Journal of Medicinally Active Plants

Volume 4
Issue 2 *Vol 4 Supplement*

January 2015

ACMAP 5th Annual Conference Program book FARGO-ND

Follow this and additional works at: https://scholarworks.umass.edu/jmap

 Part of the Plant Sciences Commons

Recommended Citation

. 2015. "ACMAP 5th Annual Conference Program book FARGO-ND." *Journal of Medicinally Active Plants* 4, (2):1-28.
DOI: https://doi.org/10.7275/R5RR1W6S
https://scholarworks.umass.edu/jmap/vol4/iss2/3

This Abstracts is brought to you for free and open access by ScholarWorks@UMass Amherst. It has been accepted for inclusion in Journal of Medicinally Active Plants by an authorized editor of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Journal of Medicinally Active Plants

Volume 4
Issue 2 *Vol 4 Supplement*

August 2015

ACMAP 5th Annual Conference Program book FARGO-ND

Follow this and additional works at: http://scholarworks.umass.edu/jmap

Recommended Citation
. 2015. "ACMAP 5th Annual Conference Program book FARGO-ND," *Journal of Medicinally Active Plants* 4(Vol 4 Supplement).
DOI: https://doi.org/10.7275/R5RR1W6S
Available at: http://scholarworks.umass.edu/jmap/vol4/iss2/3

This Abstracts is brought to you for free and open access by ScholarWorks@UMass Amherst. It has been accepted for inclusion in Journal of Medicinally Active Plants by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

American Council for Medicinally Active Plants

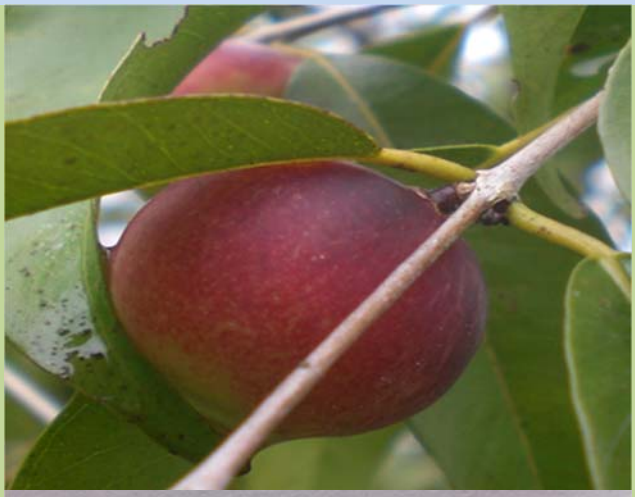
5th Annual Conference

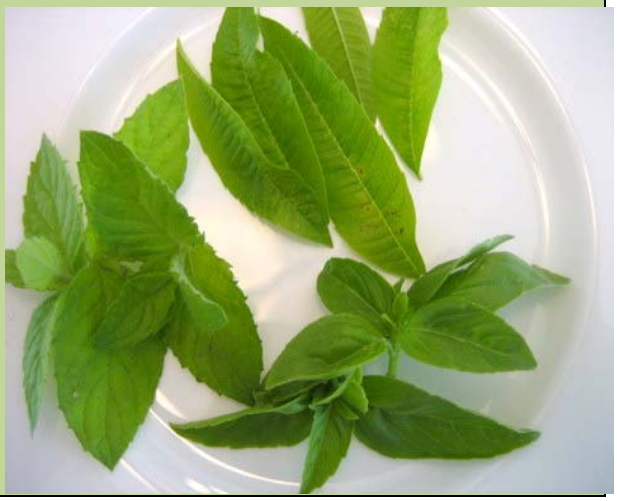
June 15-18, 2014 North Dakota State University

NDSU NORTH DAKOTA STATE UNIVERSITY

Venue : Ramada Plaza Suites and Conference Center

Fargo, North Dakota, USA





ACMAP Board of Directors

PRESIDENT

Fabricio Medina-Bolivar
Arkansas State University

VICE PRESIDENT

Jeffrey W. Adelberg
Clemson University

SECRETARY

S. Rao Mentreddy
Alabama A&M University

TREASURER

Carol M. Stiff
Kitchen Culture Kits

MEMBERS-AT-LARGE

Jeanine Davis
North Carolina State University

Nirmal Joshee
Fort Valley State University

Anait S. Levenson
University of Mississippi Medical Center

EXECUTIVE DIRECTOR

Gary W. Stutte
Kennedy Space Center

Table of Contents

American Council for Medicinally Active Plants
5th Annual Conference
June 15-18, 2014 North Dakota State University
Venue : Ramada Plaza Suites and Conference Center
Fargo, North Dakota, USA

Sunday, June 15, 2014	
5:00 – 6:00 pm	**ACMAP Board of Directors Meeting** (Board Room- Sonata 1)
6:00 – 8:00 pm	**Reception and Registration** (Ramada Plaza Lobby and Mozart 1)
Monday, June 16, 2014	
8.00– 9.00 am	**Registration at Ramada Plaza Lobby**
9.00 – 9:30 am	**Welcome and Greetings** Crystal Ballroom **Kalidas Shetty,** Associate Vice President International Collaboration and Partnership, NDSU **Dean L. Bresciani** President. NDSU **Kenneth F. Grafton** Dean College of Agriculture, Food Systems and Natural Resources, NDSU **Bruce Rafert** Provost NDSU **Fabricio Medina Bolivar** President, ACMAP **Dipayan Sarkar,** Program Chair and Host, NDSU
9:30 -10:30 am	**Plenary Session** ***"Current Global Challenges on Diet-Linked Chronic Diseases & Role of Medicinal Plants"*** **Dr. Mark Wahlqvist** Monash University, Australia and Zhejiang University, China Introduction by Dr. Kalidas Shetty
10:30 – 11:00 am	***"Effect of L-Theanine on the Cytokine Secretion of LPS-induced RAW 264.7 Cells"*** **Dr. De-Xing Hou** Kagoshima University, Japan
11:00 - 11:30 am	**Coffee Break**

	Session I Chairperson: Dr. Lyle Craker University of Massachusetts, MA, USA
11:30 – 11:50 am	***"Developing Quality Control Standards for Essential Oils from Rwanda"*** **Dr. H. Rodolfo Juliani** Rutgers University, NJ, USA
11:50 – 12:10 pm	***"Chilean Native Corn Accessions as Potential Sources of Phenolic Antioxidants and in vitro Bioactivity Linked to Hyperglycemia and Hypertension Management"*** **Dr. Lena Galvez Ranilla** Pontificia Universidad Católica de Valparaíso, Chile
12:10 – 12:30 pm	***"Inhibition of Salmonella Entry into Epithelial Cells and Intracellular Replication by Rice Bran Phytochemical Extracts"*** **Dr. Irfan A. Ghazi** Colorado State University, CO, USA & University of Hyderabad, India
12:30 – 1:00 pm	**"Our Food is our Medicine"** **The Role of Traditional Foods in Native American Communities** **Dr. Steven Dahlberg** White Earth Tribal and Community College, MN, USA
1.00 – 2:00 pm	**Lunch (Ramada)** (Mozart I and II)
2:00 – 3:30 pm	**Poster Session** Crystal Court South Viewing and Discussion
3:30 – 5.00 pm	**Open Forum** (Crystal Ballroom) ***"Crops for Health as Solution to Chronic Diseases: Strategic Vision for Agriculture and Global Food Security"*** **Dr. Kalidas Shetty** North Dakota State University, ND, USA **Dr. Mark Wahlqvist** Monash University, Australia **Dr. Donald Warne** North Dakota State University, ND, USA Open House Discussion Crystal Ballroom (Ramada Plaza)
5.00 – 5.15 pm	**Presentation on ACMAP by Dr. Fabricio Medina Bolivar** **President, ACMAP**

5.15 – 6.00 pm	**Group Photo - Break**
6:00 – 9.00 pm	**Tour of the Fargo Brewing Company** **Fargo Brewing Company** **610 N. University** **Fargo, ND 58102** **Black Barley Functional Beer** **New Americans Food Project-Ethnic Healthy Bioactive Vegetable Snacks** Sponsored By Passage to India and Fargo Brewing Company **Visit to Fargo Downtown** **Buses will Depart from Ramada at 5.30, 6.30, 7.30 and 8.30 pm and will stop at Fargo Brewing Company and Downtown Fargo. The bus will return at 9.00 pm to Ramada.**
Tuesday, June 17, 2014	
9.00 – 10.00 am	**Plenary Session** Brahms ***"Paradigm Shift in Cellulosic Biofuel Production"*** **Dr. Anthony L. Pometto III** Clemson University, SC, USA Introduction by Dr. Kalidas Shetty
10.00 – 10:30 am	***"Potential for Piperlongumine in Pancreatic Cancer Therapy"*** **Dr. Katie Reindl** North Dakota State University, ND, USA
10:30 – 11:00 am	***Changes in Essential Oil Content and Composition of Holy Basil in Response to Agronomic Treatments"*** **Dr. S. Rao Mentreddy** Alabama A & M University, AL, USA
11.00 – 11.30 am	**Coffee Break**
11.30 – 12.00 pm	***"Preclinical Studies on the Chemopreventative and Therapeutic Efficacy of Pterostilbene in Prostate Cancer"*** **Dr. Anait Levenson** University of Mississippi Medical Center, MS, USA
12:00 – 12:30 pm	***"Biotransformation, Elicitation and Metabolic Engineering Strategies to Produce Bioactive Compounds from Root Cultures"*** **Dr. Fabricio Medina Bolivar** Arkansas Biosciences Institute, Arkansas State University, AR, USA

12:30 – 1:00 pm	***"Novel Mechanisms of Dietary Medicinal Phytochemicals Identified through a Comprehensive Genome-Wide Approach: Implication for Cancer and Inflammation"*** **Dr. Andrea I Doseff** Heart and Lung Research Institute, Ohio State University, OH, USA
1:00 - 2:30 pm	**Lunch Break (Ramada) Mozart I & II**
2:30 – 2:50 pm	**Session II - Chaired by Dr. Nirmal Joshee** Fort Valley State University, GA, USA ***"New Strategies of Traceability for Determining the Geographical Origin of Medicinal Plants: Innovation of Biological Barcode by PCR-DGGE"*** **Dr. Aly El Sheikha** Al-Baha University, Saudi Arabia
2:50 – 3:10 pm	***"Effect of Application of Nutrients and Spacing on Growth, Seed and Tuber Yields in Glory Lilly"*** **Laxminarayan Hegde** University of Horticultural Sciences, Bagalkot, India
3:10 – 3:30 pm	***"Indian Traditional Crops having Functional Bioactives and their Potential Health Benefits"*** **Dr. Rashmi Yadav** National Bureau of Plant Genetic Resources, India
3.30-3.40 pm	**Break**
3:40 – 4:00 pm	**Session III. Chaired by Dr. Jeffrey Adelberg** Clemson University, SC, USA ***"Assessing Antioxidant Activities and Phenolic Compositions of Olive Leaves Processed by Different Drying Methods"*** **Dr. Ayhan Dagdele** Balikesir University, Turkey
4:00 – 4:20 pm	***"Biology, Propagation and Cultivation for Commercial Production of a Few Desert Medicinal Plants"*** **Dr. Sudhershan Chelan** Kuwait Institute for Scientific Research, Kuwait

4:20 – 4:40 pm	***"Evaluation of Phenolic-Linked Bioactive Functionality in Camu-Camu (Myrciaria dubia) for Antihyperglycemia and Antihypertension"*** **Alice Fujita** University of Sao Paulo, Brazil & North Dakota State University, ND, USA
6:00- 8.00 pm	**Dinner Banquet** Crystal Ballroom ***"Global Indigenous Chronic Disease Burden: Role of Medicinal Plants and Foods"*** **Speaker: Dr. Donald Warne** **North Dakota State University, ND, USA** **Closing Remarks:** **Dr. Fabricio Medina-Bolivar, President of ACMAP**

Wednesday, June 18, 2014

Field Trip Tours

8:30 am	**Depart Ramada**
9.00 -11.00 am	**North Dakota Agriculture: Tour of Peterson Seed Farm, Casselton, ND** **Peterson Farms Seed Co.** **3104 164th Ave SE** **Harwood, ND 58042**
12.00-1.30 pm	**Lunch at Bonanzaville, Fargo Provided by Passage to India** **Bonanzaville** **1351 W. Main Ave.** **West Fargo, ND 58078**
2.00- 3.00 pm	**Tour of State of the art NDSU Research Greenhouse Facilities** **North Dakota State University Greenhouse** **1440 18th St. N** **Fargo, ND 58102**

Invited Speaker Abstracts

Effect of L-theanine on the Cytokine secretion of LPS-induced RAW264.7 Cell

Xi He[1], Shi-rui Zhang[1], De-Xing Hou[1, 2]. [1] College of Animal Science & Technology, National Research Center of Engineering Technology for Functional Ingredients from Botanicals, Hunan Agricultural University, Changsha 410128, China; and [2]Faculty of Agriculture, Kagoshima University, Kagoshima 8900065, Japan.

L-theanine, gamma-glutamylethylamide, N-ethyl-L-glutamine, is a non-protein amino acid found principally in the tea plant. It is the predominant amino acid in tea and makes up approximately 1–2% of dry weight. Recent studies showed that L-theanine have multi-function such as affecting neurotransmission, anti-cancer, anti-inflammation, etc. The present study aimed to investigate the effect of L-theanine on the secretion level of cytokines of LPS-induced RAW264.7 Cell. RAW264.7 cells were treated with or without LPS plus 400 μmol/L or 800 μmol/L L-theanine, secretion levels of 23 kinds of cytokines were detected with Bio-plex suspension assay system. Levels of cytokines with LPS were increased notably, and the levels of IL-6, IL-10, GM-CS and TNF-α were suppressed significantly with the dose of 800 μmol/L L-theanine. Our study revealed that the adverse inflammation reaction involved in LPS-induced RAW264.7 Cell was attenuated by the L-theanine.

Potential for Piperlongumine in Pancreatic Cancer Therapy

Katie Reindl, Assistant Professor, Department of Biological Sciences, North Dakota State University

Pancreatic cancer is one of the most deadly cancers with a 5-year survival rate of less than 7%. The best chemotherapy currently available only extends the lives of pancreatic cancer patients by 6 months. There is a critical need for alternative approaches to treating this deadly disease. Modulation of oxidative stress has emerged as a potential strategy for cancer therapy. Oxidative stress results when there is an imbalance between the production of reactive species and the antioxidant capacity. Therapeutic agents that modulate ROS levels or the antioxidant capacity have shown cancer-selective effects and minimal toxicity for healthy tissues. Our research group focuses on bioactive food components for the treatment of solid tumors by evaluating their therapeutic efficacy and underlying mechanisms. In this study, we investigated the anticancer effects of piperlongumine (PPLGM), an alkaloid found in the fruits of long pepper plants, for treatment of pancreatic cancer. We found that PPLGM elevated ROS levels and induced DNA damage in pancreatic cancer cell lines resulting in cell death for both *K-ras* wildtype and mutant cell lines. Similarly, PPLGM reduced pancreatic tumor growth in a human xenograft mouse model. Tumors from the PPLGM-treated animals expressed increased levels of 8-OHdG and reduced levels of Ki-67, suggesting PPLGM enhanced oxidative stress and inhibited cell proliferation in the tumors. These results suggest that PPLGM works through a ROS-mediated DNA damage pathway to inhibit pancreatic cancer growth both *in vitro* and *in vivo*, and that modulating oxidative stress using a bioactive food component such as PPLGM holds promise for pancreatic cancer treatment.

Changes in Essential Oil Content and Composition of Holy Basil in Response to Agronomic Treatments

S. Rao Mentreddy[1], Cedric A. Sims[2], Rodolfo H. Juliani[3], and James E. Simon[3]. [1]Dept. of Biologocal and Environmental Sciences, Alabama A&M University, Normal, Alabama, 35762. [2]Alcorn State University Extension Program, Alcorn State, MS. [3]New Use Agriculture and Natural Plant Products Program, Rutgers The State University of New Jersey, New Brunswick, NJ 08901.

Holy Basil *(Ocimum tenuiflorum)* is a popular medicinal herb used for treating a wide range of ailments. With increasing demand for basil containing herbal products from Asia, holy basil has potential for production in the US, provided agronomic practices and their effects on essential oil production and its composition are known. Therefore, changes in essential oil volume and its composition of holy basil in response to planting dates, spacing, nitrogen fertilizer levels, colored mulches and organic vs. conventional production using three *O. tenuiflorum* accessions, PI 652056, PI 652057 and PI 288779 were determined. Essential oil content and its composition of stems and leaves were determined using gas chromatography/mass spectrometry. The highest amount (5.7 mL) of essential oil was produced in planting date trial, whereas the lowest amount (0.7 mL) was produced in the N-fertilizer trial. PI 288779 produced a greater volume of oil among genotypes. Eugenol and trans-β-farnesene were present in variable levels in all agronomic treatments. Trans-β-guaiene was expressed in all agronomic treatments, except the spacing trial. β-caryophyllene was present in planting date, colored mulch, and in organic vs. conventional production trials, but was absent in other trials. Methyl chavicol and 1,8-cineole were present in spacing and N-fertilizer trials. Bicyclogermacrene was present in planting date and colored mulch trials only. E-methyl cinnamate and linalool were expressed in planting date and N-fertlizer trials, respectively. β-bisabolene and α-cadinene were expressed in spacing trial. Essentail oil production and its composition vary with genotype within a species and agronomc treatments as well.

Preclinical studies on the chemopreventive and therapeutic efficacy of pterostilbene in prostate cancer

Swati Dhar[1], Liangfen Zhang[1], Avinash Kumar[1], Agnes M Rimando[2], Janice Lage[3], Jack R. Lewin[3], Xu Zhang[4] and Anait S Levenson[1,3] [1]Cancer Institute, University of Mississippi Medical Center (UMMC), Jackson, MS 39216, [2]Natural Products Utilization Unit, ARS, USDA and University of Mississippi, Oxford, MS 38677 [3]Department of Pathology, UMMC, Jackson, MS 39216; 4Center of Biostatistics and Bioinformatics, UMMC, Jackson, MS 39216.

Pterostilbene (PTER) is a naturally occurring dimethylether analogue of resveratrol with potent anti-oxidant, anti-inflammatory and anticancer activity. We reported earlier that PTER inhibited metastasis-associated protein 1 (MTA1) expression in prostate cancer cell lines and MTA1-mediated growth, progression and metastasis of orthotopically implanted tumor cells in nude mice. In the current study, we used the *Pten*-null conditional knockout mice to evaluate the efficacy of PTER on MTA1-mediated events in prostate cancer progression. This model mimics human disease and provides fast stage-defined development of prostate cancer. Mice were fed, starting at 3 weeks of age, with phytoestrogen-free diet AIN 76A and injected daily (i.p.) either with 10% DMSO (vehicle control) or with 10 mg/kg bw of PTER until 6, 10, 15 and 25 weeks of age. Our

results showed that PTER reduced the progression of prostate cancer through inhibition of inflammation and MTA1/pAkt/AR pathways. Prostate tissues from the PTER-treated group showed a decrease in Ki67 proliferation marker-positive cells and angiogenesis, and an increase in apoptosis. Taken together our findings suggest that PTER blocks prostate cancer growth and progression at prostate intraepithelial neoplasia (PIN) precancerous stage in *Pten* conditional knockout mice. These findings may have potential clinical application for chemoprevention and therapeutic strategies in prostate cancer.

Biotransformation, elicitation and metabolic engineering strategies to produce bioactive compounds from root cultures

Fabricio Medina-Bolivar[1,2], Tianhong Yang[1], Luis Nopo-Olazabal[1], Nirmal Joshee[3]. [1]Arkansas Biosciences Institute and [2]Department of Biological Sciences, Arkansas State University. [3]Agricultural Research Station, Fort Valley State University.

Hairy root cultures of peanut (*Arachis hypogaea*), muscadine grape (*Vitis rotundifolia*) and American skullcap (*Scutellaria lateriflora*) were established in our laboratory to study the biosynthesis of known polyphenols and potentially identify new medicinally active compounds. In peanut and muscadine grape, treatment with methyl jasmonate (MeJA) combined with cyclodextrin led to several fold increase in the levels of the stilbenoids arachidin-1 and arachidin-3 when compared to treatment with MeJA alone. Furthermore, when piceatannol was fed to the cultures in combination with MeJA and cyclodextrin the levels were further increased significantly. When MeJA and cyclodextrin were added to the skullcap hairy root cultures, the levels of verbascoside and the known flavones baicalein, scutellarein, wogonin and their respective glucuronides were not significantly altered. However, several other compounds which were characterized by tandem mass spectrometry were induced. To manipulate the levels of polyphenols, transgenic hairy root lines of *S. lateriflora* harboring a flavonoid-specific transcription factor (AtMYB12) were produced. Semi-quantitative RT-PCR analysis showed an increase in the expression of phenylalanine ammonia lyase and chalcone isomerase genes in the transgenic AtMYB12-hairy root line when compared to a wild-type line. Subsequently the accumulation of wogonin was increased in the AtMYB12-hairy root lines. In addition, after naringenin and chrysin were fed to the skullcap hairy root cultures novel glucuronides were produced. In summary, elicitation, metabolic engineering and biotransformation strategies led to the increase of known bioactive metabolites and production of potentially new compounds that merit further study to identify their biological activities.

Novel mechanisms of dietary medicinal phytochemicals identified through a comprehensive genome-wide approach: implication for cancer and inflammation.

Andrea I. Doseff[1]. [1]Department of Molecular Genetics, Department of Internal Medicine, Heart and Lung Research Institute, The Ohio State University, Columbus, OH, 43221, USA.

Flavonoids constitute the largest class of non-essential dietary phytochemicals, adding essential health value to our diet and emerging as key nutraceuticals with anti-tumor and anti-inflammatory activities. Cellular targets for dietary phytochemicals remain largely unknown, posing significant challenges for the regulation of dietary supplements and the understanding of how active plant

compounds provide health value. We developed a novel implementation of phage-display-coupled with next-generation sequencing (PD-Seq) to identify human cellular targets of small molecules. The identification of these targets revealed new mechanisms responsible for the health beneficial effects of flavonoids. The molecular characterization of these mechanisms using a breast cancer model and human biopsies helped defined how phytochemicals exert their anti-cancer and anti-inflammatory actions. Functional food formulations with enriched flavonoid content increased bioavailability and showed efficacy in vivo, highlighting the possibilities of clinical interventions. Our results provide a new framework to understand how medicinally active phytochemicals result in their recognized health benefits.

Oral Presentation Abstracts

Developing quality control standards for essential oils from Rwanda

H. Rodolfo Juliani[1], Nicholas Hitimana[2] and James E Simon[1]. Plant Biology and Pathology Department. School of Environmental and Biological Sciences (SEBS). Rutgers University. 59 Dudley Road New Brunswick, New Jersey 08901-8520. 2. Ikirezi Natural Products P.O. Box 7446 Kigali, Rwanda.

In several African Sub-Saharan countries, aromatic plants can be grown and distilled for their essential oils as high value products and sources of income generation for the local producer and distiller. Essential oils are volatile substances that give aromatic plants their characteristic aroma. The production of organic essential oils is an important strategy to add value to plant products and contribute to create new markets while also fostering the conservation of the environment. Essential oil quality depends upon production and management practices while procuring the commercial oils. Factors such as germplasm collection, extraction systems, collection and storage will have a great impact on the final quality of the oil. As Rwanda has been producing organic essential oils for international markets, this work sought to develop quality control standards for essential oils produced by Ikirezi Natural Products, a community interest business. Characters that define the quality of essential oils include color, aroma, haziness, physical/chemical properties (density, refractive index and optical rotation) and chemical composition. This research presentation will provide an overview of the joint collaboration between Ikirezi Natural Products and Rutgers University to develop standards for geranium (*Pelargonium* spp.), lemongrass (*Cymbopogon citratus*), eucalyptus (*Eucalyptus* spp.), tagetes (*Tagetes minuta*) and patchouli (*Pogostemon cablin*) oils.

Chilean native corn accessions as potential sources of phenolic antioxidants and *in vitro* bioactivity linked to hyperglycemia and hypertension management

Adrian González-Muñoz[1], Ana Maria Quesille-Villalobos[1], Claudia Fuentealba[1], Kalidas Shetty[2] and Lena Gálvez Ranilla[1]. [1]School of Food Engineering, Pontificia Universidad Católica de Valparaíso, Av Waddington 716, Valparaíso, Chile and [2]Dept. of Plant Science, North Dakota State University, Fargo, North Dakota 58108.

Chilean food diversity may represent a potential source of bioactive compounds with health-related functional properties. The total phenolic contents (TPC), phenolic profiles, antioxidant

capacity (DPPH and ABTS) and the inhibition of enzymes relevant for managing early stages of type 2 diabetes such as hyperglycemia-relevant α-glucosidase and α-amylase and hypertension-relevant angiotensin I-converting enzyme (ACE-I) were screened for the first time in thirty-three Chilean corn accessions in both free and cell wall-bound fractions. Total phenolic contents (TPC) varied from 132.2 to 262.5 mg of gallic acid equivalents/100g dry weight (DW), and around 88% of TPC and antioxidant capacity were found in the bound form. Major phenolic compounds detected in free fractions by HPLC were vanillin, vanillic, protocatechuic, ferulic and *p*-coumaric acids, whereas only ferulic and *p*-coumaric acids were detected in all bound fractions. Pisankalla accession (red kernel) had the highest ferulic acid content (269.5 mg/100g DW). No α-amylase and ACE-I inhibition were found; however, all free fractions inhibited α-glucosidase (10.8-72.5%) indicating potential antihyperglycemia activity. Multivariate principal component analysis revealed that darker samples (free fraction) showed higher TPC and antioxidant capacity, while α-glucosidase inhibition was linked to yellow-colored samples. Therefore, Chilean native corn accessions may be important natural sources of phenolic antioxidants with the potential of controlling early stages of postprandial hyperglycemia. This research provides the biochemical base for further *in vivo* studies and a rationale for functional food and ingredient design.

Inhibition of *Salmonella* entry into epithelial cells and intracellular replication by rice bran phytochemical extracts.

Irfan A. Ghazi1,3,5, Genevieve M. Forster2, Jan E. Leach3, Anna McClung4, Elizabeth P. Ryan1
1Department of Environmental and Radiological Health Sciences, 2Department of Clinical Sciences, 3Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, USA, 4USDA-ARS Dale Bumpers National Rice Research Center, Stuttgart, Arkansas, USA, 5Department of Plant Sciences, University of Hyderabad, Hyderabad, India.

Rice bran contains several nutrients and medicinal compounds such as polyphenols, dietary fibers, antioxidants and essential fatty acids that were reported to have health beneficial effects. These benefits include protection against gastrointestinal cancer and reduction in serum cholesterol levels. We recently reported that rice bran bioactivities enhance mucosal IgA production and significantly reduces colonization of *Salmonella* following oral infection in mice. We hypothesize that dietary rice bran may increase innate resistance against the enteric pathogens such as *Salmonella enterica typhimurium* via multiple mechanisms of action and synergies between bioactive components. In the present study, rice bran from ten genetically and phytochemically diverse rice varieties was used to assess the inhibition of *S. enterica* entry in mouse small intestine epithelial (MSIE) cells. Rice bran extracts from the *japonica* rice variety Lijianxintuanheigu (LTH) at concentrations of 0.5 mg/ml – 2 mg/ml blocked more than 90% of *S. enterica* entry into MSIE cells. Extracts at these concentrations did not show direct antimicrobial effects on *Salmonella* growth. Rice bran extract varietal differences in the inhibition of *Salmonella* entry and *Salmonella* replication will be presented. The LTH variety is highly susceptible to plant disease, however the bran may contain several phytochemicals with medicinal properties. Overall, our findings suggest that rice bran from diverse varieties contain bioactive compounds that may be used to develop enteric disease protective traits in ongoing global rice crop improvement programs. Rice crop improvement strategies aimed for diarrheal disease prevention represents a promising, sustainable global public health strategy.

New strategies of traceability for determining the geographical origin of medicinal plants: Innovation of biological barcode by PCR-DGGE

Aly Farag El Sheikha[1,2]. [1] Dept. of Food Science & Technology, Minufiya University, Shibin El Kom, 32511 and [2]Dept. of Biology, Al-Baha University, Al-Baha, P.O.BOX 1988, E-mail: elsheikha_aly@yahoo.com

Globalization of trade is expanding natural product markets that sustain life and promote good health, yet the challenging financial climate is squeezing profit margins and exacerbating the propensity for contamination, fraudulent market substitution and the use of unlabeled fillers. Consumers are becoming increasingly concerned about the authenticity of the products they purchase. International trade in herbal products is a major force in the global economy and the demand is increasing in both developing and developed nations. Currently, more than 1,000 companies producing medicinal plant products with annual revenues in excess of US$60 billion. Determination of geographical origin is a demand of the traceability system of import-export of herbal plant raw materials for food and drug use (178/2002/EC, NTA Vol 2B Ed. July 2003) and WHO/2003 guideline should lead to total transparency of herbal medicines production from plant to finished product. A hypothesis to trace the source of medicinal plants is by analysing in a global way the microbial communities of medicinal plants. A rapid method based on a molecular technique employing 26S rDNA and 28 rDNA profiles from yeast and fungi generated by PCR-DGGE were used to discriminate origin of Physalis and Shea tree fruits from different locations. When the profiles were analysed by multivariate analysis, distinct microbial communities were detected. The band profiles of fruit yeasts or fungi from different locations were different and specific for each location. These fingerprints could be used as a barcode to discriminate medicinal plant origins. This method is new traceability tool which provides medicinal plants and herbs with a unique biological barcode and makes it possible to trace back these plants to their original location. Additionally, this analytical technique provides the integrity and authenticity to medicinal plant products with the goal of protecting consumers from health risks associated with product substitution and contamination.

Effect of application of nutrients and spacings on growth, seed and tuber yields in glory lily (*Gloriosa superba* L.)

Rahul S. Phatak[1], Laxminarayan Hegde[2], N. K. Hegde[3], Vijaykumar Narayanpur[3] [1] Subject matter specialist (Horticulture), UAS, Raichur, Karnataka [2]Prof. & Head, Horticultural Research Station, Sirsi-581401, Karnataka, INDIA [2]Dept. of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Sirsi

In an experiment conducted to find the effects application of nutrients and spacings on growth and yield of glory lily during 2012-13 Uttara Kannada district of Karnataka, India, with six treatments replicated four times, 15t Farm Yard Manure (FYM) + 150:75:120 kg NPK / ha registered significantly highest vine length (181.80 cm), number of branches (9.40), stem girth (6.97 mm), fresh seed yield (32.03 q/ha) and dry seed yield (6.57 q/ha). Fresh and dry seed yields in this treatment were statistically on par with 15t FYM + 125:70:100 kg NPK / ha. Significantly highest number of pods (17.0) / plant and pod length (7.11 cm) were recorded in 15t FYM + 100:50:75 kg

NPK / ha and 15t FYM + 125:70:100 kg NPK / ha, respectively. The highest tuber yield per ha (26.61q) was recorded in 15t FYM + 100:50:75 kg NPK / ha. Highest values for vine length (148.67 cm) and stem girth (6.32 mm) were observed under 90 x 60 cm and 60 x 60 cm spacing, respectively. Flower initiation was early in 90 x 30 cm spacing which recorded significantly highest number of pods (10.67) per plant. The fresh and dry seed yield per ha (14.28 q and 2.04 q, respectively) were statistically superior in 90 x30 cm. Highest tuber yield per ha (18.64 q) was recorded in 60 x 30 cm which was on par with 90 x 30 cm spacing. The role of fertilizers and spacings on active principle 'colchicine' content and yield is being analyzed.

Indian Traditional Crops Having Functional Bio-Actives and Their Potential Health Benefits

Rashmi Yadav, J C Rana, Rakesh Bharadwaj, M Dutta and K C Bansal. Germplasm Evaluation Division, National Bureau of Plant Genetic Resources, New Delhi, India-110012.

India is considered as homeland for many indigenous and traditional crops associated with culture and traditions of people living a particular region. Demographically Indian Central Himalayan region constitute inaccessible, fragile and difficult terrains having wide array of diversity of plants and animals. Traditional food crops which are associated with native communities of the Himalayan region basically include crops which thrive well in harsh ecological conditions and provide complete sustainable diets. Small millets and pseudo-cereals constitute major portion of their staple food and among pseudo-cereals, grain amaranth and buckwheat are most important and common. Grain amaranth seeds are rich in dietary fibre content, thus an effective agent against cancer and heart disease. High dietary fibre content prove to have hypoglycaemic effect and very effective in reducing blood sugar. It is also said to be contain fairly high amount of phytosterols which play a major part in the prevention of all kinds of diseases. Grain amaranth besides possessing high lysine that is low in other grains, posses high antioxidant properties and is free from gluten. Research carried on these crops showed wide variation between crops and between varieties with in a crop for antioxidant properties, phenoloics and other phyto-chemicals linked with glucose metabolism. The grain contains a high level of protein, perhaps averaging 13%, with an excellent amino acid balance which can supplement a diet which is high in cereals (deficient in lysine) and legumes (deficient in the sulphur amino acids). Its protein contains around 5% lysine and 4.4% sulfur amino acids, which are the limiting amino acids in other grains especially leucine and threonine. Presences of high bioactive functionality relevant to type 2 diabetes management make these crops a valuable resource for the natives of Himalayan region. This paper provides current status of researches made in India specially focused to utilize these crops for making sustainable and acceptable future strategies which may need to include scientific rationale and understanding for designing functional foods targeted to provide nutritional security and management of new emerging health issues.

Wound healing effects of Oriental Sweet Gum Storax in non-diabetic and diabetic rats

Ayhan Dagdelen[1], Musa Ozgur Ozyigit[2], Betul Cam Etoz[3], Nilufer Cinkilic[4], Deniz Bagdas[5]
[1]Department of Food Engineering, Faculty of Engineering and Architecture, Balıkesir

University, Balıkesir, Turkey, [2]Department of Pathology, Faculty of Veterinary Medicine, [3]Department of Physiology, Faculty of Medicine, [4]Department of Biology, Faculty of Science and Arts, [5] Experimental Animals Breeding and Research Center, Faculty of Medicine, Uludag University, Bursa, Turkey.

The herbaceous plant, oriental sweet gum (*Liquidambar orientalis* Mill) has been widely used in phytotherapy in the Mediterranean region for its medicinal and cosmetic benefits. In alternative Turkish medicine, the storax (oriental sweet gum) produced by injuring *Liquidambar orientalis* Mill. has good antiseptic effects, and is used for the treatment of various skin diseases. It has also been reported to have strong therapeutic activity, such as anti-bactericidal effects. The objective of the present study was to evaluate wound healing effects of Oriental Sweet Gum storax in rats. Male Sprague Dawley rats were used. One full-thickness experimental wound (1.5 cm x 1.5 cm) was created on each side from the dorsal midline. Left side wound tissue was used for histopathological examinations and the right side was used to evaluate wound closure. The rats were divided into two equally sized groups: nondiabetic and diabetic groups. Then, three subgroups were created for each main group including control, reference drug (Madécassol) and Oriental Sweet Gum storax treatments (n=8/ group). Madécassol (Bayer) and Oriental Sweet Gum Storax (collected from naturally grown Sigla trees (*L. orientalis* Mill. var. *orientalis*) in Fethiye (Muğla, Turkey) were used topically (0.5 ml) for 16 days from the beginning of wound creation. No topical agent was used for the control. Histopathological examination of wound tissues was performed on day 4, 8, 12 and 16. Total phenolic content of storax (TPC) was determined colorimetrically using the Folin–Ciocalteu reagent. Phenolic composition was determined using HPLC and antioxidant capacity was determined by DPPH method. Topically applied storax accelerated wound healing starting from day 8 in non-diabetic group, and day 12 in diabetic group. Epithelialization and fibroblast formation increased in wounds of rats treated with Oriental Sweet Gum Storax. Additionally, phenolics of the samples were detected as vanillic acid, vanillin, p-coumaric acid and cinnamic acid. TPC was found as to be 1347.30 mg GAE/kg and antioxidant capacity was found 1551.90 % of inhibition. In the light of these results, topically used Oriental Sweet Gum Storax has beneficial effects in improving wound repair. Antioxidant activity of Oriental Sweet Gum Storax may contribute to the healing mechanisms.

Biology, Propagation and Cultivation for Commercial Production of a Few Desert Medicinal plants

Sudhersan Chellan. Biotechnology Program, Environment and Life Sciences Research Centre, Kuwait Institute for Scientific Research, P.O.Box 24885, Safat 13109, Kuwait.

Many of the desert plants have potential food and medicinal values. Due to the arid climatic conditions these desert medicinal plants are visible only a short duration of 30 to 45 days time. Complete biology of these plants need to be studied for mass propagation, large-scale cultivation for commercial production and conservation. A study was undertaken to know the biology of short-lived desert medicinal plants such as *Cistanche tubulosa*, *Orobanche aegyptiaca*, *Cynomorium coccineum*, *Lycium shawii*, *Scrophularia deserti* and *Terfezia*. The study revealed interesting characteristic features of these desert plants. Among the 5 species studied, first 3 are parasitic plants and *Lycium* and *Scropularia* are drought tolerant perennials and the Terfezia is a ectomycorhizal fungi associated with a host plant called Helianthemum. Studies were also

undertaken, about the host plant species required for the cultivation of the parasitic plants and also the application of micropropagation technology for the mass propagation of these plants for cultivation, commercial production and conservation. The result of the study indicated that these plants could be produced on year round basis for food and medicinal values.

Evaluation of phenolic-linked bioactive functionality in camu-camu (*Myrciaria dubia* Mc. Vaugh) for antihyperglycemia and antihypertension

Alice Fujita[1,2], Dipayan Sarkar[2], Shibao Wu[3], Edward Kennelly[3], Maria Ines Genovese[1]and Kalidas Shetty[2]. [1]Laboratory of Food Bioactive Compounds, Food and Experimental Nutrition Dept., FCF, University of São Paulo, Brazil, [2]Dept. of Plant Sciences, North Dakota State University, Fargo, ND, [3]Laboratory of Biochemistry, Biological Science Dept., LC, University of New York, NY.

Camu-camu (*Myrciaria dubia* Mc. Vaugh) has significant potential for health-relevant agro industrial applications due to its rich bioactive functional properties. The main objective of this study was to evaluate bioactive profiles, phenolic-linked antioxidant activities and functionality relevant to hyperglycemia and hypertension managementin spray-dried and freeze dried camu-camu pulp with *in vitro* assay model. Commercial camu-camu pulp was spray dried at selected temperatures with different carrier agents in different concentrations (maltodextrin and gum arabic). Bioactive functionality of both camucamu powders was compared by determining total soluble phenolic content, free radical scavenging antioxidant activity, α-amylase and α-glucosidase inhibitory activity through *in vitro* assays. Freeze dried camu-camu powder showed better preservation of phenolic-linked antioxidant activity compared to the spray dried sample. Addition of lower concentration of carrier agents in camu-camu powder showed higher enzyme inhibitory activities in relation to improved glucose metabolism regulation. Overall camu-camu showed superior anti diabetic properties with rich phenolic bioactive profiles, and could be incorporated in dietary strategies to prevent and manage global epidemic of type 2 diabetes.

Poster Presentation Abstracts

Improvement of anti-diabetic functionality of camu-camu (*Myrciaria dubia* Mc. Vaugh) extracts in soymilk carrier through fermentation with probiotic *Lactobacillus helveticus*

Alice Fujita[1,2], Dipayan Sarkar[2], Maria Ines Genovese[1]and Kalidas Shetty[2].
[1]Laboratory of Food Bioactive Compounds, Food and Experimental Nutrition Department, FCF, University of São Paulo, Brazil and [2]Dept. of Plant Sciences, North Dakota State University, Fargo, ND.

Camu-camu (*Myrciaria dubia* Mc. Vaugh) is a native fruit of Brazil and mainly found in the Northern Tropical Region. It is rich in bioactive compounds such as vitamin C and polyphenols. However, this fruit is highly acidic which limits the consumption, therefore one alternative is to design new products which would allow its use as functional ingredients. The aim of this work was to evaluate antioxidant capacity and anti-diabetic functionality of different concentration of camu-camu freeze-dried pulp after fermentation for 0, 24, 48 and 72 hours with soy milk and by using *Lactobacillus helveticus.* Total soluble phenolic content increased after 48 h of fermentation,

while free radical scavenging (DPPH inhibition) activity was high in all concentrations of camu-camu powder and in all time points. *In vitro* assays to determine type 2 diabetes relevant enzymes inhibition such as α-amylase and α-glucosidase inhibitory activity were evaluated. Results showed increased inhibition in fermented samples, mainly after 48 h. When pH was adjusted the inhibition decreased. Angiotensin converting enzyme (ACE) inhibition was high in all concentration, especially in 2% camu-camu powder after 48 h fermentation. These results proves that fermentation of camu-camu powder with probiotic can enhance anti-diabetic potential and could be used as an alternative for designing functional food to prevent and manage type 2 diabetes-linked cardiovascular complications.

Assessing Antioxidant Activities and Phenolic Compositions of Olive Leaves Processed by Different Drying Methods

Serpil Kara[1], Serap Dogan[2], Mehmet Emin Diken[3], Umran Alan[1], Hasan Huseyin Kara[4], Ayhan Dagdelen[5]. [1]Department of Elementary Education, Faculty of Education, Bayburt University, Bayburt, Turkey, [2]Department of Molecular Biology and Genetics, Faculty of Science and Arts, [3]Department of Biology, Faculty of Science and Arts, Balıkesir University, Balıkesir, Turkey, [4]Department of Food Engineering, Faculty of Engineering, Bayburt University, Bayburt, Turkey, [5]Department of Food Engineering, Faculty of Engineering and Architecture, Balıkesir University, Balıkesir, Turkey.

In recent years, olive leaves have been evaluated for their biological properties such as antioxidant and antimicrobial activites and positive health effects as antihypoglycemic, antihypertensives, antiinflammatory, antiatherogenic. These effects of olive leaves are mostly attributed to their polyphenols. Phenolic profile of olive leaves is known to be affected by agronomic and technological factors such as leaf age, maturation index, locality, cultivar, moisture content and industrial processes applied for phenolic extraction.
There is large economic potential of olive leaves as they are obtained during pruning and cleaning-blending operations before olive harvesting. Processing method is critical for preservating leaf phenolic quality. In this study, the effect of drying method of olive leaves on antioxidant activity and phenolic compounds was investigated. Olive leaves were obtained from Ayvalık and Gemlik cultivars. Four drying methods were applied including: natural (room temperature), conventional, infrared and microwave. Total phenolic content was determined colorimetrically using the Folin–Ciocalteu reagent and composition was determined using HPLC. Free Radical Scavenging Ability was determined with DPPH (2,2-diphenyl-1-picrylhydrazyl) method. Total phenolic content ranged between 165.18 (Gemlik-infrared) and 409.88 (Gemlik-microwave) mg GAE/100 g, and antioxidant activities were between 82.76 % (Ayvalık-room temperature)- 93.42 % (Gemlik-microwave) of inhibition. Oleuropein, luteolin 7-glucoside, tyrosol, caffeic acid, rutin hydrate, and quercetin were the main phenolics among all samples. Oleuropein was found to be highest phenolic ranged between 7233 µg/100 g (Ayvalık-infrared) and 17698 µg/100 g (Gemlik-microwave) while quercetin was the lowest phenolic which ranged between 3 µg/100 g (Gemlik-conventional) and 13 µg/100 g (Ayvalık-conventional). Cultivar and drying method affected antioxidant activity and phenolic composition. The highest phenolic content and antioxidant activity was obtained by microwave drying.

Antimicrobial Effects of Zetrin Spice Against Pathogenic Microorganisms

Ayhan Dagdelen[1], Selami Selvi[2], Hasan Huseyin Kara[3], Mustafa Korkmaz[4]. [1]Department of Food Engineering, Faculty of Engineering and Architecture, Balıkesir University, Balıkesir, Turkey, [2]Department of Medicinal and Aromatic Plants, Altınoluk Vocational School, Balıkesir University, Balıkesir, Turkey, [3]Department of Food Engineering, Faculty of Engineering, Bayburt University, Bayburt, Turkey, [4]Department of Biology, Faculty of Science and Arts,Erzincan University, Erzincan, Turkey.

Dried and ground spices, herbs or herbal mixtures are used for their characteristic flavors in foods, but they also have antimicrobial and antioxidative effects due to their bioactive compounds. Zetrin is a spice consumed in soups in Erzincan, and it includes approximately 80 plant varieties. *Origanum acutidens* is the main plant in zetrin, and it is obtained by drying, grinding and mixing of various organs of different plants. In this study, antimicrobial effect of Zetrin is characterized. Methanol:Water (80:20) was used for phenolic extraction of samples. Fourteen bacteria and two fungal strains were used as test microorganisms, and Gentamycin was used as the antibiotic control. The antimicrobial activity of the samples was determined by disc diffusion method. When compared to the antibiotic, phenolic extracts of Zetrin showed lower antimicrobial activities. Antimicrobial effect was not observed for *Enterococcus faecalis* ATCC. Among all microorganisms tested, *Clostridium perfiringens* ATCC13124 and *Acinetobacter baumannii* ATCC 19606 were the most effected microorganisms. Large variation in microbial activity was observed.

Common Medicinally Active Plants Used as Herbal Tea in Turkey

Ayhan Dagdelen[1], Selami Selvi[2], Hasan Huseyin Kara[3], Mustafa Korkmaz[4]. [1]Department of Food Engineering, Faculty of Engineering and Architecture, Balıkesir University, Balıkesir, Turkey, [2]Department of Medicinal and Aromatic Plants, Altınoluk Vocational School, Balıkesir University, Balıkesir, Turkey, [3]Department of Food Engineering, Faculty of Engineering, Bayburt University, Bayburt, Turkey, [4]Department of Biology, Faculty of Science and Arts, Erzincan University, Erzincan, Turkey.

Herbal teas are the second most consumed beverages after water in the world. Herbal teas which are used for medicinal expectations are being used for therapeutical effects on cold, fatigue, indigestion, gastrointestinal symptoms, constipation, diarrhea, and insomnia. Turkey is one of the richest countries among the European continent, in terms of medicinal and aromatic plants. In this study, a survey of medicinal herbal plants used by local people in Turkey is reported. The most commonly consumed herbal teas have been identified which have been reported on ethnobotanical, ethnopharmacological and floristic studies in Turkey. It is concluded that there are 65 different herbal teas widely consumed in Turkey for their medicinal effects. Scientific and local names, the parts of the plants which are used for consumption and usage aims of these plants have been identified. Lamiaceae family has been found to be the most commonly used medicinal tea in Turkey.

A Review of St. John's Wort (*Hypericum perforatum* L.) as Medicinal and Aromatic Plant

Ayhan Dagdelen[1], Rasim Alper Oral[1], Selami Selvi[2], Mehmet Serhat Odabas[3], [1]Balikesir

University, Engineering Faculty, Department of Food Engineering, Balikesir, Turkey, [2]Balıkesir University, Altınoluk Vocational School, Department of Medicinal and Aromatic Plants, [3]Ondokuz Mayis University, Bafra Vocational School, Samsun, Turkey.

Hypericum is a genus of about 400 species of flowering plants in the family Guttiferae. The species of this genus have been used as traditional medicinal plants for hundreds of years due to their wound-healing, bactericide, anti-inflammatory, diuretic and sedative properties. In addition to this, it is used as herbal tea. In particular, extracts of *Hypericum perforatum* L. are now widely used in Europe for the treatment of depression. In Turkey, the genus is represented by 89 species of which 43 are endemic. The major phytomedicinal compounds of Hypericum plants are phloroglucinol derivatives hyperforin and adhyperforin, the naphthodianthrones hypericin and pseudohypericin, the flavonoids hyperoside, rutin, quercitrin, quercetin and biapigenin and the phenylpropanes caffeic acid and chlorogenic acid which possess a wide array of biological properties. The photodynamic, antidepressive and antiviral pharmacological activities of *Hypericum* extracts are mainly attributed to the naphthodianthrones, hypericin and pseudohypericin. Hyperforin is a prenylated phloroglucinol derivative that consists of a phloroglucinol skeleton with lipophilic isoprene chains. Flavonoids are a group of bioactive compounds present in Hypericum plants. They play an important role in preventing cardiovascular diseases and several kinds of cancer. The health effects of St. John's Wort are presented in this review.

Bioactivity of commercial samples of two Traditional Medicinal Plants: *Ocimum tenuiflorum* and *Salvia triloba.*

Alexander Gosslau, Jeff Hedrick, Jenish Karmacharya, Jaime-Faye Malik, Bridget Schaper and Adolfina Koroch. Science Department, Borough of Manhattan Community College, The City University of New York, NY.

Ocimum tenuiflorum (Holy basil) and *Salvia triloba* (Greek sage) have been used in traditional medicine for centuries in different cultures. Holy basil is considered to be very sacred in Hindu religion and it is also used to alleviate cold, coughs, nausea, vomiting, diarrhea, and others. Similarly, Greek sage is used to treat gastrointestinal disorders, to strengthen immunity, and as anti-inflammatory. Antioxidants are beneficial for our body because they help to reduce the effects of oxidative stress. Oxidative stress is indicated by an accumulation of free radicals generated by external factors such as radiation, smoking, but also internally during metabolism by electron leakage in mitochondria. There is accumulating evidence that free radicals are one of the major underlying cause for many degenerative diseases such as cardiovascular, Alzheimer's disease, diabetes, cancer, and believed to accelerate the process of aging itself. Many beneficial properties of natural products are associated with their total phenolic content. The objective of this study was to investigate the total phenolic content and antioxidant activity in different commercial samples of *O. tenuiflorum* and *S. triloba.* Dry plant leaves were grinded and dissolved in DMSO. Antioxidant *a*ctivity and total phenolics content were quantified using the Folin-Ciocalteu method and the ABTS assay. Our results indicated that the two plants have a high total phenolic content which correlated to high antioxidant activity in a dose-dependent manner. Both plant extracts did not show any toxic effects in mammalian fibroblasts up to high concentration (100μg/ml) as

indicated by the MTT-method. In conclusion, *O. tenuiflorum* and *S. triloba* showed high antioxidant activity and non-toxic effects making them promising candidates against degenerative diseases. This research is part of educational experiences in an urban community college setting, enabling students to acquire the critical thinking and research skills necessary to pursue a baccalaureate degree in a science-related discipline.

Sidr (*Ziziphus spina-christi*) one of most resistant plant to climatic variability of Saudi Arabia: Application studies on Al-Baha region

Saeed Al-Sokari[1]. [1]Dept. of Biology, Al-Baha University, Al-Baha, P.O.BOX 1988.

Ziziphus spina-christi (L.) Desf., locally known as Sidr, is a multipurpose tree species belonging to the botanical family *Rhamnaceae*. Sidr known as Christ's Thorn Jujube, is a native plant that grows in tropical and subtropical regions especially in Middle East. It is an important cultivated tree and one of the few truly native tree species of Saudi Arabia that is still growing along with many newly introduced exotic plants. For a long time, in folklore medicine, all parts of the plant are used by the local Arab people to help maintain a healthy. In Saudi Arabia, it is used for the treatment of ulcers, wounds, eye diseases and bronchitis. The Bedouin use it for the treatment of wounds, skin diseases and as an anti-inflammatory. They also use it as a febrifuge and diuretic. In Saudi Arabia, the tree grows wild on a wide range of soil types in the Southern and Southwestern region and has been abundantly cultivated as an irrigated ornamental and shade tree in the streets and backyards of many private homes, schools, hospitals and government premises throughout the Kingdom. It is hard, can adapt and grow in a wide range of temperature from below 0 to 52°C. The trees are inexpensive to grow because no irrigation is needed once the tree is established. The tree grows widely in Al-Baha region (Southwestern Saudi Arabia), especially in Al Khitan, Al Aqiq, and Al Makhwah regions that represent three different ecological conditions. Very few studies have addressed the ecophysiological responses of Sidr to different ecological conditions. For the first time, this work reports eco-physiological studies on the Sidr tree of Al-Baha in an attempt to elucidate its morphological and physiological features that account for their survival on the sites under study.

Ithrib (*Rumex nervosus* Vahl) as a famous ethnomedicinal plant of Saudi Arabia

Aly Farag El Sheikha[1,2], Saeed Al-Sokari[2] and Abdulaziz Yahya Al-Ghamdi[2]. [1] Dept. of Food Science & Technology, Minufiya University, Shibin El Kom, 32511 and [2]Dept. of Biology, Al-Baha University, Al-Baha, P.O.BOX 1988.

Since the time of immemorial, plants were used for multiple socio-cultural and economic uses. Medicinal use is one of the services that plants provide for human welfare. In this regard, studies indicate that 25% of the modern drugs are derived from the extracts of medicinal plants. Despite of this, however, the alarming population growth with increasing demand and consumption is distracting medicinal plants resources from their natural habitat. Furthermore, documentation of medicinal plants knowledge is incomplete as the result of limited inventory of medicinal plants traditionally used by local people. Ithrib (*Rumex nervosus*) is an edible plant consumed by some people in Saudi Arabia especially in Al-Baha region and Yemen and little information was reported about this plant. *Rumex nervosus* (Polygonaceae) is a large annual herb up to 1.5 m high, leaves usually sagittate, inflorescence much branched, leafless panicle, nut light brown. Ithrib is

very popular plant which used as diuretic, gonorrhoea, lung T.B, leprosy, fever, liver disease, hypertension, haemorrhoids, scabies, antiemetic, aphrodisiac, cough, rabies, rheumatism and migraine in traditional medicine. Decoction of leaf or root powder taken as vermifuge. Due to indiscriminate use of commercial antimicrobial drugs commonly used in treatment of various diseases the human pathogenic microorganisms have developed multiple drug resistance which creates enormous health problems. The problem of microbial resistance some time takes the shape of epidemic due to development of drug resistant microorganisms thus in recent year lot of attention is diverted to discover new source of natural antimicrobial agents. The potential of this study is presenting *Rumex nervosus* as a new source of new antimicrobial agents. We tested the extracts of leaf and root of Ithrib to verify the antimicrobial activity which gave a good activity against *Escherichia coli* 254607 and *Staphylococcus epidermidis* 254997.

In vitro anticancer activity of quercetin derivatives by inducing apoptosis in HCT116 human colon carcinoma.

Kozue Sakao, Chiyomi Okuyama and De-Xing Hou. Department of Biochemical Science and Technology, Kagoshima University, Kagoshima 890-0065, Japan.

Quercetin is a flavonoid compound and found in many plants and foods, such as red wine, onions, green tea, apples, berries, and others. The hydroxyl groups of flavonoids are important for their bioactive functions and also prone to oxidation to quinones. To directly demonstrate the role of hydroxyl groups, we have synthesized acetyl and benzyl derivatives of quercetin, 3,7,3',4'-O-tetraacetylquercetin (4Ac-Q) and 3,7,3',4'-O-tetrabenzylquercetin (4Bn-Q), which substituted the hydroxyl groups of quercetin with acetyl or benzyl groups at the 3,7,3',4' positions and have shown that the hydroxyl groups of quercetin contributed to the generation of intracellular superoxide, consequently inhibiting proliferation and inducing apoptosis in human promyelocytic leukemia cells. To further elucidate this role of quercetin's hydroxyl group in other cancer cells, we investigated the anti-proliferative effects and molecular mechanisms of these quercetin derivatives in wild-type p53-carrying ($p53^{+/+}$) or p53 null ($p53^{-/-}$) HCT116 human colon carcinoma cells, which can be used to test p53 dependence for apoptosis. Treatment of HCT116($p53^{+/+}$) and HCT116($p53^{-/-}$) cells with quercetin and its derivatives revealed that 4Ac-Q and quercetin, but not 4Bn-Q, significantly inhibit cell proliferation in both of cell lines, especially, 4Ac-Q showed stronger anti-proliferative effect than parent quercetin. Molecular data further revealed that the active form of caspase 3, an initiator caspase of apoptosis, and the cleavage of poly (ADP-ribose) polymerase (PARP), which responds to DNA strand breaks and as another hallmark of apoptosis, were detected in the quercetin or 4Ac-Q-treated cells, but not in 4Bn-Q-treated cells. No the significant difference in anti proliferation and apoptotic induction observed between HCT116 ($p53^{+/+}$) and HCT116 ($p53^{-/-}$) cells. These findings provide that, quercetin and 4Ac-Q might suppress cell proliferation by inducing apoptosis, and 4Bn-Q lost this ability. The more detail molecular mechanisms, anti-proliferation and apoptosis, of these compounds will be represented in the congress.

The change of ginsenoside composition in ginseng leaves by the steaming process

Myeong-Hwan Jang[1],Tae-Ryong Kwon[1], Jin-Kook Choi[1], Tae-Suk Ryu[1], Deok-Jong Ahn[1], Won-Kwon Jung[1] and Man Park[2]. [1]Agricultural Research and Extension Services, GyeongBuk-do,

South Korea [2]KyungPook National University, South Korea.

In general, there is higher ginsenoside content in the ginseng (*Panax ginseng* C. A. Meyer) leaf than the root. For a long time, only ginseng roots have been used, and the aerial part including the ginseng leaf has been discarded. Recently, studies on mass extraction of ginsenoside from ginseng leaf are being carried out. The purpose of this study is basic research on extracting ginsenoside from ginseng leaves. We investigated the ginsenoside content of ginseng leaves and the change of ginsenoside composition in them after the steaming process. 3-year old gingseng(*Panax ginseng* C. A. Meyer) leaves used for the experiment were cultivated without pesticide in a shaded greenhouse. After harvesting the leaves, the steaming process was carried out at three levels. The ginsenosides were extracted using 50% MeOH-sonication, and analyzed with high performance liquid chromatography (HPLC). According to the experiment results, the contents of ginsenoside Rb_1, Rb_2, Rc, Rd, Re, and Rg_1 were high in the ginseng leaves. Ginsenoside F_1 and F_2 which didn't exist in the roots were extracted. After the steaming process, most of the ginsenosides contents decreased. However, ginsenoside Rg_2(s) was shown to increase slightly. The contents of ginsenoside F_1 and F_2 were shown to have significantly ($p<0.05$) increased. It is known that ginsenoside F_1 has ultraviolet-blocking effects and ginsenoside F_2 controls atopic dermatitis. The reason for the increase of ginsenoside F_1 and F_2 according to the steaming process is being investigated. The two ingredients can be utilized if they can be mass-produced.

Micropropagation and in vitro scaling up protocols for medicinal plant *Scutellaria barbata*

Terri A. Brearley, Aisha L. Hill, Brajesh N. Vaidya, Nirmal Joshee. College of Agriculture, Family Sciences and Technology, Fort Valley State University, Fort Valley, GA 31030.

Scutellaria barbata is a clinically well researched medicinal plant on various types of cancer cells causing apoptosis and inhibiting tumor growth. TEAC assay suggests high antioxidant capacity of leaf extracts that could be tied to its therapeutic role. Histochemical studies of foliar trichomes reveal presence of flavonoids. *S. barbata* nodal explants (1–1.2 cm) were examined for adventitious shoot induction in Murashige and Skoog medium using six different cytokinins at 5 µM with 0.1 NAA and were observed and transferred after 7, 14, and 21 days post inoculation. The cultures were transferred to basal MS for elongation and shoot number was recorded. At 7 dpi *m*–Topolin and BAP performed equally, however, *m*–Topolin was superior at 14 and 21 dpi. After establishing superiority of *m*–Topolin, nine carbon sources (0.1 M) with 5 µM *m*–Topolin and 0.1 NAA were tested for 14 and 21 days for adventitious shoot induction. Glucose and fructose induced highest number of adventitious shoot buds. To study scaling up potential, ten week old multiplying cultures were transferred to Liquid Lab Rocker® boxes containing a napkin and 30 mL of basal MS with 3% sucrose. The cultures in the Liquid Lab Rocker ® boxes will be removed and fresh weight, shoot number, and dry weight will be recorded to analyze biomass production. Microshoots were transferred for rooting into Magenta™ vessels filled with autoclaved potting mixture and a rooting protocol with close to 100% rooting has been established. Prolific in vitro flowering and seed set was seen during rooting stage and it is of value for rare and valuable genotypes. Sterile vessels with microshoots were placed under 16/8 light at 25 °C. Micropropagation experiments using transverse Thin Cell Layer explants are in progress.

Effect on Ginseng (*Panax ginseng* C. A. meyer) Growth in Response to Exposure to Light-Emitting Diodes in Greenhouse Cultivation

Myeong-Hwan Jangl[1],Tae-Ryong Kwonr[1], Jin-Kook Choi[1], Tae-Suk Ryu[1], Deok-jong Ahn[1], Won-Kwon Jung[1] and Man Park[2]. [1]Punggi Ginseng Experiment Station, Gyeong Buk Provincial A.T.A, Korea [2]KyungPook National University, Korea.

Ginseng(*Panax ginseng* C. A. Meyer) is produced in the amount of one billion dollar in South Korea and is the fourth most important crop in the entire crops. Korean ginseng has been cultivated for 500 years and cultivation technology is also the world's highest levels. However, due to injury by continuous cropping of ginseng, virgin soil has been decreased, greenhouse facility for ginseng cultivation has been increased gradually. This study was carried out to solve a lack of light with the LED (Light Emitting Diode) light source in the greenhouse. Red LED light used in the test was a peak at 660 nm while having a range of 600 ~ 700 nm, The blue LED light had a peak at 450 nm while having a range of 400 ~ 500 nm. White LED light had 450nm of the blue light and a range of 500 ~ 700nm with moderate peak. The quantum and photosynthesis was lower in the combination of 3:6:1(Red:Blue:White) and 0:10:0, which was high percentage of blue light. 100% red light had high photosynthetic efficiency, but leaf shape was little shrinking. Root weight of ginseng was heavier in the plot of 7:2:1(Red:Blue:White) and 6:3:1 treatments, compared to other treatments.

Antimicrobial and anti-inflammatory activities of extracts and isolated compound of *Ficus thonningii* Blume (Moraceae)

Morenike Eunice Coker[1], Olufemi Ezekiel Adeleke[1] and Muyiwa Ogegbo[2] . [1]Dept. of Pharmaceutical Microbiology, Faculty of Pharmacy, University of Ibadan, Nigeria and [2]Institute of Health Research and Policy, London Metropolitan University, United Kingdom.

Infectious diseases and the associated inflammation pose a serious health problem worldwide, especially in tropical countries; yet, bacterial resistance to standard antibiotics is on the increase. Hence, a deliberate focus worldwide on plants of medicinal importance. In this study, crude extracts of the leaves and stem bark of *Ficus thonningii* Blume (Moraceae) as well as the bioactive fractions and isolated compound were investigated for both antimicrobial and anti-inflammatory activities. The phytochemical screening yielded alkaloids and triterpenoids in addition to other metabolites already associated with the plant. The antimicrobial susceptibility studies through antibiogram, bacterial kinetics, Minimal Inhibitory Concentration (MIC) and Minimal Bactericidal Concentration (MBC) determinations showed activity against the microbial isolates tested namely: *Staphylococcus aureus* (4 strains), *Escherichia coli* (3 strains), *Pseudomonas aeruginosa* (3 strains), *Bacillus cereus* (1 strain) and *Bacillus subtilis* (3 strains). Also, the crude leaf extract of *Ficus thonningii* showed appreciable anti-inflammatory activity when compared with the control drug, acetylsalicylic acid. Thus, *Ficus thonningii* Blume has the potential of serving as a source of new drug with antimicrobial and anti-inflammatory activities.

Phenolic Linked anti-diabetic potential of *Swertia chirayita*

Susanna Phoboo[1], Pramod Kumar Jha[2], Prasanta C Bhowmik[3*], Kalidas Shetty [4]. [1]Dept of Pharmacy, Dhulikhel Hospital, Kathmandu University Hospital, Dhulikhel, Nepal; [2]Dept of

Botany, Tribhuvan University, Kirtipur, Nepal; Stockbridge School of Agriculture, University of Massachusetts, Amherst, MA 01003; [4]Department of Plant Biology, North Dakota State University, Fargo, USA.

The crude extract of *Swertia chirayita*, an important medicinal plant of Nepal, is locally used for many diseases including diabetes. In order to examine its anti-diabetic potential, crude aqueous and 12% ethanol extracts of *S. chirayita* collected from nine districts of Nepal were analyzed for anti-diabetic-linked anti-hyperglycemia potential using *in vitro* biochemical assays. There was moderate-to-high positive correlation between antioxidant activity and total phenolic content of both extracts and moderate-to-high α-glucosidase inhibitory activity. Although the anti-diabetic property of *S. chirayita* is mainly attributed to the phytochemical swerchirin present in its hexane fraction, we propose that the crude extract of this plant used in local healing also has anti-hyperglycemia potential. The crude extracts indicated the presence of three main phytochemicals mainly mangiferin, swertiamarin, and amarogentin and their derivatives. Among the standard compounds (mangiferin, swertiamarin, and amarogentin), mangiferin showed α-glucosidase and 2,2-diphenyl-1-picrylhydrazyl radical inhibitory activity indicating anti-hyperglycemia potential. The aqueous and 12% ethanol extracts of wild and cultivated plants of *Swertia chirayita* from three different districts of East Nepal were also investigated to understand possible variation in anti-diabetic related bioactivity. In general, higher antioxidant activity was found in wild aqueous and ethanol extracts, while higher α-glucosidase inhibitory activity was found in cultivated extracts for all plant parts. Only aqueous extracts from cultivated *S. chirayita* from Tehrathum showed ACE (angiotensin converting enzyme) inhibitory activity. This study also indicated that despite the small differences in their biological functionality, cultivated *S. chirayita* has the same potential as wild *S. chirayita* in the management of type 2 diabetes and its related complications.

Comparison of biomass and yield for kekik grown in central Turkey

Reyhan Bahtıyarca Bagdat[1], Neset Arslan[2], Lyle E. Craker[3]. [1]Central Research Institute for Field Crops, Medicinal and Aromatic Plants Breeding Department, Ankara, Turkey. [2]Ankara University Agricultural Faculty, Agronomy Depatment, Ankara, Turkey. [3]Univertiy of Massachusetts, Stockbridge School of Agriculture, Amherst, MA, USA.

Due to similar aromas, most species of *Origanum*, *Thymus*, and *Satureja* produced in Turkey are commonly known as kekik to distinguish this group plants from other condiment type plants. Kekik plants are important export products from Turkey to the U.S.A. and European countries. To increase farm production, field trials were conducted with selected cultivars at the Central Research Institute for Field Crops in Ankara, Turkey, to compare plant yield characteristics. Plants harvested during 2009 and 2010, two years after establishing, showed vigorous growth, and except for the *S. hortensis*, both fresh weight and dry weight were higher in the second harvest as compared with the first harvest. The higher yields appeared primarily due to increased leaf enlargement in the second year. For example, fresh and dry leaf yield (kg/ha) of *S. spicigera* in 2010 was twice the fresh leaf yield of 2009. Except for *S. hortensis*, increases in fresh and dry leaf yields in the second harvest year were also observed in the other test plants as compared with the yields in the first harvest year.

Phytochemical analysis of some celery accessions

Alaa Al-Din Helaly[1.2], Jun Pill Baek[1], Emad Mady[1.2], Eldekashy M.H.Z.[3] and Lyle Craker[1].
[1]Stockbridge School of Agriculture, University of Massachusetts, Amherst, Massachusetts, USA
[2]Horticulture Department, Faculty of Agriculture, Al-Azhar University, Nasr City, Cairo, Egypt
[3]Horticulture Department, Faculty of Agriculture, Assiut University, Egypt.

Essential oils and phenolic acids extracted from celery (*Apium graveolens* L) have applications in the food, medicine, and flavoring industries. Yet, as a culinary herb and vegetable, celery currently has substantial plant to plant variation and therefore a high degree of genetic inconsistency in yield and phytochemical production, limiting commercial applications. To assess possible improvements in production of essential oils and other constituents, three celery accessions, two commercial selections (Balady from Egypt and Green Leaves from the U.S.A.) and one wild type (collected in Egypt) were grown in a greenhouse under identical environments. Measurements of chlorophyll, carotenoids, anthocyanin, phenolic acids, rosmarinic acid, tannin, total soluble sugars, and essential oils demonstrated significant differences among the accessions, suggesting that plant breeding could be used to improve the yield of economic important characteristics. For example, at the first harvest the wild type produced 61% and 272% above the commercial accessions Balady and Green Leaves, respectively.

Carvacrol and thymol production of thyme, oregano, and winter savory cultivated in central Turkey

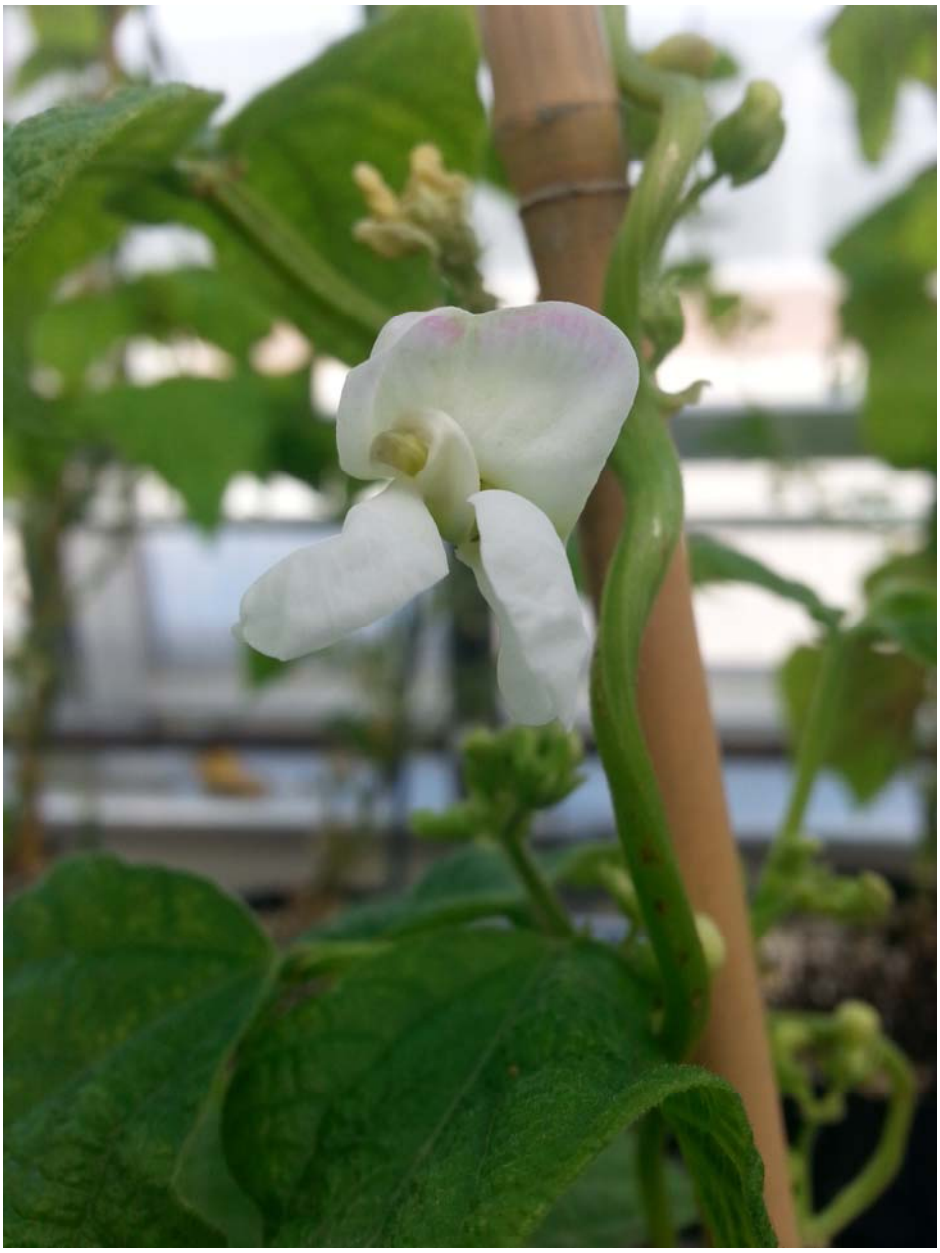
Reyhan Bahtıyarca Bagdat[1], Arif Ipek[2], Neset Arslan[3], Lyle. E. Craker[4]. [1]Central Research Institute for Field Crops, Medicinal and Aromatic Plants Breeding Department, Ankara, Turkey, [2]Çankırı Karatekin University, Biology Department, Çankırı, Turkey, [3]Ankara University Agricultural Faculty, Agronomy Depatment, Ankara, Turkey, [4]Univertiy of Massachusetts, Stockbridge School of Agriculture, Amherst, MA, USA. Email: reyhan@umass.edu

Essential oil production of thyme (*Thymus* spp.), oregano (*Origanum* spp.), and summer savory (*Satureja* spp.) growing in the Ankara, Turkey, were investigated for the production of essential oil and for the level of carvacrol and thymol. The field trials were arranged in a completely randomized block design with four replications. All measurements were taken from two cuttings. Following essential oil ratios were recorded for 2009 and 2010 havests were 4.6-4.6% in *O. vulgare* var. *hirtum*, 2.7-2.6% in *T. vulgaris*, 1.4-1.3% in *T. citriodorus,* 2.0-2.6% in *O. onites*, 2.4-2.0% in *S. hortensis*, and 1.4-1.7% in *S. spicigera.* Despite most previous studies emphasizing carvacrol as the major constituent of *O. onites* and *O. vulgare* var. *hirtum* species in the natural flora of Turkey, the current study detected thymol (a high of 69.8%) as major a constituent in these plants. *S. hortensis* contained chemotypes high in carvacrol (a high of 64.69%) and □-terpinene (a high of 19.5%). The essential oil of *S. spicigera* contained 51.15% carvacrol and 19.25% □-terpinene. The major constituent in *T. citriodorus* was geraniol (48.39%). The thyme cultivar Varico III and the oregano cultivar Carva gave the most satisfactory yields with 5.4-6.0% and 2.9-3.6% essential oil content, respectively. The thyme oil contained 64.87-74.86% thymol and the oregano oil contained 74.18-79.03% carvacrol from the first cuttings made in mid-June.

Assessment of essential oil composition in downy mildew resistance basils (*Ocimum basilicum* L.)

Robert Pyne[1], H. Rodolfo Juliani[1], Adolfina R. Koroch[1, 2], and James E. Simon[1]. [1]New Use Agriculture and Natural Plant Products Program, Plant Biology and Pathology Dept., Rutgers University, 59 Dudley Rd., New Brunswick, NJ 08901 [2] Borough of Manhattan Community College (BMCC, CUNY), New York, NY.

Sweet basil (*Ocimum basilicum* L.) is the most commercially important herb in the United States and is recognized for its distinct aroma and flavor. In the last years the cultivation and production of sweet basil in the US and globally is being threatened by a new destructive disease on this crop-basil downy mildew (BDM), *Peronospora belbahrii*. Basil downy mildew has devastated crops in the USA since its appearance in 2009. In response to this new threat, a breeding effort was initiated at Rutgers University to identify and incorporate genetic resistance into a traditional sweet basil. Although, tolerance to BDM has been identified in other *Ocimum* spp, the traditional sweet basils are susceptible. Non- traditional sweet basil gene pool is a useful source for BDM resistance, however the transfer and persistence of unwanted traits affecting appearance and aroma, represents a significant obstacle even with achieving tolerance and potential resistance to BDM. The objective of this study was to screen the essential oil components from four different breeding lines while breeding for BDM resistance. We have identified different levels of resistance in four different Rutgers breeding lines and compare their aroma to the traditional sweet basil. The aroma profile of those bred into sweet basil phenotypes will be presented.



ACMAP thanks the Global Institute of Food Security and International Agriculture (GIFSIA) at NDSU for active support to the 5th Annual Conference

The 5th Annual Conference Planning Committee would like to thank:
The Fargo-Moorhead Visitors and Convention Bureau
Carl and Julie Peterson of Peterson Farms Seed Co. in Harwood, ND
Dr. Gerald Seiler and the Sunflower and Plant Biology Research Unit at the ARS-USDA Red River Valley Agricultural Research Center in Fargo, ND