



Division of Plant Sciences
College of Agriculture, Food and Natural Resources
University of Missouri

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FROM THE DIVISION DIRECTOR

The First Quarter

The first few days were very hectic, as evidenced by the photo on the right. If you think it has that “deer in the headlights” quality, I have an explanation. A picture is required to become official, so I scheduled an appointment right away after I arrived. It was cold and windy when I walked up to Whitten Hall and found Steve. Steve said hello, sit there, look here, flash, flash. It was all over in about 30 seconds, before my nose even thawed out. I may go back later for another try.

I have dedicated much of my first couple of months here at MU to learning as much as possible about our people and their aspirations and concerns. Of course, this will be an ongoing process, but I can say that I continue to be impressed with the quality of the people and programs in the Division of Plant Sciences.

We clearly have limitations, such as the decline over time in state funding for our programs. Yet, I also see opportunities for our division in many areas. I am elated that we have received funding to support salary increases this year. It is good to see the dedication and quality work of the division’s people be rewarded.

Another of these opportunities is identifying the best new faculty, among the most important things we do. We are fortunate to have received administrative hiring approval for several positions. Current searches include a Turf Management Research and Teaching position, a Cotton Research position, and a Weed Scientist position, the last two located at the Delta Center in Portageville. Two additional requested positions are in the approval process, including a Turf Extension Pathologist and a Cereal Crop Extension Specialist position, to be located in Columbia. We also have an opening for Rice Research at the Delta Center.



Mike Collins

Mike



Awards and Honors

Brad Fresenburg

CAFNR Outstanding Teaching Award (Apr 2008). Recipients must demonstrate clarity of presentations and assignments, variability of instructional materials and teaching methodology, enthusiasm for their subject matter and teaching in general, and a task-oriented teaching style that provides a variety of opportunities for students to learn.



Craig Roberts

J.W. Burch State Specialist Agricultural Extension Award (Apr 2008). The J. W. Burch Award for exceptional extension program leadership specialists for their effectiveness of program leadership with field staff, quality of extension publications, presentations and other educational materials, and recognition by state and national peers for their program quality.



Brett Naylor

Outstanding Junior Award from the CAFNR Student Council (Apr 2008). These awards were started in 1998 by the College of Agriculture, Food and Natural Resources Student Council. Individual class awards are given to students who demonstrate leadership and CAFNR activity involvement.



Robert Sharp

Frederick B. Mumford Outstanding Faculty Award (Apr 2008). This award recognizes a College of Agriculture, Food and Natural Resources faculty member for a sustained record of excellence in teaching, research and/or extension/outreach. The awardee will demonstrate enthusiasm for and excellence in teaching, be a caring mentor and be viewed as an exemplary educator by both students and faculty.



Nadia Navarrete-Tindall

Missouri Conservationist of the Year (Feb 2008). The Missouri Department of Conservation has only given this award 55 times since the early 1940's. Nadia's accomplishments included a multidisciplinary approach to conservation as well as her work with minorities. Nadia recently accepted a faculty position at Lincoln University, in Jefferson City.





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Classes and Training Programs

Study Abroad To Thailand, 2008

Dr. Bob Sites Leads the Way



Some Thai fauna won't fit in Dr. Sites' net, and he seems a little apprehensive about trying.



Katie Cox (lower right), a Plant Sciences student, and other CAFNR undergraduates survey coral reef health as part of the course.

Chris Gibson (red shirt) and David Hoppe (cowboy hat) of Premium Standard Farms describe land application practices for manure to members of the Inter Agency Technical Working Group (ITWG) on the annual field tour June 11, 2008. Tour participants included representatives from MDNR, Missouri Department of Agriculture, USDA NRCS, EPA Region 7 and MU. The program was organized in part by John Lory of the Plant Sciences Division to facilitate communication among agencies related to regulating animal feeding operations.





Around the Division

KNOW YOUR COLLEAGUES: The Mitchum Lab

Dr. Melissa G. Mitchum is an Assistant Professor in the Division of Plant Sciences and Resident Faculty Member of the Christopher S. Bond Life Sciences Center. She is a member of the Interdisciplinary Plant Group and National Center for Biotechnology on campus. She teaches the Nematology section of our undergraduate Plant Pathology course and a graduate course in Plant-Nematode Interactions. Her goal is to develop an internationally recognized program in molecular plant-nematode interactions studying nematode secreted parasitism proteins and mechanisms of nematode feeding cell formation. Her research program is currently funded by the USDA National Research Initiative Competitive Grants Program, the Missouri Soybean Merchandising Council, the United Soybean Board, a Soybean Cyst Nematode Special Grant to MU and the Missouri Agricultural Experiment Station. To learn more about her research program visit the Mitchum Lab website at <http://plantsci.missouri.edu/mitchumlab>.



Dr. Jianying Wang, Post-Doctoral Research Associate, uses the confocal microscope to determine the subcellular localization of nematode-secreted CLE peptides. Dr. Wang received his MS and PhD degrees in Plant Pathology from Nanjing Agricultural University in China.

nematode-induced feeding cell formation. Demos obtained his PhD from the MU Division of Plant Sciences under the direction of Hari Krishnan.

Dr. Demosthenis "Demos" Chronis, Post-Doctoral Research Associate, uses the inverted light microscope to monitor expression of genes involved in cytokinin biosynthesis and signaling to dissect the role of this phytohormone in



Dr. Pramod Kandoth, Post-Doctoral Research Associate, uses *Agrobacterium rhizogenes* transformation of soybean to generate transgenic hairy roots for RNA-mediated gene silencing of soybean genes with a potential role in resistance to the soybean cyst nematode. Pramod obtained a MS in Biotechnology from Tamil Nadu Agricultural University and a PhD in Biochemistry from the Indian Institute of Science.



Bob Heinz, Research Specialist, uses a semi-automated elutriator to extract nematodes from soil samples. You'll find Bob at our Worm Lab and the Ashland Ave Greenhouses maintaining our nematode populations and coordinating the efforts of the MU Extension Nematology Lab (<http://soilplantlab.missouri.edu/nematode/>)

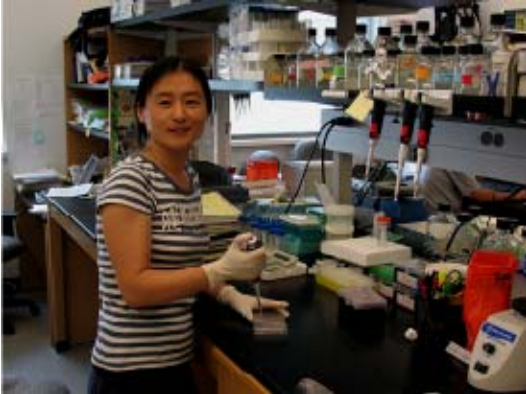




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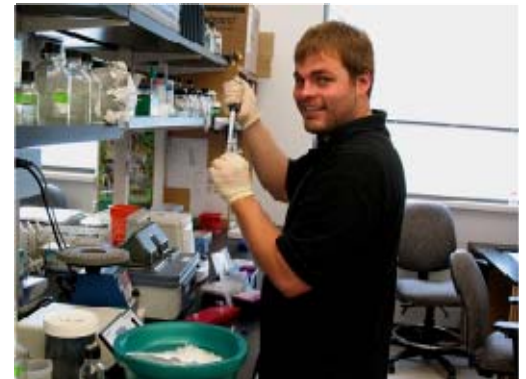
Around the Division

Amy Replege, PhD Student, sets up nematode eggs to hatch juveniles for infection assays of putative nematode CLE peptide receptor mutants to identify host-components of nematode CLE signaling. Amy received a BS in Biology from the University of Puget Sound. She is currently a Life Sciences Fellow.



Xiaohong Liu, PhD Student, conducts quantitative real-time PCR assays to compare gene expression changes in resistant and susceptible soybean roots in response to nematode infection. Xiaohong received a MS in Plant Pathology from China Agricultural University.

Greg Yeckel, Senior Undergraduate Research Fellow, clones a soybean gene promoter upstream of the GUS reporter gene to monitor cell-type specific expression during nematode invasion of roots. Greg will graduate this fall with a BS in Biology and plans to pursue a graduate career in plant biology.



Xuejing Yang, Research Assistant, propagates transgenic soybean hairy roots for testing targeted knock-down of cyst nematode parasitism genes through host-induced RNAi gene silencing. Xuejing obtained her MS in Plant Pathology from Nanjing Agricultural University in China and will graduate this fall with a MS in Library Sciences.

Pranavi Tella, Lab Assistant, keeps the lab in excellent working order. You'll find her washing dishes, making media, autoclaving, pouring plates, harvesting and plating seed, and watering plants in the greenhouse. Pranavi will graduate this Fall with a MS in Electrical and Computer Engineering.





6 Recent Grants

Investigators	Title	Sponsor	Amount of Funding	Dates
Bailey, W.; Hibbard, B.	Selection intensity of MIR604, event 5307 and MIR604X530	Syngenta Biotechnology, Inc.	\$7,500	4/1/08-3/31/09
Bailey, W.	MIR604: refuge strategy adult emergence tent studies	Syngenta Seeds, Inc.	\$51,577	4/22/08-4/21/09
Bailey, W.	Lap resistant (MIR162) corn: efficacy and yield vs. corn earworm	Syngenta Seeds, Inc.	\$4,485	4/4/08-4/3/09
Bradley, K.	Optimum GAT corn	Pioneer Hibred	\$10,000	4/11/08-4/10/09
Bradley, K.	Fomesafen/glyphosate premix: evaluate formulated premix variants for weed control and crop tolerance in soybeans	Syngenta Crop Production	\$13,455	4/16/08-4/1/09
Bruhn, J.; Mihail, J.	2008 sudden oak death stream baiting survey	Forest Service	\$13,100	5/1/08-4/30/09
Burdick, B.	Academic yield trial with roundup ready 2 yield soybeans	Monsanto Co.	\$9,000	4/1/08-3/31/09
Finke, D	University research council grant	University Research Council	\$7,500	5/1/08-6/30/09
Fritschi, F.	University research council grant	University Research Council	\$7,500	4/1/08-5/31/09
Fritschi, F.	Fifth international crop science congress travel grant	American Society of Agronomy	\$2,000	5/5/08-5/30/08
Fritschi, F.	Coupling high-throughput genetic and phenotypic information for yield enhancement	Smith Bucklin and Associate	\$106,267	4/1/08-3/31/09
Nelson, K.	Academic yield trial with roundup ready 2 yield soybeans	Monsanto Co.	\$11,000	4/1/08-3/31/09
Nelson, K.	RICETEC agreement, 2008	RICETEC, Inc.	\$5,000	4/1/08-3/31/09
Nelson, K.	RR2Y soybean germplasm early-mid MG# yield plots	Monsanto Co.	\$5,000	5/1/08-11/30/08
Kroening, M.; Quinn J.; Starbuck, C.; Fresenburg, B	A statewide educational program featuring IPM in the urban homeowner's landscape	CSREES	\$15,211	5/15/08-5/14/10
Nguyen, H.; Shannon, G.; Kumar, R.	Molecular-genetic regulation of seed oil accumulation in soybean	MSMC	\$72,582	5/1/08-8/31/09



Recent Grants

Investigators	Title	Sponsor	Amount of Funding	Dates
Shannon, G.; Sleper, D.; Nguyen, H.	Evaluate germplasm for oleic acid and develop group III-V soybeans with optimum saturates, oleic and linolenic acids	ARS	\$129,675	4/21/08- 2/28/09
Shannon, G	Evaluation of soybean varieties and exotic germplasm for tolerance to drought	Smith Bucklin and Associates	\$25,206	5/1/08- 4/30/09
Shannon, G.	Evaluation of soybean varieties and exotic germplasm for tolerance to soil waterlogging	Southern Soybean Research Program	\$24,206	5/1/08- 4/30/09
Sharp, R.	Physiology and genetics of maize root adaptation to water deficits	Monsanto Co.	\$643,560	4/1/08- 9/30/11
Sleper, D.; Nguyen, H.; Shannon, G.; Pathan, M.	Development of high yielding group III-V soybeans with Hi-protein, SCN resistance, and low allergen, stachyose concentrations	Dept. of Ag.	\$91,113	4/28/08- 2/28/09
Wiebold, B.	Academic yield trial with roundup ready 2 yield soybeans	Monsanto Co.	\$9,000	4/1/08- 3/31/09
Wiebold, B.	RR2Y soybean germplasm mid-late MG3 yield plots	Monsanto Co.	\$3,500	5/1/08- 11/30/08
Zhang, Z.	University research council grant	University Research Council	\$39,572	6/1/08- 5/31/09



8 Recent Publications

- Brawner, S.A. and M.R. Warmund. 2008. Husk softening and kernel characteristics of three black walnut cultivars at successive harvest dates. *HortScience* 43: 691-695.
- Bruhn, J.N., and Hall, M. 2008. Growing shiitake mushrooms in an agroforestry practice. *Agroforestry in Action*, AF1010 – 2008. 12 p.
- Curtis, L.E., R.L. Kallenbach, and C.A. Roberts. 2008. Allocating forage to fall-calving cow-calf pairs strip-grazing stockpiled tall fescue. *J. Anim. Sci.* 86:780-789.
- Dunn, D. and G. Stevens. 2008. Response of rice yields to phosphorus fertilizer rates and polymer coating. *Crop Management*. [Online] doi: 10.1094/CM-2008-0610-01-RS. <http://www.plantmanagementnetwork.org>
- Flores, T., O. Karpova, X. Su, P. Zeng, K. Bilyeu, D. A. Sleper, H.T. Nguyen, and Z.J. Zhang. 2008. Silencing of GmFAD3 gene by siRNA leads to low α -linolenic acids (18:3) of *fad3*-mutant phenotype in soybean [*Glycine max* (Merr.)]. *Transgenic Res.* DOI 10.1007/s11248-008-9167-6.
- Follis, C.C., S.H. Anderson, B.S. Fresenburg, and E.H. Ervin. 2008. Evaluation of sand-soil-compost root zones developed for athletic fields. *Acta Hort.* 783:97-104.
- Gassmann W. (2008) Alternative splicing in plant defense. In A.S.N. Reddy and M. Golovkin (eds.), *Nuclear pre-mRNA processing in plants*. Springer-Verlag, Berlin, Germany; pp. 219-233.
- Goyne, K.W., H.J. Jun, S.H. Anderson, and P.P. Motavalli. 2008. Phosphorus and nitrogen sorption to soils in the presence of poultry litter-derived dissolved organic matter. *J. Environ. Qual.* 37:154-163.
- Hamza, M.A., S.H. Anderson, and L.A.G. Aylmore. 2008. Water drawdown by radish (*Raphanus sativus* L.) multiple-root systems evaluated using computed tomography. *Australian J. of Soil Research* 46:228-236.
- Hu, J., M.G. Mitchum, N. Barnaby, B.T. Ayele, M. Ogawa, E. Nam, W-C. Lai, A. Hanada, J.M. Alonso, J.R. Ecker, S.M. Swain, S. Yamaguchi, Y. Kamiya, and T-P. Sun. 2008. Sites of synthesis of bioactive gibberellins and potential roles of their transport during reproductive growth in *Arabidopsis*. *The Plant Cell* 20:320-336 *= co-first authors.
- Jiang, P., N.R. Kitchen, S.H. Anderson, E.J. Sadler, and K.A. Sudduth. 2008. Estimating plant-available water using the simple inverse yield model for claypan landscapes. *Agron. J.* 100:830-836.
- Kazemi, H.V., S.H. Anderson, K.W. Goyne, and C.J. Gantzer. 2008. Atrazine and alachlor transport in claypan soils as influenced by differential antecedent soil water content. *J. Environ. Qual.* 37:1599-1607.
- Kazemi, H.V., S.H. Anderson, K.W. Goyne, and C.J. Gantzer. 2008. Spatial variability of bromide and atrazine transport parameters for a Udipsamment. *Geoderma* 144:545-556.
- Kosnicki, E. and R. W. Sites. 2007. A Last-Desired index for assessing the effectiveness of grass riparian filter strips in improving water quality in an agricultural region. *Environ. Entomol.* 36(4): 713-724.
- Kumar, S., S.H. Anderson, L.G. Bricknell, R.P. Udawatta, and C.J. Gantzer. 2008. Soil hydraulic properties influenced by agroforestry and grass buffers for grazed pasture systems. *J. Soil Water Conserv.* 63:224-232.
- Lee, J.D., M.L. Oliva, D.A. Sleper, and G.J. Shannon. 2008. Irrigation has little effect on unsaturated fatty acid content in soya bean seed oil within genotypes differing in fatty acid profile. *J. Agron and Crop Sci.* ISSN 0931-2250. doi:10.1111/j.1439-037X.2008.00315.
- Lee, Jeong-Dong, Ju-Kyung Yu, Young-Hyun Hwang, Sean Blake, Yoon-Sup So, Geung-Joo Lee, H.T. Nguyen, J. Grover Shannon. 2008. Genetic diversity of wild soybean (*Glycine soja* Sieb. & Zucc) accessions from South Korea and other countries. *Crop Sci.* 48:606-616.
- Linzer, R.E., Orosina, W.J., Gonthier, P., Bruhn, J.N., Laflame, G., Bussi eres, G., and Garbelotto, M. 2008. Inferences on the phylogeography of the fungal pathogen *Heterobasidion annosum*, including evidence of interspecific horizontal genetic transfer and of human-mediated, long-range dispersal. *Molecular Phylogenetics and Evolution*, doi: 10.1016/j.ympev.2007.12.010
- Lory, J. A., R. E. Massey, C. D. Fulhage, M. C. Shannon, R. L. Belyea, and J. M. Zulovich. 2008. Comparing the feed, fertilizer, and fuel value of distiller's grains. *Crop Management* 4/2008.
- Lory, J.A., R.E. Massey, and B.C. Joern. 2008. Using Manure as a Fertilizer for Crop Production. Pp. 105-116 in *Final Report:*



Recent Publications

Gulf Hypoxia and Local Water Quality Concerns Workshop. September 26-28, 2005, Ames, Iowa. Sponsored by Iowa State University and EPA. Organized by the MRSHNC, Upper Mississippi River Sub-basin Hypoxia Nutrient Committee. St. Joseph, Michigan: ASABE.

- Mitchum, M.G. and T.J. Baum. 2008. Genomics of the soybean cyst nematode-soybean interaction. Chapter 17 In: Stacey, G., ed. *Genetics and Genomics of Soybean*, Springer, New York, pp.321-341.
- Mitchum, M.G., X. Wang, and E.L. Davis. 2008. Diverse and conserved roles of CLE peptides. *Current Opinion in Plant Biology* 11(1):75-81.
- Monnig, N. H. and K. W. Bradley. 2008. Influence of fall and early spring herbicide applications on winter and summer annual weed populations in no-till corn. *Weed Technol.* 22:42-48.
- Pathan, M.S. and D.A. Sleper. 2008. Advances in soybean breeding. In G. Stacey ed., *Genetics and Genomics of Soybean*. Springer, New York, NY.
- Rachman, A., S.H. Anderson, E.E. Alberts, A.L. Thompson, and C.J. Gantzer. 2008. Predicting runoff and sediment yield from a stiff-stemmed grass hedge system for a small watershed. *Trans. of the ASABE* 51:425-432.
- Sanchez-Villeda, H., Schroeder, S., Flint-Garcia, S.A., Guill, K.E., Yamasaki, M., and McMullen, M.D. DNAAAlignEditor: DNA Alignment Editor Tool. *BMC Bioinformatics* 9:154 (electronic journal) www.biomedcentral.com/1471-2105/9/154. 2008.
- Sites, R. W. and A. Vitheepradit. 2007. *Namtokocoris*, a new genus of Naucoridae (Hemiptera: Heteroptera) in waterfalls of Indochina, with descriptions of six new species. *Zootaxa* 1588: 1-29.
- Sites, R. W. and Suputa. 2008. New species of *Nesocricos* and *Tanycricos* (Hemiptera: Heteroptera: Naucoridae: Cheirocheliinae: Tanycricini) in the mountains of West Papua, Indonesian New Guinea. *Zootaxa* 1714: 19-30.
- Stevens, G., A. Wrather, M. Rhine, D. Dunn, and E. Vories. 2008. Predicting rice yield response to midseason nitrogen with plant area measurements. *Agronomy Journal* 100:387-392.
- Udawatta, R.P., and S.H. Anderson. 2008. CT-measured pore characteristics of surface and subsurface soils influenced by agroforestry and grass buffers. *Geoderma* 145:381-389.
- Udawatta, R.P., C.J. Gantzer, S.H. Anderson, and H.E. Garrett. 2008. Agroforestry and grass buffer effects on high resolution X-ray CT-measured pore characteristics. *Soil Sci. Soc. Am. J.* 72:295-304.
- Udawatta, R.P., R.J. Kremer, B.W. Adamson, and S.H. Anderson. 2008. Variations in soil aggregate stability and enzyme activities in a temperate agroforestry practice. *Applied Soil Ecology* 39:153-160.
- Udawatta, R.P., S.H. Anderson, C.J. Gantzer, and H.E. Garrett. 2008. Influence of prairie restoration on CT-measured soil pore characteristics. *J. Environ. Qual.* 37:219-228.
- Warmund, Michele R. and Mark V. Coggeshall. 2008. Flowering and Fruit Characteristics of Black Walnuts: A Tool for Identifying and Selecting Cultivars <http://extension.missouri.edu/explore/miscpubs/xm1001.htm>.
- Wrather, J. A., B. J. Phipps, W. E. Stevens, and A. S. Phillips. 2008. Cotton planting date and plant population effects on yield and quality in the Mississippi Delta. *Journal of Cotton Science* 12:1-7.
- Wrather, J. A., J. G. Shannon, T. E. Carter, J. P. Bond, J. C. Rupe, and A. M. R. Almeida. 2008. Reaction of drought-tolerant soybean genotypes to *Macrophomina phaseolina*. Online. *Plant Health Progress* doi:110.1094/PHP-2008-0618-01-RS.
- Yamasaki, M., Schroeder, S., Sanchez-Villeda, H., Gaut, B., and McMullen, M.D. Empirical analysis of selection screens for domestication and improvement loci in maize by extended DNA sequencing. *The Plant Genome*. 1: (electronic journal) www.crops.org/genome/files/c07-09-0530-mcmullen.pdf. 2008.
- Yaya Cui, Asita Chatterjee, Hailian Yang, and Arun K. Chatterjee. 2008. Regulatory network controlling extracellular proteins in *Erwinia carotovora* ssp. *carotovora*: FlhDC, the master regulator of flagellar genes, activates *rsmB* regulatory sRNA production by affecting *gacA* and *hexA* (*lrhA*) expression. *Journal of Bacteriology*. 190:4610-4623.
- Yu, J., Holland, J.B., McMullen, M.D., and Buckler, E.S. Genetic design and statistical power of nested association mapping in maize. *Genetics* 178:539-551. 2008.



Events and Activities

SOME UPCOMING MEETINGS & ACTIVITIES:

A more complete list of Division Events can be found at <http://plantsci.missouri.edu>

FIELD DAYS:

Greenley, Aug 7, 2008.
Graves-Chapple, Aug 26, 2008.
Hundley-Whaley, Aug 27, 2008

2008 SOCIETY MEETINGS:

ASHS, American Society for Horticultural Science meets in Orlando, July 21-24.

ESA, The Entomological Society of America meets Nov 16-19 in Reno.

APS, The American Phytopathological Society Centennial meeting is in Minneapolis, July 26-30.

ASA, The American Society of Agronomy meets in Houston, Oct 5-9.



Mary Kroening and Simeon Wright presented as part of the May 22nd, 2008 Rose Workshop at Bradford Farm.



Center pivot irrigation on one of Gene Steven's rice experiments near Portageville, MO. Gene is investigating the potential for reducing water usage for the rice crop using sprinkler irrigation compared with the flood system.

THANKS to everyone who contributed images and materials for the newsletter. Thanks especially to Randy Mertens & Tonya Mueller for design input and to Melissa Mitchum for helping us get to know her group.

Special photo credit to Simeon Wright for the cover image [A cedar apple rust (*Gymnosporangium juniperi-virginianae*) gall with telial growth on an Eastern red cedar branch] and the section header p. 6 & 7 [Cedar quince rust (*Gymnosporangium clavipes*) with aecia on hawthorn fruit].

TAKE a moment now to think about images and materials for our next issue.