

**FACULTY OF AGRICULTURAL
AND FOOD SCIENCES**



**ANNUAL REPORT OF SPONSORED RESEARCH
PROJECTS AND SERVICE CONTRACTS**

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PREPARED BY

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**Chairman of Research Committee
(2004-2005)**

EXECUTIVE SUMMARY

Research funds and income from service contracts amounted to 4,311,744 U.S.\$. Research funds from the Lebanese National Council for Scientific Research (LNCSR), University Research Board (URB), Service Contracts and Local, Regional & International Agencies accounted for 0.7, 2.7, 30.1 and 66.5 %, respectively.

During the academic year 2004-2005, the Faculty of Agricultural and Food Sciences hosted 19 Local, Regional & International-, 6 LNCSR-, and 16 URB -funded projects and 8 service contracts. Research areas funded by International Agencies included biotechnology, biodiversity, community nutrition, human and animal nutrition, food microbiology, poultry science, crop production, environmental science, plant pathology, sustainable agriculture, and integrated pest management. Research domains funded by the LNCSR and URB were more varied and included agricultural engineering, crop production and protection, plant diseases, fertigation, human nutrition and obesity, community nutrition, animal and poultry nutrition, trace minerals, landscape design and water pollution. Service contracts involved, mainly, agricultural extension and crop production.

The number of research projects was 41. Of these, 15 were in the Department of Plant Science, 11 in the Department of Land and Water Resources, 10 in the Department of Nutrition and Food Science and 5 in the Department of Animal Science.

The number of service contracts was 8. Of these, 4 were coordinated by the Department of Animal Science, 1 by the Department of Land and Water Resources, 1 by the Department of Plant Science and 2 by the Agricultural Research and Education Center.

INTRODUCTION

The Faculty of Agricultural and Food Sciences at the American University of Beirut is at the forefront of internationally-recognized basic and applied research geared towards serving the needs of Lebanon and the region and is actively involved in providing extension/training services to the community.

In addition to addressing a broad spectrum of research needs in the agricultural, food, landscape and nutritional sciences, the Faculty is particularly active in community service and development. The Sustainable Forage Development Program provided training for enhancing the capabilities of dairy farmers, who received cows through the US Dairy Stock Improvement Program, to produce forage crops. The Technology Transfer and Extension projects outlined the profiles of farming systems in the country and provided training to farmers to upgrade agricultural productivity and profitability. The Training Course and Knowledge Sharing in Urban Agriculture in the Middle East and North Africa (MENA) Region provided a forum for government staff, civil-society organizations and action researchers to improve their understanding of the discipline with the objective of enhancing their participation in the processes of multi-stakeholder policy development, research, action planning and implementation in the field of urban agriculture. The project Enhancing Livelihoods of Poor Farmers: Community Supported Agriculture focuses on organic agriculture as an environmentally conserving activity and aims at exploring institutional set-ups that can allow the building of socially responsible enterprises to support rural development. The Faculty has been collaborating with the University of Hawaii for strengthening agricultural programs and extension training in agricultural sciences in the Universities of Mosul and Dahouk in Iraq.

The Faculty has been participating in collaborative efforts to establish standardized plant virus detection methods for the Middle East. The project, Development of a Regional Viral Indexing and Certification Program for Plant Propagation Materials in The Middle East, aims at developing detection methods for major viruses infecting selected crops and establishing a plant pathogen detection laboratory in Lebanon through collaborative research among countries in the Middle East under the leadership of the University of Wisconsin, Madison, in the U.S. A more recent cooperation with the University of Wisconsin is centered on developing virus-resistant tomato varieties under the project Development of Tomatoes with Combined Resistance to Tomato Yellow Leaf Curl Virus using both Virus-derived Resistance and Molecular Marker assisted Breeding. The Faculty has been leading in efforts on management of Cedar Forests in the Mediterranean. The project, Integrated Management of Cedar Forests in Lebanon in Cooperation with other Mediterranean Countries, aims at developing an action plan for integrated management of forests including assessment of insect infestation in cedar forests in the Mediterranean region, determining the causes of *Cephalcia tannourinensis* insect infestation outbreak in Tannourine and assessing the possible threats of similar outbreaks in cedar forests in the region. The project Bioprospecting in the Middle East aims at identifying medicinal plants that are indigenous to Lebanon and investigating their biological activities through multidisciplinary approaches. The Faculty has initiated efforts aimed at investigating indigenous dietary diversity in rural communities. The project, Wild Edible Plants: Promoting Diversity in Poor Communities of Lebanon, explores the link between consumption of wild edible plants and issues of food security, dietary diversity and risk factors of chronic diseases.

The Faculty operates an Environmental and Sustainable Development Unit that aims to promote collaboration on sustainable development initiatives among departments at AUB and other institutions and organizations undertaking related activities. The Unit draws on the vast experience of the Faculty in natural resource management and environmental issues of relevance to the region. The Unit focuses on research and development activities linked to community development and operates in close cooperation with the Interfaculty Graduate Environmental Science program.

RESEARCH FACILITIES

Research facilities available in the Faculty of Agricultural and Food Sciences include the following:

Department of Animal Sciences

- Animal Rooms
- Feed Analysis Laboratory
- In Vitro Digestibility Apparatus
- Culturing and Enumeration of Microorganisms
- Tissue Culture Compartment
- Serology and Molecular Biology Research
- Histology and Immunofluorescence
- Conventional and Environmentally Controlled Poultry Houses
- Small Ruminant Digestibility Units
- Physiology Laboratory

Department of Land and Water Resources

- GIS Facilities
- Atomic Absorption Spectrophotometer (Micro and Macro Nutrient Analysis)
- Flame Photometer (K, Na & Ca measurement)
- Digestion Block and Microwave Digestion System
- Measurement of Soil Physical Properties
- Water Quality Measurement (Salinity, pH, Cations, Anions & Turbidity)
- Computer Facilities to Perform Required Analyses

Department of Nutrition and Food Science

- Caloric Value Determination of Foods
- Dietary Fiber Determination Unit
- High Pressure Liquid Chromatography Apparatus
- Gas Chromatography Apparatus
- Human Metabolic Unit
- Dual Energy X-Ray Absorptiometry Unit
- Body Composition Analyzer Apparatus
- Indirect Calorimetry
- Mixograph

- Sensory Evaluation Laboratory
- UV-VIS Spectrophotometer
- Food Processing Pilot Plant with Facilities for Canning, Evaporation, Dehydration, Bread Making, and Chilled and Frozen Storage, of Foods

Department of Plant Sciences

- Greenhouses for Plant Propagation and Pot Experiment
- Growth Chambers and Incubators for Microorganisms, Insects and Plants
- Extraction Equipment
- DNA and Protein Analysis (Electrophoresis and PCR)
- Tissue Culture Setup and Equipment
- Plant Tissue Analysis and Composition Equipment
- Light Microscopy Equipment for Research and Teaching
- Gas-chromatography and Mass Spectrometry

Agricultural Research and Education Center (AREC)

The Agricultural Research and Education Center, located in the Beqaa, has 600 dunums that can be subdivided into 5 dunums plots, and allocated for research on rain-fed and irrigated agronomic and horticultural crops including medicinal plants using several types of up-to-date agricultural machinery and implements in the fields of mechanization, irrigation, and soil fertility. A plot of 110 dunums has recently been allocated for organic crop production. In addition, phytothrone, three greenhouses, and an orchard of several fruit species are available. Facilities in the poultry sector allow for conducting nutritional trials on broilers in floor pens, battery brooders and cages. Moreover, a Seed Bank has been recently established to preserve genetic materials for short and longtime periods. Trials on laying hens can be conducted in groups using floor pens, or individually in cages placed in environmentally controlled rooms. A new environmentally controlled layer house, equipped with colony cages, has been established for research trials on laying hens and parent breeders. Moreover, a conventional poultry house has been converted to conduct free-range poultry research trials. A dairy herd and flocks of Awassi sheep and Shami goats with milking parlors are available for research activities. Research trials on small ruminants can be conducted in individual and collective pens. Crates for conducting digestibility trials on small ruminants are also available. A creamery has been recently renovated and equipped to conduct research on dairy products.

RESEARCH INTERESTS

Research themes/interests that are being pursued by faculty members include the following:

Department of Animal Sciences

- Identification and Control of Animal Diseases
- Identification of Major Contaminants of Milk
- Utilization of Food By-products in Animal Nutrition
- Restricted Feeding and Fat/Fat-Soluble Vitamin Supplemented Diets in Animal Nutrition
- Pasture Utilization and Grazing Intensity

- Livestock-Environment Interactions
- Bioeconomic Sustainability of Small Ruminant Systems
- Optimization Strategies for Small Ruminant Production
- Stress Physiology in Ruminants
- Barley and Low-Protein Diets in Poultry Nutrition
- Molting of Laying Hens
- Nutrient Requirements of Poultry at High Temperatures
- Utilization of Prebiotics and other Feed Additives in Poultry Diets

Department of Land and Water Resources

- Environmental/Rural and Dry land Hydrologic Modeling
- Water Harvesting/Storing
- Nutrient Management in Agricultural Systems
- Agrochemical Toxicity and Residual Effects in Soils
- Development of Suitable Fertilization Programs for Major Crops in Lebanon
- Fertigation
- Design and Analysis of Agricultural Machinery
- Pesticide Application Technology and Drift Reduction Techniques
- Modeling the Dynamics and Transport of Pesticide Sprays
- Water Requirements of Crops and Deficit Irrigation
- Water Resources Management
- Agricultural and Environmental Sustainability
- Application of GIS Methodologies in Desertification Monitoring
- Phytoremediation and Pollutant Dynamics in Soil-plant Systems
- Economics of Water and Natural Resources
- Wastewater Utilization
- Economics of Biodiversity
- Selenium Status in Lebanese soils, Plants and local Foodstuffs

Department of Nutrition and Food Science

- Diet Composition in Obesity and Hyperinsulinemia
- Dietary Fats and Plasma Lipids
- Nutritional Status of Populations
- Vitamins in Health and Disease
- Macronutrient Metabolism
- Assessment of Bone Density and Percent Body Fat
- Nutrition and physical performance
- Nutrition and Renal Disease
- Metabolic Aspects of Appetite Control
- Processing, Nutritional Value and Sensory Properties of Traditional Foods
- Bread and Cereal Technology
- Nutritive Value of Foods
- Functional Foods
- Shelf-Life Determination of Foods
- Food Microbiology

- Sensory Evaluation of Foods

Department of Plant Sciences

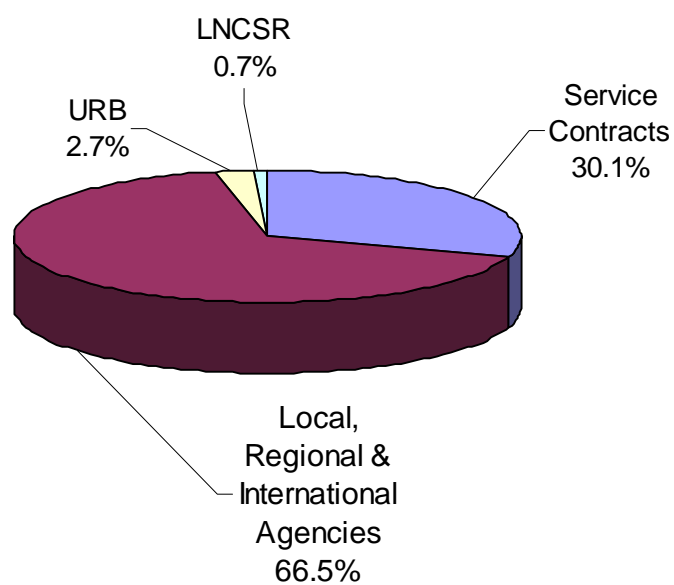
- Etiology and Epidemiology of Plant Diseases
- Integrated Pest Management
- Validation of Models for Disease Prediction and Forecasting
- Survey and Identification of the Wild Mushrooms of Lebanon
- Pesticides Residues, Metabolism and Fate in the Environment
- Biorational Pesticides
- Alternative Use of Herbicides, Fungicides and Insecticides
- Characterization of Plant Genetic Resources
- Plant Breeding
- Medicinal Properties of Wild and Cultivated Plants
- Phytoremediation

Faculty Research Funds and Service Contracts

2004 – 2005

Faculty Research Funds and Service Contracts (2004-2005)

Source	Amount (\$)
Service Contracts	1,296,633
Local, Regional & International Agencies	2,866,411
University Research Board (URB)	117,000
Lebanese National Council for Scientific Research (LNCSR)	31,700
Total	4,311,744



Service Contracts

Coordinator	Department ^a	Title	Funding Agency ^b	Area	Amount in \$
N. Dagher	ANSC	Sustainable forage development program	Mercy Corps	Agricultural Extension	1,034,000
S. Hamadeh	ANSC	Establishing a national training unit in Lebanon	IFAD	Agricultural Extension	37,361
S. Hamadeh	ANSC	Technical training support & monitoring to field extension agents & the M&E team of C/MADP*	IFAD	Agricultural Extension	20,857
S. Hamadeh	ANSC	Memorandum of partnership with University of Hawaii: Strengthening the agricultural programs and extension training in agricultural sciences*	University of Hawaii	Agricultural Extension	142,415
R. Zurayk	LWRS	Provision of technology transfer and extension for major irrigation schemes (Akkar El Bared, Dannyieh, Qasmieh, South Bekaa)*	CDR	Agricultural Extension	55,000
M. Haidar	PLSC	Employment creation and income generation through the development of micro and small agro-industries in south Lebanon	ESCWA	Agricultural Extension	59,95
M. Farran	AREC	Vegetables seeds trial at AREC	Unifert	Crop Production	6,000
M. Farran	AREC	Expansion of the existing pilot apple nursery	INDEVCO	Crop Production	1,000

*. Processed by Regional External Programs (REP) office.

a. ANSC: Animal Science; AREC: Agricultural Research and Extension Center; LWRS: Land and Water Resources; PLSC: Plant Science.

b. CDR: Lebanese Council for Development & Reconstruction; ESCWA: United Nations Economic & Social Commission for Western Asia; IFAD: International Fund for Agricultural Development.

Local, Regional and International Agencies

Investigators	Dept. ^a	Title	Funding Agency ^b	Research Area	Amount in \$
M. Farran	ANSC	Evaluation of graded levels of organic manure on yield and quality of vegetable crops grown in the Bekaa valley	Green Line Association	Crop Production	8,000
M. Farran	ANSC	Effect of dietary phytase on the performance of broiler chicks	BASF AG	Poultry Science	5,500
N. Farajalla	LWRS	Integrated development of wad systems in Lebanon	UNESCO	Environmental Science	2,000
N. Farajalla	LWRS	Support for environmental management of the Iraqi marshlands	UNEP	Environmental Science	40,000
R. Zurayk	LWRS	MENA regional short courses on urban agriculture	IDRC	Sustainable Agriculture	384,995
R. Zurayk	LWRS	Enhancing livelihoods of poor farmers in south Lebanon: Community supported agriculture.	Mercy Corps International	Sustainable Agriculture	180,000
R. Zurayk	LWRS	Global environment outlook 4 (GEO-4)	UNEP	Environmental Science	10,000
R. Zurayk	LWRS	Sustainable livelihoods in drylands community of practice	World Bank /UNDP	Sustainable Agriculture	7,661
M. Batal	NFSC	Wild edible plants: Promoting dietary diversity in poor communities of Lebanon	IDRC	Community nutrition	154,986
N. Hwalla	NFSC	Effect of Metformin on weight loss and body composition in obese insulin resistant subject fed either a high or low carbohydrate diet	Food & Drug Corporation	Human Nutrition	7,000
R. Tannous	NFSC	Testing microbiological contamination of meat products in Lebanon	UNIDO	Food Microbiology	13,000
Y. Abou-Jawdah	PLSC	Development of tomatoes with combined resistance to tomato yellow	University of	Integrated Pest	269,026

		leaf curl virus using both virus-derived resistance & molecular marker assisted breeding	Wisconsin	Management	
Y. Abou-Jawdah	PLSC	Development of a regional viral indexing & certification program for plant propagation materials in the Middle East.	University of Wisconsin	Integrated Pest Management	15,359
Y. Abou-Jawdah	PLSC	Selection of cucumbers for resistance to cucurbit yellow stunting disorder virus	USDA	Plant Pathology	4,690
N. Kawar	PLSC	Integrated management of cedars forests in Lebanon in cooperation with other Mediterranean countries	UNEP/GEF	Integrated Pest Management	484,528
S. Talhouk	PLSC	Bioprospecting in the Middle East	Hightech FZE	Biotechnology	1,198,680
S. Talhouk	PLSC	A holistic landscape approach to biodiversity use in Lebanon: Partnering with landowners	W. Ezzeddine	Landscape design	73,204
S. Talhouk	PLSC	Lebanese oregano essential oil	SRI	Medicinal Plants	1,596
S. Talhouk	PLSC	Development of the national biodiversity framework for Lebanon and top up biodiversity enabling activity	UNDP	Biodiversity	6,186

a ANSC: Animal Science; AREC: Agricultural Research and Extension Center; LWRS: Land and Water Resources; PLSC: Plant Science.

b. IDRC: International Development Research Centre; SRI: Stanford Research Institute; UNDP: United Nations Development Program; UNEP/GEF: United Nations Environment Programme/Global Environment Facility; UNESCO: United Nations Educational, Scientific & Cultural Organization; UNIDO: United Nations Industrial Development Organization; USDA: United States Department of Agriculture.

University Research Board (URB)

Name	Dept *	Title	Research Area	Budget \$
Hamadeh, Shady	ANSC	The effect of vitamin C supplementation on some physiological and immunological indicators in water-stressed Awassi sheep	Animal nutrition	6,500
Bashour, Issam	LWRS	Status of selenium in Lebanon soils, grains, vegetables and fruits	Trace minerals	7,500
Farajalla, Nadim	LWRS	Characterizing and modeling solute movement in soil under field conditions	Water pollution	5,500
Nimah, Musa	LWRS	Olive yield as affected by supplemental irrigation and split fertilization and pest management	Fertigation	7,000
Sidahmed, Moatasim	LWRS	The design and testing of a lentil harvester for commercially grown lentils in West Asia and North Africa	Agricultural engineering	8,600
Batal, Malek	NFSC	Complementary feeding in Lebanon: Determinants and nutritional adequacy	Community nutrition	6,500
Ghaddar, Sana	NFSC	Dietary and behavioral characteristics of normal weight versus hyper and normoinsulinemic normoglycemic obese subjects	Human nutrition	7,000
Hwalla, Nahla	NFSC	Effect of macronutrient composition of meals on postprandial PYY response of healthy subjects	Human nutrition	8,600
Kassaify, Zeina	NFSC	The inhibitory effects of different essential oil formulations in meat and poultry traditional marinades against food borne pathogens	Food microbiology	7,600
Obeid, Omar	NFSC	Postprandial ghreline status following macronutrient manipulation of meals in adult females	Human nutrition	6,500
Toufeili, Imad	NFSC	Roles of asparagine, glutamine and reducing sugars and baking time/temperature in the formation of acrylamide in Arabic bread	Food science	8,500

Abou-Jawdah, Yusuf	PLSC	Diagnosis of mollicutes infecting fruit trees in Lebanon	Crop protection	8,600
Haidar, Mustapha	PLSC	The role of inositol, 1,4,5-triphosphate in light signal transduction dodder (<i>Cucusta</i> spp) seedlings.	Weed science	7,500
Lafta, Abbas	PLSC	Evaluation of yield and postharvest quality of potatoes exposed to water stress	Crop production	6,600
Makhzoumi, Jala	PLSC	Garden landscape in Beirut: The intended and the incidental	Landscape design	7,000
Yau, Sui-Kwong	PLSC	Agronomic studies on safflower. II. N fertilization and supplementary irrigation	Fertigation	7,500

* ANSC: Animal Science; LWRS: Land and Water Resources; NFSC: Nutrition and Food Science; PLSC: Plant Science.

Lebanese National Council for Scientific Research (LNCSR)

Name	Dept*.	Title	Research Area	Budget \$
Barbour, Elie	ANSC	Relationship of water deprivation-stress to immunity in Awassi ewes of Lebanon	Animal science	5,000
Farran, Mohammad	ANSC	Utilization of locally produced barley and oil seed meals and feed additives in poultry diets	Poultry science	6,700
Nimah, Musa	LWRS	Introduction of saffron to the Bekaa: I. Selection and agronomic Studies	Crop production	5,300
Hwalla, Nahla	NFSC	Diet and physical activity as determinants of non-communicable disease risk factors in Lebanon	Human nutrition	6,000
Abou-Jawdah, Yusuf	PLSC	Identification and evaluation of local strains of fungi and viruses as biological control agents of pests of major economic significance to Lebanese agriculture	Crop protection	4,700
Saad, Adib	PLSC	Disease forecasting for management of epidemic diseases on apple and potato in Lebanon	Crop protection	4,000

* ANSC: Animal Science; LWRS: Land and Water Resources; NFSC: Nutrition and Food Science; PLSC: Plant Science.

PUBLICATIONS

During the academic year, 2004-2005, the Faculty generated 24 refereed articles, 4 abstracts, 7 proceedings, 5 chapters in books and 1 book. Details of publications are as follows:

Department of Animal Sciences

Barbour, E., Banat, G., Itani, W., Jaber, L., Habre, A., and Hamadeh, S. (2005). Quantitative assessment of humoral immunosuppression in water deprived semi nomadic sheep. *International Journal of Applied Research in Veterinary Medicine*, **2**(4):310-320.

Barbour, E.K., Sheib, H., Sagherian, V., Talhouk, R., and Talhouk, S. (2005). Immunopotential activities of *Calendula officinalis* and *Centaurea ainetensis* against IBD (Gumboro) virus in chicken broilers. *Journal of the American Holistic Veterinary Association*, **23**(4):15-20.

Tami, F., Darwish, R., Abi-Said, M., and Hamadeh, S. (2005). Sustainable improvement of small ruminant production in the semi-arid areas of Lebanon, *Journal of Sustainable Agriculture*, **25**(3):103-115.

Ghanem, A.M., Jaber, L.S., Abi Said, M., Barbour, E.K., and Hamadeh, S. K. (2005). The effect of vitamin C supplementation on some physiological indicators in water-stressed Awassi ewes. Proceedings of the 6th International Sheep Veterinary Congress in Crete, Greece, 17-21 June, 2005, 182-183.

Sleiman, F.T., Afram, M.N., Uwayjan, M.G., Farran, M.T., Hamadeh, S.K., Darwish, M.R. and Barbour, E.K. Utilization of different protein sources as supplements to whey treated straw silage. Joint annual meeting of ADSA-ASAS- CSAS, July 24-28, 2005, Cincinnati, Ohio.

Department of Land and Water Resources

Sidahmed, M.M. and Jaber, N.S. (2004). The design and testing of a cutter and feeder mechanism for the mechanical harvesting of lentils. *Biosystems Engineering*, **88**(3): 295-304.

Bashour I. *Soil Chemistry and Fertility*. EOLSS Encyclopedia, United Nations, <http://www.eolss.com>.

Farajalla, N.S. and Nimah, M. (eds). (2004). *Challenges Facing Water Resources Management in Arid and Semi-Arid Regions, Symposium Proceedings*, Vol I (450 pp) & Vol II (350 pp), AUB-FAFS, Beirut, Lebanon.

Nimah, M.N. (2004). System selection and management of irrigation with brackish/saline water. In: *Prospects of Saline Agriculture in the Arabian Peninsula*. F.K. Taha, S. Ismail and A. Jaradat (eds). Amherst Scientific Publishers, Amherst, Mass, USA, pp. 351-359.

Zurayk, R. and Haidar, M. (2004). Biodiversity conservation priorities: Lebanon. In: *Sharing Innovative Experiences*. UNDP. New York Vol. 9, pp. 13-20.

Zurayk, R., Haidar, M. and Hamadeh, S. (2005). The Local Users Network: A

Participatory Communication Forum. In: Mear, A. (ed.). *Food and Water for Millions: Participatory Communication for Land and Water Management*. Montreal, Canada. pp. 17-25.

Bu Ghanem, M., Kai, L., Khoury, J., Moadad, N., and Zurayk, R. (2004). La Cerise d'Aarsal – Liban. Promouvoir la Compétitivité de l'Agriculture par les Savoir-faire Locaux. Atelier sur les indications géographiques au Moyen-Orient et en Afrique du Nord, 7-10 Juin 2004, Montpellier, France. pp. 25-27.

Farajalla, N.S., and Abou Mosleh, R. (2005). Characterization of river pollution through riverbed sediment analysis – case study Lebanon. Proceedings ASAE International Meeting, Tampa Florida, USA.

Jamali, D. and Zurayk, R. (2004). A community of practice approach to knowledge management, ECKM 2004: The 5th European Conference on Knowledge Management, Paris, France, 30 September, 2004, Vol. I. pp.455-460.

Lteif, A., Bashour, I., Nimah, M.N., and Darwish, R. (2005). Selenium levels in Beqaa Valley in Lebanon. 15th International Plant Nutrition for Food Security, Human Health and Environmental Protection, September 14-19, Beijing, China, pp. 716-717.

Nimah, M. N. (2005). Cucumber Yield under regular deficit irrigation and mulching treatments, 3rd International Cucurbit Symposium, Townsville, Australia.

Zurayk, R., Makki, F., Naddeh, S., Haidar, M., Codsí, E., Fatfat, S., Houjeiri, A., and Daccache, J. (2004). Le Plan d'Action Libanais. Promouvoir la Compétitivité de l'Agriculture par les Savoir-faire Locaux. Atelier sur les indications géographiques au Moyen-Orient et en Afrique du Nord, 7-10 Juin 2004, Montpellier, France. pp. 79-80.

Department of Nutrition and Food Sciences

Abou-Samra, R., Hwalla, N., Torbay, N., Dib, L. and El-Hajj Fuleihan, G. (2005). High plasma leptin is not associated with higher bone mineral density in insulin resistant premenopausal obese women. *Journal of Clinical Endocrinology & Metabolism*, **90**:2588-2594.

Al Awar, R.M., Obeid, O.A., Hwalla, N., and Azar, S. (2005). Postprandial acylated ghrelin status following fat and protein manipulation of meals in healthy young women. *Clinical Science*, **109**:405-411.

Batal, M., and Boulghourjian, C. (2005). Breastfeeding initiation and duration in Lebanon: Are the hospitals “Mother Friendly”? *Journal of Pediatric Nursing*. **20**(1):53-59.

Batal, M., Receveur, O., Gray-Donald, K., and Kuhnlein, H.V. (2005). Estimation of traditional food intake in indigenous communities in the Yukon and Denendeh. *International Journal of Circumpolar Health*. **64**(1):46-54.

Ghaddar, S. (2005). Anemia in the hemodialysis population. In: *Aging in Contemporary Society: Translating Research into Practice*. Yee-Melichar, D. and Boyle, A.R. (eds.). XanEdu, Ann Arbor, Michigan, pp. 113-156.

Hwalla, N., Mehio Sibai, A., and Adra, N. (2005). Adolescent obesity and physical activity. *World Review of Nutrition and Dietetics*, **94**:42-50.

Hwalla, N., Shaker, L., Torbay, N., Azar, S.T., Habbal, Z. and Adra, N. (2005). Postprandial glycaemic and insulinemic responses to high carbohydrate versus high protein meals in obese normoglycaemic subjects with varied insulin Sensitivity. *Nutrition Research*, **25**:535-48.

Najjar, N., Adra, N., and Hwalla, N. (2004). Glycaemic and insulinemic responses to hot versus cooled potato in males with varied insulin sensitivity. *Nutrition Research*, **24**:993-1004.

Obeid, O.A. (2005). Plasma amino acid concentrations in patients with coronary heart disease: A comparison between UK Indian Asian and European men. *International Journal of Vitamins & Nutrition Research*, **75**(4):267-273.

Obeid, O.A., Bitar, S., Hwalla, N., Torbay, N. and Emery, P.W. (2005). Effect of diet supplementation with glutamine, dihydroxyacetone and leucine on food intake, weight gain and postprandial glycogen metabolism of rat. *Nutrition*, **21**:224-229

Harakeh, S., Yassine, H., Gharios, M., Barbour, E., Hajjar, S., Elfadel, M., Toufeili, I., and Tannous, R. (2005). Isolation, molecular characterization and antimicrobial resistance patterns of Salmonella and E. Coli isolates from meat-based fast food in Lebanon. *Science of the Total Environment*, **341**:33-44.

Kassaify, Z.G., Li, E.W., and Mine, Y. (2005). Identification of antiadhesive fraction(s) in nonimmunized egg yolk powder: *In vitro* study. *Journal of Agricultural and Food Chemistry*, **53**(11):4607-4614.

Salamoun, M., Kizirian, A., Tannous, R., Nabulsi, M., Choucair, M., Deeb, M., and El-Hajj Fuleihan, G. (2005). Low calcium and vitamin D intake in healthy children and adolescents and their correlates. *European Journal of Clinical Nutrition*, **59**:177-184.

Bassil, M., Hwalla, N., and Obeid, O.A. (2005). The acute effect of leptin injection on *in vivo* postprandial glycogen and lipid synthesis in rats. Presented at the Annual summer meeting hosted by the institute of Food Research Norwich. Plant and Human health. 27-28 July, 2005

Mrayati, M., Hwalla, N., and Obeid, O.A. (2005). No acute effect of ghrelin injection on *in vivo* postprandial glycogen and lipid synthesis of rats. Presented at the Annual summer meeting hosted by the institute of Food Research Norwich. Plant and Human health. 27-28 July, 2005.

Obeid, O.A. (2004). Oman: Eating habits of students at SQU. Second Arab Nutrition Conference, Manama, Bahrain. December 6-9, 2004.

Department of Plant Sciences

Abou-Jawdah, Y., Sobh, H., Cordahi, N., Kawtharani, H., Nemer, G., Maxwell, D.P. and Nakhla, M.K. (2004). Immunodiagnosis of *Prune dwarf virus* using antiserum produced to its recombinant coat protein. *Journal of Virological Methods*. **121**:31-38.

- Abou-Jawdah, Y., Wardan, R., Sobh, H., and Salameh, A. (2004). Antifungal activities of selected Lebanese wild plants, against plant pathogenic fungi. *Phytopathologia Mediterranea*. **43**:377- 386
- Haidar, M., Iskandarani, N., Sidahmed, M. and Darwish, R. (2005). Susceptibility of *Orobanche ramosa* and potato tolerance to rimsulfuron. *Crop Protection*. **24**(1): 7-13.
- Haidar, M., Sidahmed, M., Darwish, R. and Lafta, A. (2005). Selective control of *Orobanche ramosa* in potato with rimsulfuron and sub-lethal doses of glyphosate. *Crop Protection*. **24**(8):743-747.
- Talhok, S.N., Van Breugel, P., Zurayk, R., Al-Khatib, A., Estephan, J., Ghalayini, A., Debian, N., and Lychaa, D. (2005). Status and prospects for the conservation of ruminant semi-natural carob *Ceratonia siliqua* L. populations in Lebanon. *Forest Ecology and Management*, **206**:49-59.
- Talhok, S. N., Dardas, M., Dagher, M., Clubbe, C., Jury, S., Zurayk, R., and Maunder, M. (2005). Patterns of floristic diversity in semi natural coastal vegetation of Lebanon and implications for conservation. *Biodiversity and Conservation*, **14**:903-915.
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