annual mean minimum temperature, and mean annual rainfall during the period (1979–2008). The analyzed results were also used to forecast for the period (2009–2018).

The results show that no change has occurred in the mean annual rainfall in both northern and eastern part, while it has increased in the central region of Jordan. Although local temperatures fluctuate naturally, but over the past 50 years, the mean local temperature in Jordan has increased rapidly since 1992 by 1.5–2 ◦C. It is noticed from the data that the change in both maximum and minimum temperatures has clearly begun after 1991, in which this phenomenon may give an indication of changing point in climate of Jordan. As for prediction is concern, the show continuous increase in both maximum and minimum temperatures in the eastern, northern and southern regions of Jordan.The application of GIS in this study was successfully used to analyze the data and to produce 'easy to use' maps to understand the impact of global warming. This application is the first in terms of its applicability in Jordan. The authors believe that the results of this study will be of great help to the decision makers in the field of environment in Jordan.

Keywords : Climate change; GIS; Jordan; Arid region; Rainfall.

Numerical and Experimental Investigations of the Environmental Impact of the Dead Sea Level Fluctuation on the Eastern Coast of the Dead Sea

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Abstract:

The Dead Sea level has fluctuated during the historic period, bringing about major changes in its shoreline and surface area. As a terminal lake, such fluctuations are due to many factors including high sensitivity to hydrological and climatic changes. Due to these changes, a new hydrological disequilibrium has been developed and sinkholes, landslides and subsidence hazards have imposed recurring threats of earthquakes and soil liquefaction. Sinkholes are very dangerous phenomena which may result in losses in life and properties. The sinkholes in Ghor Al-haditha severely threaten the future of the overall activities in area. The drop in the Dead Sea level affects the groundwater the nearby aquifer. This may have far-reaching environmental and geological engineering impact on the Dead Sea coast.

The objective of this study is to find out the mechanism of sinkhole formation to predict the scenario of any hazards as well predicting safe areas and hazardous areas. This analysis can propose practical solutions to minimize the affects and the spread of this phenomenon.Based on this study, themechanism of sinkhole development can summarized as follows:

- As the Dead Sea level sharply decreasing the salt-fresh water interface regress towards the sea;
- Fresh ground water flows through the layers towards the regression area and infiltrated downward;
- Fresh water continues its way expanding its passages and cavities;
- Fresh water motion develops into a swirl making a cylinder widening as it flows deeper;
- This motion of fresh water develops a cylindrical subsurface vacuity hat covered by surface layers that vary in thickness from one place to another; and
- As a result of difference between pressure in the vacuity and the outer pressure, the covering layer brakes and falls down into the cylinder forming the sinkhole.

The fresh groundwater dissolves the salt deposits (layer) under the surface (which is presented in the study are) as it flows from East to West through the study area. The salt layer may be represented as simple salt evaporation, halite (NaCl), anhydrite ($CaSO_4$), potassium chloride (KCl), and polyhalite (K_2SO_4, $MgSO_4$,$_2$ $CaSO_4$,$_2H_2O$). The geochemical study proved that the salt dissolution was a major reason for sinkholes formation.The flow of groundwater from the surrounding lower aquifer to the Dead Sea causes a loss of adjacent fresh groundwater resources

of 50 millions of cubic meters on the Jordanian side. This is one of major factors to safe the level of the Dead Sea. Therefore, Red-Sea Dead Sea Conveyance Systems is a vital option to resolve the current problems with respect to losing fresh groundwater and sinkholesformation.

Keywords: Modeling; Geochemistry; Dead Sea level; Sinkholes; Groundwater; Seawater Intrusion.

Persistent Organic Pollutants and Pharmaceutical Residues in Selected Water Dams in Jordan

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Abstract:

The current study aimed to determine residues of pharmaceutical and polynuclear aromatic hydrocarbons (PAHs) in water and sediments samples collected from three dams in Jordan namely King Talal Dam (KTD), Mujeb Dam (MD) and Tannour Dam (TD) during the period extended from August 2010 to April 2012.The results showed that the discharge of the reclaimed wastewater effluents had clear impacts on dam's water quality. The highest concentration levels of pharmaceutical compounds residues in dam's water were found at KTD which is receiving mainly wastewater from As-Samara wastewater treatment plant compared to their concentrations at Mujeb and Tannour Dams. The major pharmaceuticals compounds detected in water samples collected from KTD were carbamazepine, naproxen, sulfamethoxazole and erythromycin. The average concentrations of carbamazepine were 3.6 and 7.5 μg/L for summer and winter monitoring periods, respectively. While the two antibiotics, sulfamethoxazole and erythromycin concentrations varied over 50-366 ng/L and 3-3240 ng/L for summer and winter sampling periods. Naproxen concentrations ranged 112-180 ng/L in the summer and 210-490 ng/L in the winter season.

Furthermore, the total PAHs concentrations (ΣPAHs) in water samples for summer season at KTD ranged from 0.29 to 1.79 μg/L with an average value of 0.29 μg/L and from 0.59to 74.12 μg/kg with an average concentration of 26.34 μg/kg for the sediments. While, higher concentrations found at the same investigated site in winter season which ranged from 15.51 to 179.05 μg/L with an average value of 55.24 μg/L and from 115.25 to 1525.5 μg/kg with anaverage value of 860.98 μg/kg for water and sediments, respectively. Similar trends were observed for ΣPAHs for samples collected from Mujeb and Tannour dams.

The targeted organic compounds concentrations were compared to the following nationaland international standards for drinking water namely: Jordanian standards, World Health Organization (WHO) and Environmental Protection Agancy (EPA). It was found that concentration levels of polynuclear aromatic hydrocarbons (ΣPAHs) have exceeded dramatically both WHO and EPA drinking water regulations limits by more than two thousands folds particularly for samples collected during the winter sampling period. It was found that water pollution at both KTD and MD was due to human activities and industrial wastes by the terrestrial region around the catchment area. The present study is considered as the first comprehensive investigation of organic and pharmaceutical residues in surface water andsediments in Jordan's reservoirs.

Keywords: Polynuclear; Aromatic Hydrocarbons (PAHs); Pharmaceuticals residues; Dams Water; Dams sediments; Jordan.

Characteristics of Storm Water Runoff Quality from Different Catchment Areas in Jordan

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Abstract:

Water resources are extremely limited in Jordan. Therefore, protecting water resources from different pollution sources play a major role in mitigating the problem of water scarcity and shall be given the proper consideration in the Jordan's water resources development and management program. To date most studies conducted on water pollution sources in Amman-Zarqa basin have focused on the estimation of wastewater source pollutants (Point source pollution such as domestic and industrial) and the effects they have on water bodies' quality such as ground water and dams. Little attention has been given to storm water pollutants from different land uses such as residential, commercial, industrial and agricultural areas as sources of pollution.Therefore, this study has investigated the characteristics of storm water runoff generated from different types of catchments in Amman-Zarqa basin. Six storm events were monitored over two winter seasons (2012-2013 and 2013-2014). The results showed that the average pollutant concentrations of storm water runoff were significantly different from the residential, commercial, industrial and agricultural areas. The results showed that the commercial site generated storm water runoff with the highest concentrations of organic pollutants COD and BOD5 (1685 mg/L & 91 mg/ L) and dissolved heavy metals Zn, Cu, Pb and Mn (0.106 mg/L, 0.033 mg/L, 0.02 mg/L and 0.189 mg/L respectively).

This is mainly due to the high traffic volume at commercial site compared with the other sites. While the agriculture site generated the highest concentrations of total suspended solids TSS (6029 mg/L), nutrients T-N and T-P (31.2 mg/L & 34.3 mg/L) and fecal bacteria TCC, TFCC and E.coli (4.06E+07, 8.00E+05 & 1.31E+05 MPN/100ml, respectively) carried by the storm water runoff. This is reflecting the presence of anthropogenic pollution sources such as using chemical and nature fertilizers in agriculture site. Key constituents of runoff quality (COD, TSS, TKN, T-P, Zn & Pb) from all sites are considered very high compared to those reported in other countries. Moreover, the EPA Storm Water Management Model (SWMM) was used to estimate the hydraulic and pollutant loads generated by runoff in Amman-Zarqa basin. The results showed that SWMM model has successfully modelled the real inflow data entering the KTD, also it shows that the pollutants loads generated by runoff in Amman-Zarqa basin were much higher than those discharged from Assmara WWTP by 5 times for BOD5, 2 times forCOD and 67 times for TSS.This study has provided a better understanding of the concentrations and sources of storm water runoff pollutants generated from urban and rural site which is posing a serious threat to water bodies within the Amman-Zarqa basin. Therefore, best management practices and proper land management measures should be taken to minimize the impacts of storm water runoff.

Keywords: Urban runoff quality; Commercial; Residential; Organic and inorganic pollutants.

Baseline Determination of Gasoline Additive Methyl Tertiary Butyl Ether (MTBE) and Petroleum Derivatives (BTEZ) in Water Resources

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Abstract:

This research aims to investigate possible occurrence, distribution and sources of the newly added gasoline oxygenate, methyl tertiary butyl ether (MTBE) and gasoline components of benzene, toluene, ethyl benzene and xylenes (BTEX) group in Jordan's water resources through a preliminary assessment study. The study has focused on monitoring the levels of (MTBE) and (BTEX) in Amman-Zarqa basin and northern governorate/Yarmouk basin, where comprehensive sampling campaigns were conducted and corresponded to groundwater wells depending on their locations from the gas stations. Purge and trap gas chromatography-Mass spectrometer system was used in the first year and purge and trap-gas chromatography-flame ionization detector was used in the second year for the determination of (MTBE) and (BTEX) in groundwater, which is capable to detect µg/l levels. The levels of MTBE detected for two years study were mostly below the lowest reportable value (LRV), which is 1 µg/1 and comply with the taste and odor guidelines ranges from 20 to 40 µg/l (EPA 2009). High concentration of MTBE detection has been observed at Hashimeya wells numbers 2 and 5 in summer season of the second study year, which was 32.4, 17.1 respectively. The increase has been dropped down to near and or below LRV in winter time. BTEX detection in all monitored locations where below LRV and comply with international and national standards. The study has not completed for the analysis of soil samples due to the unavailability of local companies, which agreed to execute the drilling work and obtain core soil samples in order to investigate the release of petroleum derivatives from underground fuel tanks in case of detection significant amount of MTBE and BTEX in water resources.

Keywords: Gasoline Stations; GC-MS; Amman-Zarqa Basin; BTEX; MTBE; P&T concentrator Ethyl Benzene; Xylenes; Toluene; Benzene.

The Use of Geographical Information Systems, Remote Sensing and Indigenous Knowledge to Select the Optimum Sites for Water Harvesting Schemes in the Badia Region

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Abstract:

Jordan is located in an arid to semi arid region where around 90% of its land receives an average annual precipitation of less than 100 mm while only 3% of the land receives an average annual precipitation of 300 mm or more. Jordan is characterized as a "water scarce" country because the current per capita share of water is estimated to be of the order of 140 m3 per year which is well below the 1000 m3 threshold. Rainwater harvesting is the accumulating and storing, of rainwater. It has been used to provide drinking water, water for livestock, water for irrigation or to refill aquifers as a groundwater recharge. GIS has been widely used in selecting the best sites for water harvesting schemes. This research aims at selecting optimum sites for water harvesting schemes in the Jordan arid lands (Badia) using indigenous knowledge and geo-informatics. To achieve this aim, a community-based research and desktop investigating is applied.

The community-based research focused on consulting with 200 stakeholders form local communities where they provided knowledge on opportunities and constrains form their experience on water management in the arid lands where they live and interact. Also, they provided information on potential location for water collecting sites that has been used for ages to provide water to humans and livestock. On the other hand, desktop research is conducted on sitting criteria for water harvesting based on physical and socio-economic characteristics. The physical criteria includes rainfall volumes, slope, distance to water courses (wadis), distance form geologic faults and soil texture, where socioeconomic criteria include distance to groundwater wells, distance to urban area, distance to agriculture activities and distance to international brooders. This selecting criterion in combination with indigenous knowledge is used within GIS environment to identify optimum sites for water harvesting. GIS analysis resulted in identifying 118 potential sites. Of those, 30 sites had already recommended by the community consultations.

Keywords: GIS; Indigenous Knowledge; Water Harvesting; Arid Lands; Jordan.

Assessment of Pollutants Movement from Selected Landfill Sites in Jordan Using GIS Techniques

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Abstract:

This research project aimed to investigate the potential pollution of soil and groundwater from two waste disposal sites in the Jordanian Badia: Al-Akaider waste disposal site and Mafraq waste disposal site. Twenty (20) boreholes to a depth of up to twenty meters, when applicable, were dug (10 in each site). Samples were collected every 25 cm in the upper three meters of the borehole, and then every one meter from 3-20 meters or from 3 meters until we reached solid rocks. United States Environmental Protection Agency (USEPA) Method 3050B was used to extract heavy metals from the borehole samples collected from the two waste disposal sites. This method is not a total digestion technique. It is a very strong acid digestion that will dissolve the elements that could become 'environmentally available'. The heavy metals Cd, Pb, Cu, Co, and Ni were extracted as indicator heavy metal pollutants. The borehole samples collected from the two disposal sites were extracted for possible organic pollutants using the Ultrasonic extraction method as described by Martens, D., et al., (2002). The samples were extracted with n-hexane-acetone 1+1 (v/v). It can be concluded from the results that heavy metals in the different sampled layers from AL-Akaider and Mafraq disposal sites did not show any trends of movement downward. The concentration of all the determined heavy metals does not represent any environmental concern and there is no possibility of those heavy metals reaching the underground water aquifers beneath these disposal sites. The variation of concentration at all sampled depths does not indicate any trend of movement of these heavy metals downward. Most probably, the variation with depth reflects the nature of the studied waste disposal sites, which is using the dump and bury technique. The sampled layers represent materials dumped at different time periods with possible variable concentration of these heavy metals. It has to be also pointed out that the pH of all collected samples is alkaline which leads to precipitation of heavy metals and reduce their mobility. It can also be concluded from the results that some polyaromatic compounds were detected in many of the analyzed samples from both disposal sites and in some in very high concentration. Al-Akaider disposal site which has the loose material and no solid rock in all sampled boreholes did not have any polyaromatic hydrocarbons beneath 6 m.

Hence, there is no danger of any of these compounds leaching down to the aquifer beneath this disposal site. As for Mafraq disposal site, in all boreholes, solid basalt rock was reached, hence the chance of the detected polyaromatic hydrocarbons leaching down almost does not exist. General conclusion about pesticides and pharmaceuticals content in the two sampled disposal: Again it has to be stressed that the analyses of these groups of compounds were very qualitative and were not compared with any standards to get concentration because the standards were not available. Hence, they can be looked at as indications and incentives to carry out more research about them. It can be concluded that some pesticides and pharmaceuticals were detected in many of the analyzed

samples from both disposal sites. Although the presence of some pesticides could be attributed to the dump and bury system used, care must be taken and ground water beneath AL-Akaider must be monitored for the presence of pesticides. Mafraq site has a solid basalt rock beneath it and the chances of these compounds leaching to the aquifer beneath it are very slim.

Keywords: Soild waste; Al-Akaider; Mafraq; Heavy metals; pollution; Disposal sites; Organic pollutants.

قطاع العلوم الزراعية والاتصالات

Management of Protected Cucumber and Pepper under Organic Farming Systems in Jordan Valley

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Abstract:

This research project aimed to investigate the possibility of managing pests in organic farming of both cucumber and pepper grown under plastic houses in the Jordan valley. The location of the experiment was chosen in Dair Allah regional center, in the Jordan Valley which was mostly isolated and relatively far from cultivated areas. The project duration lasted for 3 years. Every year experiments were conducted where pest management in organic farming was compared with that of conventional farming. The 189 and Naysa commercial cultivars for cucumber and pepper respectively, commonly used by farmers in the Jordan Valley were selected for this study. Soil solarization was performed every season prior to planting to suppress soil pests including root knot nematode and soil borne fungi. Other special measures were followed in organic farming including cultural practices such as double doors of the plastic houses, insect sticky traps, and the use of organically registered pesticides and fertilizers. Results showed that incidence and severity of viral diseases and downy mildew of cucumber were low in both farming systems. This might be due to healthy seedlings, planting date and the cultural practices. On the other hand, other pests and diseases such as mites, aphids on pepper, and powdery mildew of cucumber and pepper occurred in higher incidences and severity in both farming systems. However, these pests varied in their occurrences, incidences and severity within seasons and farming systems. In certain instances cucumbers and peppers grown organically have higher infested plants than conventional ones. The reason might be due to insufficient organically registered pesticides or those registered ones are not much effective or more epidemiological studies are needed to effectively integrate these pest management. Plant parameters were similar on both farming systems, however, the yield of organically grown cucumbers and peppers were higher than those grown in conventional ways. Seminars and field days were successfully held to expose both farm advisors and farmers to our findings. In conclusion, we believe that we generated scientific evidence and knowledge on productivity and pest management of cucumber and pepper grown organically under plastic houses in the Jordan Valley. Although we are certain that more in depth epidemiological studies are needed to effectively suppress pest and diseases in organically grown crops.

Keywords: Pests; Organically

Variation in Thermoregulatory and Immune Responses to Thermal and Immune Challenges between Black Bedouin and Damascus Male Goats

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Abstract:

We have demonstrated resilient thermotolerance of *Black Bedouin* goats to both cold and heat stress, over the *Damascus* breed. However, there are conflicting field observations regarding the potential thermotolerance and immunocompetence of the *F1* progeny (*Black Bedouin* X *Damascus* cross breed). A summertime 28-day trial was conducted using male goats from three breed lines (n=7 per breed), coupled with two hypohydration protocols. Each animal was fitted with thermologgers, intraperitoneally and subcutaneously, to measure core (T_{core}) and peripheral (T_{sq}) body temperatures, respectively. All goats were initially maintained under shade for seven-day basal period, and then switched to unshaded housing for the next 21 days. During the first 14 days, animals had free access to water. For the third 7-day period, access to water was time-restricted (4 hours/day). Finally, for the last 7 days, water was gradually restricted to 60% of the second week's daily intake. In a second trial, lipopolysaccharide (LPS)-immune challenge (1 µg/kg BW) was performed to evaluate acute phase immune response. For the summertime-hypohydration trial, the *F1* goats displayed greater heterothermy, as reflected by the maxima-to-minima T_{core} ranges, than the *Black Bedouin* or *Damascus* counterparts, especially after initiation of the water restriction bouts. Furthermore, the *F1* kids displayed higher ratios of relative medullary thickness of the kidney (77.7, 73.3 and 72.6 ± 1.1%), along with higher circulating concentrations of antidiuretic hormone (44.6, 31.6 and 11.6 ± 3.7 ng/mL), respectively, suggesting a role of improved water metabolism in their enhanced thermotolerance. The immune challenge trial revealed exacerbated febrile (manifested by greater T_{core}-T_{sq} variation) as well as proinflammatory (circulating interleukin 1 beta) responses for *Damascus* goats over both breeds 2, 4 and 12-hours following LPS injection. The results infer a role of improved water metabolism in enhanced *F1* thermotolerance, and suggest immune sensitivity of the *Damascus* goats.

Keywords: T_{core} ; T_{sq}

Investigation of Factors Influencing Awassi Lambs Survivorship under Extensive and Semi-extensive Production Systems

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Abstract:

Recent years witnessed a significant increase in Awassi lambs mortality which implies significant economic losses that threaten the sustainability of sheep farming in Jordan. The objective was to identify the causes of postnatal lambs deaths and contributing factors. A field investigations were conducted from November 2011 to April 2014, covering three lambing seasons and two production systems; the extensive and the semi-extensive. A total of 140 sheep flocks distributed over 6 governorates were included in the project. Data were collected on 29,290 lambs born, 5448 of which died before weaning. The pre-weaning mortality was 18.6%. During the first week of life, about 24% of dead lambs were lost due to hypothermia and cold exposure, followed by starvation (15%), small size or underweight at birth (13 %), enterotoxaemia (12%), severe diarrhea (10%), pneumonia and other respiratory distress (10 %) and 8 % were aborted fetus. Lambs born under extensive management system were 1.2 more likely to die ($P<0.0001$) than lambs born under semi-extensive systems. Lambs born in extensive production system were 3.2 more ($P<0.0001$) likely to die due to diarrhea compared to lambs born in semi-extensive production system. Lambs born in extensive system were 2.7 and 2.8 more ($P<0.0001$) likely to die due to hypothermia and starvation, respectively, compared to lambs born in semi-extensive systems. Lambs born from twin litter were 2.3 and 2.1 more ($P<0.0001$) likely to die due to hypothermia and starvation, respectively, compared to lambs born from single litter. Lambs born with light body weights (< 2 kg) were 3.6 and 2.2 more ($P<0.0001$) likely to die due to hypothermia and starvation, respectively, compared to lambs born with heavier body weight (6 kg). Light lambs also suffered from enterotoxaemia and diarrhea 1.7 times more ($P<0.0001$) than heavier lambs. Lambs born from ewes at their first parity were 2.6 more likely to die due to respiratory problems (mainly Pneumonia), 2.5 more likely to die due to starvation and underweight and 2.5 more likely to die due to hypothermia compared to lambs born to ewes in their 6th parity. Lambs born underweight were 3.4 more ($P<0.0001$) likely to die during winter compared to lambs born in fall. Improving the levels of management sores were positively associated with increases ($P<0.0001$) in total serum IgG concentration, lamb survival rates and lambs birth weight. In conclusion, the high lambs mortality in Jordan can be alleviated if the major death causes, their frequency and their risk rates are controlled. The concerned governmental organizations should provide applicable solutions and support the sheep farmers at filed conditions.

Keywords: Lambs

Application of Biotechnology in Characterization, Propagation and Conservation of Cultivated and Wild Date Palm Phoenix Dactylifera Trees in Jordan

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Abstract:

NAC proteins constitute a family of plant-specific transcription factors that are involved in many plant cellular processes including responses to abiotic stress. In this study, a cDNA clone encoding the *HvSNAC1* transcription factor was isolated from drought-stressed barley using a bioinformatics approach based on amino acid sequence data of the stress-related SNAC1 protein from rice. Phylogenetic analysis of the deduced amino acid sequence of HvSNAC1 showed that this protein belongs to the stress clade of NAC proteins that include SNAC1 and TaNAC2. Expression analysis indicated that the *HvSNAC1* gene is strongly induced by different abiotic stresses including drought. Overexpression of *HvSNAC1* in barley under the control of a constitutive promoter produced plants that grew normally under well-watered conditions when compared with wild-type plants. Transgenic barley plants overexpressing *HvSNAC1* showed higher drought tolerance at different growth stages when compared with wild-type plants. In addition, the constitutive overexpression of *HvSNAC1* resulted in improved water status, photosynthetic activity and reduced water loss rate when compared with wild-type plants under drought conditions. Furthermore, the transgenic plants also showed significantly improved productivity, as reflected by the increase in biological yield over the wild-type plants under severe field drought conditions. In conclusion, the *HvSNAC1* gene could be a useful tool for improving barley productivity under field drought conditions without impairment in growth under normal field conditions.

Keywords: HvSNAC1

Callipyge-Awassi Growth and Meat Characteristics in Comparison to the Pure Awassi

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Abstract:

In order to improve meat quality and quantity, the Callipyge gene was introduced to the local Awassi sheep by importation of frozen semen (from Utah University (USA)) of the Rambouillet sheep that carry the Callipyge gene (homozygous). After obtaining the first generation, nine ram lambs (4 from CA-AW (50% Awassi and 50% Callipyge) and 5 from AW (pure Awassi) were subjected to fattening trial for 90 days (post weaning) in individual pens using standard ration, then the ram lambs were slaughtered for meat characteristics measurements. No difference was observed in initial body weight, while final weight ($P < 0.009$), total gain ($P < 0.009$), average daily gain ($P < 0.009$) and feed efficiency ($P < 0.01$) were significantly higher for CA-AW than for AW. Weights of hot carcass ($P = 0.02$), cold carcass ($P = 0.02$), shoulder ($P = 0.01$), leg ($P = 0.006$), rack ($P = 0.007$) and loin ($P = 0\text{-}002$) were significantly higher in CA-AW than in AW while fat tail weight ($P < 0.0001$) was greater in AW than in CA-AW, whereas there was no significant difference ($P = 0.18$) in dressing percentage between genetic groups. Non carcass components show that CA-AW was significantly higher in Mesenteric fat, Lungs and trachea, Heart, Liver, and Kidney fat weights than in AW, while there was no significant difference in spleen and kidney weights. Meat pH ($P < 0.02$) , color coordinates (L' and a'), and tenderness ($P < 0.0001$) were higher in AW than CA-AW, while there were no significant differences in the meat Cooking loss and water holding capacity (WHC). Longissimus weight ($P < 0.0002$), eye muscle area ($P < 0.0001$) and muscle weight ($P < 0.0006$) were greater in CA-AW than AW. In conclusion a substantial effect of Callipyge gene on growth and meat characteristics was observed and can be used for improving the productivity of Awassi sheep.

Keywords: Awassi sheep

Effect of Using Anti-frost Products to Avoid Frost Damage of some Vegetable Crops

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Abstract:

Frost stress can cause severe losses for many vegetable and fruit trees crops. Sensitive vegetable crops such as tomato, eggplant, pepper, potato and squash grown during winter time can be severely injured when subjected to frost, with significant effects on plant foliage, production and even kill the entire plants. Several cultural practices have been undertaken to avoid/minimize/mitigate frost impact, including heating, sprinkler irrigation, smoking, etc. However, the efficiency of these practices was very limited, especially, in case of open field cultivation and their costs in terms of money and environmental hazards are relatively high. Therefore, there is a need for widely available, simplified and cost effective mechanism or methods to protect plant from this serious problem such as using frost protection materials. To evaluate the efficacy of different frost protection materials on avoiding/minimizing/mitigating frost damage to selected frost sensitive vegetables; tomato, eggplant, pepper, potato, squash, three experiments were conducted at the National Center for Agricultural Research and Extension (NCARE). The first experiment was done to evaluate the efficiency of using different concentrations of anti-frost acrylic polymer (Toma Therm^{TM}) on reducing frost damage. Accordingly, the selected crops were treated with four anti-frost concentrations; 0 (control), 1, 2 and 3% and subjected to three frost stress temperatures (-1, -4, and -7 ^{o}C) in a walk-in air freezing chamber for 30 and 60 minutes. Damage occurred to plants through frost was determined by two methods: using electrolyte leakage assays (frost injury) and scoring plants for survival after frost (Frost severity). Frost recovery was also determined by counting the number of recovered plants after frost treatments.

Results showed that using anti-frost product can not totally prevent frost from inflicting damage on the tested five crops. However, increasing anti-frost concentration decreased plants' frost damage when compared with the control. Furthermore, the efficiency of anti-frost concentration used varied with the crops; for the treated tomato, eggplant, and squash plants, the use of 3% anti-frost concentration significantly reduced frost injury by 24, 26, and 57% as compared with untreated plants. It has also been shown that treating pepper and potato plants with 2% anti-frost conc. might be enough to reduce frost injury and improve frost recovery. In general, increasing exposure time from 30 to 60 minutes, under the above given frost stress temperatures, has significant effect on increasing frost damage in tomato, eggplants, and pepper plants, while exposing potato and squash plants to the frost stress temperatures for 30 minutes might be enough to cause same damage as exposing to 60 minutes. The anti-frost product decreased frost damage to various degrees depending on crops type, anti-frost concentration and frost temperature. In the second experiment, these crops were treated with three frost protection materials; acrylic polymer, hydrophobic kaolin particle film, and Potassium Nitrate (NO_3), in addition to untreated plants (control), and subjected to three frost stress temperatures (-1, -4, and -7 ^{o}C), in a walk-in air freezing chamber. Frost damaged (injury and severity) and plant recovery from frost were determined following same procedures/methods as in the first experiment. The results of this experiment showed that the efficiency of the tested plant protection materials varied with crops

and frost stress temperature. In general, spraying plants with hydrophobic particle film reduced frost injury in the tested vegetable crops except for tomato as compared with the other frost protection materials especially when plants subjected to -7^{o}C or -4^{o}C frost temperatures. Recovery from frost was also improved by spraying plants with hydrophobic particle film and acrylic polymer in the tested crops except for squash plants. In the third experiment same first and second experiments were conducted in the north of Jordan Valley during 2010/2011 and 2011/2012 growing seasons, and second experiment was conducted in Al-Shoubak during 2011/2012 growing season. For North of Jordan Valley experiments, no data were collected because, in these seasons, there was no frost. For Al-Shoubak experiment, treated plants were naturally subjected to -10 and -13^{o}C frost temperature, which caused plant death, indicating that the tested frost protection materials used in this experiment are unable to protect plant from frost damage if the frost stress temperature below -10^{o}C.

Keywords: Plant frost damage; Frost protection materials; Vegetables; Frost recovery; Frost duration.

Cactus (Opuntia Ficus-Indica) Cultivation under the Organic Farming System in Jordan

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The Jordan Badia

Abstract:

This research aims to study the effect of adding four different levels of compost (humus) and two levels of water on fruit production and forage production of cactus in the Jordanian Badia. In addition, this study aims to study the cactus in Jordan and to study the palatability of cactus leaves in the animal fodders. This study was conducted at Tal Hassan Center affiliated to the National Center for Research and Development. The study was designed based on two main treatments, the first treatment with two levels, 50% and 100% of the total transpiration and evaporation and second treatment was 4 levels of organic fertilizers (0, 17, 34, and 50) Kg Nitrogen per Dunum. This study showed that the use of 1666.6 Kg/Dunum of organic compost increased 3 to 6 times the plant size and increased the fruit weight 3 to 5 times compared to the control. The second treatment resulted in no significant difference between 50% and 100% of the total transpiration and evaporation for fruit production. This study also showed that the 100% treatment with 1666.6 Kg/Dunum of organic compost made the best results for forage production (vegetation) under the Badia conditions. The cactus palatability experiment conducted at JUST campus showed better results compared with wheat fodders. Away from these experiments, three trainings and awareness sessions about cactus production were conducted at Northern Badia, Western Badia, and Middle Badia targeting the local women.

Keywords: Cactus

الملخص:
يهدف هذه البحث الى دراسة تاثير اضافة اربعة مستويات مختلفة من السماد العضوي (الدبال) ومستويين من المياه على الانتاج الثمري (الفاكهة) والانتاج الخضري (الاعلاف) للصبار الكمثري في البادية الاردنية، وعمل استقصاء لانتاج الاردن من الصبار، ومعرفة مدى استساغة الاغنام لالواح الصبار وعمل دورات توعوية حول زراعة الصبار واستخداماته في مجالات مختلفة.
اجريت هذه الدراسة في محطة تل حسان التابعة للمركز الوطني للبحث والتطوير في منطقة الازرق. صممت الدراسة اعتمادا على معاملتين، المعاملةالأولى: ويرمز لها (I1,I2) والتي تدل على ري النباتات بكمية تساوي50% من تقدير قراءة مجموع النتح والتبخير و 100%من تقدير مجموع قراءة النتح والتبخير، والمعاملة الثانية: ويرمز لها (F1, F2, F3, F4) والتي تدل على معدلات الاضافة التالية من السماد العضوي على التوالي (0,17, 34, 50) كغم من النيتروجين لكل دونم.

اظهرت النتائج بوضوح ان استعمال 1666.6 كغم/دونم كمبوست في تجربة الفاكهة ضاعف حجم النبات من 3 الى 6 مرات، في حين تشير النتائج الى ان استعمال 1666.6 كغم/دونم كمبوست ضاعف عدد ووزن الثمار بمعدلات تتراوح بين 3 الى 5 مرات مقارنة بمعاملة الشاهد، هذا يبين ان تجربة الفاكهة المتمثلة بالحصول على افضل نمو خضري وثمري تحت معدل ري مكافئ لـ 50% من قراءات حوض التبخر مع اضافة 1666.6 كغم/دونم كمبوست، بينما لم تتواجد اية فروقات معنوية في عدد الواح النباتات التي تم ريها بكمية تساوي 50% من قراءات حوض التبخر مقارنة بالنباتات التي تم ريها بكمية مياه تساوي 100% من قراءات حوض التبخر، بينما لم تكن هنالك فروقات معنوية بما يتعلق بمعدل وزن الثمار بين معاملتي الري. كما اظهرت الدراسة ان تجربة زراعة الصبار كعلف بمعدل ري مكافئ لـ 100% من قراءات حوض التبخر مع استعمال معدلات التسميد العالية 1666.6 كغم/دونم كمبوست تعطي افضل النتائج، كذلك فان السماد العضوي يساعد نبات الصبار على تحمل درجات الحرارة المنخفضة والصقيع في البادية الاردنية.

اظهرت دراسة مدى استساغة واستفادة اغنام العواسي من الواح الصبار التي تم تنفيذها في جامعة العلوم والتكنولوجيا الاردنية على ان استهلاك الاغنام لالواح الصبار افضل مقارنة مع تبن القمح واكثر استساغة، حيث لوحظ بان الزيادة الوزنية اليومية كانت افضل مرتين في العليقة التي تحتوي على الصبار مقارنة مع العليقة الاخرى التي تحتوي على تبن القمح، علماً ان تناول المادة الجافة، البروتين الخام، الياف المنظف المتعادل والياف المنظف الحمضي كانت اعلى لدى الحملان المغذية على تبن القمح من الحملان المغذية على الواح الصبار، اضافة الى انه لم يكن هنالك اختلاف معنوي في هضمية كل من المادة الجافة، البروتين الخام والياف المنظف المتعادل، بينما كانت هضمية الياف المنظف الحمضي اعلى لدى الحملان المغذية على تبن القمح. ان نسبة النيتروجين المتبقي كنسبة مئوية من النيتروجين المتناول كانت اعلى لدى الحملان المغذية على تبن القمح، حيث انه تم تصميم فرامة مختصة في تقطيع الواح الصبار بعد ازالة الاشواك الى قطع صغير حوالي (1-2) سم قبل تقديمها للاغنام وذلك لتسهيل على الاغنام تناولها وهضمها.

تم تنفيذ ثلاثة دورات تدريبية في مركز شابات القطرانة (البادية الجنوبية) بتاريخ 2014/6/10 وجمعية سيدات الازرق الجنوبي للتنمية الاجتماعية (البادية الوسطى) بتاريخ 2014/6/17 وجمعية عناقيد الخير التعاونية (البادية الشمالية الشرقية) 2014/6/23، تهدف هذه الدورات الى تدريب سيدات البادية الاردنية على زراعة نبات الصبار وفوائده وطرق استخدامه في تصنيع الصابون والكريمات، حيث انه تم تدريب 126 سيدة على كيفية صناعة الصابون والكريمات من الصبار بالاضافة الى تزويد المشاركات في الدورة التدريبية بالدليل الارشادي اللازمة لذلك، وكذلك تم اعداد دليل يوضح واقع زراعة الصبار في الاردن ومجالات تحسين انتاجية واستخداماته في مجالات مختلفة.

Evaluation of Rapeseed Local Wild Accessions and Introduced Cultivars for Biofuel Production (Quantity and Quality) Under Saline and Treated Wastewater

تقييم الأنواع البرية والأصناف المدخلة من الخردل لإنتاج الوقود الحيوي تحت الري بالمياه المالحة ومياه الصرف المستصلحة

محمد خضر الرفاعي

المركز الوطني للبحث والإرشاد الزراعي

الملخص:

إن الحاجة الى تأمين مصادر الطاقة من الأمور بالغة التحدي على الأخص في المناطق التي تعد محدودة بمصادرها الطبيعية من الطاقة. أهم هذه المصادر هو الوقود الأحفوري (البترول) والذي لا يتوفر بكميات إقتصادية في الأردن، لهذا السبب يتضح الإهتمام المحلي بالمصادر البديلة ومن ضمنها محاصيل الطاقة. من جهة أخرى، يتوفر مساحات كبيرة من الأراضي المتملحة والمياه الجوفية المالحة على شكل ينابيع طبيعية بتغذية سنوية تقدر ب 46 مليون متر مكعب، كذلك يتوفر ما مقداره 104 مليون متر مكعب سنويا من مياه الصرف الصحي المعالجة، وهذه المصادر – غير التقليدية – من المياه محدودة الإستخدام لأسباب متعددة منها الحاجة الى محاصيل عالية التحمل للملوحة، أسباب وتخوف صحي أو عدم المعرفة بتوفر هذه المصادر، حيث أدى العزوف عن إستثمار هذه المصادر المتاحة الى هجر الزراعة في كثير من المناطق. إن تفعيل الأستخدام لهذه المصادر – الغير تقليلدية – من المياه في إنتاج محاصيل الطاقة سوف ينعكس إيجاباً على الزراعة في الأردن حيث أنه لا يتعارض مع مفهوم الأولويات الإنتاجية (الغذاء أم الطاقة)، لكون هذه المصادر لا تجود فيها الزراعات للمحاصيل الغذائية والتي إن أنتجت ستعاني من عدم الجدوى الإقتصادية نتيجةً لتدني الإنتاج والجودة معاً.

جاء هذه المشروع وبدعم سخي من السادة صندوق دعم البحث العلمي كفرصة لدراسة إنتاجية محصول الطاقة العالمي الأول "الخردل" في ظروف الزراعة الملحية و إستخدام مياه الصرف الصحي المعالجة، حيث أن هذا النبات بري وكان مهملاً ولم تتم دراسته أو إستإناسة من قبل. بدأ العمل في المشروع بتاريخ 2010/10/1 بعد تفضل السادة صندوق دعم البحث العلمي بدعمه (2010/9/30). إشتملت مراحل التفيذ على أربع نشاطات رئيسه، (1) مسح وتحديد المواقع والبيئات للتجمعات البرية (2) جمع وحفظ عينات ممثلة (3) تقييم الأنواع البرية المتوفرة من الخردل (4) تحديد نسب الزيت لإغراض إنتاج الوقود الحيوي. لتحقيق هدف تحديد مواقع تواجد الخردل البري بنوعيه (*Sinapis alba & Sinapis arvensis*)، بدأ العمل بالمسح الميداني في فترة الربيع الى أوائل الصيف حيث تم تسجيل تواجد الأصناف أو عدم التواجد إضافة الى وصف البيئات، الغطاء النباتي، والنقاط الجغرافية. صيفاً، تم جمع البذارمن 25 موقع (إضافةً الى 12 عينة تم جمعها سابقاً) وبعدد كلي 36 سلالة برية موزعة على شمال ووسط وجنوب الأردن. العدد الكلي المجموع من الصنف *S. alba* هو 20 نوع في حين العدد الكلي من الصنف *S. arvensis* هو17 نوع.

زرعت الأنواع البرية الى جانب الأصناف المدخلة من دول العالم بعدد كلي 49 نوع وبواقع 20 سلالة برية من النوع البري (*S. alba*) مرتبطاً بثلاثة شواهد من دول العالم (ألمانيا، كندا، أكرانيا) وبواقع 17 سلالة برية من النوع (*S. arvensis*) مرتبطاً بتسع شواهد من دول العالم (سوريا، ألمانيا، الصين، اليابان، بريطانيا، كندا). تمت الزراعة لمدة عامين في ثلاثة ظروف بيئية متباينة وهي (1) ظروف الزراعة الملحية (ملوحة الماء 5 دسيسمنز/م ملوحة التربة 25-45 دسيسمنز/م)-في محطة الخالدية (2) ظروف الزراعة بالري بمياه الصرف المعالجة- في محطة الرمثا و (3) ظروف الزراعة المطرية الجافة-في محطة الربة. إستخدم تصميم القطاعات العشوائية بثلاث مكررات لكل صنف ومعاملة وبمساحة تجريبية (2x2) 4 م^2. تم جمع وتحليل عينات من التربة (عمق 25 و50 سم) لتحديد نسج التربة والوصف الكيميائي في مواقع التنفيذ الثلاث. تم تسميد مواقع التجربة بالسماد المركب(21.5 غم/م^2 $20N:20P_2O_5:20K_2O$) و الرش بالمبيدات المطلوبة.

أعتمد تاريخ أول ري أو هطول مطري فعال كموعد للزراعة وبناءً عليه تم تثبيت مواعيد الإنبات، الأزهار، النضج وطول فترة الإزهار(plant phenology). تم قياس الصفات المظهرية (plant morphology) بعد إزهار كافة النباتات وهي عدد الأفرع الرئيسة، عدد القرون، طول القرن، عدد البذور في القرن، طول النبات، إرتفاع القرن السفلي (لأغراض الحصاد الآلي) وملمس النبات. عند النضج تم وزن مادة الحصاد البيولوجية (الخضراء والجافة) إنتاج البذور وزن ال 1000 بذرة (حجم البذور) وحساب

معامل الحصاد وتقدير الإنتاج لمساحة الهكتار. بالنسبة لمعملات الري، نفذ هذا المشروع في الموقع التجريبي لأبحاث المياه العادمة المستصلحة بجانب محطة تنقية الرمثا، حيث تم إستخدام نوع واحد من مياه الري وهي المياه المستصلحة الخارجة من محطة تنقية الرمثا والتي تعمل بتقنية المعالجة الثنائية بإستخدام نظام الحمأة المنشطة. وقد تم الري من خلال نظام فلتره مكون من فلتر رملي و شبكي و قرصي وباستخدام شبكة ري بالتنقيط (جي آر). تم ري التجارب بمياه عادمة مستصلحة من تاريخ الزراعة بالاضافة إلى كمية الامطار الهاطلة خلال تلك الفترة أما بالنسبة للتجربة المنفذة في الخالدية، إضافة الى كمية الأمطار الهاطلة فقد تم ري التجارب بمياه مالحة من تاريخ الزراعة تكميليا لغاية شهر أيار. تم تحديد نسب الزيت لكل نوع من أصناف الخردل المزروعة والشواهد كيميائياً بإستخدام جهاز (soxhlet) في مختبرات العلوم (جامعة اليرموك) بعد طحن البذور، كما تم إستخلاص الزيت من أربع سلالات لتحديد جودة الوقود الحيوي المنتج وخصائصه.

أهم النتائج المستخلصة. تم توثيق أكثر من 250 موقع بري موزع على شمال ووسط وجنوب المملكة شاملةً المناطق الشرقية والأغواروجمع الخردل من 37 موقعاً ممثلاً. إتضح من الدراسة تواجد الصنف *S. alba* خارج الأراضي الزراعية وعلى إرتفاعات أكثر تبايناً من الصنف *S. arvensis*والذي ينتشر في الحقول والمناطق المرتفعة. أضيف الصنف النباتي (*Hirscheldia incana*) الى الملاحظات التسجيلية كونه يشبه الخردل والذي كان يولد إعتقاداً بأنه هو الخردل لتشابه الأزهار الصفراء ولكونه منتشر في كافة المناطق، حيث وجد في هذه الدراسة عدم الصواب في هذا الفكرة العامة لكون الصنف المذكور آنفاً من جنس آخر.

ميزت الأنواع المقيمة من النوع *S. alba* مع الشواهد العالمية عند الري بمياه الصرف المعالجة بتسجيل أعلى إنتاج من البذور 4.9 طن/هكتار وبمتوسط 1.8 طن/ هكتار ، في حين كان أعلى إنتاج من القش الجاف 44.8 طن/هكتار وبمتوسط 16.1 طن/هكتار وكانت أعلى نسبة من الزيت 34.6% وبمتوسط 26.9%. ميزت الأنواع المقيمة من النوع *S. alba* مع الشواهد العالمية عند الري بالمياه المالحة بتسجيل أعلى إنتاج من البذور 1.7 طن/هكتار وبمتوسط 0.74 طن/ هكتار ، في حين كان أعلى إنتاج من القش الجاف 10.9 طن/هكتار وبمتوسط 6.8 طن/هكتار وكانت أعلى نسبة من الزيت 45% وبمتوسط 28.7%.

ميزت الأنواع المقيمة من النوع *S. arvensis* مع الشواهد العالمية عند الري بمياه الصرف المعالجة بتسجيل أعلى إنتاج من البذور 2.9 طن/هكتار وبمتوسط 0.94 طن/ هكتار، في حين كان أعلى إنتاج من القش الجاف 41.4 طن/هكتار وبمتوسط 11.2 طن/هكتار وكانت أعلى نسبة من الزيت 57.3% وبمتوسط 31.9%. ميزت الأنواع المقيمة من النوع *S. arvensis* مع الشواهد العالمية عند الري بالمياه المالحة بتسجيل أعلى إنتاج من البذور 2 طن/هكتار وبمتوسط 1.1 طن/ هكتار، في حين كان أعلى إنتاج من القش الجاف 12 طن/هكتار وبمتوسط 4.8 طن/هكتار وكانت أعلى نسبة من الزيت 48.5% وبمتوسط 30.5%.

من جهة أخرى لم تجد زراعة الخردل عموماً تحت ظروف الزراعة المطرية الجافة. تم تحليل محتوي البروتين والألياف في القش الجاف والكسبة بعد عصر بذور الخردل ووجد أعلى نسبة بروتين 17% في القش وبمتوسط 8.8% وهذه النسب تعد من الأعلى مقارنة بالعلائق التقليدية الناتجة عن زراعة القمح والشعير، ووجد أعلى نسبة بروتين 43.9% في كسبة البذور والتي تعد من المصادر الغنية والبدائل المهمة لتغذية الدواجن والأبقار والخراف. حددت بعض الخصائص للزيت المستخلص من أربع سلالات مختارة أهمّها قيمة الحامض (والتي تمثّل نسبة الأحماض الدهنية الحرّة)، أمّا بالنسبة لنسب وتركيب الأحماض الدهنيّة المختلفة في هذه الزيوت فقد تمّ الاكتفاء بتحليل الديزل الحيوي المنتج من هذه الزيوت بالنسبة للأحماض الدهنية المكوّنة لها حيث أثبتت تجاربنا أنّه يتطابق مع نتائج الزيت الأمّ.

تحديد أفضل ظروف للأسترة القبلية باستخدام حامض الكبريتيك كمحفّز علماً بأنّ قيمة الحامض للسلالات المختارة كانت منخفضة جدّاً للقطافات الجديدة (محصول السنة دون تخزين) ممّا يعني أنّه لا ضرورة لإجراء الأسترة القبلية إلاّ في حال خزّنت البذور لفترة طويلة. ولهذا السبب تمّ الاستغناء عن محاولة استبدال حامض الكبريتيك كمحفّز بمحفّز صلب مثل البنتونايت أو الزركون المسلفت لأن الأسترة القبلية ليست في هذه الحال بالذات خطوة مهمّة في إنتاج الديزل الحيوي. إنتاج الديزل الحيوي بالطرق التقليدية المتضمنة استخدام هيدروكسيد البوتاسيوم كمحفّز. تقييم الديزل الحيوي المنتج من حيث قابلية استخدامه كوقود ومطابقته للمواصفات العالمية (بعض الفحوصات مثل نسبة الكبريت ودرجة الصدأ لم نستطع إجراءها بسبب نقص الموازنة المخصصة لبند التحليل ولكن الأمر ليس مهمّاً في هذه المرحلة خاصّة وأنّ الديزل الحيوي عادةً ما ينجح في هذه الفحوصات وبجدارة فائقة كما هو معروف وكما أثبتت فحوصاتنا التي أجريناها في المجموعة بالنسبة للديزل الحيوي المنتج من بذور الجاتروفا).

تحضير أشكال مختلفة من أكسيد المغنيسيوم ودراسة خصائصها الفيزيائية (البنية، قاعديّة السطح وتوزيعها) ومدى ملاءمتها للاستخدام كبديل صديق للبيئة لهيدروكسيد البوتاسيوم واستطعنا تطوير أحد الأشكال الواعدة والذي يحقّق إنتاجيّة عالية للديزل الحيوي ولكن وجدنا أنّ نوع سلالة النبتة المستخلص منها الزيت له تأثير على كفاءة هذا المحفّز وسيكون هذا الأمر محلّ دراسات

تطويرية قادمة بغية تحسين الأداء الحفزي لأكسيد المغنيسيوم المعالج ومعرفة سبب تأثير نوع السلالات المختلفة على الأداء الحفزي. إجراء تجارب أوّلية على ما يُسمّى بالأسترة الاستخلاصيّة باستعمال الميثانول كمذيب مخلوطاً بمذيبات غير قطبية مثل الكلوروفورم والإيثر ممّا يفتح الباب لأبحاث قادمة تهدف إلى تقليل كلفة عمليّة الإنتاج وجعلها أكثر صداقة للبيئة.

قام طالب الماجستير عبد الله العمري بالعمل على هذا المشروع وأنتج رسالة ماجستير (مرفق نسخة منها) تمّت مناقشته لها بنجاح ونحن بصدد إعداد ورقة بحثية مستلّة من هذه الرسالة لتنشر في مجلّة عالمية. النتائج مشجعّة جدّاً لاستمرار البحث في هذا الموضوع، وبالفعل تمّ تكليف طالب ماجستير آخر هو رضوان الجرّاح/قسم الكيمياء في جامعة اليرموك بمتابعة العمل حول استخدام أكاسيد أخرى كمحفّز غير متجانس عالي الكفاءة وتنصبّ واجباته في تطوير محفّز مناسب من أكسيد الخارصين. تم إنشاء وحدة إنتاجية متكاملة لإنتاج وقود الديزل الحيوي بالتعاون ما بين المشروع و الوكالة اليابانية للتعاون الدولي JICA وتدريب الفنيين والمزارعيين على مفهوم وتطبيقات إنتاج وقود الديزل الحيوي. كما تم تنظيم أيام حقلية ولقاء تلفزيوني مع القناة الرسمية بمشاركة المسؤلين للتعريف بالمحصول الجديد.

إن الأنواع التي تمت دراستها في هذا المشروع وجدت واعدةً لتطوير وزراعة محصول الخردل وبنسب زيت عالية، حيث أثبت هذا المحصول مقدرته على تحمل الري بالمياه – الغير تقليديه – لأنتاج وقود الديزل الحيوي وغيره من الإستخدامات مثل إستخدام التبن كأعلاف للحيوانات وإستخدام الكسبة بعد عصر البذور كمركزات علفية للدواجن وإنتاج العسل من الزهور. إن تطوير وإعتماد أصناف ملائمة لمثل هذه الظروف المتوفرة والغير مستغلة بشكل واسع سيسهم في عكس الهجرة لمستخدمي هذه المصادر من المزارعين والمستثمرين إضافةً الى الإسهام في التوسع الأفقي في المساحات الخضراء.

Development of Salinity Tolerant Tomato Genotypes Using Molecular Marker Assisted Selection

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Abstract:

Tomato (*Solanum lycopersicum*) is one of the most important horticultural crops in the world. In terms of human health, the tomato fruit is a major component of daily meals in many countries and constitutes an important source of minerals, vitamins and antioxidant compounds. It is one of the major vegetable crops grown in Jordan and many Jordanian tomato landraces are still grown in small farms due to quality and special consumer demands. The average annual area planted with tomato during 2001-2005 in Jordan was 9.1 thousand hectares with an average production 426.9 thousand tons. Most of tomato cultivars grown in Jordan are hybrids with high water and fertilizer requirement and low tolerance to environmental stresses. However, tomato landraces which is less sensitive to environmental stresses and grown mainly under rainfed condition are still grown in small farms due to, quality and special demand of some consumers. These landraces are valuable sources of genetic characteristic, which is of plant breeder's interest to include in breeding programs for crop improvement. Tomato in Jordan is transplanted in nurseries and grown in open field or under greenhouses. The shortage of good quality water in local resources is becoming an important issue. For this reasons, the use of available saline water is becoming important and should receive immediate consideration. Tomato could act as a model crop for the use of saline and poor quality water because of the wealth of knowledge available on physiology and genetics of this species. Tomato has been catalogued as moderately sensitive to salinity at all stages of plant development, including seed germination, vegetative growth and reproduction, and as a result, tomato yield is reduced under salt stress. Since the 1980s, the use of molecular markers has been suggested to improve the efficiency of releasing tolerant varieties, thus overcoming difficulties met with classical breeding. For tomato, a high-density molecular map is available in which more than 40 resistance genes are localized. Markers linked to these genes can be used to speed up gene transfer and pyramiding. Most breeding efforts are centered on locating genes or QTLs conferring resistance or tolerance to biotic and a biotic stress factors. With this aim, breeders have developed many experimental populations derived from interspecific crosses using *S. lycopersicum* as the receptor parent and various wild relatives as parental donors. Develop of quantitative trait loci in tomato were constricted mainly for disease and pest and the mapping traits correlated to a biotic stress are limited. This project is aimed to utilize the molecular markers to improve tomato landrace and genotypes for salinity and subsequently to water stress which are considered the main limiting factors for yield and quality of tomato in Jordan.

Keywords: Solanum lycopersicum.

Utility of Nitrogen Fertilizers as an Environmentally Applicable Tool for Controlling Root-Knot Nematode (Meloidogynejavanica) in Jordan

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Abstract:

The influence of different nitrogen salts at five electrical conductivity levels (EC 2, 4, 6 and 8 mmhos/cm) on the Javanese root-knot nematode (RKN) (*Meloidogynejavanica*) and its interaction with cucumber or tomato was evaluated under *in vitro*, growth chamber and greenhouse conditions. Percentages of egg-hatching and second-stage juvenile viability of M. javanica were greatly reduced when NH_4Cl, $(NH_4)_2SO_4$ and NH_4NO_3 were used especially at the higher levels of EC and accompanied with reduction in cucumber root galling. The lower root galling (less than 2.5) was accompanied with NH_4Cl, $(NH_4)_2SO_4$ and $(NH_4)_2HPO_4$, while KNO_3 and NH_4NO_3 resulted in moderate root galling. In contrast to the nitrogen salts, NaCl caused a reduction in both nematode infection and root growth especially at higher EC levels and this could be due to salinity effect. Diammonium phosphate was superior over the tested salts in increasing plant and root fresh and dry weights and cucumber phosphorus content, while KNO3 was superior in increasing in plant content of potassium. Both ammonium chloride (NH4Cl) and ammonium sulfate $(NH_4)_2SO_4$ were more effective than ammonium nitrate (NH_4NO_3), which was more effective than potassium nitrate (KNO_3) and sodium chloride (NaCl) in suppressing *M. javanica* by reducing root galling and nematode reproduction on tomato cv. GS12. Under greenhouse conditions, the minimum significant galling index values assessed for NH4Cl, (NH4) 2SO4, NH4NO3 and KNO3 were 1.60, 2.04, 2.30 and 3.30, respectively whereas the maximum value (4.01) corresponded to NaCl and was not statistically different from the control (4.92). A significant increase in tomato growth and protein content for $(NH_4)_2SO_4$ and NH4NO3 was observed. On the other hand, in NaCl treatment, there was a decrease in dry weights and protein content due to salinity compared with the control. The higher salt ECs did not affect the pH of the rhizospheric soil but slightly increased its measured EC and salinity. Hence, $(NH_4)_2SO_4$ is a more suitable candidate than NH_4Cl for the effective control of the root-knot nematode when irrigation water is a limiting factor with high salinity level similar to NaCl. Therefore, the use of ammonium containing salts especially $(NH_4)_2SO_4$ and NH_4Cl alone or in combination with other control measures may result in controlling *M. javanica*.

Efficacy of nitrogen salts at 2, 4, and 8 mmhos/cm electrical conductivity (EC) on the host-pathogen relationship ofroot-knot nematode (*Meloidogyne javanica*) and cucumber or tomato was investigated and compared with the effects of nematicides at two locations (Ghor Safi and Karak Valley). Root galling of cucumber roots caused by *M. javanica* was more effectively suppressed using ammonium-containing salts: NH_4Cl, $(NH_4)_2HPO_4$ and $(NH_4)_2SO_4$ at EC4 and EC8 than at EC2 and in a similar effect level of the nematicide, oxamyl or ethoprophos, and the reduction was accompanied by a reduction in the nematode final population number. At higher EC levels, NH_4Cl followed by $(NH_4)_2SO_4$ led to an increase of salinity up to about 1750 and 1245 mg/kg, respectively, without affecting cucumber growth and yield. Diammonium phosphate was superior over the ammonium salts in increasing cucumber growth and yield despite root-knot infection. Use of nitrogen salts could control *M. javanica* and improve growth and yield of cucumber under field conditions. It was found that both diammonium phosphate ($(NH_4)_2HPO_4$) and ammonium

sulphate ($(NH_4)_2SO_4$) were more effective than ammonium chloride (NH_4Cl) in causing an obvious suppression of *M. Javanica* infection on tomato through reducing root galling and nematode reproduction and improving tomato growth and yield and their suppressive effect was similar to that of oxamyl or ethoprophos. At higher ECs, the tested nitrogen salts did not greatly affect pH, EC and salinity of rhizospheric soil except NH_4Cl at EC8 that caused higher EC and salinity over the untreated control which makes NH_4Cl less suitable candidate. Therefore, the use of $(NH_4)_2HPO_4$ and $(NH_4)_2SO_4$ alone or in combination with other control measures could control *M. Javanica* and improve the growth and yield of tomato under field conditions.

Keywords: Salinity.

Field Evaluation of Deficit Irrigation Effects on Tomato Growth Performance, Water-Use Efficiency and Control of Parasitic Nematode Infection

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Abstract:

Two field experiments were conducted using a common tomato cultivar (GS12) to assess the effect of deficit irrigation (DI) regimes on tomato growth performance, and on root-knot nematode *Meloidogyne javanica* galling and abundance. Irrigation treatments consisted of five irrigation regimes: 20%, 40%, 60%, 80% and 100% of field capacity. The results showed that DI decreased significantly leaf area, relative water content, water potential, minerals content and chlorophyll content. The 80% irrigation regime caused minor reductions in plant growth, but significantly reduced nematode infection load. Nematode infection was reduced even further at higher levels of water deficit, but this also led to marked reductions in fresh and dry weights of tomato. Total tomato yield, fruit soluble solids, and acidity were decreased with increasing irrigation water deficit. Water-use efficiency was lowest in the 100% irrigation regime and highest in the 20% irrigation regime among the irrigation treatments. The results indicated that the DI at a certain limit decreased *M. javanica* infection without causing significant reductions in tomato growth performance.

Keywords: Arid environment; Crop quality; Deficit irrigation; Nematode; Semi-arid environment; Water-use efficiency; Yield.

Genetic Diversity Analysis of Sheep and Goat Breeds in Jordan

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Abstract:

Genetic diversity of sheep and goat was investigated in Jorda. The genetic diversity of sheep was investigated using microsatellite markers (MS). Six ovine and bovine MS located on chromosomes 2 and 6 of sheep genome were genotyped on 294 individual from ten geographical regions. The number of alleles per locus (A), the expected heterozygosity (He) and observed heterozygosity (Ho) were measured. Overall A, He and Ho were 12.67, 0.820 and 0.684, respectively. On the other hand, genetic distances undoubtedly revealed the expected degree of differentiation among the studied populations. The finding showed closeness of three populations from south (Maan, Showbak and Tafeilah) to each other. Populations from the middle regions of Jordan (Karak, Madaba, Amman, AzZarqa and Mafraq) were found to be in one cluster. Only two populations of the middle region were an exception: AlSalt and Dead Sea. Finally, sheep populations from Irbid were located in separated cluster. It was clear that the studied predefined populations were subdivided from four populations and would be most probably accounted as ancestral populations. These results indicate that number of population is less than the predefined population as ten based on geographical sampling areas. The possible inference might be that geographical location, genetic migration, similar selection forces, and common ancestor account for population admixture and subdivision of Awassi sheep breed in Jordan. Finally, the present study sheds new light on the molecular and population genetics of Awassi sheep from different regions of Jordan and to utilize the possible findings for future management of genetic conservation under conditions of climate changes and crossbreeding policy. On the other hand, phylogeny and evolutionary analyses were performed for goat breeds based on DNA sequencing. DNA segment of 0.5-kb from sixteen goat individuals of four breeds was sequenced. The DNA sequencing was analyzed by both Arlequin and MEGA softwares. The results showed a quite evolutionary differentiation found within goat breeds between. Furthermore, phylogeny tree was reconstructed providing evidences for a close phylogenetic alliance among breeds. The resulted evolutionary sequencing and phylogeny trees provide evidences that sequencing data were worthy to describe the evolutionary and phylogeny genetics in goats breeds in Jordan. On other hand, the data were given other scope for possible detection of gene(s) and identify polymorphisms, given possibility to identify Caprine and ovine genes from other close species genome like cattle and using theory of selection signatures. In the future we intend, in order to clearly identify the genetic polymorphisms, to detect further genetic variation and to develop tests particularly suitable for specific interested genes and genotypes.

Keywords: Awassi sheep; Microsatellite markers (MS).

تحليل التنوع الحيوي الوراثي لسلالات الأغنام والماعز في الأردن

الملخص:

لقد تم تحليل التنوع الحيوي الوراثي لسلالات الأغنام والماعز في الأردن. وكان تحليل التنوع الوراثي للأغنام باستخدام الواسمات الوراثية (Microsatelliate) للأغنام وتقع على الكروموسومات 2 و 6 من الأغنام الجينوم على 294 فرد من مناطق جغرافية مختلفة .وعدد الأليلات في موضع (A)، وتم قياس التغاير المتوقع (هو1)، والتغاير الملاحظ (هو2). وعموما، كان هو1 وهو2 12.67 هما 0.820 و 0.684 على التوالي. من ناحية أخرى، المسافات الجينية كشفت بلا شك الدرجة المتوقعة من التمايز بين الاغنام من المناطق المختلفة ودراستها. أظهرت النتائج تقارب أغنام من ثلاثة مناطق هي الجنوب معان، والشوبك والطفيلية مع بعضها البعض. وتم العثور على الاغنام من المناطق الوسطى من الأردن (الكرك ومادبا وعمان والازرق والمفرق) ليكون في مجموعة واحدة. هما فقط اغنام المنطقة الوسطى كانوا استثناء وهم السلط والبحر الميت. وأخيرا، كانت موجودة الأغنام من اربد في المجموعة لوحدها. وكان واضحا أن تم تقسيم لاغنام وراثياً له أرتباط للمناطق الجغرافية ووجود انتقال جيني وأسلاف. هذه النتائج تشير إلى أن حجم العينة أقل من المفترضة مسبقا من عشرة على أساس المناطق الجغرافية التي أخذت منها العينات. والاستدلال بذلك قد يكون بسبب الموقع الجغرافي والهجرة الوراثية وعوامل وراثية مختلفة وحساب سلف مشترك للاختلاط مابين الاغنام العواسي في الأردن .وأخيرا، فإن الدراسة تسلط الضوء من جديد على التركيبة الوراثية الجزيئية والتنوع الوراثي من الأغنام العواسي من مناطق مختلفة من الأردن ومن أجل الاستفادة من النتائج المحتملة لإدارة المستقبلية للحفاظ الوراثي في ظل ظروف التغيرات المناخية وسياسة التهجين السائدة . من ناحية أخرى، أجريت تحليلات التطورية والتنوع الوراثي لسلالات الماعز على أساس تسلسل الحمض النووي. وكان التسلسل لقطعة DNA من قياس 0.5 كيلو بايت لستة عشر أفراد من الماعز من أربع سلالات. تم تحليل تسلسل الحمض النووي من قبل كل من Arlequin وبرامج MEGA .وأظهرت النتائج وجود التمايز التطوري تماما وجدت داخل سلالات الماعز . وعلاوة على ذلك، تم بناؤ شجرة نسب لتقديم الأدلة عن النشوء والتطور الوثيق بين السلالات. أن توفرنتائج التسلسل الوراثي والنسب والأشجار التطورية أدت لوصف التنوع الوراثي التطورية والنسب سلالات الماعز في الأردن. من جهة أخرى أعطيت البيانات نطاقات لمتواليات وراثية لتحديد بعض الجينات وتحديد الأشكال الوراثية تحت الانتخاب في الماعز، أن إمكانية تحديد الجينات للماعز ترافق مع تحديد ما يشابهها من الجينات في الجينوم للاغنام في الاردن باستخدام نظرية دلائل الانتخاب (Selection signatures). إننا نعتزم، من أجل تحديد واضح لتعدد الأشكال الجينيةفي الاغنام والماعز الكشف عن مزيد من الاختلاف الجيني وتطوير اختبارات المناسبة الخاصة بتحديد الجينات المحددة والمهمة للتنميط الجيني.

Microarray Analysis of the Genome-Wide Response to Cement-Dust Pollution in Arabidopsis Thaliana

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Abstract:

Air pollution exerts detriment effects on plant ecosystem and restrict agricultural productivity. Cement dust is considered as one of the most harmful air-pollutants of industrial origin. Cement dust was reported as a limiting factor to plant growth and productivity. To elucidate the physiological and metabolic responses of plants to cement dust, a genome-wide study should be performed by employing a microarray analysis. In this study, Arabidopsis plants were dusted with cement at a rate of 1.5 g per 1 m^2 area. Gene expression microarray analysis was performed using The GeneChip® Arabidopsis ATH1 Genome Array. Microarray analysis identified 1599 differentially expressed genes (DEGs) in response to cement dust application. Out of these DEGs, 831 genes were upregulated and 768 genes were downregulated. Among the upregulated genes are heat-shock protein, ascorbate peroxidase, late embryogenesis abundant protein, Monodehydroascorbate reductase, and glutathione transferase. The upregulated genes identified in the present study are related to responses to environmental stimuli, stress responses, transport, and transcription factor activity. The microarray data revealed that cement dust led to downregulation of Catalase gene. Catalase is a potent antioxidant enzyme that catalyzes the dismutation of H_2O_2 to oxygen and water. The downregulation of catalase may count for the decrease in its activity in response to cement dust. Some transcription factors were shown to be downregulated by cement dust. Among these transcription factors are MYB 122, MYB 78, HRS 1, WOX 14, ARID/BRIGHT, and MEE 3. All of the differentially expressed genes responsive to cement dust were characterized functionally using gene ontology terms. According to the cellular component vocabulary of ontological annotation, the most represented categories in both up- and down-regulated genes were nucleus and other cytoplasmic components. Quantitative real-time PCR analysis validated the microarray expression results.

The results of the present study showed that the total chlorophyll and total protein contents were significantly decreased in response to cement dust, while anthocyanin content was increased. Exposure of Arabidopsis plants to cement dust resulted in a significant enhancement of lipid peroxidation (Malondialdehyde content) and hydrogen peroxide (H_2O_2) levels. Both carotenoid and starch contents were not affected by exposing Arabidopsis plants to cement dust.Changes in the activities of antioxidative enzymes were further explored. Cement dust resulted in increased activities of ascorbate peroxidase (APX), superoxide dismutase (SOD), and glutathione peroxidase (GPX). While, catalase (CAT) activity was significantly decreased in response to the treatment.It can be concluded from the present results that cement dust imposes oxidative stress on Arabidopsis plants with the induction of secondary defense mechanisms. This is the first comprehensive plant transcriptome analysis under cement-dust application.

Keywords: Microarray; Genome-wide; Pollution; Cement; Dust; Arabidopsis.

Effect of Olive Mill Waster Land-Spreading on Olive Tree Performance Oil Quality and Soil Properties

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Abstract:

The application of fresh olive mill wastewater (OMW) to the soil surface of an olive (Olea europaea, L.) orchard was studied for three consecutive years (2011,2012,2013). The experiment was conducted at a private olive orchard located in Raba area at Al–Karak governorate. Olive mill wastewater was applied to olive orchard with 15 year old trees (cv. Nabli Muhassan) in winter at five application rates: Control (no application of OMW), 5L/m^2 one doses at monthly intervals. The effect on soil properties, plant performance, fruit set, yield, oil content and oil quality was studied. Results of the study indicated that, there was no negative effect of OMW application on soil properties. The concentration of K, organic matter, phenolic compounds and total microbial count were significantly higher in OMW - treated soil as compared to the control soil. Olive mill wastewater applied at 10 L/m^2 and 20 L/m^2 gave significant increase in shoot growth, photosynthesis, fruit set and fruit yield. No negative effects were observed for OMW application on oil quality parameters and fatty acid composition throughout the experimental period. Results of this study indicated that the annual application of OMW at 10 L/m^2 is recommended to improve soil fertility and plant performance.

Keywords: *Olea europaea*; Nabali Muhassan; Soil properties; Phenolic compounds; Microbial count; Leaf nutrient content; Tree yield.

Reuse of Biosolids as a Fertilizer for Increasing Forage Production and Enchancing Soil Fertility

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Abstract:

The research compared the effects of biosolids (anaerobically digested), commercial fertilizer and manure on forage crop production (Sorghum vulgare). The field pilot- experiment was conducted during 2012 (between May and September) at the Zarqa region near the Samra Wastewater Treatment Plant. The experiment was established in randomized complete block design (RCBD) with four replications. Treatments and soil were analyzed before and after the experiment Biosolids were categorized as Class A (type 1) based on the Jordanian Standard No. (1145/2006). Rates were calculated based on the agronomic nitrogen requirement of Sorghum – Forage which is approximately (13.5) Kg dun-1. All samples were analyzed for soil texture, pH, EC, CEC, SAR, organic matter, mineral nitrogen, available phosphorus, exchangeable potassium, exchangeable sodium, DTPA extractable micronutrients and trace metals (Fe, Zn, Mn, Cu, Cd, Pb), in addition to some biological analysis (Salmonella spp., TFCC, and IPN). Soil, plant, biosolids and manure samples were checked against the presence of Enteric viruses (6 types of viruses: Adenovirus, Human hepatitis A, Human adenovirus, Human enterovirus 71, HumanCoxsackievirus, and Human poliovirus). Results show similar fresh and dry yield using biosolids, commercial fertilizer and manure. Macronutrients analysis showed that there were no significant differences in N concentration between biosolids treatment, manure and fertilizer treatments. P concentration was significantly increased at manure treatment over the control.

Keywords: Biosolids; Manure.

Seroprevalence and Molecular Characterization of Chlamydophila Abortus in Ewes and Does in Jordan

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Abstract:

Ewes are normally very fertile animals but may have a high incidence of abortion compared with farm animals (Smith, 1986). An accurate diagnosis of abortion in a flock requires a good communication between the flock veterinarian and a veterinary diagnostic laboratory. Several infectious agents have been incriminated as causes of abortion in sheep but the most common ones are Brucella Melitensis. Such infectious agents are the most common cause of sheep abortion in Jordan. Aborted animals were developed a strong immunity that prevents further abortions during following pregnancies. In rams C abortus can cause orchitis and seminal vesiculitis, were resulted in the shedding of the organism in semen. Adult animals were infected as a result of contamination through the ingestion of organisms shed in vaginal fluids and placental membranes at the time of abortion or lambing inhalation of the organism from the environment or sometimes through infected semen.

Keywords: Animals; Abortion; Diagnosis.

Effect of Various Shading Methods on Cucumber (Cucumis sativus L.) Growth and Yield Production

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Abstract:

Greenhouse shading may have a time-dependent effect on fruit production, water and nutrient uptake in plants. A plastic house experiment was conducted in Madaba city (high lands) in the first year, then repeated in the Jordan Valley in the second year to find out the impact of four shading treatments on cucumber growth and yield production. These treatments were; Green Shadow 1 (GS1), Whitewash (Calcium Carbonate), Mud and Control (no shading). The first year results showed that plastic cover permeability was not affected by the types of the used treatments after washing the cover materials. Whereas, the control treatment produced the highest vegetative growth and fruit yield, so there is no need for shading the plastic houses at this area of Jordan during summer months. However, using of whitewash or mud as a shading material kept on fruit quality. Also, as the light intensity or the temperature increases, vegetative and yield measurements increases. On the other hand, it was observed that the use of the GS1 as a shading material accelerate flowering, extended production period and deceased the mite infection percentages. While, the second year results showed that permeability was reduced by using GS1 or whitewash as shading materials. GS1 treatment produced the highest vegetative growth, whereas, whitewash produced the highest fruit yield. However, using GS1 improved fruit fresh and dry weight and kept on fruit quality. Also, as the light intensity increased, fruit fresh and dry weight was increased; while, control treatment delayed flowering, decreased production period and increased the mite infestation. S o, there is a need for shading the plastic houses at this area of Jordan during summer months.

Keywords: Cucumber; GS1; Plastic House; Shading; Whitewash; Mite.

Improving Nutritive Value of Cereals and Legumes Straws for Ruminant Nutrition by either Aqueous Ammonia Treatment or Fibrolytic Enzymes with Addition of Some Feed Additives

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Abstract:

One of the restrictions in ruminant feeding is the shortage and high prices of forages, which revealed more prominently during winter. Limited water resources and fluctuated rainfall govern planting of green forages, where forage crops required elevated needs of water. Currently treated effluents were being used for irrigation as an alternative source of needed water. In Jordan Valley, there was an indirect irrigation use after mixing treated effluents with natural and fresh water supplies. Wastewater is considered as a good fertilizer and soil amendment that would increase crop yield and enhanced soil fertility and productivity. Regarding to the preservation of cultivated crops irrigated with wastewater, ensiling was an active method used for preservation of moist forage crops. It was based on solid-state lactic acid fermentation under anaerobic conditions. Air was detrimental to silage as it enables plant respiration and the activity of aerobic spoilage microorganisms such as yeasts and molds. In this project, four forage crops such as corn, alfalfa, barley sorghum were cultivated in small scale, and irrigated with wastewater to test crops interaction with wastewater, the ensiling process and to standardized the developing technique of sealed-vacuum small plastic bags. In the second stage of the project, only two types of most compatible forage crops were re-cultivated in large scale to produce enough amounts of silage for ruminant consumption during animal performance trials. Small bags of fifty kilograms capacity were used for packaging chopped crops after harvesting and then were sealed tightly after totally removing of air. The sealed small bags were stored for enough time interval needed for silage maturity. Ensiling process in this stage would be followed the recommendations resulted from the previous one of the project. Thirty dairy Holstein-Friesian cattle and eighty four of Awassi ewes and Shami goats were used in performance trials to investigate replacing of alfalfa hay as a source of roughage with produced silage of crops irrigated with wastewater and ensiled with seal-vacuum small bags.

Keywords: Dairy cattle; Small ruminants; Wastewater; Bag silage; Alfalfa.

دراسة بيولوجية وايكولوجية وطرق المكافحة المتكاملة لعثة حفار أوراق وثمار البندورة

عاصم أبو علوش، مروان عبدالوالي، باسل عبيدات

الملخص:

أدت الاصابة بحشرة حفار (عثة) أوراق البندورة *Tuta absoluta* والتي ظهرت بشكل مفاجئ في الثلاث سنوات الاخيرة بشكل مفاجئ في مختلف مناطق العالم والمملكة مسببة خسائر اقتصادية كبيرة لايمكن تحملها وقد أدت في بعض المناطق (المفرق) الى خسارة كامل المحصول عند عدد كبير من المزارعين. وقد كان لطبيعة الحشرة البيولوجية والسلوكية من حيث مهاجمتها لكامل أجزاء النبات وتواجدها بين أنسجة النبات وخصوبتها العالية دورا محددا لعمليات المقاومة المستخدمة من قبل المزارعين وفرضت أعباءا مادية اضافية.

هدفت الدراسة الحالية والتي نفذت على مدار ثلاث سنوات في مناطق وبيئات مختلفة من المملكة الى دراسة ايكوبيولوجية هذه الافة الخطيرة, وتتبع سلوكها في الظروف المختبرية والحقلية، ودراسة عناصر (وسائل) المكافحة المتكاملة المتعددة للسيطرة على هذه الافة مع التركيز على دراسة حساسية الأصناف و امكانية استخدام المفترسات والمتطفلات والمبيدات الحيوية، وتقليل استخدام المبيدات الكيماوية، وتعميم نتائج و مخرجات وتوصيات هذه الدراسة على المرشدين الزراعيين والمهتمين.

أظهرت نتائج الدراسة أن الحشرة تتواجد بكثافة عالية في مختلف المواسم والمناطق وأنها تهاجم كافة أجزاء النبات فوق سطح التربة ووصلت نسب الاصابة الى 100% على الاوراق ولم تسجل أية فروقات فسي حساسية الاصناف المزروعة داخل البيوت المحمية او في الحقل المكشوف. أعطت المصائد الفرمونية نتائج ايجابيه في خفض مجتمع الحشرة وكانت فعالية المبيدات الكيماوية أعلى من فعالية المبيدات الحيوية ولم تؤثر المبيدات المستخدمة على مواصفات الثمار. كما تم حصر ثلاثة أعداء حيوية تهاجم هذ الافة وهي *Chrysopa carnea, Nesidiocoris tenuis, Bracon concolorans*.

Rearing and Release of Aphelinus Mali (Hald) (Hymenoptera: Aphelinidae), the Sole Parasitoid of Woolly Apple Eriosoma Lanigerum (Hausmann) (Homoptera: Eriosomatidae) on Apple Orchards in Ash-Shoubak

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[b] University of Jordan

[c] National Center for Agricultural Research and Extension

Abstract:

Aphelinus mali (Hald) (Hymenoptera: Aphelinidae) is the sole parasitoid of woolly apple aphid (WAA), *Eriosoma lanigerum* (Hausmann) (Homoptera: Eriosomatidae). Five ratios of parasitoid to aphid colonies were tested to determine the suitable amount of the parasitoid that gives the highest percentage of parasitism under greenhouse conditions. Curve fitting using Table Curve program showed that releasing 6 pairs of unsexed *A. mali* adults to 100 colonies of WAA results in 98.7 % of parasitism of WAA after 10 days of releasing adults of parasitoids. A valuable suppression of WAA in 2010 was recorded in two apple orchards where the parasitoid was released compared with the orchard in which no release of the parasitoid was done. However, the continuous use of pesticides by apple orchardists in the apple orchards near the experimental orchards resulted in decreasing parasitism rates in 2011 in the apple orchards where release was done due to the movement of WAA from pesticide-controlled orchards to parasitoid-controlled orchards. The government represented by ministry of agriculture is requested to apply a legislation that prevents apple orchardists use insecticides in order to give good opportunity of the parasitoid to build itself.

Keywords: Biological control; Apple; Woolly apple aphid; Integrated Pest Management.

Evaluation of Rapeseed Local Wild Accessions and Introduced Cultivars for Biofuel Production (Quantity and Quality) Under Saline and Treated Wastewater

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Abstract:

The needs for renewable energy sources are a challenge that maximized in regions where the natural sources for energy are limited. The most important was the fossil oil which was not available commercially in Jordan. Locally, interest in alternatives for imported fossil oil was sensational. Besides, reducing CO_2 emission from traditional energy sources was under focus from the environmental scope. Rapeseed (Sinapis spp) was one of the leading biofuel crops worldwide with nearly 30% oil. Arabic countries as Morocco, Tunisia and Algeria were cultivated this plant. In Jordan, rapeseed was a wild, ignored and a noxious unwanted weed and no previous efforts for its domestication and growing for cooking or biofuel oil. Wild accessions of rapeseed were collected from two species *S. alba* and *S. arvensis*. They showed vast differences either within or between species in plant height, pod shape, number of seeds per pod, seed color and others, also accessions noticed to be vigorous in many arid regions. Reclaimed water was available in many stations locally that could be used for the production of energy oil at the same time avoided the conflict between food and fuel as the growing plants were out of the cultivation areas for food crops. Saline water and soils could be involved in the rapeseed production chain, as those resources are not fully used and limited for certain robust crops.

Key words: *S. alba*; s. *arvensis*

Biological Properties of Black Cumin Nigella Sativa L

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[a] Jordan University of Science and Technology

Abstract:

The main objectives of the third stage of this project were to continue the evaluation of the effect of removing free and bound phenolic compounds on the inhibitory activity of ACE. The hydrolyzed peptides obtained from crude protein fractions after removal of black cumin were fractionated using reversed phase high performance liquid chromatography (RP-HPLC). The fractionated proteins from two varieties of black cumin flour were subjected to removal of free and bound phenolic compounds followed by hydrolysis with proteases enzymes. In order to identify and characterize using gel electrophoresis and reversed phase high performance liquid. Chromatography (RP-HPLC) and liquid chromatography electrospray ionization mass spectrometry (LC-ESI-MS/MS). The patterns of hydrolyzed protein fractions before removal of phenolic compounds from both of cultivar 1 and 2 were slightly similar to protein fractions after removal of phenolic compounds.

Keywords: Black cumin; Proteases enzymes.

Production Possibility of Transgenic and Preserved Date Palm Resistant to Red Palm Weevil

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[a] Al-Balqa Applied University

[b] University of Jordan

Abstract:

Date palm (*Phoenix dactylifera*) is the major fruit tree crop in arid areas in the Middle East including Jordan. The need for massive expansion of date palm plantations resistant to Red Weevil *(Rhynchophorus ferrugineu*s) is great significant for date palm industry in Jordan and world wild. Unfortunately, no specific date palm species is resistant to Red Weevil. Thus, this study was developed reliable protocols for the production of Date palm resistant to Red weevil. The red palm weevil *Rhynchophorus ferrugineus* is the most serious pest of date palms in the Middle East. Due to the importance of this pest to all date palm growers in the region the production of transgenic date palm resistant to red weevil is the sole solution. The production of Bt crops were successfully deployed in agriculture, which lead to a decrease in pesticide usage, and that they are environmentally benign. Since the commercial introduction of Bt to agricultural markets, using Bt for pest management is considered a safe and eco-friendly tactic with no adverse effects on humans and other mammals. However, the sustainability and durability of pest resistance will continue to decrease. A synthetic *cry* gene coding for an insecticidal crystal protein of *Bacillus thuringiensis* (*Bt*) were transferred to date palm explants by co-cultivating somatic embryos with *Agrobacteriumtumefaciens*. This crop is especially important in Jordan. The high cost of date plantlets, the very long time to flowering and harvest, and the production of date palm resistant to red weevil raise concerns for the future planting of tissue culture originated date palms, which enable the expansion of date palm plantation in the region and elsewhere. In vitro multiplication and production of transgenic transplants were tested, evaluated and conserved

Keywords: Date Palm; Tissue culture; Red Weevil; Transgenic Plants; *Bacillus Thuringiensis.*

The Potential of Moringa Peregrine for Agricultural and Industrial Uses

Nasab Al Rwashda[a], Feras Aelael [a], Omar khabor [a], Faisal Barakeh[a]

[a] National Center for Agricultural Research and Extension

Abstracts:

The objectives of this study were to evaluate the potential of cultivation of *Moringa* species in Wadi Arab and other location in Jordan, Silage production from the *Moringa* trees for feeding livestock to enhancing feed and food security under climate change, and to study the nutritional value of the *Moringa* oil compared with olive oil. The fatty acid compositions of the *Moringa* peregrine oil seeds and olive oil were analyzed, the major saturated fatty acids in all oils were palmitic and stearic acids, the main unsaturated fatty acid were oleic and linoleic acid. All the studied oil samples contain the oleic and linoleic acids, these oils can be classified in the oleic-linoleic.

Keywords: Moringa

Determination of Water Requirement and Crop Coefficients of Date Palm Trees in Jordan Valley

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[b] Al-Balqa Applied University

[c] Jordan University of Science and Technology

Abstract:

A study was conducted to determine the actual water requirement for mature date palm trees at Deir-Alla Research Station during 2011 growing season. Four irrigation treatments were tested which are application of 50, 70, 100 and 125% of weekly crop water requirements using Randomize Complete Block Design in four replicates on two date palm varieties Mudjoul and Berhi. Soil moisture depletion method was used to determine actual evapotranspiration (Etc) using Neutron Probe scuttling technique in monitoring the soil moisture through installation of two PVC pipe 44 mm diameter and 240 cm depth. Soil sample from all treatment and for deferent depths were collected before and after conducting the study to evaluate the effect of the different irrigation treatments of salt accumulation and sodium adsorption ratio (SAR). The required climatic data for estimation of reference crop potential evapotranspiration using Penman-Montieh method were collected from a nearby climatic station.

Keywords: Etc; SAR

Intelligent System for Stack Emission Air Pollution Detection Using Video Monitoring

Ashraf Ahmad[a], Yehya Al Halbi[a], Edward Jasser[a]

Baha Al khassawneh[a], Zaid Hamzeh[b]

[a] Princess Sumaya University

[b] Lead Company

Abstract:

The project represents an important prospect for video processing and for environmental studies. It is expected to be a useful and robust tool for future environmental control projects and methods. The ability to identify, measure and quantify air pollutants, in real time through inexpensive methods, holds a great promise as it may help in solving pollution problems. This could be achieved through active and constant surveillance using appropriate complex reactive systems that can be easily installed and handled through a friendly user interface. The development of such a useful system by a local research team will indeed be a great advantage.

Keywords: Pollutants; Atmosphere; Environmental

Measuring Jordanian Hospitals' Efficiency through Mining Development Analysis

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[a] Jordan University of Science and Technology

[b] Yarmouk University

Abstract:

The aim of this project is to providean analysis of the notions of care provision and time management of the health sector in Jordan. Each hospital is considered as a Decision Making Unit (DMU) that takes as input resources and transforms them into appropriate services. The investigators aim to measure the performance of hospitals in terms of (1) health care provision efficiency through mining Data Envelopment Analysis (DEA) and Constraint Clustering Analysis, and (2) time management. The DMUs and their corresponding resource-service factors are determined clearly by health sector experts. The study's aim is to enhance the relative performance for each DMU compared to other DMUs. The DMUs are ranked and the weaker DMUs are compared with the best in the rank in order to detect the main weaknesses and suggest ways to overcome them. The investigators expect to identify some criteria and a possible set of best practices which can be adopted to improve the overall productivity of the health services in Jordan

Keywords: Efficiency measurement; Clustering Analysis; Data Envelopment Analysis

Electronic Tourist Guide

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[a] Yarmouk University

Abstract:

The wireless and mobile technologies are constantly evolving and redesigning the ways in which individuals, institutes and industries share information. Since tourismis an information-intensive industry, it seems natural to make use of these technologies to enhance its efficiency. We aim, in this project, to develop and implement an electronic tourist guide system that can adapt to the individual tourist needs. The investigators expect the system to be a boost to tourism in Jordan.

Keywords: Tourism; P2P Networks; Sensor Network; Mobile Computing

Semi-Automatic Generation of Arabic Digital Talking Books

Iyad Abu Doush [a], Faisal Al Khattib [a], Abed Al Raof Bsool [a]

[a] Yarmouk University

Abstract:

The overall goal of this study is to develop an integrated framework for delivering electronic Arabic books in accessible format (i.e., DAISY). The framework could help people with print disabilities in exploring and reading Arabic books. The design of the framework includes: Firstly, Input format: the widely used format for electronic books is PDF. Usually it was converted from text or from images. The PDF books were converted into text format convert text into audio: Arabic speech synthesizer was used to convert the generated text into audio. Secondly, Generate a digital talking book: the generated text book and the generated audio book were connected together to generate the DAISY book. Very small number of Arabic books was available in accessible format for people with print disabilities (e.g., people with visual impairment and people with learning disabilities). Digital talking books were electronic documents encoded in DAISY format. The purpose of this format was to provide access-for-all to digital information. This grant proposal was researched for developing a complete framework for semi-automatic building of DAISY digital talking books for Arabic language.

Keywords: DAISY; Digital talking books; Blind and visually impaired

QoS –Sensitive Resource Management in Wireless Mobile Networks

Aymen Zryqat[a], Asmet Dmoor[b], Khaled Bqaeen[c]

[a] Mutah University

[b] Private Applied Science University

[c] Glamorgan University

Abstract:

QoS for wireless mobile technology were improved via the improvement of the capacity, as it is the critical issue nowadays. The effect of different propagation environments were studied on deployment strategies of wireless broadband services to rural areas using the new broadband (i.e. Wi-Max/Wi-Fi or 4G) technology. Following the enormous trend in wireless communication, there was a growing interest in how to deploy the system network infrastructure to achieve maximum capacity, coverage and flexibility in the most cost-efficient manner. To maximize the number of subscribers within a cellular network while maintaining overall quality of service, one can implement a range of techniques, each smoothly boosting the total network capacity a little further to meet the market demand. The aim of this project is to provide the operators in the mobile companies with the best of the old and the new technology anywhere and on move. New deployment strategies were suggested to achieve maximum capacity on the network while maintaining better QoS to the end user while being mobile.

Keywords: Wireless Networks; Resource Management

Using Wireless Transmission for Faster Service of Emergency Vehicles

Hussein Al-zoubi[a], Sahar Shatnawi [a], Alaa Kalaf [a], Blqees Mohammad [a]

[a] Yarmouk University

Abstract:

Modern day cities exhibit extensive numbers of road intersections. Traffic management at these intersections is usually handled through traffic signals. During rush hours, going through traffic signals is known to consume substantial amounts of time, even for short distances. This adversely impacts traffic flow at large while particularly hindering the operation of emergency and first responders' vehicles. Since part of the mandate of an emergency vehicle is to reach some accident location to handle a given situation in minimum time, traffic signal preemption by emergency vehicles represents one valuable approach to overcoming this hurdle. This approach would be intended to give an emergency vehicle full control over an intersection with the intended effort of evacuating congested traffic ahead. Several approaches have been proposed in the literature for preempting traffic signals by emergency traffic. However, existing approaches suffer certain drawbacks that would need to be addressed and tackled. In this research we present a novel approach towards addressing this problem leveraging the use of the cellular network infrastructure, which when compared to existing state-of-the art solutions offers a low-cost alternative that can be conceived using off-the-shelf devices and components. Our proposed solution has been implemented and tested on a real traffic light in the field. Our study has incorporated a number of field surveys on best ways to preempt a traffic intersection which have involved the general public, emergency vehicle operators, rescue teams and a variety of stakeholders with an all-out effort collect feedback to assess best traffic management practices, public acceptance and address various legislative matters in connection with this subject.

Keywords: Traffic signals; Accident location; Light

Integration of Photogrammetry, GIS, and Remote Sensing for Tourism in Jordan

[a] **Rami Al Rzooq [a],** Abdullah Al Zubi [a], Mowafq Ghanameh [a], Abed Al Rhman Akel

[a] Al-Balqa Applied University

Abstract:

Jordan has often been described as the crossroads of the Middle East. Its tourism industry offers tremendous potential. Prior to the recent peace initiatives, tourism has long been supported by regional trade. The country has an extraordinary range of unique natural, historic, recreational and ecological areas and religious sites of significant interest to tourists from around the world. Jordan also has significant religious foundation for a number of the world's religions. It is part of the Holy Land of both the Old and New Testaments, and in the writings of Islam. Due to the importance of the tourism, this project was integrated between the Geometrics sciences (GIS, Photogrammetry, and Remote Sensing) in order to support and serve this sector in Jordan. GIS was used to crate tourist's layers that shows the tourist in simple, easy, and flexible manner the tourists sites in Jordan. Photogrammetry was employed to generate a DTM and an Ortho-photo which could be used together to give an actual terrain view for the tourists sites. Remote Sensing was used in creating images of how Jordan seen from the space which gave the foreigners more information about Jordan. The results of previous integration have been managed and included in a stand-alone application which could run without the need to the expensive GIS software. The standalone program should be easy, can be updated flexible, friendly to the end users (tourists), which means that the program should not be constraint to the geomantic people.

Keywords: GIS; DTM**;** Geometrics

Efficient Cryptographic Processor for Internet and Wireless Security Based on Elliptic Curve Cryptography

Lo'ai Ali Tawalbeh[a], Mohammad AL-Rousan [a], Osama AlKhalel[a]

[a] Jordan University of Science and Technology

Abstract:

The aim of this research is to Investigate the characteristics of the Elliptic Curves defined over the prime fields (GF(p)) and Design hardware architecture for Elliptic Curve Crypto-processor. It is about describing the proposed architecture using hardware description language and simulating it for functional correctness. Implementing the crypto-processor on hardware (FPGA kit) and evaluating its performance in terms of area and time delay. It is about embedding the resulting crypto-processor in different Internet and wireless network applications to increase the security level. This research mainly focused on efficient hardware realization of a crypto-processor based on elliptic curve cryptography. The proposed processor was embedded in the internet and wireless applications to provide high level of information security.

Keywords: Information Security; Elliptic curves**;** Hardware design**;** Internet

Aparticle Swarm Parallel Framework for Multi-criteria Optimization

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[a] Yarmouk University

Abstract:

The aim of this project has been to look at three issues during the implementation of a system that is used in conjunction with best placement strategies of wind turbines in a wind farm. The first issue deals with improving the particle swarm optimization (PSO) algorithm. The second deals with implementing a parallel PSO algorithm for multi-criteria optimization, as the third addresses an actual design problem to use the developed system for best placement strategies of wind turbines in a wind farm.

Keywords: Wind turbines; PSO algorithm

A Signal Processing Approach for the Diagnosis of Asthma from Cough Sounds

Mhmud Al Khassawneh[a], Faisal Abu Qteish[b] , Khaled Graibeh [a] Hitem Bin Salameh [b], Isra Al Shrae

[a] Yarmouk University

[b] Jordan University of Science and Technology

Abstract:

Childhood asthma has become more widespread in recent decades. As the most common chronic illness in children, childhood asthma causes more missed school days and places further limits on activity than did any other disease in Jordan. Pediatric asthma accounts for large proportions of childhood hospitalizations, healthcare visits, absenteeism from day care/school and missed working days by the parents as a result. Healthcare expenditures on asthma treatment in developed countries are 1-2% of the total healthcare costs. In Jordan, around 0.5 million people are known to have asthma. Nearly, 0.12 million of these people are children. Childhood asthma and adult asthma have the same underlying cause - inflammation of the airways. Such inflammations make the airways overly sensitive, leading to signs and symptoms that range from minor coughing or wheezing to serious flare-ups that interfere with breathing. The diagnosis of asthma in children was commonly dependent on the physician's experience and the collaboration from the child part. Sometimes, it might be difficult to decide whether a child has asthma or some other childhood condition due to potential similarities in the exhibited symptoms. While wheezing was traditionally associated with asthma, not all children with asthma by necessity exhibit wheezing. In fact, with many children, coughing could be the main indicator of asthma. It has been reported that many asthmatic children have special coughing sounds, which suggests that there was a relationship between the cough sound and asthma in children who do not ordinarily wheeze. By understanding the relationship between the sound of the cough and the asthma offers an important diagnostic method to manage and diagnose asthma. Therefore, an accurate diagnostic method for asthma in children was in order. The main objective of this study was to help physicians better diagnose asthma, especially in young children. Therefore, the initial step in this process was to interpret and correlate the cough signal type with identified clinical symptoms and spirometer readings in patients. This research has been aimed at analyzing the spectral characteristics of the cough sound in asthmatic and non-asthmatic children in order to develop an objective method for the diagnosis of Asthma in children.

Keywords: Chronic Cough**;** Wheeze analysis**;** Wavelet Transform

A Library of Automatically Optimized Sparse Matrix Computations Kernels on Graphics Processors Accelerators

Walid Abo Sofa

University of Jordan

Abstract:

The goals of this research is to develop a well-documented, easy to use and a very effective parallel software library which provides both science engineering students and academic and other users can automatically tuned and high performance parallel sparse matrix kernels executed on graphic processing units accelerators (GPUs). The ultimate goal of this work is to generate a sparse kernel implementations whose performance approaches that could be achieved by the best hand-tuned code for GPUs. Sparse kernels are computational operations on matrices whose entries are mostly zero so that operations with and storage of these zero elements may be eliminated. Sparse matrices vary in their nonzero distributions from structured to random sparsity patterns. Hence, improving the performance of sparse matrix computation kernels requires an effective combination of a sparse matrix storage format and optimizations that make the most of the underlying architecture for the chosen storage format. This research project has went through different stages. In the first phase of each stage we have been designing and implementing a fundamental sparse matrix kernel to execute on graphics processing units (GPUs). In the second phase of the each stage we have been designing and implementing an automatic tuning/optimization frame work for the sparse matrix kernel which was implemented in the first phase. Initially we have considered one of the most common sparse matrix kernels: sparse matrix-vector multiplication (SpMV). This operation represented one of the most fundamental performance bottlenecks in solving sparse linear systems and eigenvalue problems. We have intended to build an effective approach for implementing a parallel sparse matrix-vector multiplication kernel on GPUs using a Blocked Transpose Jagged Diagonal Storage Format BTJAD. The work was followed by the implementation design and evaluation of a prototype auto tuning/optimizing software tool for a single sparse matrix-vector multiplication operation. Our auto-tuning software chooses the best storage format and selects values for parameters of the code of a corresponding kernel to obtain best performance on the GPU.

Keywords: GPUs; SpMV; Kernels

قطاع العلوم الانسانية والاجتماعية والاقتصادية

The Impact of Climate Change on Water Resources and Agricultural Potential in Jordan

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[a] Mutah University

[b] Ministry of Agriculture

Abstract:

The aim of the present project was to evaluate the effect of climate and global change on water resources and the impacts of such changes on green and blue water fluxes. The water balance of the Dead Sea was also investigated to examine the environmental and anthropogenic implications on the important water body. One of the papers was the effect of climate change on green water fluxes, water consumed in vegetation growth. Results show that a decrease in precipitation by 10% along with a rise in temperature will lead to aridification with strong impacts on green and blue water fluxes. A reduction in precipitation along with an increase in air temperature will seriously reduce the renewable water resources in Jordan by 20% to 40% (published in Climate Change and the Sustainable Use of Water Resources).

The water budget was also carried out on a watershed level. The basin chosen for this was a relatively medium size watershed draining part of the Karak Plateau. Results were obtained using a spatially distributed transient model. Calculations provided estimates of evapotranspiration, water recharge and runoff. Total renewable water resources in this watershed were around 13% of total annual areal precipitation (published in Environmental Processes). Theoretical calculations of the water budget of the Dead Sea indicated that total water flow to the Sea was close to 1550 to 1600 million m^3/year prior to 1960. Current water flow is within the range 300-350 million m^3. Annual evaporation from the sea surface is around 1200 mm which gives a total loss of 720 million m^3 annually. Potash withdrawal accounts for a significant contribution to sea level decline (published in Theoretical and Applied Climatology).

Keywords: Eastern Mediterranean; Semiarid environments; Climate gradient; Blue water fluxes; Climate change; Spatial modeling; Aeolian Erosion; Dust Storms; Threshold Friction Velocity; Jordan Desert; Tragedy of the Commons; Consolidated Crusted Surface; Soil Texture

فعالية برنامج إرشادي لتهيئة المقبلين على الزواج في تحسين التكيف النفسي ومهارات التواصل وإدارة الصراعات والمشكلات وتأكيد الذات

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أ. جامعة مؤتة.

ب. مركز التوعية والارشاد الاسري.

ج. مدارس رحمة الخاصة.

الملخص:

هدفت الدراسة الحالية للبحث في فعالية برنامج إرشادي مخصص للمقبلين على الزواج في تحسين وتنمية كل من: التكيف، ومهارات الاتصال، ومهارات حل المشكلات، ومهارات توكيد الذات، ومهارات إدارة الصراع، وتحسين اتجاهاتهم نحو الزواج، ولتحقيق أهداف الدراسة قام الباحثان باختيار مجتمع دراسة من محافظة الزرقاء، وقام باختيار عينة اختيرت عشوائيا بالتعاون مع مركز الإرشاد والتوعية الأسري، حيث أجري البرنامج في المركز، وقد تألفت عينة الدراسة من مجموعتين تجريبية وضابطة، حيث بلغ عدد أعضاء المجموعة التجريبية (13 من الذكور، و17 من الإناث) كما بلغ عدد أفراد المجموعة الضابطة (15 من الذكور، و15 من الإناث).

وتم بناء ستة مقاييس جديدة تخدم الدراسة الحالية وهي مقاييس: (التكيف، ومهارات الاتصال، وحل المشكلات، وتوكيد الذات، وإدارة الصراع، واتجاهات المقبلين نحو الزواج)، كما قام الباحثان بمشاركة الفريق البحثي بتطوير برنامج تدريبي إرشادي مكون من (15) جلسة إرشادية، تطبق بطريقة جمعية، مدة كل جلسة ساعة ونصف، وقد تم تطبيق البرنامج على أعضاء المجموعة التجريبية (الذكور والإناث) كل على حدى، فيما لم يتم تطبيق البرنامج على أعضاء المجموعة الضابطة.

وتوصلت الدراسة لعدة نتائج من أهمها: وجود فروق ذات دلالة إحصائية عند مستوى (α=.05) بين أعضاء المجموعة التجريبية والضابطة في جميع المقاييس الستة، لصالح أعضاء المجموعة التجريبية على القياس الكلي، وفي معظم أبعاد المقاييس لدى الذكور. وجود فروق ذات دلالة إحصائية عند مستوى (α=.05) بين أعضاء المجموعة التجريبية والضابطة في جميع المقاييس الستة، لصالح أعضاء المجموعة التجريبية على القياس الكلي، وفي جميع أبعاد المقاييس لدى الإناث. عدم وجود فروق ذات دلالة إحصائية عند مستوى (α=.05) بين أفراد المجموعة التجريبية تبعا للمتغيرات التالية: النوع الاجتماعي، والمؤهل العلمي، والفئة العمرية، وطبيعة العمل، وعدد أفراد العائلة، وترتيب المشارك في أسرته، والمستوى الاقتصادي، والتدخين، نوع المنزل عدم وجود فروق ذات دلالة إحصائية عند مستوى (α=.05) في المجموعة التجريبية في المتابعة الأولى (بعد انتهاء البرنامج)، والثانية (بعد ثلاثة شهور من انتهاء البرنامج).

الكلمات الدالة : برنامج ارشادي، الزواج، تهيئة، تأكيد الذات، التكيف النفسي، ادارة الصراعات، مهارات الاتصال، حل المشكلات.

The Negative Biological and Health Consequences of Endogamous Marriage in North Jordan

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Abstract:

Various degrees of endogamous marriage are practiced in very high rates in the Arab and Muslim societies when compared with their rates among other societies. There are several motives for this type of marriage including increase strength of unity between members of the same group and keep ownership within the group over generations. In spite of this, intermarriage may lead to birth babies who have genetic defects in higher rates of those that may result from outmarriage. This research paper aimed to study genetic disorders in families formed based on endogamous marriage in seven villages in northern Jordan: Fo'ara, Jenin ElSafa, Wagas, and Malka of Irbid governorate; Sakeb of Jerash governorate; and Kufr najah and Rajeb of Ajloun. This phenomenon has been studied from the medical anthropological point of view, and in order to achieve the goals of study, the researchers used ethnographic and statistical methodologist based on participant observation and structured interview to collect the data. The field work was conducted over a period of five months. This research reached the conclusion that despite the several benefits that may result from consanguineous type of marriage including strengthen the unity between members of the same tribe and keeping the ownership within same group and continuity of marriage, endogamous marriage may lead to biologically weak born offsprings who suffer from many genetic diseases that may be avoided by conducting pre-marriage medical examinations and genetic studies. The institutions that have an interest in this issue should develop polices and make various pre-marriage medical examinations accessible for people in health centers and hospitals and continue to educate people to expand public awareness about these genetic disorders that may result from endogamous marriage. These activities can be carried out through various mean of media and educational workshops in health and religious institutions for local communities.

Keywords: Endogamous marriage; Jordan; Health Problems; Blood disorders; Genetic disorders; Cleft Lip

Improving Reading Comprehension in English among Secondary Stage Students in Jordan

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[c] Mutah University

Abstract:

this project being supported by the scientific research fund / ministry of higher educational addressed among other aspects the reading comprehension interests of 500 second secondary class students in English at Amman 2nd directorate of education through by using a close questionnaire of 43 items. The results revealed that students were mainly interested in gathering vocabulary items to use them in speaking and writing, developing reading strategies, receiving training on how to understand the reading text, developing intercultural awareness via reading comprehension, developing analytical and critical reading skills, knowing the general and specific ideas in the reading text and reading the whole passage to understand it. Others encompassed getting a translation of the reading passage and following a bottom up approach in reading comprehension in favor of literary stream 2nd secondary students compared with scientific stream students. The results of this study did not reveal any statistically significant differences in the students' reading comprehension interests ascribed to gender. Further, there were statistically significant differences in reading comprehension interests in favor of students, whose achievement level in English in the general secondary exam out of 70, were 31-40, 41-50, 51-60. 61-70 compared with the consideration of the excellent students' interests by taking them into account when teaching reading comprehension to under-achieving students. Finally, the researchers provided a set of reading comprehension among high school student in Jordan in light of the finding and the conclusions derived from the various surveys conducted and the experiments conducted.

Keywords: Teaching EFL reading; Learning reading comprehension; Secondary stage reading; Teaching English in Jordan; English Language learning

Development of Quality and Professionalism Criteria in Jordan Media

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Abstract:

The main purpose of this study was to identify Jordanianjournalists' knowledge and awareness of the basic concepts of professionalism and media quality by addressing four sets of media quality standards, abstracted from several studies. Notable among those sets are media content standards, performance quality standards of newsrooms, institutional standards, and standards of news selection. Furthermore, the study endeavored to find the difference between awareness of specific standards of professionalism and quality, and realization of the actual practices of media institutions. The responses of 200 journalists revealed that there was a reasonable awareness of the basic concepts of quality and professionalis. However, the study found a gap between Jordanian journalists' realization of quality and professionalism standards and the actual applications of those standards by the institutions. This study recommended that media institutions should adopt quality concepts and bridge the gap between standards and actual media practices by means of independence protection; separation between ownership and editing; restraining the external interference and increasing the level of quality in media performance, particularly in localism standards, using sources, pluralism, accuracy, social responsibility, criteria of news selection, and publishing relevant guidelines.

Keywords: Media Quality; Jordan Media; Criteria

Standardizing the "Woodcock-Johnson" Cognitive and Achievement Tests for Jordanian Students

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Abstract:

The purpose of the present study is to examine the applicability, validity, and reliability of the Woodcock-Johnson cognitive and achievement tests in Arabic (WJ III; Woodcock, McGrew & Mather, 2001, 2007; Woodcock, McGrew, Mather, & Schrank, 2003, 2007). The WJ III Battery consists of tests of cognitive abilities and achievement. The design of the WJ III Battery is unique in that its cognitive and achievement assessments have been shown to be highly predictive of reading, writing, and math achievement, whereas other measures in use have not demonstrated as strong a correlation (e.g. the Wechsler Intelligence Scale for Children–Fourth Edition and the Wechsler Individual Achievement Test - Second Edition) (Flanagan, 2001). In addition, several other studies have investigated the use of the WJ Tests for identifying students with special needs, specifically students with learning disabilities, and have added to the base of information on its validity and reliability (Abu-Hamour, Al Hmouz, Mattar, & Muhaidat, 2012; Lohman, 2003; Mather & Woodcock, 2001; Schrank, 2005). The WJ III Battery is based on the most current theoretical model of intelligence, Cattell-Horn-Carroll (CHC) theory (Alfonso, Flanagan, & Radwan, 2005). The broad CHC abilities measured on one or more of the WJ Tests are: Long-Term Retrieval (Glr), Auditory Processing (Ga), Fluid Reasoning (Gf), Processing Speed (Gs), Short-Term Memory (Gsm), Visual-Spatial Thinking (Gv), Comprehension-Knowledge (Gc), Reading- Writing (Grw), and Quantitative Knowledge (Gq). The resulting coefficients were very high in all reliability cases (.89-.99). The very rigorous steps of translation, the short time between the two testing sessions, providing clear and explicit instructions for administering the Jordanian WJ Tests, the examiners' familiarity with the format and testing technique, and the absence of any mistakes in the tests format or instructions helped to achieve the high reliability results. In addition, very small standard error of measurements was detected which lead to the conclusion that the Jordanian WJ Tests scores are consistent across a short period of time and across different examiners.

Keywords: WJ III Tests; CHC Theory; Cognitive and Achievemnt Tests; Students with Special Needs; School Psychology; Special Education; Mild Disabilities

The Relationship between Strategic Planning System Characteristics and Organizational Effectiveness in Jordanian Hotels

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Abstract:

The tourism sector in Jordan is the second largest private sector employer and the second highest producer of foreign exchange. The sector, however, has been affected by many external factors in the Middleeast, such as wars, turmoil and, most recently, the Arab Spring. Given the changing environment in which these hotels are doing business, they require High adaptation capabilities in order to grow and compete. Despite this, little research has been undertaken in this area. This research, therefore, aims to identify and examine the characteristics of strategic planning systems in Jordanian hotels and their relationship to organizational effectiveness. In order to achieve this aim, a questionnaire is developed after reviewing the literature related to strategic planning and its effectiveness in both developed and emerging markets. The empirical research is undertaken via survey of all four and five star hotels operating around Jordan's most popular tourist attractions: Amman, the Dead Sea, Petra, and Aqaba. A total of 138 questionnaires were handed to the entire target population of 46 hotels. This questionnaire yielded an 80.4 % percent response rate. The main finding of this research are: the *mean* time horizon for strategic planning is 5.4 years; top management and boards of directors have less participation in strategic planning processes than outside consultants; internal scanning is used less frequently than external scanning; some important strategy analysis tools are used less frequently than traditional ones; and the areas of research and development and technology are covered. However, strategic planning is found to be positively and significantly related to organizational effectiveness.

Keywords: Strategic planning; Organizational effectiveness; Jordan; Environmental Scanning; Time horizon; Functional Coverage; Organizational characteristic

Pushing Factors of Jordanian Social Movement and its Characteristics

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Abstract:

The Objectives of the studywere: determine the personal, social, economic characteristics of the participants in Jordans social movement, participants' perceptions of the future of the social movement, evaluation of the participants in the social movement of security responses (intelligence, police, and gendarmerie) to the social protesters, perceptions of the participants in the social movement towards reform and corruption, identify the national priorities for reform, identify the reasons for participating in the social movement, identify the demands of the participants in the social movement, identify the driving factors for the social movement (reasons), and uncover the demands of the social movements.

Focus groups discussion revealed that there are many reasons that led people to demonstrate in streets as a result of a cumulative sense of injustice among the people who suffer from poverty, and block the rights of a large segment of the population by the lack of equal opportunities, lack of access to jobs, increasing numbers of unemployed educated people, and increasing poverty among large segments in many of the villages and towns of Jordan. Further, other reasons include lack of seriousness of the government's efforts toward reform, as well as, the slowdown in the process of political, economic and social reform.

According to participants in the focus groups the motives behind joining the social movement in Jordan is due to the political awareness among the Jordanian public, seeking to stop the steeling of the country's wealth, and the pursuit of the existence of a democratic state and to fight poverty, and corruption in all its forms, financial, administrative and political. Moreover, the creation of a modern law for the elections is the right of people to choose their representatives in the House of Representatives, and constitutional amendments. In terms of public demands there are two types of demands advocated by the social movement: demands of certain groups such as the establishment of the teachers union, the second type of demands are the demands of the public calling for reform, especially political and economic reforms, the achievement of real democracy, and the fight against the corruption.

Factor analysis revealed three factors behind social movement, they are: The interest of status qua factor (such as intelligence interference in public life, the control of the old guard on the public life, appointments genetic in senior positions, security intervention in public life, the intervention of the Queen in the public affairs of the state). The second factor called the economic situation (such as rising prices in general, failures in the fight against poverty, lack of seriousness in reform, a failure in the fight against unemployment, corruption, financial and administrative). The third factor called the situation of political and civil rights (such as the lack of equality and fairness, access to a democratic society, protection of human rights, and achieving constitutional monarchy). Two factors composed all demands by the public. The first factor named social factor (such as equality, justice and fairness, the trial of the corrupt, poverty eradication). The second factor security factor (such as the independence of the security services, ensure freedoms,

constitutional monarchy, the independence of universities, and remove security interventions in public life).

Keywords: Youth; Social movement; Economic characteristics; Jordan

Leadership Styles of Jordanian Women Leaders in the Public and Private Sectors

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Abstract:

The purposes of this study were to identify the leadership styles of Jordanian women leaders in the public and private sectors and to identify differences in leadership styles between women the two sectors. In addition, the study explored women's definition of leadership; their perceptions on barriers hindering Jordanian women's advancement; main strategies and policies for Jordanian women's advancement in leadership positions. Jordanian women defined leadership from a comprehensive point of view taking into consideration that effective leaders are managers who have clear vision. They set and achieve the goals of the organization and the society in collaboration with the team focusing on their own strengths and the strengths of others. They initiate new ideas, respect and empower others, fair and trust worthy, influence, make decisions, solve problems, facilitate positive change and growth, and provide encouragement to others.

The findings of the study also revealed that Jordanian women demonstrate effective leadership style as they exhibit transformational with part of the transactional leadership behaviour. Jordanian women are likely to be visionary, committed, credible, creative, inspiring to followers, and set as role model as leaders in their organizations. The results also showed that Jordanian women exhibit important aspects of the transactional leadership style, which is the contingent reward and they do not exhibit the passive management by exception behaviour however. They do exhibit the active management by exception behaviour as well as they (sometimes) avoid making decisions. The results also revealed that women in the public sector are more likely to exhibit a passive style of transactional leadership and the Laissez–faire style than women in the private sector.

As for the leadership outcomes, Jordanian women see themselves as being effective in achieving goals as well as being influential by exerting extra efforts by followers and having a sense of self-satisfactions. On the other hand, comparisons on the outcomes of leadership components show that both groups differ significantly on only one outcome where women in the private sector are more likely to be effective than women in the public sector. Jordanian women leaders were aware of the different barriers for women advancement and they were aware of the strategies to move forward in their careers. The barriers for women advancement included the political and legal barriers, economic, organizational and workplace barriers, family, social and cultural barriers and personal and self-development barriers. Women empowerment, legal support, organizational and family support, awareness raising and training on leadership skills were main issues suggested by women leaders to enhance Jordanian women's advancement in leadership positions and recommendations were illustrated accordingly.

Key words: Leadership Styles; Leadership; Gender; Female leaders; Leadership skills; Private sector; Public sector.

The Great Arab Revolt Archaeological Project (GARAP) - The Fourth Season

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Abstract:

The objective of this study were the Great Arab Revolt Project(GARP) plans to carry out a ten-year investigation of the archaeological remains of the war between the Ottman Empire and the Hashemite Arabs between 1916 and 1918. This project will be a major contribution to the development of the new sub discipline of modern conflict archaeology. it also has the potential to contribute to the creation of new heritage tourism attractions of economic benefit to Jordan. This season's work has strengthened the hypothesis that the area along the Hijaz Railway was much more heavily, militarised than at first thought. It has now been established that the high ground around the Hijaz railway was heavily entrenched in 1916-18, and the impression grows of a large-scale counter-insurgency operation in southern Jordan between July 1917 and October 1918 - testimony to the effectiveness of the Arab military effort. It has also been established that there is an excellent presence of remains reflecting the character of the Ottoman military occupation in the later stages of the war. The Great Arab Revolt Project is therefore contributing substantial new information and ideas to at least three distinct archaeologies: that of modern conflict, that of southern Jordan, and that of desert movement and warfare. It is also revealing the potential which exists for the development of major new heritage tourism attractions in the region.

Kewords: The Great Arab Revolt; Archaeological field survey; Ottoman Rule; Oral History; Hejaz Railway

Assessing the Extent of the Success Public Private Partnership (PPP) in E-government Implementation Experiment in Jordan

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Abstract:

The main aim of this Project is to evaluate the adoption of Public Private Partnership (PPP) approach in E-Government program in Jordan as one of the developing countries through appraising the second stage of the three-stage model of PPP developed by (Al-Shqairat, 2009). Al-Shqairat's proposed model consists of three main stages; planning, implementation, and evaluation. Hence, this project aims to develop and validate a research instrument that can be used to empirically evaluate the implementation stage for PPP in the context of E-Government program in Jordan using triangulation methodology. The research employed quantitative and qualitative methodology using 110 structured questionnaires and 11 semi-structured interviews with PPP practitioners, respectively. The main findings of this study shows significant support for the proposed implementation stage. Accordingly, this model could be adopted by government entities in order to be successfully implemented in E-government programs in Jordan in particular and IT projects in general.

Keywords: Public Private Partnership (PPP) implementation; E-Government; Jordan; Public Sector; Private Sector; PPP forms; PPP mechanisms; E. Government.

Impact of IT on the Level of Productivity and Services: A Field Study on Greater Municipalities of Maan, Tafila, and Karak

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Abstract:

The study aims at investigating the effect of using information technology (IT) on the level of productivity and services at south region municipalities (Karak, Ma'an and Tafila). The importance of the study is to illustrate the effect of IT on the quality of services and productivity level of workers at these municipalities. A survey was conducted and questionnaires were distributed to (76) employees of the south region's greater municipalities. The data were gathered and analyzed using SPSS statistical program. The study's results show that the present information system is fairly accepted to produce services since it collects data from its available financial, managerial and technical jobs. Further, the information provided by the present system does not cover all aspects of work. Also, the study found that employees who used the investigated information system were satisfied and its technologies play a significant role in the progress of services level provided by municipalities. The study recommends the necessity of establishing an integrated information system that covers all applied aspects for all departments of the south region's municipalities in order to improve the effectiveness of the present system to: firstly, enhance the productivity and services level; secondly, provide suitable training and orientation to municipalities' employees to enable them to use IT and be capable of improving work performance and get exclusive services. Therefore, the three municipalities need develop a relationship with scientific and academic institutions which in returns benefit them to acquire the latest information technology achievements.

Kewords: Services; Productivity; Information Technology; Municipalities; South of Jordan

فهرست المسائل اللغوية في المعاجم العربية وحوسبتها

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أ جامعة مؤتة.

ب جامعة الحسين بن طلال.

ج الجامعة الالمانية الاردنية

الملخص:

فهرسة للمسائل اللغويّة: الصوتيّة والصرفيّة والنحويّة في عشرةٍ من المعاجم العربية القديمة، هي معجم العين، وجمهرة اللغة، والصحاح، ومقاييس اللغة، والمحيط في اللغة، وتهذيب اللغة، والمحكم والمحيط الأعظم، ولسان العرب، والقاموس المحيط، وتاج العروس. ومجموع مجلداتها(120) مجلداً. تم تصنيف مئات المسائل اللغوية في أبوابٍ، مثل: الاستغناء، والاتساع، والحمل على المعنى، والحمل على التوهم، وتداخل اللغات، والممات من الألفاظ، والشذوذ، واللهجات، والعوض، والنيابة، والتعاقب، والحمل على النظير، والإشباع، والخفة والثقل وغيرها، ويندرج تحت كل باب طائفة من المسائل اللغوية التي وردت في هذه المعاجم، مشفوعةً بمقدمة موجزة عن الظاهرة اللغوية موضع الدراسة، وأهم المصادر التي أشارت إليها، وأشار البحث على نهج كتاب "دراسات لأسلوب القرآن الكريم" من حيث ذكر المادة اللغوية، ومواضع ورودها في المعاجم. فعلى سبيل المثال تناول البحث (ظاهرة الاستغناء) باباً من الأبواب، ويقدم البحث تعريفاً للظاهرة ومرادفاتها اصطلاحاً، وأهم جهود العلماء فيها والمصادر التي أشارت إليها، وتقسيمها إلى فصول مثل: الاستغناء قي باب النحو ويشمل مسائل، والاستغناء في باب الصرف ومسائله، قام الفريق بتتبع مواضع الاستغناء في هذه المعاجم وفهرستها بعد تصنيفها في مسائل، واستقصاء كل ما حمل عليها من ألفاظ في المعجم موضع الدراسة. قام الفريق البحثي بادخال بيانات هذه المعاجم على النظام المحوسب كاملة بواقع (38143) ثمانية وثلاثين ألفاً ومائة وثلاث وأربعين بطاقة. رُتبت هذه البطاقات حسب الموضوعات الرئيسيّة للمشروع، وكلّ عنوان رئيسي يتفرع عنه عناوين فرعيّة مرتبة هجائياً، يندرج تحت العنوان الفرعي مئات البيانات التي تُشكّل مادة المعجم. فأنجز الفريق فهرساً متخصصاً في المسائل اللغويّة في المعاجم العربيّة، وموثّق بأسلوب علمي عالي الجودة، وهو الأول من نوعه في العالم العربيّ، والأول من نوعه في فهرسة المسائل اللغويّة في المعاجم العشرة، وبدقة تتجاوز في نسبتها العامة96 %. المعاجم العشرة، يمكن توزيعها الكترونيّا كقاعدة بيانات على المكتبات، والجامعات والمراكز البحثيّة، والمؤسسات المعنيّة، وهنالك إمكانية للتجديد والتحديث وتعديل البيانات، وإضافة معاجم جديدة في المستقبل.

الكلمات الدالة : معاجم، مسائل لغوية، فهرسة المسائل اللغوية، حوسبة المسائل اللغوية

مدى تحقيق الوزارات والمؤسسات الفائزة بجائزة الملك عبدالله الثاني لتميز الأداء الحكومي والشفافية لثقافة التميز من وجهة نظر العاملين فيها ومتلقي الخدمة

شفيق إبراهيم حداد، محفوظ أحمد جودة.

جامعة العلوم التطبيقية.

الملخص:

تهدف هذه الدراسة الى بيان مدى تحقيق الوزارات والمؤسسات الفائزة بجائزة الملك عبدالله الثاني لتميز الأداء الحكومي والشفافية لثقافة التميز من وجهة نظر العاملين فيها ومتلقي الخدمة. وأثر ثقافة التميز في تطبيق معايير الجائزة في نشر وعي ثقافة التميز لدى الوزارات والمؤسسات التي لم تحصل على الجائزة بعد. تكون مجتمع الدراسة من كافة الوزارات والمؤسسات العامة الفائزة بجائزة الملك عبدالله الثاني لتميز الأداء الحكومي والشفافية، ومتلقي الخدمة من المؤسسات والأفراد. ويبلغ عدد الوزارات والمؤسسات العامة الفائزة بالجائزة (28) وزارة ومؤسسة عامة خلال خمس دورات من الدورة الأولى 2004/2003 حتى الدورة الخامسة 2011/2010. وتم استخدام اسلوب الحصر الشامل للوزارات والمؤسسات العامة الفائزة بجائزة الملك عبدالله الثاني لتميز الأداء الحكومي والشفافية. وبلغ إجمالي عدد أفراد عينة البحث التي تم توزيع نماذج الاستبانة عليها (952) فرداً. توصلت الدراسة الى متوسط ثقافة الابداع والذي بلغ (4.08) هو أعلى متوسطات أبعاد ثقافة التميز، وأن أعلى متوسط لأبعاد الممارسات المثلى كان لبعد التركيز على متلقي الخدمة (3.99). وأظهرت نتائج الدراسة أن هناك تاثيرا معنويا لثقافة التميز في المؤسسات الحكومية الحاصلة على الجائزة في تطبيق معايير التقييم المعتمدة في الجائزة". كما أظهرت الدراسة وجود تاثير معنوي لكل بعد من أبعاد ثقافة التميز في تطبيق معايير التقييم المعتمدة في الجائزة. ووجدت الدراسة أيضاً أنّ هناك تأثير معنوي لمعايير التقييم المعتمدة في جائزة الملك عبد الله الثاني لتميز الأداء الحكومي والشفافية في كل بعد من أبعاد الممارسات المثلى للمؤسسات الحكومية. وكذلك أشارت النتائج إلى وجود تاثير معنوي للممارسات المثلى للمؤسسات الحكومية في أبعاد ثقافة التميز. وكانت تقييمات العاملين في المؤسسات الحكومية الفائزة ايجابية لكل من ثقافة التميز، والممارسات المثلى. وأشارت النتائج إلى أن أن تقييمات رضى متلقي الخدمة من المؤسسات الحكومية الفائزة بالجائزة كانت ايجابية. بالاضافةالى وجود تأثير معنوي لمعايير التقييم–بدلالة ابعادها - في رضى متلقي الخدمة من المؤسسات الحاصلة على الجائزة.

الكلمات الدالة : التميز، الجودة، ثقافة التميز، الأداء الحكومي، المؤسسات الفائزة، جائزة الملك عبد الله.

Expected Economic Effects of the Jordanian Canadian Free Trade Area

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Abstract:

This study has evaluated the trade potential between Jordan and Canada in light of the recently signed FTA. A rich set of trade analysis were utilized including the analysis of revealed comparative advantages, current tariff structures, trade intensity and complementarity and the trade flows matching technique. Macroeconomic and business environments for the two countries were compared. General and bilateral trade flows and directions were extensively analyzed for both countries. T he main findings of the study can be summarized as follows: Jordanian trade liberalization policy especially via various FTA's between Jordan and several other countries, has contributed to the expansion of both exports and imports. However, the growth of imports was faster than the growth of exports due to supply side constraint. This has contributed to worsen the chronic trade deficit. The comparative analysis showed the following findings: The Jordanian economy is smaller and more vulnerable to structural macroeconomic imbalances compared to Canadian economy. Canada surpassed Jordan in all indicators of competitiveness including easiness of doing business, cost of establishing a new project, labor productivity growth. This may indicate to competitive difficulties that will potentially face domestic producers as trade becomes more liberalized between the two countries. Canada and Jordan are very similar in term of reliance on trade as the values of exports reliance index are very close to each other and to the world average. Canada is more exports dependence on developed economies compared to Jordan as indicated by exports exposure index. However, Jordan is more open to trade than Canada as the value of trade openness sub-index in Jordan is twice the value in Canada, which implies that Jordan is more reliance on trade in economic activities compared to Canada. The Iraqi, US, Indian and Saudi markets, respectively, were the most important destinations to Jordanian exports. The largest supplier of goods to Jordan was Saudi Arabia, China, Italy, Germany and Egypt, respectively. The three-degree exports concentration ratio for Canada was about 43%, indicating to less degree of export diversification compared to Jordan where the ratio was significantly less at 36%.

Keywords: Trade; Canada; Jordan; Compare; exports; FTA; Economic; Area

علاقة البطالة بالجريمة في المجتمع الاردني: دراسة مسحية للسجون الأردنية

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ب جامعة مؤتة

الملخص:

هدفت الدراسة الحالية للتعرف على علاقة البطالة بالجريمة والانحراف في المجتمع الأردني بشكل عام، وهدفت إلى معرفة العلاقة بين مجموعة من المتغيرات الاجتماعية والديمغرافية ممثلة بنوع البطالة، مدة البطالة، العمر، المستوى التعليمي، الدخل الشهري، الحالة الاجتماعية، مكان الاقامة، عدد أفراد الأسرة بالجريمة والانحراف على عينة من العاطلين عن العمل المودعين في السجون الرئيسية الأردنية (الجويدة، سواقة، قفقفا، بيرين، ارميمين). وبلغ حجم 2500 مبحوثاً. واستخدام البرنامج الاحصائي SPSS لمعرفة علاقة البطالة بالجريمة. كشفت الدراسة أن البطالة مشكلة معقدة وحيوية ومؤثرة ومتأثرة بالعديد من المتغيرات والعوامل الاجتماعية والاقتصادية والسياسية والديمغرافية. وتبين أنها ذات تأثير ومساهمة في ايجاد البطالة. فاتسمت عينة الدراسة بتدني تحصيلها العلمي، وكبر عدد أفراد الأسرة، وأغلبهم من الفئات العمرية الصغيرة وغير المتزوجين. وأظهرت الدراسة في الجزء الثاني بأن هناك علاقة ذات دلالة احصائية بين المتغيرات الاجتماعية والديمغرافية لأفراد عينة الدراسة وارتكاب الجرائم، فاغلبهم ارتكب جرائم الجنح والجنايات والمخالفات على التوالي، الممثلة بالجرائم الاخلاقية والمتاجرة وتعاطي المخدرات، والتزوير، والسرقة، والنصب والاحتيال، والقتل، والاعتداء على الاخرين، والمشاجرات. وتبين أن أقوى المتغيرات تأثيرا على ارتكاب الجريمة هو مدة البطالة ومستوى الدخل الشهري ونوع البطالة والمستوى التعليمي.

الكلمات الدالة : البطالة، الجريمة، الانحراف ، الفقر، السجون، متغيرات اجتماعية، متغيرات ديمغرافية

Analysis of Organic Residues Preserved in Archaeological Ceramics from Bronze Age and Iron Age Sites in Jordan

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Abstract:

This research project utilized scientific methods and techniques including gas chromatography-mass spectrometry (GC-MS), petrography, x-ray diffraction (XRD) and x-ray fluorescence (XRF) to study organic residues preserved in ancient clay vessels and their characteristics. A total of eighty one samples including pottery, clay and soil samples were investigated. The results obtained from organic residue analysis indicate a poor preservation of organic residue in the analyzed samples of pottery sherds. The types and the quantities of the detected biomarkers, mainly fatty acids, inferred that the original organic materials that could have been used in pottery vessels were significantly altered due to the high level of degradation caused by human use and/or burial environments, which preclude determining the exact origin of these materials. Therefore, the sources of organic residues in pottery samples were tentatively determined, that most of the organic residues have originated from most probably botanical sources, such as plant oils and some of them have originated from possibly animal fat. The petrographic and elemental analysis of the pottery of the different studied sites indicate the presence of melted quartz grains and vitrified pottery matrix in some of the samples, which lead us to presume that the potters used high firing temperature in the manufacturing of certain pots. It is also show that the potters have used variety of additive tempering and the changes in the tempering agents added by the potter during the ceramic production might have been made in propose by the potter. This change in tempering agents might be connected to change in the function and use of the pots.

The analysis of the pottery of the different studied sites can be clustered into three areas; the first is the site of Tell Omari, Kh. Al-Batrawy and Kh. Jneneh. These sites have exploited the marly and phosphatic limestones which are found in their vicinities. Secondly, the site of Tell Abu Al-Kharaz and Tell Zera'a have in general pottery of similar mineral fabrics resulted from the exploitation of clay sources which are found in eastern slopes of the Jordan Valley. Clays are made of weathered and reworked minerals derived from limestone, sandstone and basalt formations found along the eastern slopes of the Jordan Valley. Thirdly, the multi sources of Sahab pottery which are made of varied types of clay minerals reflected in its pottery fabric and this could be the result of the clay formation processes in the flat land of Sahab area or due to active exchange of pottery and clay between Sahab and the surrounding areas. It is also found that, the most suspected clay sources are associated with the rock sources are carbonate (limestone), sandstone, phosphate and volcanic tuff, these rock types are found in the vicinities of the site of Kh. Jneneh, Kh. Al-Batrawy, Kh. Sahab, and Tell al-Omairi. Finally, the limitation of obtained results in terms of organic residues preservation and in the geographic distribution of the sampled sites, the study stresses on the need for building up the achieved database and more samples to be analyzed in future works, as the diversity and regionalism of the Bronze and Iron Ages pottery production in Jordan is becoming more evident.

Keywords: Organic Residues; Pottery, Clay; Tempering; Archaeological Site; Gas Chromatography-Mass Spectrometry; Petrography; X-ray Diffraction and X-ray Fluorescence.

Translation and Arabicization Movement in the Hashemite Kingdom of Jordan

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Abstract:

The study aims to highlight the role of public and private sectors in the Jordanian translation movement. The project starts with a general introduction about translation in the world and the Arab World. The role of public and private sectors in prompting the translation movement in Jordan will be thoroughly investigated through providing names, statistics and highlighting and commenting on the main activities carried out by these organizations. The Jordan Committee of Arabicization, Translation and Publication; Jordan Academy for Arabic; The Royal Scientific Society; The Royal Academy for Islamic Civilization Institute for Islamic Thought; Ministries and Governmental Institutions; The Ministry of Culture; The Ministry of Education; The Ministry of Communication; The Ministry of Awqaf; The Ministry of Information; The Ministry of Health; The Ministry of Tourism; The Jordanian Universities; The Private Sector such as the Private Publishers will be investigated. This study enhanced the Translation and Arabicization movement as well as cultural and educational process in Jordan and in the Arab World as well. It is also hoped that this work would be of much use to libraries, translators and information canters here in Jordan and abroad and encourage more research in other Arab countries

Keywords: Translation and Interpreting; Translation Arabicization; Language planingin Jordan; Jordanian Translators Guide

Methodology of Utilizing Teaching Islamic Law and its Principles in Enhancing Moderation and Tolerance

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Abstract:

Due to the conditions of the contemporary world, this project aims to shed light on methods of utilizing teaching Islamic law and its principles in a way that allows graduates to be quite effective in spreading the values of moderation and challenging intolerance and terrorism in our societies. Hence, this project aims for the long run to help in spreading general awareness in this concern, and tolerant way of thinking. The case study selects the faculty of *Shari'ah* at The University of Jordan as an applicable example to improve the methods of teaching in such vital type of institutions. The specific objectives of this project are to draw a suggested program to utilize the teaching of Islamic law and its principles in enhancing moderation and tolerance, including a suggested general strategic plan, taking into consideration the points of weakness in the current curricula and in teaching methods. The outcome of this research is expected to influence large number of Islamic studies graduates and youth in the Muslim world, particularly in Jordan. Improving the performance of faculties of *Shari'ah* in this country is another important goal of this project.

Keywords: Islamic Jurisprudence and its Principles; Moderation; Amman Massage; Teaching; Development; Contemporary Islamic studies; Challenging Terrorism

التحليل والتقييم لمخطوطات البحر الميت، وأبعادها التاريخية، والدينية، والاجتماعية، والاقتصادية في إطارها الحضاري العام

عمر الغول أ، عفاف زيادة أ ، محمد البخيت ب

أ جامعة اليرموك

ب الجامعة الأردنية

الملخص:

توزع عمل المشروع في محاور عدة، كان أحدها التأسيس لاشتغال علمي أكاديمي رصين بمخطوطات البحر الميت وبأديان الشرق القديم بعيدًا عن الخطاب العاطفي أوالديني المبسَّط، فعمل المشروع على تأسيس مكتبة مختصة في هذا الموضوع، تضم نشرات النصوص الدينية الأصلية، وأهم ما نشر من دراسات، حتى باتت تعد أفضل مكتبة من نوعها من بين المكتبات العربية. وعمل المشروع، من جهة ثانية، على توثيق مخطوطات البحر الميت الموجودة في المتاحف الأردنية، بتصويرها، وتسجيل المعلومات الأساسية المتعلقة بها. وهدف المشروع من ناحية أخرى إلى نقل المعرفة بالمخطوطات إلى المختصين وإلى الجمهور المهتم كذلك، فأصدر خمسة كتب عن مخطوطات البحر الميت، تراوحت موضوعاتها ما بين المعرفة العامة والاختصاص العميق، وجاءت ثلاثة منها مترجمة.

ولزيادة الفائدة لدى الجمهور، نظم المشروع إلقاء محاضرات عن مخطوطات البحر الميت في المنتديات الثقافية وفي الجامعات والمدارس، زاد عددها على مئتي محاضرة، شملت معظم أرجاء المملكة، اشترك في إلقائها الباحثون في المشروع وطلاب وطالبات الدراسات العليا في الجامعات الأردنية، بعدما دربهم القائمون على المشروع تدريبًا خاصًا على ذلك. ورافق إلقاء المحاضرات توزيع قرص مدمج على معلمي ومعلمات المدارس من ذوي العلاقة، وعلى توزيع نسخ من الكتب التي أصدرها المشروع، وجرى هذا كله بالتنسيق مع وزارة التربية والتعليم. كما عقد المشروع دورة تدريبية في موضوع مخطوطات البحر الميت للمعلمين من ذوي العلاقة العاملين بمدارس وكالة غوث وتشغيل اللاجئين الفلسطينيين بمحافظة إربد. وعلى الصعيد الإعلامي، نبه المشروع إلى أهمية مخطوطات البحر الميت من النواحي التاريخية والدينية والسياسية، وذلك من خلال كتابة المقالات في الصحف، وتقديم المقابلات التلفزيونية والإذاعية والصحفية، ومن خلال إعداد موقع إلكتروني للمشروع.

وشملت نشاطات المشروع المناهج المدرسية والجامعية؛ فأجرى المشروع مراجعة شاملة للمادة المتعلقة بمخطوطات البحر الميت الواردة في المناهج المدرسية، وقدم تقريرًا مفصلاً عنها رُفع إلى وزارة التربية والتعليم، شمل تصويبات لما وقع في المادة من أخطاء، وملاحظات أساسية عن بناء الفصول ذات العلاقة ومحتواها. ولما كان موضوع مخطوطات البحر الميت لا يُدرس في الجامعات الأردنية، فقد صمم المشروع مساقين جامعيين، يعتني أحدهما بالنواحي التاريخية للمخطوطات في المقام الأول، ويولي الآخر النواحي الدينية لهذه النصوص أهمية خاصة، وخاطب أقسام التاريخ وكليات الشريعة في الجامعات الأردنية، مقترحًا إدراج هذين المساقين في الخطط الجامعية لتلك الأقسام، ومبديًا الاستعداد لتقديم المساعدة والمشورة العلميين بهذا الصدد. هذا، وقت فازت جامعة اليرموك بالجائزة الثالثة من جوائز سمو الأمير الحسن بن طلال للتميز العلمي لعام 2015 عن هذا المشروع.

الكلمات الدالة: الكتابات السامية، النقوش، الأديان القديمة، الآداب القديمة، البرديات

Archaeological Sites under Risks: The Case of Jordan

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Abstract:

The current project is amid to evaluate the main risk at four case study archeological sites at Jordan. These sites include the archeological site of Petra, Jerash, Amman Citadel and Ghor es-Safi. The main threats at Petra and Jerash sites were natural threats and salt damage were the major concern. Full scientific measurements were carried out to evaluate the salt damages and their thermodynamic hazards according to the current environmental conditions. Human activities as well as management methodologies were a major risk at the Amman Citadel. Each case study research showed the complexity of each site and scientific approaches to minimize this risk at the case study locations.

Keywords: Competition; Jordan; Central Bank; Banking system; Stability; Economic Growth

تحديد العوامل الاقتصادية والاجتماعية المؤثرة في معدل البطالة في مجتمع إقليم جنوب الأردن

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الملخص:

تهدف الدراسة إلى تحديد العوامل الاقتصادية والاجتماعية لأسباب البطالة، من وجهة نظر الأسر في إقليم جنوب الأردن إلى محافظات (الكرك، الطفيلة ومعان). ولتحقيق هدف الدراسة تم الاعتماد على منهجية المسح الميداني الاجتماعية للحالات الدراسية، بواسطة أداة الاستبيان التي أعدت بغرض جمع البيانات من الميدان مباشرة، وبواقع عينة اشتملت على 1538 أسرة من المجتمع المستهدف في إقليم جنوب الأردن. من خلال أسلوب التحليل العاملي الذي تمت معالجته بطريقة المكونات الرئيسية لمجموعة عوامل لها الأثر الأكبر في تحديد أسباب البطالة وطرق الحد منها، ويمكن للمخطط التنموي الاقليمي في الأردن أن يحدد خصائص الأسر المتعطلة عن العمل في المنطقة من خلال عدد من المتغيرات تضمنتها تسعة عوامل رئيسية كان لها معدل تفسير للتباين في سبب الظاهرة بمعدل 69.5%، وقد أمكن تسمية هذه العوامل بالتأهيل (البشري والمادي)، والعامل الاجتماعي الثقافي. وقد خرجت الدراسة بمجموعة من الاستنتاجات والتوصيات التي يمكن أن يأخذ بها المخطط التنموي في رسم استراتيجيات التنمية الاجتماعية في المنطقة.

الكلمات الدالة : البطالة، إقليم الجنوب، الخصائص الاجتماعية، التحليل العاملي، البطالة

الخصائص الاجتماعية والاقتصادية للفقراء (الأشد فقراً) في محافظات (الكرك، والطفيلة، ومعان)

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أ الحسين بن طلال

ب جامعة مؤتة

الملخص:

الفقر من أخطر القضايا وأكثرها تعقيداً وقياساً وقراءة فهي ظاهرة تجمع ما بين السبب والنتيجة، لذلك يجب التركيز في دراسة الفقر وبالتالي الجهود المبذولة في معالجته على قراءة خصائصه وفق المرجعية الاجتماعية والديمغرافية والاقتصادية التي يعيش فيها الفقراء. لذلك فقد جاءت هذه الدراسة لتقييم الأوضاع الاقتصادية والاجتماعية للفقراء (الأشد فقراً) في محافظات (معان، الطفيلة، الكرك) وذلك من خلال اجراء دراسة مسحية تتبعية لعينة من الفقراء المسجلين لدى صندوق المعونة الوطنية في المحافظات المذكورة والبالغ عددهم 9206 فقيراً حسب بيانات صندوق المعونة الوطنية لعام 2010. بلغت حجم العينة 2288 فرداً موزعين على مختلف مناطق محافظات الجنوب منطقة الدراسة، ويمكن تلخيص أهم نتائج الدراسة على مستوى المحافظات الثلاث كما يلي، مع الاشارة إلى وجود بعض الاختلافات في الأوضاع الاقتصادية والاجتماعية للفقراء في كل محافظة على حدى، ويمكن تلخيص هذه النتائج كالآتي : بلغت نسبة الأسر الفقيرة التي ترأسها إمرأة 56% من الأسر الفقيرة عينة الدراسة. شكل الأميين من الأسر الفقيرة عينة الدراسة أعلى نسبة من بين الأسر المبحوثة حيث بلغت نسبتهم 64.6%، في حين شكل الفقراء الجامعيين أدنى نسبة 0.6% من إجمالي الفقراء عينة الدراسة. معظم الأسر عينة الدراسة مكونة من فرد واحد فقط ويشكلون ما نسبته 42.15 وبلغت نسبة الأسر التي عدد أفرادها (3-5) نسبة 24.25. الغالبية العظمى من الأسر عينة الدراسة تقطن ضمن سكن من نوع (بيت أو دار) تعود ملكيتها لهم وبنسبة 65.2% من الأسر الفقيرة عينة الدراسة وبنسبة رضا عن السكن بلغت 79%. أما دور المعونة النقدية التي يحصل عليها الفقراء من صندوق المعونة الوطنية في تغطية احتياجات الأسر الفقيرة فقد بينت الدراسة أن 61% من الفقراء عينة الدراسة يعتقدون أن المعونة لا تغطي أكثر من نصف احتياجاتهم. بينت الدراسة أن نسبة أفراد الأسر العاملين 18.2% من إجمالي الأسر عينة الدراسة ، في حين أن نسبة أفراد الأسر العاطلين والراغبين في العمل بلغت 14.2%، أما نسبة الأسر التي لديها رغبة في الاستغناء عن المعونة من خلال الحصول على فرصة عمل 17.4%. يعتقد أكثر من نصف الفقراء في منطقة الدراسة وبدرجة متوسطة بظاهرة توارث الفقر ضمن عائلاتهم. بلغت نسبة الأسر التي لديها مصادر دخل أخرى 36.4% من إجمالي الفقراء عينة الدراسة. أما اسباب الفقر، فقد اشار الفقراء عينة الدراسة إلى أن أسباب أوضاع الفقر لديهم حسب وجهة نظرهم تعود بالدرجة الرئيسية إلى: ارتفاع الأسعار مقارنة بالدخل وبنسبة موافقة 76.9%، كبر السن والعجز وبنسبة موافقة 45.9%، انخفاض المستوى التعليمي وبنسبة موافقة 39.2%، البطالة وبنسبة موافقة 25.8%.

الكلمات الدالة: الفقر، الخصائص الاقتصادية، محافظة الكرك، جيوب الفقر، تأهيل الفقراء، مكافحة الفقر، الخصائص الاجتماعية

المحددات المكانية والزمنية لجريمة السرقة في محافظات المملكة الأردنية الهاشمية (دراسة في التحليل المكاني)

قاسم الدويكات [أ]، عامر الخطيب [ب]

أ جامعة اليرموك

ب جامعة مؤتة

الملخص:

هدفت هذه الدراسة إلى الكشف عن حجم السرقة في محافظات المملكة في الفترة بين 2000-2010، وتحديد مدى ارتباط معدلات الجريمة بالكثافة السكانية في محافظات المملكة، والكشف عن الخصائص المكانية والزمانية والخصائص الاجتماعية والاقتصادية للجناة. ولتحقيق هذه الأهداف تم تصميم استبيان يتكون من ثلاث اقسام، يتعلق الأول بالخصائص الاجتماعية والاقتصادية للجناة، والثاني باستقصاء الخصائص الزمانية والمكانية لجريمة السرقة، والثالث باستقصاء الخصائص العامة لجريمة السرقة. وتم تطبيق الاستبيان على عينة من الموقوفين والمحكومين بجنح وجنايات السرقة في خمس مراكز اصلاح في اقاليم المملكة، وبلغت العينة النهائية (1148). وقد استخدمت الأساليب الاحصائية المناسبة لتحليل البيانات والاجابة عن اهداف الدراسة واسئلتها. وقد أظهرت الدراسة النتائج التالية:

أولاً: نتائج متعلقة بخصائص عامة بجريمة السرقة، ومنها :

- تزداد جريمة السرقة في المناطق ذات الكثافة السكانية المرتفعة.
- هناك علاقة طردية بين معدل الجريمة والتحضر.
- تبين أن أكثر الجناة يفضلون السرقة بمفردهم، فقد بلغت نسبتهم 45.9 % من العدد الكلي لمرتكبي السرقة.

ثانياً: نتائج الخصائص الزمنية للجريمة:

- تكثر حوادث السرقة في شباط وآذار وأيار.
- تزداد حوادث السرقة في نهاية الاسبوع وقبل منتصف الليل.

ثالثاً: نتائج الخصائص المكانية:

- يتجه اغلب الجناة إلى سرقة الاماكن البعيدة عن سكنهم، وانهم يفضلون السير على الاقدام، أو يستعملون سيارات خاصة.

رابعاً: نتائج تتعلق بخصائص الجناة الاقتصادية والاجتماعية:

- ان اغلب الجناة ذكور، وان تعليمهم متدن، وانهم عاطلين عن العمل، وانهم يتأثرون بآبائهم.

الكلمات الدالة :الجريمة، جريمة السرقة، المحددات الزمنية، جريمة السرقة، جغرافية الجريمة، الأردن

الشباب والمشاريع الصغيرة المدرة للدخل : مبادرات فردية في مواجهة الفقر والبطالة

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أ الجامعة الأردنية

ب جامعة البلقاء التطبيقية

ج المجلس الأعلى للشباب

الملخص:

تعد المشروعات الصغيرة ذات أهمية كبيرة في جميع دول العالم ولا سيما الدول النامية، وأصبحت المشروعات الصغيرة تمثل طرحاً يحتل أولوية متقدمة على أجندة اقتصادات الدول النامية، ومنها البلدان العربية وخاصة محدودة الدخل – بما فيها الأردن. فهي تمثل حلاً ضروريا للإسهام في حل مشكلتي الفقر والبطالة اللتان تعاني منهما معظم الدول العربية. وبدأت المشروعات الخاصة الصغيرة تلقى اقبالاً حتى في الدول التي تمتاز بسيطرة الدولة مركزيا على الاقتصاد الوطني. ومن القطاعات التي سمح فيها للأعمال والمشروعات صغيرة ومتوسطة الحجم العمل في قطاع البضائع الاستهلاكية وهو قطاع تعجز مؤسسات الدولة عن تأمين حاجاته بصورة وافية. وتشكل المنشآت المايكروية والصغيرة والمتوسطة ما يفوق 99% من اجمالي تلك المنشآت هي تلك العاملة في القطاع الخاص، وتوفر بحدود 421 ألف عامل أي ما يعادل 70% من إجمالي القوى العاملة في المشروعات الخاصة في الاقتصاد الأردني. وجاءت البيانات وفقا للتعريف المتبع حاليا من قبل دائرة الاحصاءات العامة الذي يستند إلى أن المشروع المايكروي هو الذي يشغل أقل من خمسة عمال، في حين أن المشروع الذي يشغل من 5 – 19، وتلك التي تشغل عاملين بين 20-99 منشآت صغيرة ومتوسطة الحجم على التوالي. وتشكل المنشآت المايكروية ما يقارب من 89% من اجمالي عدد تلك المنشآت، وتشغل هذه المنشآت ما يقرب من 40% من اجمالي العاملين في هذه المنشآت، وتعادل هذه النسبة ما لا يقل عن 50% من إجمالي القوى العاملة الأردنية، في حين أن المنشآت الصغيرة والمتوسطة تشكل ما نسبته (9% و 16%) من إجمالي عدد المنشآت، وتوفر فرص عمل لما نسبته (17% و 15%) من القوى العاملة في تلك المنشآت على التوالي.

الكلمات الدالة: الشباب، المشاريع الصغيرة، مكافحة البطالة، مبادرات فردية

الآثار الاقتصاديّة والاجتماعيّة للفقر على الأطفال في الأردن

محمد عيسى شحاتيت [أ]، أحمد حماد أبو حيدر [ب]

أ جامعة الأميرة سمية للتكنولوجيا

ب دائرة الاحصاءات العامة

الملخص:

تهدف هذه الدّراسة إلى بيان الآثار الاقتصاديّة والاجتماعيّة للفقر على الأطفال من خلال تحليل خصائص الأطفال الفقراء وأسرهم وتحديد هذه الآثار ودرجة شدتها على الأطفال الفقراء، مما يساعد في توجيه السياسات الاقتصاديّة والاجتماعيّة لهذه الشريحة توجيهاً صحيحاً. كما تهدف إلى التعرف على العلاقات بين متغيرات الدّراسة المختلفة الخاصة بالأطفال الفقراء، وتطوير واستخدام مقاييس لفقر الأطفال في الأردن من خلال اقتراح مؤشرات تقيس الأبعاد المتعددة لفقر الأطفال، باستخدام مؤشرات الآثار الاقتصادية والاجتماعية والتعليم والصحة وخصائص المسكن وغيرها من المتغيرات لاستخدامها من قبل الدراسات المستقبلية في هذا المجال. كما تهدف إلى توجيه التخطيط بحيث يأخذ بعين الاعتبار أثر السياسات على وضع الأطفال الفقراء ويراعي احتياجاتهم وأسرهم. وتوصلت الدراسة إلى ما يلي : إن نحو 48% من الأطفال قيد الدّراسة هم من الذكور، وأن نسبة عالية من الأطفال هم في مرحلة التعليم الأساسي (59% تقريبا). وإن نسبة الأطفال الضعفاء من الناحية الصحيّة لا تتجاوز 9%. كما بينت الدّراسة أن نحو 6.7% من الأطفال يعملون، ويعود ذلك إلى الفقر الذي يعاني منه هؤلاء الأطفال وأسرهم. تسكن الغالبية العظمى من الأطفال الفقراء (نحو 70.3%) في شقة، وكانت أعلى نسبة من الأطفال الفقراء الذين يسكنون الشقق في محافظات مأدبا والعقبة والزرقاء، أما نسبة الأطفال الفقراء الذين يسكنون في "براكية" فكانت عالية نسبيا في محافظات المفرق ومعان وجرش، حيث بلغت هذه النسب نحو 20% و15% و14% على الترتيب. وبلغت هذه النسبة نحو 5.4% على مستوى الأردن. جميع أسر الأطفال الفقراء في محافظات العاصمة والبلقاء ومأدبا وعجلون والطفيلة والعقبة يتزودون بمياه الشرب من الشبكة العامة للمياه وأن نحو 14% من أسر الأطفال الفقراء في الأردن يتزودون بالمياه من خلال بئر، سواء كان بئر تجميع أو بئر ارتوازي، وأغلب هذه الأسر تسكن في المفرق ومعان وجرش واربد، بنسب نحو 73% و44% و25% و24%، على الترتيب. إن المصدر الرئيسي للإضاءة لجميع أسر الأطفال الفقراء في محافظات العاصمة والبلقاء ومأدبا وعجلون والطفيلة ومعان والعقبة هو الشبكة العامة للكهرباء، وأن المصدر الرئيسي للإضاءة لنحو 2.7% من أسر الأطفال الفقراء في الأردن هو مولد خاص للكهرباء، وأغلب هذه الأسر تسكن في المفرق واربد وجرش، بنسب نحو 20% و5% و3%، على الترتيب. كما بينت الدّراسة أن نحو 71% من مساكن الأطفال الفقراء موصولة بالشبكة العامة للمجاري وأن نحو ربع المساكن تستخدم الحفر الامتصاصية. أما المحافظات التي تفتقر إلى خدمات الصرف الصحي المناسبة فهي المفرق ومعان وجرش، ولعل طبيعة المنطقة وقلة الكثافة السكانية هي التي ساعدت على ذلك.

نحو 9.4% من آباء الأطفال الفقراء متوفون وأن نحو 0.6% من أمهات الأطفال متوفيات. وقد يعزى عمل الأطفال الفقراء لهذين السببين. أما نسبة طلاق الآباء والأمهات فهي قليلة مقارنة مع مثيلاتها على مستوى الأردن. ويلاحظ أيضا أن المستوى التعليمي للأمهات هو دون المستوى التعليمي للآباء. كما بينت نتائج الدّراسة أن نحو 16% من الأمهات تعمل وأن 11% من الآباء لا يعملون. هناك أسرة واحدة من كل خمس أسر تتلقى إعانات من صندوق المعونة الوطنية وأن نحو 16% يتلقون معونات من أفراد من خارج الأسرة. أما المصادر الرئيسية للدخل فهي الأجور والرواتب (39.6%) ثم الانتاج الذاتي للأسرة (23.6%) ثم المشاريع الخاصة أي المهن الحرة (18.3%). تأثر نحو ثلثي الأطفال الفقراء سلبيا من حيث عدم حصولهم على الغذاء المناسب. وكذا الحال بالنسبة لأثر الفقر سلبيا على ملابس الطّفل وعلى حصول الطّفل على الحذاء المناسب. إن شدة الفقر الاقتصادي للأطفال الفقراء على مستوى الأردن هي 76.6%، وهي متقاربة للذكور والإناث. وترتفع، نسبيا، في محافظات معان والبلقاء ومأدبا. إن أكثر المتغيرات الاجتماعيّة التي تؤثر على الأطفال الفقراء، هي عدم الشعور بالراحة في السكن، يليه أثر سوء معاملة الآخرين وعدم احترام الآخرين للطفل وشعور الطّفل بالعزلة عن المجتمع. هناك تأثير للمتغيرات النفسية على الأطفال الفقراء، هي شعور الطفل بعدم اهتمام الآخرين به، يليه شعور الطفل بأنه عبء على الآخرين ثم نظرة الشفقة في عيون الآخرين. إن أكثر الآثار الصحية هي عدم توافر الأدوية، يليه عدم وجود مرافق صحية مناسبة، ثم تدهور صحة الطّفل بسبب الفقر تتركز الآثار التعليمية للفقر حول عدم توافر الأدوات المدرسية، ثم الحصول على معدل متدن في المدرسة، يليه عدم التحاق الأطفال بالمدرسة، ثم التسرب من المدرسة نتيجة للفقر. عدم وجود فروق ذات دلالة إحصائية في درجة الأثر الاقتصادي للفقر يمكن أن تعزى لمتغير الجنس. أما بالنسبة لمكان الإقامة، نجد أن هناك اختلافات جوهرية بين المحافظات في هذا الشأن. كما تبين وجود فروق معنوية في درجة الأثر الاقتصادي للفقر على الأطفال يمكن أن تعزى للمستوى التعليمي للأب وللأم. وللحالة الزواجية للوالدين. يؤثّر الفقر اجتماعيا على الأطفال الفقراء بناء على اختلاف مكان إقامتهم

واختلاف مستوى تعليم كل من الأب والأم. كما نجد أن الفقر يؤثّر اجتماعيا على الأطفال الفقراء بنفس الدرجة بغض النظر عن اختلاف جنسهم أو الحالة الزواجية للوالدين.

الكلمات الدالة : فقر الأطفال، الاردن، الفقر.

توثيق المهن والحرف التقليدية في شمال الأردن

محمود النعامنة، عبد الله الشرمان

جامعة اليرموك

الملخص:

تعدّ المهن والحرف اليدوية من مكونات الموروث التراثي والفني في الأردن، ونظراً لأهميتها وجب توثيقها من أجل المحافظة عليها. وبرأينا أن هذه المهن تحمل وتعكس طابعاً اجتماعياً، وثقافياً وفنياً، وفي بعض الحالات أقتصادياً. ويهدف هذا المشروع إلى توثيق ودراسة المهن اليدوية والحرفية في منطقة شمالي الأردن، الواصلة بين عدد من مناطق بلاد الشام المحاددة لها، بسبب التشابه في الموروث الثقافي والاجتماعي بين هذه المناطق. ولأهمية الموضوع، والمحافظة عليه، كان لا بد من الوقوف على هذا التراث الهام من خلال زيارات ميدانية لبعض المناطق التي لا تزال تحافظ على هذه المهن، والتي انتقلت فيها المهنة من الآباء إلى الأجداد ، خاصة وأنها تعتمد بشكل اساسي على العمل اليدوي البحت، وتوفر المواد الأولية في البيئة المحيطة. تهدف الدراسة إلى ابراز أهمية التراث الثقافي بشل عام والمهن والحرف اليدوية بشكل خاص في تشكيل الهوية الثقافية، والوطنية الأردنية، وفهم الاطار التاريخي، والاجتماعي للمهن والحرف التقليدية في شمال الأردن كمنتجات ثقافية. إضافة إلى تحليل الابعاد الاجتماعية والثقافية والاقتصادية ونشر المعرفة والوعي بأهمية هذه المهن والتأسيس لاجراء دراسات مشابهة في المناطق الأخرى من الأردن.

خلصت الدراسة إلى وجود نمطية جغرافية في توزيع الحرف التقليدية في شمال الأردن، فعلى سبيل المثال، اختصت قرية المزار الشمالي بصناعة المهابيش لوجود المادة الخام فيها بشكل كبير، وهي في العادة خشب البطم. أما بالنسبة للصناعات القشية، فوجدت بشكل أكثر في المناطق السهلية، بسبب زراعة القمح فيها بكثرة. وبالنسبة لصناعة الأسلحة، فقد اختصت بها احدى العائلات التي تسكن حالياً في قرية علعال، حيث تصنع الشباري والسيوف. استطاع الباحثون تقسيم هذه الحرف إلى عدة اقسام حسب نوع الحرفة مثل : الصناعات الخشبية، وصناعة النسيج، والقش، والمنسوجات، والحدادة،والجلود، والصناعت الطينية كأفران الطابون. دلت نتائج الدراسة على أن معظم هذه الحرف لم يكن الهدف منها أولا هو الربح المادي، وإنما للاستخدام المنزلي. لكن طرأ تطور بعد ذلك على هذه الحرف خاصة في العقود الأخيرة ، حيث ازداد الطلب على اقتناء مثل هذه المنتجات فأصبحت تصنع على نطاق تجاري. ومن الملاحظ أن انتقال هذه الحرف للأجيال اللاحقة اقتصر فقط على صناعة الأسلحة والمهابيش لمردودها الاقتصادي المجزي نوعا ما في الوقت الحالي. إن هذه الحرف خدمت بشكل أو بآخر النمط المعيشي أو الاقتصادي في شمال الأردن لعقود طويلة خلت، حيث كانت استراتيجية المعيشة تكاد تقتصر على الزراعة البسيطة، وبشكل موسمي، ولم ترتبط هذه الصناعات بطقوس دينية، أو عادات اجتماعية معينة، كما هو الحال في المجتمعات الأخرى. أصبح كثير من هذه الحرف يختفي بسبب وجود بدائل حديثة واقتصادية لها، وخير دليل على ذلك فرن الطابون الذي تعذر علينا في البداية إيجاد من يستخدمه حتى هذا اليوم، ولأسباب عديدة، مثل، ارتفاع اسعار الطحين، وتوفر مادة الخبز بشكل كبير وغير مكلف. إن أهم ما يميز هذه الحرف هو اختصاصية العمل حسب الجنس فنجد أن الصناعات الخشبية مثل المهباش لا يقوم بها إلا الرجال. أما النساء فقد اختصصن بصناعة أفران الطابون، والصناعات القشية، وصناعة الأنسجة، حيث لا تتطلب تلك الحرف مجهود عضلي، وإنما دقة متناهية في العمل. وظلت النساء ولوقت طويل هي الأقدر على القيام بكثير من هذه المهن اليدوية والحرفية.

الكلمات الدالة: الموروث، الأردن، تقليدي، ثقافة، توثيق

الأمنُ الإنسانيّ للأكاديميّين في الأردن

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الملخص:

ويهتمّ هذا البحث بالأمن الإنساني للأكاديميين، وتتحدّد بيئة الدراسة التطبيقيّة في المملكة الأردنيّة الهاشميّة. وقد اشتهرت المملكة الأردنية الهاشمية لعقود بنظام تعليمي متميز، على مستوى التعليم المدرسي فالجامعي، بيد أن المراقبين عن كثب يلاحظون في السنوات الأخيرة تراجعا لأداء هذا القطاع المهم في حياة الأردنيين، وفي عمليات التنمية في الأردن وفي جوارها الإقليمي. ويشير بعض الخبراء والمختصين إلى جوانب من الخلل في حياة الأكاديميين كان لها أثر في ذلك التراجع، وهي الجوانب التي يحاول الباحثون جمعها في هذا البحث تحت عنوان عريض هو (الأمن الإنساني للأكاديميين في الأردن). من خلال استطلاع آراء عيّنة علميّة من أعضاء هيئة التدريس في الجامعات الأردنيّة حول واقع تمتّعهم بالأمن الإنسانيّ في جوانب حياتهم المتعدّدة، وتحليل إفاداتهم حول ذلك من خلال استبانات أعدّت خصيصا لهذه الغاية؛ اتّضح أنّ أعضاء الهيئات التدريسية في الجامعات الأردنيّة لا يشعرون بالأمن الإنساني في كثير من جوانب حياتهم. وبناء على النتائج التفصيليّة؛ خرج البحث بمجموعة من التوصيات الدقيقة حول جوانب أمن الأكاديميين في الأردن.

الكلمات الدالة: الأمن الانساني، الأكاديميين، تدريس، تنمية، صناعة التعليم، ادارة جامعية، بحث علمي، حقوق وواجبات ولوائح

Social and Economic Problems of Widows and Divorced Women in the Southern Governorates of Jordan

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Abstract:

This study aims at identifying the problems and priorities widows and divorced women in the four southern governorates in Jordan have. I t also aims at identifying the demographic characteristics of these women. The sample of the study included (905) widows and (852) divorced women from Kerak, Maan, Tafileh and Aqaba. To achieve the purposes of this study, the research team developed the study instrument and other experts examined its psychometric characteristic. The results of the demographic investigation revealed that most members of the sample were illiterate and that the second nomadic educational qualification was preparatory schooling or less. Results also showed that women in the sample became widows within the age range of (45-54) or got divorced within the range of (25-34). The widows aged (65) at the time of the study while the age range (45-54) for the divorced women ranked first. The longest marriage period before becoming a widow was within the range of (25-34) while divorce mostly occurred during the first ten years of marriage. Results declared that widows first lived in an independent residence then moved to live at their parents whereas the divorced women lived are their parents first then moved to live independently. The main resource of income for all members of the sample was the same: The National Aid Fund. This income, however, varied in quantity. Health care statistics showed that (20.5%) of the sample were suffering from some disease such as high blood pressure. Figures also showed that (95.8%) have a health insurance. Taking the responsibilities of both the mother and the father at the same time is the problem that ranked first among the widows while the divorced women noted that, unlike men, they receive severe social blame if they decide to marry again. According to all members of the study sample, the most prevailing economic problem was that their limited income is insufficient to meet the needs of their children. Psychologically, widows were so anxious about the future of their children whereas the divorced women expressed future anxiety. The priority that ranked first for widows is raising the fund aid provided by the government, then providing a residence. These two priorities ranked quite the opposite among the divorced women.

Keywords: Widows; Divorced Women; Social Problems; Women; Needs

محددات الزواج المبكر للإناث وآثاره الاجتماعية والاقتصادية والصحية في المجتمع الأردني: دراسة تحليلية

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ج جامعة الشرق الاوسط

الملخص:

هدفت هذه الدراسة الى كشف مدى شيوع ظاهرة زواج الاناث المبكر (قبل سن 18) في المجتمع الاردني، وبيان اسبابه والتعرف على المحددات الاجتماعية والاقتصادية، والديموغرافية لزواج الاناث المبكر وكما هدفت الى تحديد الاثار الاجتماعية والاقتصادية والثقافية والديموغرافية المترتبة على زواج الاناث في سن مبكرة. ولتحقيق هذه الاهداف صمم الباحثون استبانة شملت معلومات عن الزوجة، والجوانب الديموغرافية والصحية للزوجة والاسرة، والاثار الاجتماعية والثقافية والاقتصادية المترتبة على الزواج المبكر. وقد طبقت الاستبانة على عينة من (300) من السيدات اللواتي تزوجن قبل سنة 18، وهي ممثلة للأقاليم الثلاث، الشمال ، الوسط، الجنوب، وقد تم استخدام الأساليب الاحصائية المناسبة للإجابة على اسئلة الدراسة واهدافها، وقد خلصت الدراسة إلى النتائج التالية: لقد بينت الدراسة أن أهم اسباب الزواج المبكر للإناث هي رغبة الأهل، واسباب شخصية، واسباب تتعلق بنظرة المجتمع. كما اوضحت أن العوامل الثقافية سبب رئيس في بقاء زواج الاناث المبكر وخاصة في الريف، ثم العوامل الاجتماعية مما تمثله من قيم وعادات وضغوطات. وقد أكدت الدراسة أن هناك آثاراً اجتماعية واقتصادية على الأنثى منها: انخفاض مستوى التعليم، ضعف المساهمة في سوق العمل، تهميش مكانتها الاجتماعية، كما ان هناك آثاراً صحية يتركها الزواج المبكر مثل افتقار المرأة الصغيرة إلى معلومات عن كيفية ارضاع الأطفال والتعامل معهم.

الكلمات الدالة: الزواج المبكر، المتغيرات الاجتماعية، دراسة تحليلية، علم السكان، المجتمع الاردني

The Impact of Teaching Islamic Curricula Using Multimedia in Development Critical Thinking Skills at Elementary Education

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Abstract:

The present study aimed to investigate the effect of teaching Islamic Education courses by using multimedia strategy in student achievement and developing critical thinking skills for tenth grade students in the of in second educational district in Amman. The study subject's consisted of (62) students have been randomly selected one as control group (34) students have been taught by the normal approach, and another experimental group (28) students studied by using multimedia strategy. The results indicated critical thinking skills in favor of experimental group. The study recommended the necessity of training teachers to use multimedia strategy in teaching.

Keywords: Multimedia; Elemantary; Islamic; Riligion, Critical Thinking

Competition in Jordan and MENA Countries Banking Markets

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Abstract:

Regulators all over the world are required to respond to the global financial crisis which affects the confidence of in the financial system. As a primary step, regulators of banking institutions need to look at the competition within their banking systems. This study examined the banking power in a number of highly concentrated banking industries. In particular, this project tests the competitive conditions in the banking industries of six Middle Eastern and North Africa (MENA) countries for the period from 1998 to 2007. Using the new Industrial Organization literature methodology, our results reveal that market power resulting from high concentration level does not eliminate competitive behavior. The banking market structure can be characterized as a monopolistic competition. The result of this study is necessary for policy market in MENA region. For them this is a signal to review their policy of interference and involvement in changes in the market structure of the banking markets and to be cautious of the process of consolidation and increasing concentration. Our result are rigorous under a variety of specification controlling for bank size, risk and a number of estimation technique including static and dynamic data analysis (Fixed or Random effects and the Generalized Methods of Moment).

Keywords: Banking; Competitive; Banking market

واقع الإعلام الإلكتروني والمطبوع في الدفاع عن حقوق الإنسان

ياسمين الضامن

الجامعة الأردنيّة

الملخص:

هدفت الدراسة إلى قياس اتجاهات الصحفيين الأردنيين نحو دور الصحافة ممثلة بالصحيفة التي يعملون فيها سواء أكانت مطبوعة أم إلكترونية، وانطلقت الدراسة من التساؤل: كيف يرى الصحفيون دور الصحافة التي يعملون فيها نحو الدفاع عن قضايا حقوق الإنسان؟ واتبعت الدراسة المنهج الوصفي الذي يعد أكثر المناهج شيوعاً في استطلاعات الرأي العام والأبحاث المسحية الأخرى، وتكون مجتمع الدراسة من الصحفيين العاملين في الصحف المطبوعة؛ حيث تم جمع أسماء الصحفيين الأردنيين العاملين في الصحف الأردنية المطبوعة، كما تم حصر المواقع الإلكترونية المرخصة لغاية 2013/12/31 بحسب دائرة المطبوعات والنشر والبالغ عددها (156) موقع لاختيار عينة من الصحافيين الذين يعملون في المواقع الإلكترونية ممن لا يعملون في الصحف المطبوعة، وتم أخذ عينة عشوائية بسيطة قوامها 150 مطبوع، 150 إلكتروني.

واعتمدت الدراسة الاستبيان الذي تم تصميمه في ضوء أهداف الدراسة ومشكلتها، وتم توزيع الاستبيان على عينة مكونة من 300 صحفي، وكان عدد الاستمارات التي تم جمعها وتحليلها (207) استمارة وكانت جميعها ملبية، وتوصلت الدراسة إلى النتائج التالية: وجود تطابق إلى حد كبير جداً في ترتيب الحقوق المدنية والسياسية وفقاً لاهتمام الصحافة وتغطيتها والدفاع عنها بين الصحافة المطبوعة والالكترونية، كما أشارت الدراسة إلى وجود تطابق إلى حد ما في ترتيب الحقوق الاقتصادية والاجتماعية والثقافية وفقاً لاهتمام الصحافة وتغطيتها والدفاع عنها بين الصحافة المطبوعة والالكترونية، وبينت الدراسة أن الخبر هو أكثر الأنماط الصحفية الأكثر استخداما في تغطية قضايا حقوق الإنسان في الصحافة المطبوعة والالكترونية. وأوضحت الدراسة أن العوامل ذات التأثير السلبي الأكبر على دور الصحافة في الدفاع عن قضايا حقوق الإنسان في الصحافة المطبوعة هي السياسات التي تتبناها الصحيفة، ثم الضغوطات التي تمارسها الأجهزة الحكومية، ثم طبيعة القضية المثارة وحساسيتها، أما في الصحافة الالكترونية كانت: طبيعة القضية المثارة وحساسيتها، ثم السياسات التي تتبناها الصحيفة، ثم الضغوطات التي تمارسها الأجهزة الحكومية. وبناء على تلك النتائج أوصت الدراسة بضرورة أن تقوم وسائل الإعلام الالكترونية بمتابعة ما يتم نشره على مواقعها من انتهاكات حقوق الإنسان وعدم الاكتفاء بعرض القضية فقط. كما أوصت الدراسة بالعمل على تعديل قوانين المطبوعات والنشر بما يرسخ من دور الصحافة الالكترونية للدفاع عن حقوق الإنسان.

الكلمات الدالة: الإعلام، الصحافة الإلكترونية، الإعلام الإداري، الحكومة الالكترونية، الوزارات الأردنية، الجامعات الأردنية، العلاقات العامة

توثيق القرى التراثية في اقليم البتراء

سعد الطويسي، فوزي قاسم ابو دنة، بلال أحمد أبو هلالة، أديب موسى السلامين

جامعة الحسين بن طلال

الملخص:

هدف هذا المشروع الى توثيق مجموعة من القرى التراثية في اقليم البترا وعددها ست قرى، حيث تضمنت عمليات التوثيق تثبيت هذه القرى على خرائط مرجعية وتحديد مواقعها الجغرافية بنقاط جغرافية مرجعية ومساحاتها ورسم مخططات هذه القرى وعمل اعادة بناء ثلاثي الابعاد لعمارتها ووحداتها السكنية. كذلك تم اعداد قاعدة بيانات كاملة للوحدات السكنية تتضمن وصفا لعمارة الجدران والملامح المعمارية الأخرى والتسقيف والارضيات من خلال نموذج خاص اعد لتلك الغاية. بالإضافة الى ذلك فقد تم تصوير كل وحدة سكنية او فراغ معماري تصويرا كاملا يعكس شكل وطبيعة وبناء تلك الوحدة. وقد تم دعم هذا المشروع من قبل صندوق دعم البحث العلمي الاردني بمبلغ (35345 دينار). وقد انطلقت فلسفة توثيق المشروع من توفير قاعدة بيانان كاملة عن هذه القرى (مخططات معمارية بمرجعية جغرافية دقيقة، وصف و تصوير فوتوغرافي) بحيث تكون هذه المادة كافية لإعادة بناء أي من القرى موضوع الدراسة في حال دمارها.

الكلمات الدالة: القرى التراثية، التراث، العمارة التقليدية، التنمية السياحية