



SWES SOUNDS

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TONES FROM THE TOOTH

I have had the great pleasure of working in several areas of Mexico over the past 15-20 years but particularly in northwest Mexico including Baja California, Sonora, and northern Sinaloa. As a soil scientist/agronomist my work is commonly in the agricultural areas of this region typically in the alluvial valleys and coastal plains. Besides being involved in field research and extension education programs, I have been taking students in some of my classes on field trips to the Mexicali Valley since 1991.



the climate and how things are changing. There is a lot of legitimate concern relative to global warming and the altered weather patterns that may be associated with that trend. Some suggest that what we are seeing is “global weirding” in terms of weather patterns. Whatever one may think, the fact of the matter is this weather event was certainly rare, extensive, and devastating.

Jeffrey C. Silvertooth, Department Head

Several months ago I agreed to work with some good friends and colleagues from Mexico on an extension type program in the Rio Fuerte Valley in northern Sinaloa and the Yaqui Valley of southern Sonora. From 5-10 February we traveled to these areas to conduct field work and several extension meetings. The original plans for our trip were entirely altered when we encountered the devastating effects of the severe cold weather that swept through this entire region the first week of February. The same system that brought unseasonably cold weather to Tucson created freezing conditions along the coastal plains of northwest Mexico all the way south of Culiacan, Sinaloa. This is extremely unusual and it happens to be the peak of the prime crop production season in that region. It is estimated that over 800,000 hectares, nearly 2.0 million acres, of crops were destroyed by the freezing weather. This included vast areas of tomatoes, corn, beans, chiles, cotton, wheat, barley, etc. The entire region had a “burnt” appearance where it would normally be vibrant, green, and productive this time of year.

Needless to say, this is a huge disaster. We are already seeing the effects with increasing produce prices in the stores. Many additional “ripple effects” are anticipated. For those of us working in environmental science it reminds us of several basic lessons. Nature is beautiful; it follows the basic laws of science and raw math without mercy. We are reminded of the close relationship we have with the environment and our food supply and how fragile that connection really is. This event highlights the close and positive relationship we have with Mexico and the regular supply of fresh produce from this region. Many folks at this time also take pause to think about



FEATURED GRADUATE STUDENT Aminata Kilungo, SWES PhD Student

I was born and raised in Tanzania, East Africa. I always wanted to become a scientist. Growing up surrounded by the ocean, the only thing I could think of was to become a marine biologist. I was lucky enough to have the opportunity to come to the US for college. In my second year in college, I discovered environmental science and at that point realized what I wanted to do for my career. Having grown up in a third world country, access to clean water and clean environment

was not something that anyone paid attention to. This problem still exists today.

In 2008, after graduating from the UA with a degree in environmental science, I went to work for an environmental consulting company, Geosystems Analysis Inc. While at Geosystems, I was involved with doing instrumentation among other things. This sparked my interest in bioinstrumentation. When I came back to graduate school, I was lucky enough to work with Dr. Powers, who is a professor in Electrical and Computer Engineering and Dr. Gerba. I am currently working on developing a previous technology that was invented by Dr. Powers and her group, to detect microbes in real-time on surfaces. I hope to develop this technology so as to be able to detect and monitor for microbial contamination in drinking water in real-time. Such a technology would be novel - we currently do not have real-time technology to monitor for microbial contamination in drinking water supplies.

Even though my passion lies in environmental microbiology, my main purpose and goal is to better the environment in any way I can. In addition to my academic career, I am also working with a non-profit organization, Sonora Environmental Research Institute Inc., (SERI). Through SERI, I am involved in educating our community and businesses around Tucson on pollution prevention and alternatives to using chemicals. SERI gave me the privilege to interact directly with the community. This experience taught me the value of community work and the importance of sharing knowledge with our community.

I am a recipient of a BioME fellowship. This is a NSF funded initiative in collaboration with the BIO5 institute. The goal of the program is to connect graduate students with K-12 teachers to enhance science. I look forward to starting to co-teach in middle school or high school in the fall, where I hope to share my research and inspire children to become environmental scientists someday.

Over the years, the US has become my home. However, I still feel my education would be most useful in places such as third world countries, where a cleaner environment and water quality issues are still considered more of a privilege than a necessity. In addition, science and technology development is needed to tackle all these problems. I hope someday to go back and help, even if all I could accomplish was to just teach.

DEPARTMENT NEWS:

Some of you may have seen a message on your computer indicating that Sophos version 7 is nearing retirement. However, there is a free update to version 9, which includes much better protection against both viruses and malware.

So how can you tell if you need to do the update or if it's already done? Right click on the blue Sophos shield icon on the lower right of the screen. If the top option says "Update now" you need to upgrade. If the top line says "Open Sophos

Endpoint Security and Control", you already have the new version.

The upgrade is easy. To start, right click on the blue Sophos shield icon at the lower right of your screen. When you right click on the icon, you will see four options. Choose to configure updating. You should see a window titled "Properties for Sophos AutoUpdate". Choose the Primary server tab and change the address from <http://Sophosru.arizona.edu/esxp> to <http://sophosru1.arizona.edu/savscfxp>

Next, copy the new address, then click the secondary server tab and paste into the address box. Change the 1 to a 2, so the address will be <http://sophosru2.arizona.edu/savscfxp>

Click apply and then exit the configuration window. You can wait for the next automatic update of Sophos to update the system (usually every hour) or you can manually ask it to update. To do a manual update, right click on the Sophos shield icon on the lower right of the screen and choose update now. I recommend the manual update option.

Once Sophos has finished updating, **you'll need to restart the computer.** Don't forget to do this step. The Sophos shield will show a yellow exclamation point when it's ready for you to restart. That's it, you are done!

Congratulations to:

Aminata Kilingo, selected as a 2011-2012 BioME Fellow. This fellowship includes a \$30,000 stipend and the opportunity to attend the BioME Summer Institute.

C.P. Gerba, appointed to the Food Advisory Committee of the Food and Drug Administration (FDA). The committee reviews proposed FDA regulations and research programs.

C.P. Gerba, elected International Water Association fellow.

Chris Rensing has been appointed a Member of the Editorial Board for Frontiers in Antimicrobials, Resistance and Chemotherapy.

Kelley Riley volunteered at the Pinal County Bluegrass Jamboree on Jan. 28. Over 1200 grade school children attended to participate in various topics in agriculture, watersheds, 4-H and how to make sure you're getting all those microbes off your hands when washing.

Lusia Ikner, Ph.D. (Gerba) completed all of her degree requirements and accepted a position with Antimicrobial Testing Laboratories in Austin, TX, to head the tissue culture and virus testing of the organization.

SWES REPORT CARD:

GRANTS:

A. Tamimi and C. P. Gerba. Field Assessment of Medium Vapor Pressure UV Lamps for Treatment of Drinking Water. Altantium. \$30,000.

A. Tamimi and C. P. Gerba. Environmental Health Aspects of Solid Waste Recycling in the Developing World. Proctor and Gamble. \$52,000.

A. Tamimi, K. Bright and C. P. Gerba. Assessment of Metam for Producing Class A Biosolids. Magna Management. \$70,000.

C. Rensing. Improving efficacy of various copper alloys toward various *Cronobacter* isolates and spores of *Clostridium perfringens* and *Bacillus cereus*. International Copper Association. \$30,000.

K. Bright. Development of a New Method for Assessing Water Quality in a Drinking Water Distribution System. TRIF. \$37,519.

M. Riley and A. Tamimi. Use of Solarization to Inactivate Pathogens in Biosolids. TRIF. \$25,000.

S. Ravishankar, **K. Bright, C.P. Gerba.** Control of Microbial Contamination in Organically Grown Foods. USDA. \$2,900,000.

PUBLICATIONS:

Boone, A. A. and C. P. Gerba. 2010. The Prevalence of Human Parainfluenza Virus 1 on Indoor Office Fomites. *Food Environ. Virol.* 2:41-46.

Castro-Del Campo, N., E. Espinoza, J. B. Valdez-Torres, C. P. Gerba and C. Chaidez. 2010. Comparison of *Salmonella enterica* subsp. *enterica* Survival in Agricultural Soil Amended with Vermicompost and Class A Biosolids. *J. Resid. Sci. Technol.* 7:81-85.

Elguindi, J., C. Andrade, H. Hasman, and C. Rensing. 2010. Significant Differences in Survival Rates on Copper Surfaces between Copper Resistant Gram-Positive and Gram-Negative Bacteria. *Appl. Microbiol. Biotech.* DOI: 10.1007/s00253-010-2980-x.

Grass, G., **C. Rensing,** and M. Solioz. 2011. Metallic Copper as an Antimicrobial Surface. *Appl. Environ. Microbiol.* doi:10.1128/AEM.02766-10

Jardine, K.J., W.M. Henderson, T.E. Huxman, and **L. Abrell.** 2010. Dynamic Solution Injection: A New Method for Preparing pptv-ppbv Standard Atmospheres of Volatile Organic Compounds. *Atmos. Meas. Techniques,* 3:1569-1576.

Jardine, K., **L. Abrell,** S.A. Kurc, T. Huxman, J. Ortega, and A. Guenther. 2010. Volatile Organic Compound Emissions

from *Larrea tridentata* (Creosotebush). *Atmos. Chem. Phys.,* 10:12191-12206 .

Kim, M., **C. P. Gerba** and C. Y. Choi. 2010. Assessment of Physically-Based Data-Driven Models to Predict Microbial Water Quality in Open Channels. *J. Environ. Sci.* 22:851-857.

Legatzki, A., M. Ortiz, J.W. Neilson, S. Dominguez, G.L. Andersen, R.S. Toomey, B.M. Pryor, L.S. Pierson III, and R.M. Maier. 2011. Bacterial and archaeal community structure of two adjacent calcite speleothems in Kartchner Caverns, Arizona, USA. *Geomicrobiol. J.* 28:99-117.

Mahalanabis, M., K.A. Reynolds, **I.L. Pepper,** and **C.P. Gerba.** 2010. Comparison of Multiple Passage Integrated Cell Culture-PCR and Cytopathogenic Effects in Cell Culture for the Assessment of Poliovirus Survival in Water. *Food Environ. Virol.* 2:225-230.

Mealman, T., I. Bagai, P. Singh, D. Goodlett, **C. Rensing,** H. Zhou, V. Wysocki, and M.M. McEvoy. 2011. Interactions between CusF and CusB identified by NMR spectroscopy and chemical cross-linking coupled to mass spectrometry. *Biochemistry.* DOI: 10.1021/bi102012j.

Sakai, M., S.B. Jones, and **M. Tuller.** 2011. Numerical Evaluation of Subsurface Soil Water Evaporation Derived from Soil Thermal Properties. *Water Resour. Res.,* 47, W02547, doi:10.1029/2010WR009866.

Solis-Dominguez, F., A. Valentin-Vargas, J. Chorover, and **R.M. Maier.** 2011. Effect of arbuscular mycorrhizal fungi on plant biomass and the rhizosphere microbial community structure of mesquite grown in acidic lead/zinc mine tailings. *Sci. Total Environ.* 409:1009-1016.

Zakai, U.I., A. Bloch-Mechkour, N.E. Jacobsen, **L. Abrell,** G. Lin, G.S. Nichol, T. Bally, and R.S. Glass. 2010. Synthesis and Structure of m-Terphenyl Thio-, Seleno- and Telluro-ethers. *J. Org. Chem.,* 75, 8363-8371.

PRESENTATIONS:

The following were from the First International Conference and Exploratory Workshop on Soil Architecture and Physico-Chemical Functions (CESAR), Research Centre Foulum, Denmark, Nov. 30-Dec. 2:

Jones, S.B., D. Or, R. Heinse, and **M. Tuller,** 2010. Beyond Earth: Designing Root Zone Environments for Reduced Gravity.

Resurreccion, A.C., P. Moldrup, **M. Tuller,** T.P.A. Ferre, K. Kawamoto, T. Komatsu, and L.W. De Jonge, 2010. Soil Water Retention at Dry Conditions and its Relation to Specific Surface Area and Texture.

Tuller, M., C.M.P. Vaz, and R. Kulkarni, 2010. A New Generation of High-Resolution Benchtop Micro-CT Scanners for Application in Soil Science.

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**Gerba, C.P.** "Germs at Home and Work" Raytheon Management Club. Desert Diamond Casino. Tucson, AZ. Sept. 16, 2010.

**Gerba, C.P.** "Germ Warfare in Your Workplace". 14<sup>th</sup> Annual Occupational Health and Safety Conference. Auckland, New Zealand. July 23, 2010.

**Gerba, C.P.** "How to keep *Salmonella* out of your Salad". Dept. of Nutritional Sciences. University of Arizona. Sept. 15.

**Gerba, C.P.** "Impact of Infectious Diseases in the Workplace". Christchurch Chamber of Commerce, Christchurch, New Zealand. July 28, 2010.

**Gerba, C.P.** "Impact of Infectious Diseases in the Workplace". Dunedin Chamber of Commerce, Dunedin, New Zealand. July 29, 2010.

**Gerba, C.P.** "Infection Control in the 21<sup>st</sup> Century". Louisiana Dental School. New Orleans, LA. June 9, 2010.

**Maier, R.M.** Arizona Superfund Issues. Green Valley Community Center, Green Valley, AZ, Jan. 14, 2011.

**Maier, R.M.** Making a living while starving in the dark: the NSF Kartchner Caverns Microbial Observatory. Keynote address, Rutgers University Symposium on Microbiology, New Brunswick, NJ, Feb. 3, 2011.

**Pepper, I.L.,** Quanrud, D.M., Takizawa, K., and **Gerba, C.** Fate of Chemical and Biological Emerging Contaminants in Biosolids and After Land Application. European Biosolids and Organic Resources Conference, Workshop and Exhibition, The Royal Armouries, Leeds, UK, Nov. 15-17, 2010.

**Silvertooth, J.C.** Soil and Plant Tissue Test Relationships for Irrigated Chile Production Systems. New Mexico Chile Conference, Las Cruces, NM, Feb. 1, 2011.

**Tuller, M.,** 2010. A New Generation of High-Resolution Benchtop Micro-CT Scanners for Application in Soil Science. **Keynote Lecture,** 1<sup>st</sup> International Conference and Exploratory Workshop on Soil Architecture and Physico-Chemical Functions (CESAR), Research Centre Foulum, Denmark, Nov. 30 – Dec 2, 2010.

**Tuller, M.,** C.M.P. Vaz, P.O. Lasso, R. Kulkarni, and T.P.A. Ferre, 2010. Evaluation of a High-Resolution Benchtop Micro-CT Scanner for Application in Porous Media Research. Abstract H13D-1013, AGU Fall Meeting, San Francisco, CA, Dec. 13-17, 2010.

**The following spoke at the Environmental Research Grad Blitz in the Student Union Ballroom on February 1, 2011:**

**Gil-Loaiza, J.** "Field Scale Phytostabilization of Mine Tailings in Iron King Mine and Humboldt Smelter."

**Levi, M.** "Advancing Soil Prediction Models with Remote Sensing and Image Segmentation."

**Ortiz, M.** "Pyrosequencing Reveals the Diversity and Variability of Bacterial Communities on Speleotherm Surfaces in Kartchner Caverns."

**Valentin-Vargas, A.** "Dynamics of Soil Microbial Communities During the Phytostabilization of Iron King Mine Tailings: a Greenhouse Experiment."

**The following presented posters at the Environmental Research Grad Blitz:**

**Beltran, J.M.S.** "Recovery of Enteroviruses from Water Using and Inexpensive Electropositive Filter."

**Choate, B.L.** "Arizona Statewide Environmental Water Needs Assessment."

**Cox, H.** "Transport of Titanium Oxide Nanoparticles in Sand."

**Hammond, C.** "A Phytostabilization Strategy for Arsenic Containing Mine Tailings in the Semi-Arid Southwestern United States."

**Matthieu, D.E.** "Field-Scale Characterization of a Chlorinated Solvent SUPERFUND Site in Tucson, Arizona."

**Rivera, B.** "Employing Microbial Source Tracking Techniques to Identify 16S rRNA Bacteriodes in the Santa Cruz River, Arizona."

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PLANE TALK

Ian Pepper, Director

In the fall of 2010, Shane Snyder joined the faculty of the Department of Chemical and Environmental Engineering, and Erin Snyder joined the faculty of SWES. Shane is a national and international authority on the detection and elimination of endocrine disruptors in potable water. To this end Shane is initiating two new projects within the Water village at ERL. The first will evaluate the efficacy of point-of-use devices to remove endocrines from potable water. The second project, funded through the NSF WET Center will evaluate spectroscopic technology to predict destruction of endocrines via advanced oxidative processes, in real-time. These are two significant projects with national significance. Erin will be involved in evaluating a new TOX control analyzer which detects potential toxic compounds in water through light emission from a *Vibrio fischeri* in-line sensor. Both of these projects involve City of Tucson Water as a collaborator and are great examples of public/private partnerships utilizing a multi-disciplinary approach.